TRADE, POVERTY, INEQUALITY AND SECURITY

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Like others I also ask myself what is development? So simple to read and so simple to understand, but then to ask why it is so complex to practice? I have read a many, influenced by a many and impressed by most as words most write and speak in this discourse of development talks about their dedication and here at ISS one meets a lot of dedicated individuals. Most are students like me, who try to learn to the best of its knowledge the discourse of development and then share with each other how lives should change in underdeveloped lands of the South for any good of its dwellers.

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Contents

Acknowledgements iii
List of Tables and Figures xii

1 Introduction: Integrating the Concepts of Global Freedom; Economics versus Society 1
1.1 Issues in Development Discourse 1
1.2 The Starting Point of the Research 9
1.3 Outline of the Research 13

2 Beyond Institutionalism: There Still Lies a Good Trade Policy 20
2.1 Introduction 20
2.2 Key Determinants of Economic Development: Trade Policy/ Openness, Institutions and Human Capital 22
2.3 Data and Methodology 26
2.3.1 Governance Indicators 28
2.3.2 Integration: (openness/ Trade Policy Variables) 31
2.3.3 Human Capital 35
2.3.4 Instruments 38
2.4 Regression Results 43
2.4.1 Tests for the Relevance and Validity of Instruments 43
2.3.2 Similarities between Our OLS and Rodrik et al.'s (2004) IV Analysis 54
2.3.3 Our IV Analysis 55
2.5 Conclusions and Policy Implications 79
Notes 81

3 HOW MAY INTERNATIONAL TRADE AFFECT POVERTY IN A DEVELOPING COUNTRY SETUP? THE INEQUALITY CHANNEL 82
3.1 Introduction 82
3.2 International Trade and Inequality: Why the Debate is Important 87
3.3 International Trade and Uneven Development: A Spiral 89
3.4 Inequality as an Outcome of Education Policy 93
3.5 Trade Inequality Inter-linkages and the Heterogenic South 94
3.5.1 Protection effect 95
3.5.2 Endowment effect 96
3.5.3 Technology transfer effect 97
3.5.4 International outsourcing and technology catch-up effect 98
3.5.5 Technology catch-up effect under factor endowment dynamics 100
3.5.6 Familiar factor endowments effect 101
3.5.7 Price elasticity effect 103
3.5.8 Wage premium effect 104
3.6 Conclusions 106
Notes 107

4 GOOD INSTITUTIONS AND FAIR TRADE: A ROAD MAP TO AN EQUAL SOCIETY 109
4.1 Introduction 109
4.2 Inequality as Important as Growth 117
4.3 Different Types of Institutions, Integration, Inequality and the Endogeneity Factors 119
4.4 Data and Methodology 128
4.5 Results 140
4.5.1 1st Stage Results 140
4.5.2 IV Results 141
4.6 Conclusions 192
Notes 196

5 Education Bias of Trade Liberalisation and Wage Inequality in Developing Countries 198
5.1 Introduction 198
5.2 Data and Methodology 202
5.2.1 Data Description 203
5.3 Results 216
5.4 Conclusions 238

6 Costs of Not Loving thy Neighbour as Thyself: Explanations behind India-Pakistan Rivalry 242
6.1 Introduction 242
6.2 India Pakistan Conflict from a Historical Perspective 250
6.3 The Liberal Peace Hypothesis 253
6.4 Theoretical Model 257
6.4.1 Costs of war 257
6.4.2 Cost of peace 259
6.5 Empirical Analysis 264
6.5.1 Hypotheses 264
6.5.2 Data and methodology 265
6.4 Conclusions 299
Notes 301

7 Conclusions From Economics to Economics of Regionalism: Development Recipe 312

References 319
Appendices 338
Data and Sources for Chapter 2, Chapter 4 and Chapter 5 338
Polity IV Dataset 340
Country List for Each Endogenous Dependent, Endogenous Independent and Instrumental Variable under Analysis in Chapter2, Chapter 4, and Chapter 5 344
Data and Sources for Chapter 6 362

List of Tables and Figures

Tables

2.1	Summary Statistics	29
2.2	Pair wise correlation	38
2.3	Drop Out Rates	41
2.4	First stage regression results for instrumental variables	48
2.5	Multiple Tests for the Relevance and Quality of Instruments for LnY	50
2.6	OLS Results for Openness/ Trade Policy, Institutions and Human Capital	52
2.7	Second stage regression results for per-capita income under the complete set of specifications	57
2.8	Second stage regression results for Lcopen and institutions	66
2.9	Second stage regression results for Txtrdg and institutions	68
2.10	Institutional comparisons	72
2.11	Interaction between human capital and institutions	76
4.1	Different Kinds of Institutions	123
4.2	Summary Statistics	126
4.3	First Stage Regression	142
4.4	Multiple Tests for the Relevance and Quality of Instruments for Gini Index	144
4.5	Multiple Tests for the Relevance and Quality of Instruments for Theil99	146

4.6	Multiple Tests for the Relevance and Quality of Instruments for High20/Low20	148
4.7	Multiple Tests for the Relevance and Quality of Instruments for Mid20	150
4.8	Rule of Law	152
4.9	Control for Corruption	154
4.10	Political Stability	158
4.11	Voice and Accountability	161
4.12	Democracy	163
4.13	Autocracy	164
4.14	Government Effectiveness	168
4.15	Regulatory Quality	170
4.16	Average Years of Schooling	173
4.17	Gini and Openness (Lcopen)	180
4.18	Gini and Trade Policy (Owti)	181
4.19	Openness / Trade Policy (All Specifications)	183
4.20	Theil99 and Openness (Lcopen)	184
4.21	Theil99 and Trade Policy (Txtrdg and Totimpov85)	190
4.22	Significance count of institutions	194
5.1	List of Countries for Theil Index (Theil99devloping)	241
5.2	Summary Statistics	202
5.3	2nd Order Relevance and Exogeneity Tests for Instruments	214
5.4	OLS and IV Regression Results for Theil99Developing	217
5.5	Inequality Trade Nexus (A Robustness Check)	220
5.6	1st Stage Regression results for Instrumental variables	226
5.7	Higher Order Relevance and Exogeniety Tests for Theil99dev	227
5.8	Interactions between Openness/ Trade Policy and Average Skills	231
5.9	Public expenditure per student as a % of per- capita GNP by region (circa 1980)	232
5.10	Budget allocated to higher education, 1990-94	234

5.11 Interactions between Openness/ Trade Policy and Higher Skills 235
6.1 Military burden in selected countries 244
6.2 DF-GLS unit root tests 276
6.3 VAR regression equations for fatal under multiple specifications of bilateral trade and military burden 278
6.4 VAR regression equations for fatal under multiple specifications of multilateral trade and military burden 285
6.5 VAR regression equations for fatal under multiple specifications of exports, imports and military burden 286
6.6 VAR regression equations for fatal under multiple specifications of education and multilateral trade 287
6.7 VAR regression equations under multiple specifications for conflict and military burden 288
6.8 Granger causality Wald tests 289
6.9 Augmented Dickey Fuller test 291
6.10 VECM regression equations for fatal under multiple specifications of trade, education and growth 297

Figures

2.1	Reversal causality between income, institutions, integration and human capital	25
2.2	Responsiveness of Income	56
4.1	Endogeneity between institutions, integration and inequality	122
4.2	Wage Inequality in U.S., U.K., and Belgium	189
5.1	Wage Inequality Trends in Some Selected Developing Countries	208
5.2	Responsiveness of Wage Inequality w.r.t Openness and Trade Policy	216
5.3	Skill Bias Technical Changes	221
5.4	Skills versus Skill Bias Technical Change	223
6.1	Hostility between Pakistan and India	244
6.2	Patterns in India-Pakistan trade	245
6.3	Conflict, development and democracy trends in India-Pakistan	248
6.4	Reaction Functions of India and Pakistan	263
6.5	Dyadic democracy scores for Pakistan and India	272
6.6	Pakistan and India's Dyadic Growth Rates	274
6.7	Forecasting simulations based on VECMs for Fatal	293
6.8	Properties of Times Series	305

1 Introduction: Integrating the Concepts of Global Freedom; Economics versus Society

'Understanding the complex forces that shape our economy is of value of its own right; there is an innate curiosity about how this system works.'

Joseph E. Stiglitz, (2001a; Nobel Prize Lecture)

1.1 Issues in Development Discourse

Society is the product of human social evolution. Contemporary thinking aims to view global society on common grounds in order to understand what constitutes the basis of being human. Since ancient times, the observed practices of human civilization explain and motivate us to derive the application of concepts like trust, welfare, empowerment and awareness towards unbiased social integration. All such concepts have been harnessed, mainly locally, and sometimes, especially lately, at a regional level. Thus, this thesis endeavours to ask, whether a universal application of unbiased social and economic integration is possible and if yes, then why successful application is thus far, unsuccessful.

Capitalism, which could be argued to have utilitarian origins, emphasizes markets on the grounds of efficiency, and allegedly provides equal opportunity to all to carry out commerce as well as providing a barometer of welfare at a price freely determined by various integrating market forces. Such examples mainly apply to developed nations. In an effort to develop a similar environment in developing countries by influencing their economic policies through the experience of developed nations, the Bretton Woods system formulated plans to structurally overhaul the

economies in the global South since the 1980s. The fundamental focus of these reforms were on giving markets a freer hand to determine output, so that growth is achieved through higher productivity levels as production activities in developing countries become more competitive locally and internationally.

In 1980s and early 1990s, many developing countries opened up their economies and became a more integral part of global finance and trade. At least, capital markets witnessed unprecedented growth throughout the South. However, growing financial sectors failed to generate real output in many developing countries. If anything, capital market reforms made economic development more fragile for many developing countries. Soon after the reform period, most developing countries found themselves with record foreign debt interest payments on the borrowing they had been doing on the pretext of reforms. Debt became a huge problem mostly for African region. Countries that witness rapid economic growth mostly came from East Asian region that have witnessed rapid capital inflows from developed countries. However, little did they know at the time that capital inflows had put them at higher risks of economic downturn because unlike investment in real sector, financial capital can move out as quickly as it had flown in. Soon it did happen with a small sign of panic in East Asia in 1997, where the countries witnessed one of the worst crises in the recent financial history of the world. A capital flight of unprecedented proportions left these economies with a financial vacuum, and at least one country (Indonesia) has not yet fully recovered.

In 1999, Kofi Anan, the then UN (United Nations) Secretary General noted the fallout of crises with following lines in the foreword of UN survey report on Asia:

> What we once called the 'Asian financial crisis' is now a global economic, social, and political crisis that has had its most devastating impact on society's margins: the millions of poor and vulnerable men, women, and children who are in no way responsible for the fallout but who have nonetheless seen their hopes dashed, and their families thrown into terrible hardship and even destitution.

Ever since, the policy recommendations by 'the Washington Consensus' have been questioned by proponents and the critiques of free markets:

> 'Much of the glowing praise for the (East Asia) region has, since 1997, been shaken and, in consequence, altered economic thinking in the rest of the world. Debate has been raging and a massive literature has been generated about the nature of the crisis. It is now clear that for the first time in over two decades the free market orthodoxy has been put on the back foot. Where there had been a 'Washington consensus' before--that is, the unanimity of the Breton Woods institutions (the IMF and World Bank) and the US Treasury in promulgating economic reforms on the basis of free markets in trade and investment, privatization of public assets, and strict control of government expenditure, there is now the emergence of a 'post-Washington consensus' which is critical of the idea that free markets work best and questions the impact of IMF-inspired 'structural adjustment programs', not just in East Asia but throughout the developing world. We can also argue that the 1997 crisis fed into the questioning of the world capitalist order' (Hasan, 2001; 2)

One of the strongest critique against free market ideology came from within : '

> More broadly, the IMF was advocating a set of policies which is generally referred to alternatively as the Washington consensus, the neo-liberal doctrines, or market fundamentalism, based on an incorrect understanding of economic theory and (what I viewed) as an inadequate interpretation of the historical data. The IMF was using models that failed to incorporate the advances in economic theory of the past twenty five years, including the work on imperfect information and incomplete markets to which I had contributed. Most importantly, they had departed from the mission for which they had been founded, under the intellectual guidance of Keynes - they actually promoted contractionary fiscal policies for countries facing an economic downturn - and they advocated polices like capital market liberalization, for which there was little evidence that growth was promoted, while there was ample evidence that such policies generated instability.' (Stiglitz, 2001b)

According to Stiglitz, who had also served as Chief Economist with the World Bank and many like minds, the world economy did not fall back well to the basic assumptions of free market paradigm.

> 'The reform agenda eventually came to be perceived, at least by its critics, as an overtly ideological effort to impose "neo-liberalism" and "market fundamentalism" on developing nations. The one thing that is generally agreed on about the consequences of these reforms is that things have not quite worked out the way they were intended. Even their most ardent supporters now concede that growth has been below expectations in Latin American (and the "transition crisis" deeper and more sustained than expected in former socialist economies).' (Rodrik, 2006; 974)

The lessons from the failure of reform process were obvious. The political economy of the world is intrinsically related to the economic outcomes. Many emphasize that it is vital to understand the history of development to understand the outcomes of development. The definition of development far exceeds economic freedoms:

> 'Growth of GNP or of individual incomes can be very important as means to expanding the freedoms enjoyed by the members of society. But freedoms depend also on other determinants, such as social and economic arrangements (for example, facilities for education and health care) as well as political and civil rights (for example, the liberty to participate in public discussion and scrutiny). Similarly, industrialization or technological progress or social modernization can substantially contribute to expanding human freedom, but freedom depends on other influences as well. If freedom is what development advances, then there is a major argument for concentrating on that overarching objective…. Development requires the removal of major sources of un-freedom: poverty as well as tyranny, poor economic opportunities as well as systematic social deprivation, neglect of public facilities as well as intolerance or over activity of repressive states.' (Sen 1999: 3)

As Sen suggests, there are macro and micro agents of economic participation to define freedom. Global freedom for comity of nations may mean free movement of labour and capital while ensuring sustainability of effort. The keyword here is sustainability. It is quite evident, from dis-

cussion carried out above, that capital inflows are not sustainable in developing countries. There needs to be a way to manage these capital inflows by formulating strategies which can target the real sector of the economy in favour of these inflows. Sustainability of effort represents real change. 'Financial globalization has not generated increased investment on higher growth in emerging markets. Countries that have grown most rapidly have been those that rely less on capital inflows.' (Rodrik and Subramanian, 2008: 18)

Hence, what becomes more important in development discourse is the real sector of the economy. To this effect, the focus of this thesis is on international trade. This is not to say that well developed capital markets do not matter. Only in the framework of this discussion, they are less relevant.

Looking at the real side of economic development, a plethora of issues unravel, which needs to be considered for ensuring good economic outcomes. Good macro-economic management policies, regulations that promote private property rights, infrastructure which can facilitate business, social empowerment which can raise the quality quotient of efforts, and trade facilitation to compete in international markets are among the few of such economic outcomes which can measure economic development far more effectively than income levels. A higher income for developing countries is an end to the comprehensive objective framework which should first represent stable institutional and market outcomes. In this respect the story of development is very simple. However, disentangling these outcomes is a complex exercise. The objective of this thesis is to shed light on some of the relationships that these economic outcomes represent to eventually determine economic welfare.

The manuscript distinguishes between the pronounced factors which can determine economic outcomes, and processes which can facilitate these outcomes. Thus, two broad categories are drawn. The factors, which eventually determine economic outcomes for a country, are growth rates in the economic activity and distributional effects of these growth rates on different social or income groups. The factors which facilitate good economic outcomes may comprise of sound institutions and

the extent to which a country is integrated with other countries in the world.

There is a rich set of literature which already investigates income driven determinants and processes of economic development. So much so that it has contributed to an element of confusion in really knowing what matters: 'Policy makers are condemned to a spray-gun approach: They shoot their reform gun on as many potential targets as possible, hoping that some will turn out to be the ones they are really after. A successful growth strategy, by contrast, begins by identifying the most binding constraint.' (Rodrik, 2006: 982)

In the economic analysis of economic growth, as against the *proximate* causes of growth which relate to accumulation of factor inputs, the more *fundamental* causes of growth relate to those variables which can improve the ability and capacity of a country to accumulate factors of production. The fundamental causes can be identified by rediscovering Adam Smith's insight that countries need solid institutions for markets to work. Institutions capture many legal, Political, Economic and Social outcomes which are so necessary for development of the economy and the society. Secure and stable property rights make up for the precedence of strong legal institutions. Representative political institutions with institutionalized representation of minority groups can represent institutions for conflict management. Fiscal and monetary institutions are necessary for ensuring economic stability. Many regulatory institutions which promote a successful market economy are also representation of good economic institutions. Institutions of social contract legitimize the market economy through social stability and social cohesion. All these institutional outcomes are interconnected to each other. To find their effect on growth is not an easy task and more so because the correlation may lead to selection bias, where one institution is preferred over other for reasons other than economic logic. For example, the positive effect of democracy is some time unduly emphasized without looking at what it is really capturing.

A simple but at the same time statistically intense and sophisticated empirical methodology is required to address these correlations. In this

thesis, the author puts effort to this by following simpler empirical methodologies used in the literature where, each institutional category can isolate its own effect from the others. In this way a comparative analysis becomes possible to also analyze their respective relevance to economic growth.

International trade, which is viewed by many as engine of growth (Dollar and Kraay, 2002, and 2003), can be a good proxy to capture the effect of globalization (entailing free markets) on economic growth. Both outcomes based and incidence based measures of trade barriers have been forthcoming in the recent empirical literature. By utilizing best possible definitions of integration, the author examines the effect of trade, in relation to prevalent institutions, in income generation. Dollar and Kraay (2002) suggest, trade is good for the poor because it is good for growth; but that is only a half-truth. It is also important to consider Sen's views on poverty, as not only a measurement of deprivation of incomes or incidence of poverty but also, more importantly the deprivation of capabilities, as a means to bring yet more comprehensive approach towards understanding poverty as well as economic development. Proxies for education, utilized in this manuscript illustrate Sen's concern for viewing development as process of enhanced social capabilities of economic agents.

How economic growth is achieved also matters. Economic growth which is captured by growth in per-capita income is an empirical generalization which has to be carefully evaluated in relation to the distributional effect of income generation. Recent empirical evidence suggests that inequality increases about as often as it decreases with rising patterns in economic growth in developing countries. (Ferreira and Ravallion, 2008) It is important to separately look at the issue of inequality and its determinants. If the gains of income are only passed to the rich, such societies cannot sustain growth for long because unequal gains to growth would have significant affects on the processes through which growth has been achieved. Unequal economic outcomes can impede development and the process. It can also lead to economic isolation if domestic pressures mount against globalization. The lessons on the failure of economic

reforms in 1990s tell us that economic development is a fragile process. The fragility has already leaded to a paradigm shift in the approaches to development. In most the shift is for right reasons. In 2000, the UN has initiated work on common goals of social development in developing countries under the banner of 'Millennium Development Goals'. The World Bank has joined in to support these initiatives.

> 'Views about development have changed in the Bank, as they have in development community more broadly. Today, there is a concern about broader objectives, entailing more instruments, than the case was earlier. Development is concerned not only with increasing GDP, but also with raising living standards more broadly. It is concerned with democratic, equitable, and sustainable development. Development is seen as a transformation of society: a dual economy is not a developed economy, and many of the earlier strategies did little to promote this broader economy, and many of the earlier strategies did little to promote this broader transformation of society.' (Stiglitz, 1999; F587)

The current economic and political landscape of the world is underdeveloped, where many developing countries still suffer from poor institutions which can only improve in the long run. There is no denial that more integration with rest of the world leads to economic gains. But without good institutions, the trading environment would never favour countries with poor institutions. In this respect some developing countries are not ready to integrate fully because integration is not just a matter of eliminating barriers to inter-state commerce. Convergence with global economy needs elimination of divergent social institutions and establishment of robust monetary and fiscal institutions which can work through international finance more effectively and a good legal order is necessary to work it all efficiently. In the absence of these factors, global trade should allow second best options where there is room for protection on importing sectors to solve the problem of labour-surplus and capital shortage. However, promoting exports by subsidizing them would be a good trade policy and it would also be pro growth. (Rodrik, 2005) The only question is: "Can developing countries export more to the developed countries?" Under current circumstances, where developed coun-

tries have heavily protected their agriculture sector, developing countries have limited options to export. Their labour intensive agriculture goods are uncompetitive internationally due to highly subsidized agriculture sector in the larger North. But one option remains. If it is about promoting exports, developing countries can do that by trading among themselves. Developing countries are not a homogenous group either. Some countries have access to higher technological production frontiers and lie higher on technical ladder than others. Such countries can be good markets for relatively less developed countries. Regional trade among developing countries is a good formula to gain from trade. Then why do they not do so? For many countries, the possibilities of trade reduce because of national and international conflicts which prevail in many of the developing peripheries of the world.

1.2 The Starting Point of the Research

'Once institutions are controlled for trade is almost always insignificant, and often enters the income equation with the 'wrong (i.e.,) negative sign.' (Rodrik et al, 2004, 131) In another paper published in the same year, Rodrik (2004a) writes 'I think the relationship is that the trade liberalization agenda today actually has become the elimination of (these) institutional differences (between developed and developing countries). '(p.517)

The comparison of two contributions by the same author shows that Rodrik et al (2004) finding regarding insignificance of trade in determining long term growth rates has been more of a case of an "emphasis on statistical significance' than on economic significance. At best the results show presence of endogeniety between institutions and trade. To perceive that trade does not matter from Rodrik et al (2004) results would be incorrect. Statistical insignificance does not mean economic insignificance.

To be fair to Rodrik et al (2004), their findings need to be viewed in its right context. Rodriguez and Rodrik (2000) bring that context quite nicely to the fore: 'we do not want to leave the reader with the impression that we think "trade protection" is good for economic growth. We

know of no credible evidence-at least for the post-1945 period-that suggests that trade restrictions are systematically associated with higher growth rates. What we would like the reader to take away from this paper is some caution and humility in interpreting the existing cross-national evidence on the relationship between trade policy and economic growth. The tendency to greatly overstate the systematic evidence in favour of trade openness has had a substantial influence on policy around the world. Our concern is that the priority afforded to trade policy has generated expectations that are unlikely to be met, and it may have crowded out other institutional reforms with potentially greater payoffs. In the real world, where administrative capacity and political capital are scarce, having a clear sense of policy priorities is of utmost importance. The effects of trade liberalization may be on balance beneficial on standard comparative-advantage grounds; the evidence provides no strong reason to dispute this. What we dispute is the view, increasingly common, that integration into the world economy is such potent force for economic growth that it can effectively substitute for a development strategy' (p.63)

The above critique has been put forward with reference to the promotion of international trade as a dominant determinant of economic growth such that other variables of interest had been over looked by researchers associated with active policy making for developing countries. Many empirical studies also came forth who showed high statistical significance between trade and development which was translated into economic significance of same magnitude such that importance of other factors were overlooked (For example see: Leamer, 1988; Dollar, 1992; Edwards, 1992; Sachs and Warner, 1995 and Frankel and Romer, 1999)

It is a hot debate among economists whether statistical significance should lead inferences upon selecting core social and economic issues. The debate carried out in previous section suggests that well developed institutions are vital for economic development and no less important than trade. Rodrik et al (2004) have rightly been successful in bringing back the importance of institutions into economic policy making by finding the dominant role of 'rule of law' in explaining development or

lack of it among developed and developing countries. The role of trade has been underscored because of its statistical insignificance in the model. Such results can always be re-evaluated by using better empirical specifications. The challenge is not to prove Rodrik et al (2004) wrong on basis of some set of different specifications which give statistical validity to a different inference than theirs.

As rightly stated by McCloskey and Ziliak (1996)

> 'My statistical significance is a "finding"; yours is an ornamented prejudice' is not the impression this author wants to give in this analysis. Yet the possibility to investigate the finding of Rodrik et al (2004) remains open: 'Econometrics will survive, but it will come at last to emphasize economic rather than statistical significance. We should of course worry some about the precision usually comes from sources other than too small a sample. Simulation, new data sets, and quantitative thinking about the conversation of the science offer a way forward. The first step anyway is plain: stop searching for economic findings under the lamppost of statistical significance'. (McCloskey and Ziliak, 1996; p.112)

Rodrik et al.'s (2004) used a simple and ingenious cross section methodology to establish the role of institutions in economic development. The thesis takes the cue from their empirical work. The author extends their analysis by following on the advice of McCloskey and Ziliak (1996) and utilizes some new datasets in a similar empirical frame work to investigate the role of trade in relation to institutions and some other core determinants of economic growth.

Economic significance of international trade and good institutions cannot be re-emphasized more than what has already been written in economics literature (theoretical and empirical). The empirical debate has not been about what matters but it is about what matters more. In other words, recent empirical literature is trying to find the most binding constraint for development. (Rodrik, 2004b) That binding constraint and its definition may vary with the definition of development. Literature has largely closed into few key economic outcomes of greater value. Nevertheless, there is always a risk of over-statement when one embarks on to find the most binding constraints.

Economic growth and its immediate determinants is the binding framework in development economics. Thus the debate mostly revolves around factors which closely relate to economic growth. Acemoglu et al (2004) vote in favour of institutions as they write a paper titled: 'Institutions as the fundamental cause of Long-Run Growth' which sounds much the same as Rodrik et al (2004) title: 'Institutions Rule: The Primacy of Institutions Over Geography and Integration in Economic Development'.

Though, in comparison to Rodrik et al (2004) who have focused on rule of law, others consider more comprehensive definitions of institutions. North (1990) provides a fine definition of institutions: 'in consequence they (institutions) structure incentives in human exchange, whether political, social, or economic' (p.3) Long term growth largely encompasses economic, political and social outcomes in addition to legal institutions. Hence, good economics is good institutions and vice versa. In economics, the question then really is how we can capture the effect of good institutions to explain good economic outcomes. They are so closely related to each other that a statistical inference about any of the encompassing relationships between good institutions and good economic outcomes needs to first select a clear and simple methodology. Thank fully, that has already been applied by many including Rodrik et al (2004). The thesis examines many studies which investigate the relationships of interest (economic growth, its outcome based determinants and processes). Each step forward into time, empirical research clarifies the issue under debate by exploring and unbundling further into 'what matters and how it matters'. (Acemoglu and Johnson, 2005a) This thesis is one such step into all such efforts.

Starting with Rodrik et al (2004), sharing their view on the role of history in economic development and taking guidance from other studies, the thesis addresses the issues of common interest by adding some new evidence in support of not only institutions but trade also. Under the econometric framework, promoted by Rodrik et al (2004), we investigate not only determinants of economic growth but also determinants of income distribution. Rich definitions of institutions and processes of

international trade have been employed to provide empirical evidence which can be at par with the economic significance of these variables. A rigorous statistical investigation has been carried out to do justice to the intellectual space which 'integration and institutions' have received recently. In economics literature, trade liberalization and good institutions have already made it to the top of list of a good development recipe.

More importantly, this manuscript brings out its bias for 'what real development is': It is about human empowerment. The empowerment cannot happen unless human behavior is changed for the good of modern evolution where a better part of world has transformed into 'a scientific society'. The countries who are the winners in economic development have better human capabilities. Barro (1992) and Barro and Lee (1993, 1993b and 1994) measures human capabilities through initial levels of schooling. Education is related with all successful outcomes of development more significantly than any other variable of interest. (Aceomoglu et al, 2005b) This thesis gives a special attention to education. Finding education to be of 'high statistical significance' may also reveal something about how successful we have been to 'rightly highlight' the relative economic significance of all the different determinants of economic development investigated upon in this thesis.

1.3 Outline of the Research

By addressing the nature of relationship of trade with income and its distribution, and analyzing the same relationships for developing countries to find ways to integrate these countries to global markets in a manner that may solve for the negative externalities of integration, the thesis promotes the idea of regional integration as a means to promote a successful trading framework for developing countries. As discussed above, one impeding factor to affect or block regional integration in developing countries is prevalent conflicts. Some conflicts are international and some are intra-national (civil war) in nature. While the preliminary chapters of this thesis establish the relationship of intra-national conflicts as a means to disrupt political stability in a country and economic development, a separate detailed chapter has been dedicated to the role of international

conflict and economic development. Pakistan and India have a 60-year long history of conflict. While both countries belong to a region that not only has been recently suggested as an economic engine of global prosperity, but has also been a source to exemplify the success of free market ideology as neighbours China and India have both witnessed economic growth rates higher than six per cent for more than a decade. A major conflict in this region is a serious impediment to economic development and prosperity of the nations that form the world's most populous areas with extreme poverty to a staggering hundreds of millions of people. Thus, this thesis analyses a major international conflict in the region and adopts a conflict resolution methodology between India and Pakistan where global as well as regional trade take centre stage. The thesis takes the following structure:

Chapter 2 empirically examines the contribution of trade liberalisation upon poverty via its impact on per-capita income levels. In addition, it compares this with the relative contribution of institutional capacity to prosperity, as well as the role of human capital accumulation. Following various definitions prevalent in the literature, the thesis employs several concepts of institutional quality, trade policy and openness variables. For example, this analysis accounts for the six different classifications of institutions, rule of law, political stability, regulatory quality, government effectiveness, voice and accountability and control of corruption identified by Kaufman et al. (2002) Regarding international, economic integration, the researcher carefully chose three specific measures of openness. The ratio of nominal imports plus exports to GDP is the conventional openness indicator; this analysis employs two others, *overall trade penetration* and *overall import penetration*. Neither of these measures are direct indicators of a country's trade policy, pointing only towards the level of its participation in international trade. There are indicators of trade restrictiveness acting as measures of trade policy, including import tariffs as percentage of imports, tariffs on intermediate inputs and capital goods, trade taxes as a ratio of overall trade and total import charges can all be considered as good proxies of trade restrictiveness and have also been employed. Other measures that capture restrictions in overall trade are

non-tariff barriers. Additionally, this analysis includes *composite* measures of the overall trade policy stance to examine how openness influences per-capita income.

The chapter employs six institutional and 11 openness variables in an attempt to undertake a comprehensive analysis of how institutional quality and exposure to increased international trade affects the economic performance of a country. Unlike in the comparable study by Rodrik et al. (2004), this study (a) includes a role for human capital, (b) employs six institutional variables compared to one only in Rodrik et al. (rule of law), (c) includes trade policy variables and not just openness indicators, and (d) expands the set of openness measures employed. Opening up domestic markets to foreign competition by revoking trade restrictions and trade barriers can be good for economic performance. Moreover, developing human capital is as important as superior institutional functioning for economic well-being. Indeed, the accumulation of human capital stocks via increased education might lead to improved institutional functioning, and the utilization of policies like trade liberalization. Policies aimed at educational improvement yield a double dividend: they improve institutions in the longer-term and in the short-term, they will allow for greater gains to the economy from trade liberalization. With regard to the role of international integration versus institutions, openness counts for little *per se* in explaining income differences across countries. This is because it is an outcome and not a cause. Trade policies and liberalization on the other hand, are significant in explaining cross-country per-capita income variation. With regard to trade policies, we can safely say that the overall policy stance, particularly those associated with black market premia in foreign exchange markets and export taxes, are most important in explaining differences in income across countries. These two phenomena also closely relate to poor institutional performance. Tariffs and quotas on imports, however, are of secondary importance, indicating that they are less growth retarding.

Recently there has been an influx of literature investigating the relationship between trade and poverty. The *right* is of the view that increased international trade is good for the poor whereas the *left* is quite

skeptical of the pro-poor effects of trade. Chapter 3 provides a comprehensive review of recent literature on the topic in order to reach some neutral ground. Although trade might carry positive affects for the poor in developing countries through growth, such gains rarely find equal distribution among the rich and the poor. This paper identifies at least eight different effects of international trade that result in unequal outcomes and thus defy the Heckscher-Ohlin-Samuelson theorem in a developing country set up. Since per decomposition, growth or inequality both affect poverty, evidence of unequal gains from trade does imply that the relationship between trade and poverty is not as simple as the *right* seems to suggest. Many studies have analyzed the relationship between trade and inequality and chapter 3 contains a review of most of these.

A comprehensive way to analyze effects of trade on inequality is to take institutions in to account in the analysis whereas not many studies have previously focused on institutions and their affect on distribution of income. Chapter 4 fills this gap in the literature as, in addition to trade it also examines how institutions fare with different measures of inequality in a cross-section framework. The chapter differentiates between institutions based on four categories legal, economic, political and social. The results show that legal institutions like rule of law and control for corruption has a strong impact on inequality. Although democratic countries are less prone to unequal outcomes, autocratic setups may not necessarily lead to greater inequalities. Both frameworks may carry redistributive effects, as both associate positively with the incomes of the poorest and negatively with the incomes of the richest. In developing countries, sometimes countries manage to redistribute because the society values equality because of prevailing cultural norms. Second, whether a country is politically stable is rather a more decisive institutional factor apropos inequality than whether a country has an autocratic or a democratic orientation. Economic institutions also seem to play an important role in alleviating global inequalities. Whether the government is functioning effectively and whether it has a robust fiscal and monetary policy seems to have stronger impact on inequality. Regulatory quality which also captures capital market reforms is weakly related with income and there are

some instances of wrong sign. This is in line with current literature on capital market inflow, which has been associated with growth failures. Education for all, a proxy for social institutions, has a strong redistributive power. Overall, higher levels of mean education, political stability, voice and accountability, control for corruption, and rule of law are more relevant in reducing inequalities. On the other hand, the middle-income group is most likely to benefit from good functioning institutions more than any other income group. As mentioned, the chapter also takes into account the role of openness and integration in welfare generation. Once controlling for institutions, openness and trade policy is associated with increased wage inequalities across nations. The results become more pronounced for developing countries. There are some signs of negative relationship of trade with income inequality, but the robustness checks fail to establish it as a significant result. For import taxes, the data is only available for developing countries thus no inferences could be drawn for developed countries. For a developing country, protection against imports may be welfare enhancing. Decreases in export taxes have an egalitarian effect only when the sample includes developed and developing countries. For reduced samples, there is inadequate information to draw any statistical inference. The analysis calls for more South-South trade, which would enable developing countries to decrease the relative wage gaps among the labour force.

Chapter 5 focuses on trade and its effect on wage inequality in developing countries. Returns to education, which have been significantly related with wage inequality, are included in the analysis. As is discussed in chapter 3, there are prevalent education inequalities in developing countries and wage inequality is on the rise, especially for those developing countries (that is Latin American countries) that recently opened up. The aim of chapter 5 is to examine whether human capital stock moderates the impact of increased trade on wage inequality in developing countries. Chapter 5 also reviews the skilled-unskilled wage differential. High initial endowments of human capital imply a more egalitarian society. When societies, which are more equal, open up their economies further, increased trade is likely to induce less inequality on impact because the

supply of skills better matches demand. Greater international exposure also brings about technological diffusion, further raising skilled labour demand. This may raise wage inequality, in contrast to the initial egalitarian *level* effect of human capital. Chapter 5 attempts to measure these two opposing forces. It employs a broad set of openness indicators measuring trade liberalization policies as well as general openness, which is an outcome, and not a policy variable. It further examines what type of education most reduces inequality. The findings suggest that countries with a higher level of initial human capital do well on the inequality front, but human capital that accrues through the trade liberalization channel has in-egalitarian effects. One explanation could be that governments in developing countries invest more in higher education at the expense of primary education in order to gain immediate benefits from globalization; thus becoming prone to wage inequality after increased international trade. These results also have implications for the speed at which trade policies become liberalized, the implication being that better educated nations should liberalize faster.

Although the economic literature has recently highlighted regional trade as one of the important means to balance out negative effects of global integration, the prevalence of conflicts of interest between countries in a region hamper the possibility of successfully applying of the idea in developing countries. India and Pakistan are no exception. Although both countries can benefit from effective regional trade arrangements, as the analysis in chapter 6 will show, there is an ongoing rivalry between both nations that greatly impedes bilateral cooperation. To make regional trade a success, which would be grounds for a smooth integration to global markets, conflict resolution strategies need to be promoted, which are mostly case sensitive. The last analytical chapter thus is dedicated to a conflict resolution strategy in the case of the India-Pakistan conflict. It examines whether greater inter-state trade, democracy and reduced military spending lower belligerence between India and Pakistan. The analysis begins with theoretical models covering the opportunity costs of conflict in terms of trade losses and security spending, as well as the costs of making concessions to rivals. Furthermore it is best

to understand conflict between the two nations in a multivariate framework that takes into account variables such as economic performance, integration with rest of the world, bilateral trade, military expenditure and population. Thus, an empirical investigation based on time-series econometrics for the period 1950-2005 with causality tests is carried out and the results suggest that reduced bilateral trade, greater military expenditure, less development expenditure, lower levels of democracy, lower growth rates and less general trade openness are all conflict enhancing, albeit with lags in some cases. Moreover, there is reverse causality between bilateral trade, militarization and conflict; low levels of bilateral trade and high militarization are conflict enhancing. Equally, conflict also reduces bilateral trade and raises militarization. *Globalization*, or a greater general openness to international trade with the rest of the world, is the most significant driver of a liberal peace, rather than a common democratic political orientation suggested by the pure form of the democratic peace.

Chapter 7 concludes the thesis by providing a comprehensive review of the analysis and some generic and specific policy guidelines for economic development in developing countries.

2 Beyond Institutionalism: There Still Lies a Good Trade Policy

Measures of absolute poverty tend to fall with economic growth in developing countries. Ferreira and Ravallion (2008: 18)

2.1 Introduction

In poor nations, economic growth constitutes the principal avenue for poverty reduction. Redistribution, even when feasible can never be sufficient for substantial poverty reduction. Thus, there is a close link between growth and poverty reduction. Growth however, may result not just from policies that foster it, such as trade policy reforms, but because certain nations have superior institutions, within which the same policy framework is determined and executed. This also raises the issue of reverse causality. Higher incomes that are the result of growth in the context of well-functioning institutions, in turn produce superior institutions that are a function of increased per-capita income. The term institutions, implies factors that result in good governance: political stability, voice and accountability, the rule of law, regulatory framework, bureaucratic quality and control of corruption (see Kaufmann, Kraay and Zoido-Lobaton 2003).

There is little controversy over the important role played by both international trade and institutional quality in fostering growth. Economic development is however, a complex phenomenon, which encompasses a multitude of social, economic, political and scientific phenomena. Accounting for all of these factors in order to explain growth is a difficult task. The purpose of this dissertation is to examine empirically the contribution of trade policy changes upon prosperity, via its impact on per-

capita income level differences across nations. This paper contributes to the debate over the relative role of institutions versus trade integration (or policies) in determining relative levels of prosperity across countries. In this connection, some authors such as Rodrik, Subramanian and Trebbi (2004, henceforth Rodrik et al.) claim that institutions dominate all other factors in determining income differences across countries. This analysis, based on an extension of their framework is somewhat skeptical of this assertion. In addition, following Glaeser et al. (2004a, 2004b), the research examines the role of human capital accumulation in this process, finding some support for their view that human capital can be just as important as institutional quality in determining relative prosperity, and may even lead to improved institutional functioning.

With regard to international trade and its impact on economic well-being, keep in mind that trade can increase or decrease independent of any changes to the trade policy stance (tariffs, non-tariff barriers, export subsidies etc.).[1] Globalization, factors that are external to an individual nation, may facilitate trade. Technological changes may make certain goods, imports for example, cheaper despite the presence of trade restrictions. Similarly, a fall in transportation costs or the end of war may alter the relative price of tradables encouraging greater international trade. Trade may increase income, but changes in trade policies may not foster increased international trade and hence not contribute to growth or poverty reduction. In short, one has to distinguish between openness, something that is an outcome of policy choices or serendipity; and trade *policies* aimed at promoting greater international trade, which might or might not succeed. The following empirical work, unlike most authors, including Rodrick et al. (2004), draws this important distinction.

The rest of the chapter is organized as follows. Section 2.2 contains a review of the literature covering the debate regarding the alternative impact of trade policy or openness on growth, with some authors establishing a direct link between openness and growth, whilst others emphasize the role of good institutions. Sections 2.3 (data and methodology) and 2.4 (regression analysis) contain the researcher's contribution to the debate. The analysis, although similar to Rodrik et al. (2004), goes beyond

their work by including more institutional measures, openness indicators, as well as explicit trade policy variables and a role for human capital. Therein lays the innovation of this paper. Finally, section 2.5 concludes with some policy implications.

2.2 Key Determinants of Economic Development: Trade Policy/ Openness, Institutions and Human Capital

Where do the fundamental and deep determinants of growth lie? Apart from the effort required in savings or capital accumulation, do the fundamental determinants of growth lie in policies such as trade policy or human capital accumulation or do, good institutions foster growth? In an influential paper, Sachs and Warner (1995) argued that countries that were more open (based upon a number of openness indicators) grew faster than countries that were not open, hence creating preconditions for poverty reduction. Classification as a 'not open country' based upon violation of any of the indicators. Rodriguez and Rodrik (2000) convincingly argued that the Sachs and Warner (1995) study suffered from sample selection bias and that some openness indicators could be highly correlated with other indicators of good governance or institutional quality. As an example of the first problem, many countries in sub-Saharan Africa counted as 'not open' as most of them had state monopolies controlling export trade. This is not true because some 'open' economies as defined by Sachs and Warner (1995), such as Indonesia also had state monopolies, in petroleum for example. Second, another indicator of the lack of openness, a black market premium on the exchange rate could be highly related to institutional quality (corruption, regulatory capacity). The most damaging of Rodriguez and Rodrik's critique of Sachs and Warner's assertion that openness promotes growth lies in the fact that an Africa dummy variable capturing the special effect of Africa on cross-national growth could substitute for the two crucial openness indicators that contributed significantly to growth.

Rodriguez and Rodrik (2000) went on to review some of the key cross-national empirical literature on the relationship between trade policy and economic growth and conclude that there is little evidence that

open trade policies, in the sense of lower tariff and non-tariff barriers to trade, are significantly associated with economic growth. The theory on this relationship, in the case of a small economy that takes world prices of tradable goods as given, would predict that: (1) in static models with no market imperfections and other pre-existing distortions, the effect of a trade restriction is to reduce the level of real GDP at world prices. In the presence of market failures such as externalities, trade restrictions may increase real GDP (although they are hardly ever the first-best means of doing so). (2) In standard models with exogenous technological change and diminishing returns to reproducible factors of production, a trade restriction has no effect on the long-term (steady state).

Dollar and Kraay (2002) evaluate the role of institutions and international trade in economic development. They provide evidence that countries with better institutions and nations that trade more grow faster. However, they conclude that trade matters more in this nexus as a short-term pro-growth strategy, while institutions feature more prominently in the long-term. However, this conclusion is rejected by Rodrik et al. (2004), who find that the quality of institutions 'trumps every thing else.' They conclude that when controlling for institutions, the measures of integration have at best insignificant effects on the level of per-capita income.

Not all institutions matter equally. Democracy may not always contribute to growth, as is the case in rapidly growing nations such as China and Singapore (see Barro 1996). There is also the issue of human capital, its place in fostering growth and even aiding the formation of superior institutions. Glaeser et al. (2004a) bring forth an important missing link to the debate by suggesting that human capital is more important for growth than institutions. In fact, they go a step further by suggesting that human capital actually contributes to institutional improvement. Their paper presents the viewpoint that the growth potential of developing countries depends more on the leadership qualities (good or bad dictatorships) rather than institutional quality.

On the importance of human capital vis-à-vis growth, Schiff (1999), after reviewing recent empirical studies on the subject concludes that

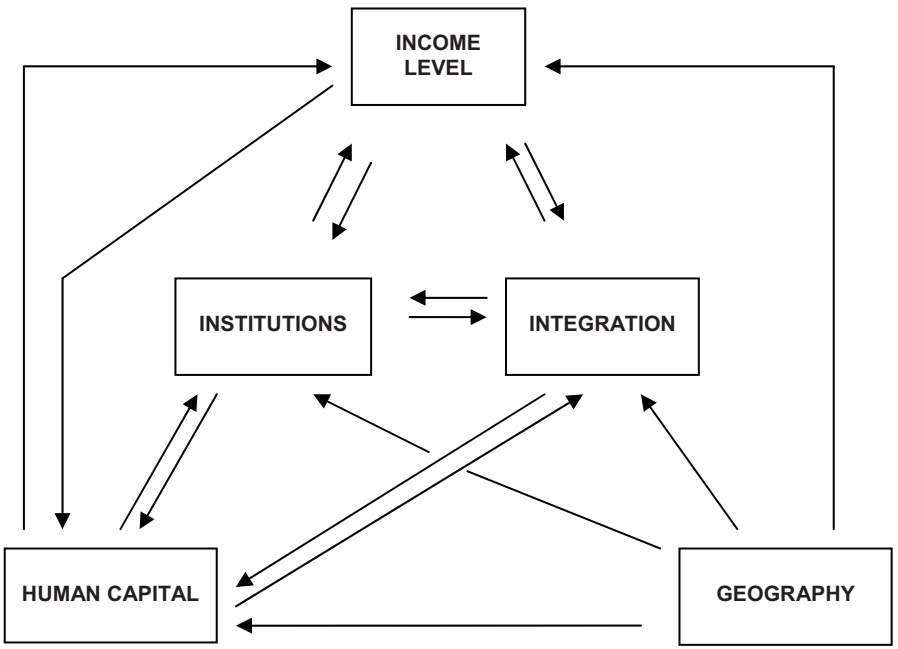
poor countries can only grow faster than rich countries if their initial stock of human capital exceeds the average level among other poor nations. For example, when comparing East Asian and South Asian economies, differences in human capital and differences in the convergence level seem to move together. For instance, East Asian developing countries witnessed unprecedented increases in GNP per-capita over the last three decades: ten times for Malaysia, 65 times for Republic of Korea and 13 times for Thailand. During the same period, Asia's least developed countries (Bhutan, Cambodia and Lao People's Democratic Republic) and South Asian developing countries (Bangladesh, India and Pakistan) saw only a meagre increase in average income of between two and slightly more than five times.

It is intriguing to note that in the 1960s when most of these countries were at similar stages of economic development, East Asian developing countries were far ahead of both Asia's least developed countries and South Asian developing countries in human capital. In fact, total literacy rates for East Asian developing countries in the 1960s were as high as 71 per cent for the Republic of Korea, 68 per cent for Thailand and even Malaysia had a rate of more than 50 per cent. On the other hand, in the case of all Asia's least developed countries and South Asia's developing countries, the total literacy rates were as low as only nine per cent for Nepal and 15 per cent for Pakistan, with Cambodia having 38 per cent literacy.

After three decades, while Asia's least developed countries and South Asia's developing countries somewhat augmented their human capital stocks, the total literacy rates are still far below 50 per cent in the cases of Bangladesh, Nepal and Pakistan. During the same period, East Asian developing countries more or less achieved the formidable task of educating most of their people. As a result, in the late 1990s, the total literacy rate of the Republic of Korea had reached 98 per cent, and Malaysia managed to achieve a rate of about 90 per cent. In short, economic progress in East Asia during the 1980s occurred because of their well-developed human capital endowment, which gathered momentum in the 1960s or earlier.

Figure 2.1 elaborates how the inter-relationship between growth, institutions, human capital and trade works. Any analysis that attempts to capture the effects of institutions and openness on prosperity is fraught with the problems of endogeneity and reverse causation. For example, richer and more developed countries have better institutions and they are more liberalized with regard to trade than more underdeveloped nations. So a pertinent question is, whether affluent countries are rich because they are more open and have better institutions or does this relationship work in reverse? There is also debate as to whether better institutions encourage trade, or if openness and liberalization cause institutional improvement.

Figure 2.1
Reverse causality between income, institutions, integration and human capital



There is some evidence to suggest that both possibilities exist (see for example Anderson and Mercuiller 1999; Wei 2000). 'The extent to which an economy is integrated with the rest of the world and the quality of its institutions are both endogenous, shaped potentially not just by each other but also by income levels. Problems of endogeneity and reverse causality plague any empirical researcher trying to make sense of relationship among these causal factors.' (Rodrik et al. 2004: 2) Human capital is also endogenous as it affects institutions as well as openness. Countries with higher levels of human capital are also the ones with better institutions. Lipset (1960) suggests that high levels of human capital resulting from education leads to benign politics, less violence and increased political stability. Similarly, nations that grow faster have more resources at their disposal to improve human capital levels. Generally, rich countries have a much higher level of human development than less developed countries. Furthermore, if the more open economies are the countries that are more affluent, then not only growth but openness too may be the product of human capital formation.

2.3 Data and Methodology

If income is the point of reference to economic development, then economic growth rates come at the center of the debate. Countries converge on the basis of high growth rate trends which have to be sustained for longer periods of time. The fundamental reason why developing countries have failed to converge is because of growth failures. East Asia stands out as an exception among developing countries where growth rates have been achieved on sustainable basis and an evidence of convergence is present. For most developing countries, growth rates have been highly volatile and unstable. In empirical studies, using growth rates as a measurement of development would also incorporate the volatility of growth rates in the analysis. Thus per capita differences in income can serve a better purpose for an empirical exercise which is set out to determine the factors which lead to economic development or lack of it. Income differences which prevail today among countries suggest that incomes in developing countries have failed to converge to that of higher income coun-

tries because of failing growth rates. Choosing GDP growth or per capita income differences is a pure empirical choice. An argument in favour of per capita income difference over GDP per capita growth rates does find some support in economic literature that has considered the econometric problems in using growth rates: ' The instability of growth rates makes talk of the growth rate almost meaningless. Moreover, the enormous volatility of growth around its trend (however defined) means that even other period as long as a decade, growth can be dominated by shocks and recovery. This implies that arbitrary parsing of the entire time series of output into different lengths is unlikely to lead to significant, policy-relevant insights into growth. Although we have learned some things from examining growth correlates with multivariate regressions of various types, there is little more to learned by moving to panels. The leads to low power, greater measurement error bias, confusion about causality and endogenity, and dynamic misspecification of many stripes, all of which cloud the interpretation of regressions using higher frequencies. One can certainly question the usefulness of a technique that might cause the estimated partial correlation to rise, fall, shift, or lose statistical significance, when any of these would have no impact on inferences about the important question of interest: the impact of permanent policy shifts on long-run out-put or growth.' (Pritchett, 2000; 247)

In light of the debate carried out in previous sections, our empirical model includes many of the core determinants of growth at the right hand side, namely international economic integration (including measures of openness and trade policy), measures of institutional quality and measures of physical and human capital. On the left hand side, present dependent variable is not growth *per se*, but the log of income per-capita. As argued, differences in per-capita income across countries are a result of differential growth rates in the past. This model follows the practice in Easterly and Levine (2003) and Rodrik et al. (2004) where the relative contribution of policies and institutions in explaining per-capita income differentials is tested. This model's sample includes both rich OECD countries and developing countries. As regards *policy*, this paper examines the effect of both openness, as in Rodrik et al. (2004), as well as trade policy variables. Openness indicators are an outcome variable, pointing

to the extent to which a country trades as a proportion of national income. Trade policy indicators are, however, a more direct measure of the policy stance, which Rodrik et al. (2004) did not examine. This paper deems these policy variables of greater significance in a test of the relative efficacy of policy vis-à-vis institutions.

The final equation to estimate takes the following form:

$$\log y_i = \alpha + \beta N_i + \chi Tp_i + \gamma Hk_i + \eta Pk_i + Geo + \varepsilon_i \quad (2.1)$$

The variable y_i is income per capita in country i, N_i, Tp_i, Hk_i, Pk_i and Geo_i are respectively measures for institutions, integration, human capital, physical capital and geography, ε_i is the random error term. Average years of schooling represent human capital. In order to have in-depth insight into how institutions or increased integration affects income per-capita, this paper employs several concepts of institutional quality, trade policy and openness variables following various definitions prevalent in the literature. Table 2.1 provides summary statistics for all endogenous dependent, endogenous independent and independent measures and their respective definitions where as a detailed discussion follows.

2.3.1 Governance Indicators

Kaufman et al (2003) have constructed six aggregate indicators which try to capture traditions and institutions by which authority in a country is maintained. If one takes into account the six different classifications of institutions identified by Kaufman et al. (2003), namely rule of law (*Rl*), political stability (*Ps*), regulatory quality (*Rq*), government effectiveness (*Ge*), voice and accountability (*Va*) and control of corruption (*Ctc*), they follow either of the 3 basic definitions of governance: (1) the process by which governments are selected, monitored and replaced (2) the capacity of the government to effectively formulate and implement sound policies, and (3) the respect of citizens and the state for the institutions that govern economic and social interactions among them.

Table 2.1
Summary Statistics

Variables	Code	Source	Obs	Std . Dev
Dependent				
Difference in Per-capita GDP, 2000	Lny	World Development Indicators	163	(1.138)
Endogenous Independent				
Openness Variables				
(Exports +Imports)/GDP at current Dollar prices, 1985	Lcopen	World Development Indicators	170	(0.589)
Import Penetration: overall, 1985	Impnov85	Pritchett (1996)	96	(21.08)
TARS trade penetration,: overall, 1985	Tars85	Pritchett (1996)	96	(36.91)
Trade Policy Variables				
Import duties as % imports, 1985	Tariffs	World Development Indicators	99	(8.903)
Tariffs on international inputs and capital goods, 1985	Owti	Sachs and Warner (1995)	98	(0.165
Trade taxes/ trade, 1982	Txtrdg	Pritchett (1996)	54	(0.031)
Weighted average of total import charges, 1985	Totimpov85	Pritchett (1996) (Available for developing countries only)	76	(21.30)
Non trade barriers frequency on intermediate inputs, 1985	Owqi	Sachs and Warner (1995)	96	(0.24)
Non-tariff barriers Coverage: overall, 1987	Ntarfov87	Pritchett (1996) (Available for developing countries only)	76	(36.305)
Sachs and Warners composite openness index, 1980	Open80s	Edwards (1998)	61	(0.446)
Leamer's measure of openness based on residuals capturing deviations of actual trade from trade as predicted by an empirical factor proportions model of trade, 1980	Leamer82	Edwards (1998)	47	(0.527)
Institutional Variables				
Voice and Accountability, 1999 Range: 2.5 to -2.5	Va	Kaufmann, Kraay and Mastruzzi (2003)	170	(0.952)
Political stability, 1999 Range: 2.5 to -2.5	Ps	Kaufmann, Kraay and Mastruzzi (2003)	156	(0.954)
Government effectiveness, 1999 Range: 2.5 to -2.5	Ge	Kaufmann, Kraay and Mastruzzi (2003)	157	(0.893)
Regulatory quality, 1999 Range: 2.5 to -2.5	Rq	Kaufmann, Kraay and Mastruzzi (2003)	166	(0.892)
Rule of Law, 1999 Range: 2.5 to -2.5	Rl	Kaufmann, Kraay and Mastruzzi (2003)	166	(0.937)
Control for Corruption, 1999 Range: 2.5 to -2.5	Ctc	Kaufmann, Kraay and Mastruzzi (2003)	159	(0.910)
Human Capital				
Average years of Schooling, 1999	Sch99	Baro and Lee (2001)	109	(2.914)
Physical Capital				
Gross capital formation as a percentage of GDP	Pk	World Development Indicators	165	(7.65)

Instruments				
Natural logarithm of predicted trade shares computed from a bilateral trade equation with 'pure geography' variables, 1985	Lfrkrom	Frankel and Romer (1999)	163	(16.75)
Fraction of the population speaking English	Engfrac	Hall and Jones (1999)	182	(0.236)
Fraction of the population speaking one of the major languages of Western Europe: French, German, Portugese or Spanish	Eurfrac	Hall and Jones (1999)	185	(0.380)
Drop out rate, 1990	Drop90	Barro and Lee (1996)	125	(0.802)
Number of school days	Schday	Barro and Lee (1996)	139	(23.43)
Distance from the equator of capital city measured as abs (Latitude)/90	Disteq	Acemoglu, Johnson and Robinson (AJR) (2001)	208	(16.65)

They relied on 194 different measures of governance drawn from 17 different sources of subjective governance data constructed by 15 different sources including international organizations, political and business risk rating agencies, think tanks and non-governmental organizations. The governance indicators have been oriented so that higher values correspond to better outcomes on a scale from -2.5 to 2.5 while covering these values for 175 countries.

Rodrik et al. (2004) only consider the rule of law. Rule of law measures the extent to which agents in the society have confidence in and abide by the rules established to govern the state. Kaufman et al (2003) constructed this measure based on perception based indices which can capture incidence of crime, or measures which capture effectiveness and predictability of the judiciary or enforceability of contracts. Overall, rule of law, is a broad institutional concept which measures: '*the success of the society in developing an environment in which fair and predictable rules from the basis for economic and social interactions, and importantly, the extent to which property rights are protected*' (Kaufman et al 2003: 4).

Rule of law only partly defines governance, and by incorporating other five measures of governance developed by Kaufman et al (2003), one can carry out a rather comprehensive institutional analysis. For example, voice and accountability has been constructed from number of indicators which measure different aspects of political process, civil liberties and political rights. In other words, voice and accountability meas-

ures the extent to which citizens of a country are able to participate in the selection of governments. Independence of media is also part of voice and accountability, whereas it may capture the monitoring role of the media through which they hold governments accountable for their actions. Political stability (*Ps*) is broadly defined to measure stability of government and absence of violence. It includes perceptions of the chances that the government in power will be destabilized or overthrown by unconstitutional and/or violent means from foreign or domestic forces of discontent or through terrorism. Government Effectiveness (*Ge*) and Regulatory Quality (*Rq*) captures the second dimension of governance which is to do with the ability of the government to formulate and implement sound policies. In other words it captures the quality of public service provision, the quality of the bureaucracy, the competence of civil servants, the independence of the civil service from political pressures and the credibility of the government's commitment to policies. The main focus of this index is on ''inputs'' required for the government to be able to produce and implement good policies and deliver public goods. (Kaufman et al, 2003: 3). Regulatory quality captures the incidence of market unfriendly policies which may include price controls, inadequate bank supervision and also perceptions of protection against foreign trade or excessive regulation against business development.

One important point to note here is that these indicators are based on perception based governance data. The justification for perception based indicators is the nature of these measures:

'*for many of the key dimensions of governance, such a corruption or the confidence that property rights are protected, relevant objective data are almost by definition impossible to obtain, and so there are few alternatives to the subjective data (kaufman et al, 2003: 19).*'

2.3.2 Integration: (openness/ Trade Policy Variables)^2

The ratio of nominal imports plus exports to GDP (*lcopen*) is the conventional openness indicator (Frankel and Romer 1999; Alcala and Ciccone 2004; Rose 2002; Dollar and Kraay 2002; Rodrik et al. 2004). However there is some controversy over the measurement of this simple

measure of openness. Some studies have utilized trade shares in current dollar (or local currency) terms referred to as nominal openness measure, and some studies have employed trade shares in PPP terms referred to as real openness measure (Alcala and Ciccone, 2004; Dollar and Kraay, 2002; Dollar, 2005; and Milanovic 2005). According to Alcala and Ciccone (2004), by utilizing trade share in PPP terms, one can eliminate the distortions which arise due to cross-country differences in the relative price of non tradable goods. On theoretical grounds Rodrik et al (2004) strongly disagree and they suggest that the use of "real openness" can yield in fact an opposite and potentially more severe bias instead of addressing any distortions in the growth model. Nevertheless, both openness measures have been utilized in recent studies and the results may be sensitive to this choice. For example, Dollar and Kraay (2005) employ real openness measures and find no evidence of any significant relationship between trade and income inequality (GINI index). However, the relationship between trade and income inequality may be of significant in nature, as we find in chapter 4, when nominal openness measure is utilized. The results on the relationship between trade and inequality also depend on the definition of inequality and what the GINI is measuring. However, debate on inequality is not of interest to this chapter. Suffice to say that in this thesis we prefer nominal trade share in current dollar terms following Frankel and Romer (1999), and Rodrik et al (2004) over real openness measure.

This conventional openness measure explains cross country variations in countries' trade as a share of GDP which primarily reflects countries' geographical characteristics more than capturing a policy element: Other things equal, countries that are physically closer to others tend to trade more. Cross country differences in trading volumes may not entirely reflect trade policy and level of integration of a country. Nevertheless, one may categorize nominal openness measure as an outcome-based measure of trade policy which captures the deviation of actual outcome from what the outcome would have been without trade barriers.

Incidence-based measures try to measure trade policies by direct observation of the policy instruments. The level of tariffs or the frequency

of various types of non tariff barriers (NTBs), are the commonly utilized incidence-based measures of trade barriers. Average tariff rates or non-tariff barrier coverage ratios are a-theoretic because they usually suffer from significant measurement errors especially for developing countries. A simple average of tariff rates across trade-able goods in a country may end up giving inordinate weight to such categories that are relatively unimportant. Also by obtaining averages weighting by imports, one may undermine the effects of such prohibitive tariffs which stifle out all imports. Pritchett and Sethi (1994) conclude that tariff reform includes broader treatment of tariff regime than just a change in tariff rates. Tariff rates are not the critical determinant of tariff revenues and large changes in tariff rates may be offset by changes in favour of exemptions or smuggling. Non tariff barriers are also not exempt from criticism. Usually only a small number of easily identifiable NTBs are reported in the data while providing no information on the extent to how binding NTBs are and thus excluding a wide range of less easily quantifiable barriers to trade, such as local procurement requirements. (Dollar and Kraay, 2004) A more general critique on all direct measures of trade policy is that there are significant gaps between actually collected tariffs and statutory rates due to corruption in the customs administration or poor enforcement of tariffs or legal exemptions doled out for political reasons.

Another valid critique to any empirical exercise, which tries to find a relationship between integration and economic development, can be to ask whether above mentioned incidence or outcome based measures of trade barriers are correlated with each other even when one may settle down by ignoring several measurement errors these proxies of openness or trade policy suffer from. Pritchett (1996) has asked a similar question and finds that different measures of trade barriers are individually and collectively uncorrelated to each other. He concludes thus that each measure should stand on its own merits.

For such limitation we have utilized both outcome based and incidence based measures of integration following Pritchett (1996) and Rose (2002). In addition to nominal trade shares, there are two additional measures of integration introduced in trade literature which are outcome

based: Pritchet (1996) estimates trade flows adjusted for country-characteristics. He has categorized it as outcome based structure adjusted trade intensity measure which estimates trade penetration. The adjustment has been done by accounting for structural characteristics such as level of per capita GDP, size (both area and population), transport costs and obvious resource endowment characteristics. The adjusted trade penetration measures are obtained for total trade (exports plus imports) (*Tarshov*) and total imports (*Impnov*).

Neither of these measures are direct indicators of a country's trade policy, pointing only towards the level of its participation in international trade. As discussed, there are many incidence based indicators of trade restrictiveness acting as close proxies of trade policy (Pritchett, 1996; Edwards 1998; Greenaway et al. 2001; Rose 2002). Despite some skepticism in literature about the use of incidence based trade policy indicators such as tariffs or NTBs (Dollar and Kraay, 2004), empirical research has failed to come up with better alternates. According to Rodriguez and Rodrik (2000), simple averages of taxes on imports and exports and NTB coverage ratios have generally passed the rigors of empirical research and all such incidence based measures are considered to have done a decent job in rank-ordering countries according to the restrictiveness of their trade regimes.

Import tariffs as percentage of imports (*Tariffs*), tariffs on intermediate inputs and capital goods (*Owti*), trade taxes as a ratio of overall trade (*Txtrg*) and total import charges (*Totimpov85*) are all incidence-based measures of trade barriers and are considered good proxies for trade restrictiveness. All of the above are employed in this study. Other measures that capture restrictions in overall trade are non-tariff barriers. In this chapter, overall non-tariff coverage (*Ntarfov87*) and non- tariff barriers on intermediate inputs and capital goods (*Owqi*) are the two proxies for non-tariff barriers.

There is also a trend in the trade literature to use composite measures of trade policy. Edwards (1998) advocates the Sachs and Warner (1995) openness index (O*pen80*). The Sachs-Warner criteria defines a country as open if (1) non-tariff barriers cover less than 40 per cent of trade, (2) av-

erage tariff rates are less than 40 per cent, (3) the black market premium was less than 20 per cent during the 1980s, (4) the economy is not socialist, and (5) the government does not control major exports through marketing boards. The rationale for combining these indicators into a single dichotomous variable is that they represent different ways policymakers can close their economy to international trade. Another measure of trade barriers is a measure based on residuals from trade equations and it is computed for the total trade for a country as the sum of deviations of the predicted from the actual level of net exports across all available commodities. Pritchett (1996) calls it endowment adjusted trade intensity ratio or simply Leamer's openness index (leamer82). The current analysis employed these composite measures to examine in detail how trade liberalization can influence per-capita income. The countries these variables cover are given in the appendix which is provided at the end of the manuscript.

2.3.3 Human Capital

In growth regressions human capital is more notably measured by schooling than health indicators such as fertility rate, mortality rate etc (Barro, 1991). Though growth theory specifically focuses on the important role of human capital in form of education, the data on such an education measure which can easily be compared across countries has not been forthcoming until recently when Barro and Lee (1993) constructed a large data set on school attainments disaggregated by age, sex and level of schooling. They have also calculated average years of schooling which is a single comparable measure of school attainment that takes into account the significant variations across countries in the standard number of schooling at each level of attainment. Average years of schooling are available for number of years starting from 1960 up till 1990. The dataset is recently updated to add 1995 and 1999 average years of schooling.

In literature there are other comparable education proxies of human capital such as test scores by students, international adult literacy rates, market value of human capital based on rates of returns, OECD (organization for economic cooperation) estimates of educational attainment. A

detailed discussion for all such measures are provided by Barro and Lee (2001) and good comparisons have been drawn in favour of average years of schooling

The presence of measurement error may not be an issue for a statistical analysis. Despite measurement errors, both change and initial levels of education are positively related with economic growth and the relationship is statistically valid (Krueger and Lindahl, 2001). However, the validity is only robust under IV analysis where education is appropriately instrumented for. Otherwise, a positive correlation between education and income levels cannot convincingly suggest that it is education and not income which is prime variable of significance in the framework driving the statistical power of the results.

In this Chapter, the researcher has utilized average years of schooling (Sch99). Instead of obtaining growth rates as is practiced in some of the literature (e.g see Glaser et al, 2004), this research employs levels of schooling. The analysis differentiates between the yearly observations of average years of schooling though. Earlier years of schooling from say 1960 or 1965 can be utilized to measure differences in initial human capital across countries in order to find out historic role of human capital in determining levels of incomes. Average years of schooling for 1960 or 1965 can be considered as initial level of human capital in a sense that levels of human capital in 1960s would be independent to economic reform period of 1980s and afterwards and more so because reforms have been initiated by most countries post Washington consensus and recent research tries to generally capture economic development in the context of post 1980s. In contrast to human capital formation in 1960s, the later years of schooling especially post 1980s levels are interlinked with the reform period and would be as endogenous a concept as integration or economic growth is itself. A detailed discussion regarding potential endogenieties between human capital and other determinants of economic development have already been carried out in section 2.2.

Due to space constraints, this chapter would limit itself to average years of schooling as an endogenous variable which represents the year 1999. Nevertheless, suffice to say here that an intensive empirical exercise

is also carried out where initial level of human capital is utilized in eq. 2.1 when it was considered exogenous. The results confirm that countries that have started out with low level of human capital have also lagged behind in incomes from countries that have started out with higher levels of human capital. The results are not presented or discussed here. In coming lines of this chapter, human capital refers to average years of schooling for 1999 (*Sch99*).

In summary, this study employs six institutional and 11 openness variables in an attempt to undertake a comprehensive analysis of how institutional quality and exposure to increased international trade affects the economic performance of a country. Unlike in the comparable study by Rodrik et al. (2004), this paper has (a) included a role for human capital, (b) employed six institutional variables compared to only one in Rodrik et al. (rule of law), (c) included trade policy variables and not just openness indicators, and (d) expanded the set of openness measures employed.

Before undertaking the regression analysis, it is useful to explore the linear dynamics of the relationship between income and the selected determinants of economic prosperity or growth. Table 2.2 provides pair wise correlations. The three openness measures show a weak relationship with income. This meets expectations because differences in trade shares across countries can have many exogenous reasons along with income itself, such as geography and trade policies.

Conversely, the coefficients of core trade policy variables show that a significant linear relationship is present between income and trade restrictiveness. Table 2.2 suggests that any decrease in tariffs and non-tariff barriers has a positive impact on per-capita income. Furthermore, institutions and human capital come out to be key-determinants of economic well-being as nearly all of them relate significantly to income.

Table 2.2
Pair wise correlation

Regressors	Difference in Percapita GDP (LnY)
Nominal Trade Shares (Lcopen)	0.19
Import Penetrations (Impnov85)	0.31
TARS trade penetration (Tars85)	0.37*
Import duties (Tariffs)	-0.51***
Tariffs on intermediate inputs and capital goods (Owti)	-0.41***
Trade taxes (Txtrdg)	-0.59***
Total import charges (Totimpov85)	-0.11
Non trade barriers (Owqi)	-0.17
Non tariff barriers	-0.501***
Sachs and Warners Openness (Open80s)	0.49***
Leamers Openness (Leamer82)	0.68***
Voice and accountability (Va)	0.69***
Political stability (Ps)	0.72***
Government effectiveness (Ge)	0.74***
Regulatory quality (Rq)	0.63***
Rule of law (Rl)	0.78***
Control for corruption (Ctc)	0.75***
Average years of schooling (Sch99)	0.18
Physical Capital (Pk)	0.88***

- ***, **, * Bonferroni- Adjusted significance at 1%, 5% and 10% level, respectively

2.3.4 Instruments

As indicated earlier, there are potential endogeneity problems between per-capita income and institutions, per-capita income and human capital, as well as between openness (or the trade policy stance) and income per-capita. One way of cleansing the empirical analysis from endogeneity in explanatory variables and the reverse causality between dependent and independent variables is to adopt Instrumental Variable (IV) techniques in the context of two stage least squares regression analysis (2SLS). As a first step to run IV regressions, this researcher found appropriate instruments for the 11 openness/trade policy variables, six institutional concepts and human capital. The first stage estimation includes instruments for the regressors with potential endogeneity problems. The regression estimate in the next stage utilizes the predicted values of these variables in a standard per-capita income or growth regression as in Eq. (2.1).

A country's location is a powerful determinant of bilateral trade. For example, New Zealand when compared to Belgium lies far outside the traditional trading routes, and thus would trade less then the later. Trade between nations may in most cases also capture their geographic proximity to each other in addition to other things. Frankel and Romer (1999) obtain predicted trade shares through a gravity equation 'The Frankel and Romer approach consists of first regressing bilateral trade flows (as a share of a country's GDP) on measures of country mass, distance between the trade partners, and a few other geographical variables, and then constructing a predicted aggregate trade share for each country on the basis of the coefficients estimated. This constructed trade share is then used as an instrument for actual trade shares in estimating the impact of trade on levels of income (Rodrik et al, 2004; 134)'. In literature, FR predicted trade shares are utilized to instrument outcome based measure of openness. Here, the author proposes to utilize FR trade shares to instrument for outcome based as well as incidence based measures of trade policy. Traditionally, especially in 1980s, countries in the South, South East and East have been on average more protective than the countries that lie in the North, North West or West. Since all proxies of incidence based measures of trade barriers are for the period of 1980s, FR trade shares based on gravity equation may effectively explain trade policy in addition to openness.

The most compelling institutional instrument in the cross country growth literature has been the measure of settler mortality suggested by Acemolgu, Johnson and Robinson (AJR) (2001). AJR argued that colonial settlements were directly proportional to the mortality rate of the settlers, whereas settlements affected early institutions which have persisted and formed current institutions. In high disease areas with higher settler mortality rates, colonial settlements were in most cases established on temporary basis promoting arbitrary rule and policies were focused to extract resources instead of institution building. Recently, Rodrik at al (2004) has shown that AJR's settler mortality works very well to explain institutions. However there are some serious draw backs to use this instrument. First, the data is only available for 64 countries. Rodrik et al.

(2004) extended it to 80 countries; it still covers a relatively low numbers when compared to another widely used institutional instrument namely, 'fractions of the population speaking English' (*Engfrac*) and 'Western European languages as the first language' (*Eurfrac*), which covers as many as 140 countries. In addition to data limitation, settler mortality may be correlated with error terms in growth equations because of its strong relationship with human capital. According to Glaeser et al (2004a), it is not clear what Europeans really brought with them when they settled. It would be as good a guess that what settlers brought with them was themselves and therefore their know-how and human capital. Furthermore, settler mortality does not reflect past settlement policies only as suggested by AJR because Settler mortality is found to be correlated with modern day disease environment e.g. malaria.

Due to these drawbacks this thesis abandons settler mortality and follows Dollar and Kraay (2002), and Hall and Jones (1999), to use 'fractions of the population speaking English' (*Engfrac*) and 'Westem European languages as the first language' (*Eurfrac*) as instruments for the institutional proxies. Hall and Jones (1999) provide a strong justification for this instrument:

> Western Europe discovered the ideas of Adam Smith, the importance of property rights, and the system of checks and balances in government, and the countries that were strongly influenced by Western Europe were, other things equal, more likely to adopt favourable infrastructure. That the extent to which the languages of Western Europe are spoken as a mother tongue is correlated with the extent of Western European influence seems perfectly natural. The other characteristic of an instrument is lack of correlation with disturbance. To satisfy this criterion, we must ask whether European influence was some how more intensively targeted towards regions of the world that are more likely to have high output per worker today. In fact, this does not seem to be the case. On the one hand, Europeans did seek to conquer and exploit areas of the world that were rich in natural resources such as gold and silver or that would provide valuable trade in commodities such as sugar and molasses. There is no tendency today for these areas to have high output per worker. On the other hand,

European influence was much stronger in areas of the world that were sparsely settled at the beginning of the sixteenth century, such as United States, Canada, Australia, New Zealand and Argentina. Presumably, these regions were sparsely settled at that time because that land was not especially productive given the technologies of fifteenth century. For these reasons it seems reasonable to assume that our measure of Western European influence are uncorrelated with error term. (101)

Table 2.3
Drop Out Rates

Country	Drop out rate	
	1990	1970
Finland	0%	0%
Norway	0%	0%
Sweden	0%	0%
Singapore	0%	6.3%
Egypt	0%	22.1%
Denmark	1%	3%
Israel	1%	1%
SriLanka	3%	6%
Uruguay	7%	14%
Tonga	8%	8%
United States	11%	11%
China	15%	15%
Belgium	19%	22%
Zambia	16%	24%
Uganda	24.3%	22.4%
Argentina	34.3%	36.3%
Bangladesh	53%	78%
Brazil	80%	78%
Afghanistan	72%	22%

There are many qualitative and quantitative measures of education which can be potential instruments for average years of schooling (Sch99). Public spending on education, Real public educational spending per pupil, teacher salary, pupil teacher ratio, availability of teaching material at different levels of education. Most of them have been available in Barro and Lee data sets and utilized in various studies (Barro and Lee, 2000; and 1996). Can they be instruments for average years of

schooling? In growth framework, most of these qualitative and quantitative proxies of education are interlinked with incomes and thus would be correlated with error terms in equation 2.1. In contrast to these measures, proxies for student performance are relatively exogenous educational inputs capturing the element of student capability. Cross country data on test scores and drop out rates are available. The data on test scores for single common subject area is not comparable for larger set of countries (e.g. only mathematics sciences cover a maximum of 50 countries), whereas data on drop out rates are available for 125 countries. Barro and Lee (2000) defines drop out rate as the percentage of children who start primary school but do not eventually reach the final grade of primary school. The variable is constructed by using data on enrolments and repeaters. Though the drop out rates are much higher in developing countries then in the OECD countries, the pattern may well be attributable to difference of culture than that of economic development and thus any relationship of drop out rates with income would only be indirect. The over identification and endogieneity tests which will follow in next sections would confirm whether drop out rates are correlated with error terms or they exogenously determine average years of schooling to eventually determine differences in per capita incomes. Table 2.3 shows drop out rates for select number of developed and developing countries for the periods of 1990 and 1970. It is interesting to note that trends in drop out rates are quite independent to differences in incomes. Egypt and Sri Lanka score much higher than United States. China, despite its robust economic growth trends recently, has shown no significant improvements in drop out rates for last three decades. Belgium scores as low as Zambia and Uganda. Brazil and Argentina are the richest and most developed Latin American countries but drop out rates in these countries are traditionally very high and in comparison much higher than Uruguay, which is a smaller country in the same region. For Brazil, the drop out rates is slightly higher than that of current day war trodden Afghanistan. Considering these cross country patterns, one can safely suggest that drop out rates would not be related with the error terms in equation 2.1 and are exogenously determined in our framework. Another instrument

which may exogenously explain Sch99 is number of school days in a year and has been utilized in this thesis.

Finally as in Hall and Jones (1999) and Rodrik et al (2004), the researcher employs 'distance from the equator' as a fifth instrument (proxy for geography). This is a purely exogenous concept.

The IV regression model has three equations, where in the first stage predicted values of institutions, openness/ trade policy and human capital respectively generated by regressing them on a set of instruments.

$$N_i = \lambda_{1i} + \phi_1 Engfrac_i + \nu_1 Eurfrac_i + \tau_1 FR_i + \varpi_1 Drop90 + \rho_1 Schday + \theta_1 Geo_i + \varepsilon_{Ni} \quad (2.2)$$

$$Tp = \lambda_{1i} + \phi_1 Engfrac_i + \nu_1 Eurfrac_i + \tau_1 FR_i + \varpi_1 Drop90 + \rho_1 Schday + \theta_1 Geo_i + \varepsilon_{Ni} \quad (2.3)$$

$$Hk = \lambda_{1i} + \phi_1 Engfrac_i + \nu_1 Eurfrac_i + \tau_1 FR_i + \varpi_1 Drop90 + \rho_1 Schday + \theta_1 Geo_i + \varepsilon_{Ni} \quad (2.4)$$

Where $Engfrac_i$ and $Eurfrac_i$ are instruments for institutions referring to fractions of population speaking English and European languages respectively. FR_i is instrument for trade policy. $Drop90_i$ is annual drop rate for 1990 and $Schday_i$ is number of school days in a year. Geo_i is proxy for geography showing distance from the equator. At the second stage, the predicted values of respective institutional, openness/ trade policy variables and human capital are in the per-capita income Eq. (2.1).

2.4 Regression Results

2.4.1 Tests for the Relevance and Validity of Instruments

There is a very simple justification for the use of instrumental variable (IV) technique: If the error distribution is not independent of the regressor's distribution, utilisation of IV becomes imperative by using an appropriate set of instruments**.** However, there are two issues regarding the use instruments. Two show that 2SLS (2 stage least square) technique would provide better results than simple OLS (ordinary least square

technique), the instruments should be correlated with the endogenous independent variable to explain variation in it in manner that the endogenous independent variable is not correlated with error term in the main model. In other words, a good instrument, even if it is weakly related with its endogenous independent variables should pass the relevance test and endogienty test to begin with.

> 'Archimedes said. "Give me the place to stand, and a lever long enough, and I will move the Earth" (Hirsch, Kett, and Trefil, 2002: 4476). Economists have their own powerful lever: the instrumental variable estimator. The instrumental variable estimator can avoid the bias that ordinary least squares suffer when an explanatory variable in a regression is correlated with the regression's disturbance term. But, like Archimedes' lever, instrumental variable estimation requires both a valid instrument on which to stand and an instrument that isn't too short (or "too weak")' (Murray, 2006; 111)

2SLS for equation (2.1) has been run on 3 broad specifications: specification (1) Openness or Trade policy + Institutions + Human Capital + Physical Capital; Specification (2) Openness or trade policy + Institutions + Human Capital; and Specification (3) openness or trade policy + Institutions. As part of the 2SLS analysis, first stage regressions are run and it would be interesting to know what information the first stage results reveal regarding the explanatory power of the instruments. Table 2.4 suggests that the respective instruments carry the right signs for the proxies of integration and institutions. In some cases when the instruments carry the wrong signs, they are also insignificant. The (*FR*) instrument is statistically significant for all openness variables and four out of six trade policy variables. Although (*FR*) is not significant for all trade-policy variables, there is a strong one-to-one correlation between trade policy and (*FR*) instrument because the former variable always enters the trade policy equation with a right sign. Similarly, *ENG* and *EUR* come out as sound instruments for institutions, and generally they have been significant and always with a right sign. Similarly, *Drop90* and *Schday* establish themselves as good instruments. Drop out rates decrease institutional quality and countries with high drop out rates also trade less with

rest of the world. Results show that countries with higher drop out rates would have greater levels of protection towards outside competition and average years of schooling decrease with increase in drop out rates. School day is generally insignificant as well as distance from the equator but they remain important instruments because first stage regressions which employ all instruments give higher values of R2.

According to Staiger and Stock (1997) rule of thumb, instrument is good if F-test for first stage regressions is equal to or greater than 10. Only at such higher values of F-statistic a test of relative 2SLS bias of weak instruments is found to confidently hold the validity of instrument at critical regions of 10% or less. Table 2.4 shows that for outcome based measures of trade barriers (openness), institutions and human capital F-statistic is much higher than 10, while for incidence based measure of trade barriers (trade policy), F-statistic is always less than 10. This may lead to the conclusion that the instruments do work well in former case but the same instruments do not work well to explain trade policy and at best are weak. One may note here that Staiger and Stock rule of thumb is a good way to determine the validity of instruments when there is only one instrument and one endogenous independent variable. According to Stock and Yogo (2002), when the number of instruments is moderate or large as in our case, the critical values for relative bias of weak instrument are much larger than to fall under 10% (F-statistic) criterion which has been established by Staiger and Stock rule of thumb. First stage F-statistic does not provide substantial assurance that size distortion for (more than one) instruments in the model is controlled for. The size distortion is evidently present in first stage results as one can see from table 2.4. For many trade policy variables, most instruments actually work well even if the main instrument is weak (e.g. *Lfrkrom*). More importantly, relying completely on F-test statistic for first stage may lead to spurious inferences regarding the power of instruments because instruments may also be sensitive to other parameters and factors in the equation such as the very degree of endogeniety of the explanatory variables (Cruz and Moreira, 2005).

Since it quite difficult to find instruments especially in cross sections analysis which are exogenous and also relevant, weak instruments have been a great cause of interest in literature and many strategies to cope with the problem of weak instruments have been proposed which suggest a use of higher order asymptotic test techniques (Staiger and Stock, 1997; Hahn and Hausman, 2002; Cruz and Moreira, 2005). By utilising a higher order asymptotic framework, Staiger and Stock (1997) finds out that weak instruments work well even when the first stage F-statistic is quite small (less than 10). Staiger and Stock (2002) makes it further easier by running second order asymptotics based on Cragg-Donald (1993) test for the weak instruments and provide critical values to that effect where 2SLS bias is approximating to 0 and weak instruments pass the relevance criterion.

The Cragg-Donald (1993) type higher order asymptotic test can be undertaken when the second stage of the analysis is included where endogenous independent variables are expected to exogenously determine the dependent variable. For such regressions, 2SLS bias should be small and lie under the Cragg-Donald critical values to establish the validity of IV. To test for exogeniety of instruments, over identification test is carried out. The presence of over identification may indicate towards endogeniety which can be either directly running from instruments to the error term or it can be running from the variables which have been instrumented for to the error term. In both cases, with the presence of endogeniety in the estimation of the model, the purpose of utilizing instrumental variable technique would fail and simple OLS would become a preferred regression model.

Yet there is another statistical issue which has to be addressed simultaneously. It is an omnipresent problem of heteroskedasticity:

> Although the consistency of the IV coefficient estimates is not affected by the presence of heteroskedasticity, the standard IV estimates of the standard errors are inconsistent, preventing valid inference. The usual forms of the diagnostic tests for endogeneity and overidentifying restrictions will also be invalid if heteroskedasticity is present. These problems can be partially addressed through the use of heteroskedasticity-consistent or "robust'

> standard errors and statistics. The conventional IV estimator (though consistent) is, however, inefficient in the presence of heteroskedasticity. (Baum, Schaffer and Stillman, 2003: 1)

In table 2.5, multiple tests are carried out to determine the relevance and exogeniety of instruments. Heteroskedasticity robust IV coefficients are obtained. In addition to Sargan test for over identification, Hansen J test is run which provides heteroskedasticity robust estimates. There is no difference between Sargan test estimates and Hansen J test estimates. Due to space limitations, Sargan test results are discussed. Sargan test is a more familiar test of over-identification restrictions on instruments.

Note that table 2.5 provides results for selected number of cases for which 2SLS regressions are run on eq. 2.1. These cases are clearly mentioned in the table and provide a good over view of the performance of instruments for specifications where other combinations of the proxies for openness/ trade policy, institutions and human capital enter the regression model. There are some cases where human capital is absent. All such cases represent specification 3 of our main model. (For specification 3, detailed tests on the validity of institutions based on IV criterion are available in chapter 4).

Anderson and Rubin (AR) (1949, 1956) provide tests for the joint significance of endogenous regressors. Table 2.5 presents F-statistic for AR tests, which are significant for all specifications indicating that instruments do a good job in explaining the endogenous regressors. Second order asymptotic analysis undertaken by Staiger and Stock (1997) reveal that Cragg and Donald (1993) type higher order asymptotic testing was necessary to establish the statistical validity of instruments. Cargg Donald statistical tests show that all but equations 2, 3, 6, 8 and 14, have passed the 2SLS minimal bias criterion and significantly different than OLS. Largely instruments pass the relevance criterion. Over-identification test reveals that for equations 1, 5, 7, 8, 10, 11 and 14, instruments are not exogenous to the error terms. One commonality which can be found in these results is that endogeniety is generally found between instruments and error terms, when rule of law (*Rl*) has entered into the equation with the combination of nominal trade shares (*Lcopen*).

Table 2.4

First stage regression results for instrumental variables

First Stage Results

	Nominal Trade share (Icopen)	Import pene-trations 1985 (Impnov85)	TARS trade penetration 1985 (Tar-shov85)	Import duties as % Imports (Tariffs)	Tariffs on international inputs and capital goods (Owti)	Trade taxes (Txtrdg)	Weighted average of total import charges 1985 (Totimpov85)	Non trade barriers (Owqi)	Non tariff barriers 1987 (Ntarov87)
Lfrkrom	0.586	0.589	0.512	-1.919	-0.085	0.006	-15.86	-0.0313	-13.07
	(10.92)***	(8.43)***	(8.03)***	(-1.38)	(-1.85)*	(1.48)	(-2.44)**	(-0.74)	(-2.29)**
Engfrac	0.41	0.558	0.266	-3.14	0.028	0.021	17.26	-0.067	48.98
	(1.99)**	(2.18)***	(1.44)	(-0.64)	(0.37)	(1.45)	(1.03)	(-0.13)	(1.76)*
Eurfrac	-0.061	-0.143	0.074	-4.80	-0.098	-0.028	-11.08)	-0.011	-42.80
	(-0.51)	(-0.85)	(0.49)	(-1.64)*	(-1.6)*	(-2.28)**	(-1.03)	(-0.13)	(-3.7)***
Drop90	-0.006	-0.006	-0.009	0.075	0.001	0.0005	0.284	0.001	0.378
	(-2.64)***	(-2.06)**	(-3.4)***	(1.21)	(1.65)*	(1.67)*	(2.00)**	(0.73)	(1.54)
Schday	-0.002	0.002	-0.001	0.037	0.001	0.001	-0.062	0.0009	0.084
	(-0.96)	(0.78)	(-0.23)	(0.45)	(0.13)	(0.05)	(-0.38)	(0.63)	(0.28)
Disteq	-0.008	0.001	-0.0028	-0.129	-0.001	-0.0004	0.259	-0.001	0.022
	(-2.89)***	(0.00)	(-0.84)	(-1.87)*	(-1.29)	(-1.35)	(1.15)	(-0.10)	(0.05)
N	87	72	72	70	70	45	51	69	51
F	24.96***	16.12***	15.20*	5.95***	4.66***	5.45***	2.11*	0.96	3.61**
R2	0.65	0.598	0.583	0.24	0.25	0.37	0.31	0.04	0.20

First Stage Results

	Sachs and Warner open-ness 1980 (Open80s)	Leamers openness 1980 (Leamer80s)	Voice and Accountability (Va)	Political Stability (Ps)	Government Effectiveness (Ge)	Regulatory Quality (Rq)	Rule of law (Rl)	Control for Corruption (Ctc)	Average Years of Schooling 1999 (Sch99)
Lfrkrom	0.171	-0.102	0.198	0.126	0.155	0.043	0.157	0.229	-0.026
	(2.10)**	(-1.34)	(1.85)*	(1.39)	(1.92)**	(0.72)	(2.01)**	(2.66)***	(-0.12)
Engfrac	-0.098	-0.005	0.324	-0.024	0.034	-0.136	-0.035	0.479	0.502
	(-0.30)	(-0.02)	(1.59)	(-0.09)	(0.11)	(-0.86)	(-0.10)	(1.57)	(0.56)
Eurfrac	0.156	-0.134	0.888	0.701	0.666	0.835	0.578	0.478	2.341
	(0.89)	(-0.80)	(5.04)***	(3.84)***	(4.37)***	(5.93)***	(3.60)*	(3.16)***	(4.62)***
Drop90	-0.001	-0.005	-0.009	-0.013	-0.015	-0.01	-0.019	-0.013	-0.053
	(-0.04)	(-1.34)	(-2.80***	(-3.4)***	(-3.8)***	(-2.9)***	(-4.9)***	(3.67)***	(-5.2)***
Schday	-0.0002	-0.001	-0.004	0.001	0.003	-0.003	0.001	0.004	0.01
	(-0.06)	(-0.39)	(-0.38)	(0.45)	(0.71)	(-0.77)	(0.43)	(0.92)	(0.94)
Disteq	0.008	0.009	0.024	0.026	0.022	0.009	0.024	0.027	0.081
	(1.99)*	(2.04)**	(5.12)***	(4.89)***	(4.05)***	(2.58)***	(5.06)***	(5.06)***	(5.78)***
N	48	41	88	84	85	87	87	86	87
F	2.16**	3.36**	31.76***	27.64***	25.42***	17.21***	37.53***	26.54*	32.48*
R2	0.22	0.42	0.56	0.52	0.57	0.45	0.66	0.62	0.65

- t- Values in the parenthesis. ***, **, * denotes significance at 1%, 5 % and 10% levels respectively

Table 2.5
Multiple Tests for the Relevance and Quality of Instruments for LnY

Eq.	Endogenous Dependent Variable: Difference in Per-capita GDP at PPP, 2000 (LnY)	Relevance					Exogeneity
		N	1st Stage het-eroske-dasticity-robust	Maximal 2SLS Bias (b)	Cragg-Donald N*minEval stat. Chi-sq(3)	Anderson-Rubin test of joint signifi-cance of endogenous regressors F-Statistic	Sargan statistic (overi-dentification test of all instru-ments) Chi-Sq(2)
Endogenous Independent Variables : Openness, Institutions, Human Capital (Instruments= Disteq, Lfrkrom, Engfrac, Eurfrac)							
1	Nominal Trade Shares, Voice and Accountability, Average Years of School-ing, 1999 (Lcopen, Va, Sch99)	88	Robust	0.009	11.58**	20.12***	8.146*** (0.017)
2	Nominal Trade Shares, Political Stability, Average Years of Schooling, 1999 (Lcopen, Ps, Sch99)	84	Robust	0.74	1.23	18.48***	0.129 (0.93)
3	Nominal Trade Shares, Government Effectiveness, Average Years of Schooling, 1999 (Lcopen, Ge, Sch99)	85	Robust	0.88	0.64	18.84***	0.149 (0.92)
4	Nominal Trade Shares, Regulatory Quality, Average Years of Schooling, 1999 (Lcopen, Rq, Sch99)	87	Robust	0.013	10.63**	19.81***	2.85 (0.24)
5	Nominal Trade Shares, Rule of Law, Average Years of Schooling, 1999 (Lcopen, Rl, Sch199)	87	Robust	0.39	2.99**	19.81***	13.37*** (0.001)
6	Nominal Trade Shares, Control for Corruption, Average Years of Schooling, 1999 (Lcpopen, Ctc, Sch99)	86	Robust	0.81	0.97	19.35***	0.24 (0.88)
7	Import Penetration, 1985, Rule of Law, Average Years of Schooling, 1999 (Impnov85, Rl, Sch99)	72	Robust	0.34	3.29**	14.07***	9.91*** (0.007)
8	TARS trade Penetration, 1985, Rule of Law, Average Years of Schooling, 1999 (Tarshov85, Rl, Sch99)	72	Robust	0.51	2.31**	14.07***	11.29*** (0.003)

Eq.	Endogenous Dependent Variable: Difference in Per-capita GDP at PPP, 2000 (LnY)	Relevance					Exogeneity
		N	1st Stage het-eroske-dasticity-robust	Maximal 2SLS Bias (b)	Cragg-Donald N*minEval stat. Chi-sq(3)	Anderson-Rubin test of joint signifi-cance of endogenous regressors F-Statistic	Sargan statistic (overi-dentification test of all instru-ments) Chi-Sq(2)
Endogenous Independent Variables: Trade Policy, Institutions, Human Capital (Instruments= Disteq, Lfrkrom, Engfrac, Eurfrac, Dr op90, Schday)							
9	Import duties, Rule of Law, Average Years of Schooling, 1999 (Tariff, RI, Sch99)	70	Robust	0.28	3.77**	13.20***	5.91*** (0.05)
10	Tariffs on International Inputs and Capital Goods, Rule of Law, Average Years of Schooling, 1999 (Owti, RI, Sch99)	70	Robust	0.29	3.68**	16.09***	6.98*** (0.03)
11	Trade Taxes, Rule of Law, Average Years of Schooling, 1999 (Txtrdg,RI, Sch99)	45	Robust	0.18	4.88**	8.65***	2.07 (0.35)
12	Weighted Average of Total import Charges, 1985, Rule of Law, Average Years of Schooling, 1999 (Totimpov85, RI, Sch99)	52	Robust	0.019	9.91**	5.55***	4.602
13	Non Trade Barriers, Rule of Law, Average Years of Schooling, 1999 (Owqi,RI, Sch99)	69	Robust	0.84	0.84	15.54***	7.86*** (0.01)
14	Non Tariff Coverage, 1987, Rule of Law, Average Years of Schooling, 1999 (Ntarfov87, R, Sch99)	51	Robust	0.13	5.55**	9.92***	3.73 (0.15)
15	Sachs and Warner Openness, 1980, Rule of Law, Average Years of Schooling, 1999 (Open80s, RI, Sch99)	48	Robust	0.19	4.69**	14.17***	3.15 (0.20)
16	Leamers Openness, 1980; Rule of Law, Average Years of Schooling, 1999 (Leamer82, RI, Sch99)	41	Robust	0.23	4.29**	5.66***	2.39 (0.30)

- t- Values in the parenthesis. ***, **, * denotes significance at 1%, 5 % and 10% levels respectively

Table 2.6

OLS Results for Openness/ Trade Policy, Institutions and Human Capital

OLS: Dependent Variable: lnY

Independent Variables : Openness, Institutions, Human Capital								
	1	2	3	4	5	6	7	8
Nominal Trade Shares (Lcopen)	0.04	0.011	0.004	0.061	-0.036	-0.004		
	(0.45)	(0.13)	(0.05)	(0.70)	(-0.43)	(-0.05)		
Import Penetrations (Impnov85)							0.003	
							(1.15)	
TARS trade penetration (Tars85)								0.002
								(1.53)
Voice and Accountability (Va)	0.197							
	(2.38)**							
Political Stability (Ps)		0.265						
		(2.73)***						
Government Effectiveness (Ge)			0.292					
			(2.93)***					
Regulatory Quality (Rq)				0.376				
				(3.31)***				
Rule of law (Rl)					0.923		0.2591	0.247
					(4.39)***		(2.50)***	(2.29)**
Control for Corruption (Ctc)						0.258		
						(2.32)***		
Ave. Years of Schooling (Sch99)	0.258	0.251	0.237	0.232	0.217	0.245	0.243	0.239
	(9.17)***	(9.91)***	(8.14)***	(8.77)***	(8.59)***	(8.05)***	(8.505)***	(8.51)***
Disteq	0.148	0.012	0.013	0.017	0.0091	0.012	0.012	0.013
	(3.70)***	(2.79)***	(3.26)***	(4.78)***	(2.35)***	(2.85)***	(3.23)***	(3.54)***
N	97	92	93	96	96	94	77	77
F-statistic	149.2*	116.95***	124.68***	162.18***	145.62***	123.95***	138.54***	136.59***
R-Square	0.83	0.82	0.82	0.83	0.84	0.82	0.84	0.85

Independent Variables: Trade Policy, Institutions, Human Capital								
	9	10	11	12	13	14	15	16
Import duties (Tariffs)	-0.015 (-2.78)***							
Tariffs on intermediate inputs and capital goods (Owti)		-0.496 (-2.68)***						
Trade taxes (Txtrdg)			-6.68 (-3.9)***					
Total import charges (Totimpov85)				0.0007 (0.19)				
Non trade barriers (Owqi)					0.082 (0.31)			
Non tariff barriers						-0.006 (-3.5)***		
Sachs and Warners Openness (Open80s)							0.173 (1.14)	
Leamers Openness (Leamer82)								0.232 (1.53)
Rule of Law (Rl)	0.41 (4.46)***	0.294 (2.62)***	0.497 (4.94)***	0.304 (2.32)**	0.328 (2.87)***	0.243 (2.16)**	0.179 (1.42)	0.528 (5.97)***
Average Years of Schooling (Sch99)	0.201 (7.14)***	0.233 (6.81)***	0.153 (3.71)***	0.269 (7.15)***	0.244 (7.52)***	0.246 (6.96)***	0.282 (7.91)***	0.107 (3.12)***
Disteq	0.008 (2.35)**	0.011 (2.71)***	0.003 (1.16)	0.011 (2.25)**	0.10 (2.65)***	0.013 (2.54)***	0.008 (1.71)*	0.004 (1.56)*
N	78	74	47	54	73	54	52	42
F-statistic	115.48***	130.3***	120.0***	36.2***	111.85***	47.6***	110.48***	90.84***
R-Square	0.86	0.84	0.89	0.70	0.84	0.76	0.86	0.89

- t- Values in the parenthesis. ***, **, * denotes significance at 1%, 5 % and 10% levels respectively

Quite interestingly, IV analysis by Rodrik at al (2004) with *Rl* and *Lcopen* fail to pass several over-identification tests:

> … the instruments for the IV regressions in the 137-country sample fail to pass the over-identification tests despite the well known problems of these tests having low power. Indeed, this turns out to be true not just for the core specifications, but for many of the robustness tests (Ibid; 143).

The author on the other hand finds that IV analysis pass over identification tests for trade policy. 2SLS Bias obtained from Cargg-Dolad critical values also pass the relevance test of instruments for trade policy. This is interesting results in comparison to the first stage F-statistics provided in table (2.4), where F-statistics have been higher for Openness variables passing Staiger and Stock rule of thumb; while all trade policy variables failed this criterion. Our results complement the assertion of Stock and Yogo (2004) and Cruz and Moreira (2005) that a higher order asymptotic test is necessary to ensure the statistical validity of weak instruments and Staiger and stock rule of thumb may result in misleading statistical inference where instruments are large or moderate in number. Despite low values of F-statistic for trade policy proxies, instruments explain them well by passing higher order asymptotic tests for relevance and exogeniety.

2.3.2 Similarities between Our OLS and Rodrik et al.'s (2004) IV Analysis

Results in table 2.5 show that there are some instances of a presence of high 2SLS bias in favour of OLS, especially in case of such specifications where openness instead of trade policy enters into equation (2.1). Simple OLS regressions are run and results are provided in table 2.6. The results present an interesting picture in light of Rodrik et al (2004).

OLS results are obtained for reduced form of equation 2.1 where human capital is present in addition to institutional and openness/ trade policy proxies and minus physical capital. (Table 2.6) For all cases, whenever openness enters into the equation, it is insignificant. This is a similar result to Rodrik et al (2004), when they instrumented rule of law

with settler mortality rate. They also find that openness variable has become insignificant and in further robustness checks, it has entered the equation with the wrong sign. Table 2.6 reveals a similar pattern in our OLS analysis. If their IV estimates suffer from the problem of endogeniety, our OLS analysis and their IV analysis have given similar results for institutions and openness because settler mortality closely related with the human capital settlers brought to the settlements. According to Glaeser et al (2004a), settler mortality explains human capital formation in the settlements instead of institutions. If that is indeed the case, it is the effect of human capital formation which has been driving the results for Rodrik et al (2004) IV analysis. In this respect, our OLS regressions correspond to their IV. If settler mortality has increased the significance of institutions and caused openness to loose its significance in Rodrik et al (2004), *Sch99* has done the same to our OLS regressions. The correlation between settler mortality (the proxy of human capital), rule of law and income differences would capture a similar effect in IV than if a linear relation ship is sought between Sch99 (proxy of human capital), rule of law (or other institutional outcome) and income difference under an OLS.

Results in table 2.6 also show that import duties (*Tariffs*), tariffs (*Owti*), trade taxes (*Txtrdg*) and NTBs (*Ntarfov87*) are significantly and negatively related with income differences. A higher coefficient of *Txtrdg* means that more integration with rest of the world through decrease in trade taxes (i.e., export taxes) is at least as relevant as developed human capital or strong institutions. However, only in coming lines the statistical validity can really be established when results based on IV analysis are discussed and similar comparisons between openness/trade policy, institutions and human capital are drawn.

2.3.3 Our IV Analysis

Before proceeding to second stage regressions, it is necessary to examine how predicted values of openness and institutional variables relate to per-capita income in a linear framework to understand the coming results better. Figure 2.2 provides graphical representations of linear relationship

Figure 2.2 *Responsiveness of Income*

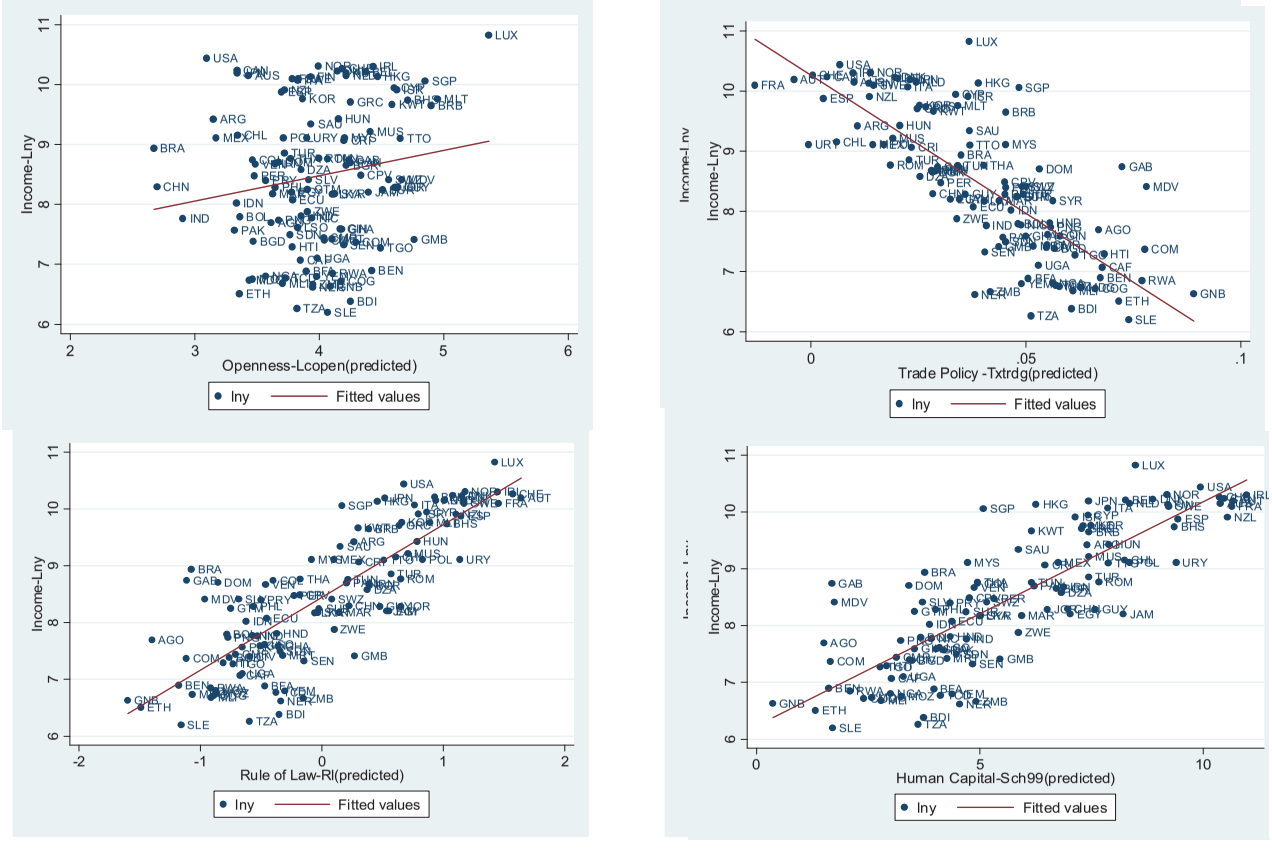


Table 2.7
Second stage regression results for per-capita income under the complete set of specifications

Independent Variables	Specification	Significant	Right Sign	Significant and Right Sign
Openness				
Nominal trade shares (Lcopen)	1	2 out of 6	1 out of 6	0 out of 2
	2	0 out of 6	0 out of 6	None
	3	1 out of 6	1 out of 6	1 out of 1
Import penetrations (Impnov85)	1	0 out of 6	1 out of 6	None
	2	0 out of 6	2 out of 6	None
	3	4 out of 6	0 out of 6	None
TARS trade penetration (Tarshov85)	1	0 out of 6	1 out of 6	None
	2	0 out of 6	0 out of 6	None
	3	4 out of 6	0 out of 6	None
Trade Policy				
Import duties as % Imports (Tariffs)	1	0 out of 6	5 out of 6	None
	2	0 out of 6	5 out of 6	None
	3	0 out of 6	6 out of 6	None
Tariffs on international inputs and capital goods (Owti)	1	0 out of 6	4 out of 6	None
	2	0 out of 6	5 out of 6	None
	3	0 out of 6	3 out of 6	None
Trade taxes (Txtrdg)	1	5 out of 6	6 out of 6	4 out of 4
	2	5 out of 6	6 out of 6	5 out of5
	3	3 out of 6	4 out of 6	3 out of 3
Weighted average of total import charges (Totimpov85)	1	0 out of 6	0 out of 6	None
	2	0 out of 6	0 out of 6	None
	3	0 out of 6	0 out of 6	None
Non trade barriers (Owqi)	1	0 out of 6	3 out of 6	None
	2	0 out of 6	5 out of 6	None
	3	0 out of 6	3 out of 6	None
Non tariff barriers (Ntarov87)	1	0 out of 6	4 out of 6	None
	2	0 out of 6	5 out of 6	None
	3	1 out of 6	4 out of 6	1 out of 1
Sachs and Warner openness (Open80s)	1	0 out of 6	6 out of 6	None
	2	3 out of 6	6 out of 6	3 out of 3
	3	1 out of 6	5 out of 6	1 out of 1
Leamers openness (Leamer80s)	1	0 out of 6	6 out of 6	none
	2	1 out of 6	6 out of 6	1 out of 1
	3	1 out of 6	2 out of 6	1 out of 1
Institutions				
Voice and Accountability (Va)	1	2 out of 11	9 out of 11	2 out of 2
	2	2 out of 11	9 out of 11	1 out of 1
	3	11 out of 11	11 out of 11	11 out of 11
Political Stability (Ps)	1	6 out of 11	11 out of 11	6 out of 6
	2	11 out of 11	11 out of 11	11 out of 11

	3	11 out of 11	11 out of 11	10 out of 10
Government Effectiveness (Ge)	1	1 out of 11	9 out of 11	1 out of 1
	2	1 out of 11	9 out of 11	1 out of 1
	3	11 out of 11	11 out of 11	11 out of 11
Regulatory Quality (Rq)	1	7 out of 11	11 out of 11	7 out of 7
	2	7 out of 11	11 out of 11	7 out of 7
	3	10out of 11	11 out of 11	10 out of 10
Rule of law (Rl)	1	2 out of 11	10 out of 11	2 out of 2
	2	1 out of 11	7 out of 11	1 out of 1
	3	10 out of 10	11 out of 11	10 out of 10
Control for Corruption (Ctc)	1	0 out of 11	2 out of 11	None
	2	0 out of 11	3 out of 11	None
	3	9 out of 11	11 out of 11	9 out of 9
Average Years of Schooling (Sch99)	1	51 out of 66	55 out of 66	51 out of 51
	2	57 out of 66	60 out of 66	57 out of 57
Physical Capital (Pk)	1	1 out of 66	49 out of 66	1 out of 1

- Standard errors corrected for as run Durbin–Wu–Hausman test (augmented regression test) for endogeneity (see Davidson and MacKinnon. 1993)
- Table illustrates results for Eq. (2.1) under various general specifications. i.e., specification 1: openness or trade policy + Institutions + Sch99 +Pk. Specification 2: openness or trade policy + Institutions + Sch99. Specification 3: openness or trade policy + Institutions
- Note that specification 3 corresponds to the one adopted by Rodrik et al. (2004) for their growth equation

of per capita income (lnY) with openness (*Lcopen*), trade policy (*Txtrdg*), rule of law (*Rl*) and human capital (*Sch99*). The use of instrumental variables provides a clear picture of openness/ trade policy, institutions and human capital with regard to income. Trade taxes, which were found to be highly significant in OLS analysis, show a steeper slope showing higher responsiveness of income to a decline in trade taxes. Increase in general trade levels (openness) may also lead to a positive effect on income but the responsiveness is less steep. The difference of slope for *Lcopen* and *Txtrdg* can be attributed to the fact that level of trade, as against a direct measure of trade policy, is capturing omitted variable effect. There is also presence of strong and positive responsiveness in income for increases in human capital (*Sch99*) and institutions (*Rl*).

Moving on to the second stage regression analysis, Table 2.7 provides the results for per-capita income equation for 11 openness/trade policy variables, 6 institutional proxies and human capital. The researcher employed three general estimation specifications for right-hand side vari-

ables (see appendix for data definitions and details). In specification 1, this researcher combined openness or trade policy indicators with institutions as well as human and physical capital; specification 2 contains openness or trade policy indicators along with institutions and human capital but not physical capital; and specification 3 corresponds to Rodrik et al. (2004) where trade policy or openness indicators juxtaposed against institutions minus human capital and physical capital. Specification 1 and specification 2 represent a richer model since both contain role for human capital in explaining per-capita income differences across nations.

The first observation, which can be made in table 2.7, is that only for specification 3, which corresponds to the specification followed by Rodrik et al. (2004); the results are also similar to their study. Institutions clearly trump openness and trade policy, as they have been highly significant in most cases. In contrast to institutional proxies, openness variables remained generally insignificant and if significant, mostly entered eq. (2.1) with a wrong sign. Trade policy variables also remained insignificant under specification 3 with the exception of trade taxes, which are significant in at least 3 out of 6 cases.

However, for specifications 1 and 2, where human capital enters Eq. (2.1), the results present a different picture and challenge the position taken up by Rodrik et al. (2004) apropos the inconsequential role of trade in economic development in the face of stronger institutions. For specifications 1 and 2, institutions are also insignificant. Compared to specification 3, the frequency of insignificance for openness reaches nearly 100 per cent in specifications 1 and 2 when human capital is considered. Openness proxies are insignificant, as well as have the wrong signs in most cases. The insignificance of openness proxies capturing the level of trade or movements in terms of trade is not surprising. These results are in accordance with the findings of Dollar and Kraay (2002) and Rodrik (1998), who suggest that the correlation of trade levels and growth performance is at best weak in the end. The results of this paper reinforce this fact in a more comprehensive manner, as it provides additional specifications to the per-capita income equation by including hu-

man capital and physical capital. Particularly, the inclusion of human capital improved the explanatory power of this model, as is evident from higher R^2 values (consult table 2.8 and 2.9 for R^2 values). As far as the trade policy variables are concerned, they are significant in some cases and the frequency of significance is much higher when compared to openness variables. Although trade policy indicators too can have wrong signs,[3] unlike Rodrik et al. (2004) where in many instances openness variables show significance but carry wrong signs, trade policy variables, which carry incorrect signs, are generally insignificant. With the exception of *Totimpov85,* other trade policy variables always enter Eq. (2.1) with right signs whenever they are significant. *Tariffs, Owti, Owqi* and *Ntarov87* also show wrong signs but in such instances, they have also been insignificant. In fact, *Owqi,* which has highest frequency of wrong signs next to *Totimpov85,* remains insignificant under all specifications and with any of the institutional combinations. By contrast, *Txtrdg,* which is the most significant trade policy variable, always enters the equation with a right (negative) sign showing that trade policy does matter and trade restrictiveness (export taxes) indeed lowers per-capita income or growth.

It is also important to understand why some trade policy variables have the wrong signs or are insignificant, when others have passed the test by emerging as significant contributors to economic success. With regard to the insignificance of import taxes, *Totimpov85* one can suggest that their contribution depends upon the composition of goods imported. Here as mentioned in data definitions, we know that data for *Totimpov85* and *Ntarfov87* is available for developing countries only. Thus this explanation must come in a developing country context.

For example, in a developing country the availability of technologically superior imported goods has positive effects on output and growth, but if imports are dominated by consumption goods, a reduction in import taxes may hamper growth potentials, and at a cost to the public exchequer. Rodrik (1998) supports this line of argument, as he found that changes in import taxes fail to influence growth in sub-Saharan African countries. According to Rodrik (1998), it is export taxes, which if low-

ered, contribute to growth. Esfhani (1991), however, provides contrary evidence. Lee (1995) found that there is a significant impact of imports on growth suggesting that import taxes do matter in affecting growth. Thus in the context of a cross-sectional study, it is wiser to examine the impact of overall trade taxes (import and export) instead of looking at any one of them, in order to gain a general insight into the workings of trade taxes apropos economic activity. According to Rodriguez and Rodrik (2000), overall trade taxes capture trade restrictiveness in a more complete manner than other trade policy proxies do, as it is comprised of both import and export taxes. Trade taxes include developed and developing countries in its sample and the results can be comparable to the larger sample of *Lcopen*.

Not surprisingly then, *Txtrg* (overall trade taxes) comes out to be the most important trade policy variable in our analysis and it shows significance in many instances in all three specifications (see Table 2.7). To be exact, *Txtrdg* is significant in four out of six cases in specification 1, five out of six cases in specification 2, and three out of six cases in specification 3. Note that trade taxes are most significant in specification1 and 2, where human capital enters the per capita equation. In comparison, many times it is observed that the institutional proxies enter eq. (2.1) insignificantly under the same specifications. This is again an important result if compared with the results obtained by Rodrik et al. (2004), where openness was generally insignificant and institutions (rule of law) have largely been highly significant at one per cent level of significance.

A Comparison of Trade Taxes (Txtrdg) with Trade Shares (Lcopen)

It is evident from the over all summary of the results presented in table 2.7 that out come based measures of trade barriers perform poorly in the regressions when compared to incidence based measures. To further validate this observation, a detailed analysis is presented in this section where performance of conventional measure of openness is analyzed against trade taxes under two general specifications 2 and 3.

Table 2.8 shows the results for *Lcopen* (openness) where it enters the per capita income equation with all six proxies of institutions one by one

with and without human capital *(sch99)* respectively. Out of 12 different cases, *Lcopen* is significant in only two of them and it carries a wrong sign in at least one of these two cases. In column 12, where openness enters with the wrong sign, the IV equation fails to pass over identification test as shown by the low P value highlighted in grey. In contrast, column 8 shows the only case where openness is significant and with the right sign, while the IV model also passes both over-identification test as well as relevance test as shown by high P values and minimal 2SLS bias respectively. Irrespective of this good result, both columns 12 and 8 represent model specification 3, where *Sch99* is not present in the equation. In presence of *Sch99*, *Lcopen* is always insignificant and institutions are insignificant in 4 out of 6 cases.

The very presence of human capital in combination with *Lcopen* and institutional proxies actually weakens the over all statistical validity of the model as for all instances when human capital has entered the equation in table 2.8, either the model fails over-identification test or it suffers from large 2SLS bias which favours OLS over IV. The poor results may indicate the problem of endogeniety which may go from *Lcopen* to human capital because of omitted variable bias retained by the model or endogeniety from institutions to human capital and which has not been captured by the instruments. On the hind side, employing a direct measure of trade policy may minimize the risk of omitted variable bias and at least the statistical validity of IV analysis would be more robust.

Trade taxes have been found to statistically and significantly explain differences in per capita income in presence of institutions and with and without human capital respectively. Trade taxes have already passed the relevance and endogeneity tests in table 2.5, where it enters eq. 2.1 with rule of law and *Sch99*.

A detailed analysis of trade taxes under general model specification 2 and 3 suggest that for 12 different cases presented in 12 different columns of table 2.9, there is not a single instance when the IV analysis had suffered from the problem of endogeniety. Evidently, trade taxes improve the statistical validity of IV analysis in comparison to conventional measure of openness. They are also significant in most cases and always enter

the per capita income equation with the right sign. However to really compare openness (*Lcopen*) and trade taxes (*Txtrdg*), similar samples have to be employed. Data for *Lcopen* is available for 170 countries and for *Txtrdg* the data is only available for 54 countries. Sample details of all countries for both variables are at the end of the manuscript. In order to compare results of *Lcopen* and *Txtrdg*, IV analysis on *Lcopen* is carried out for the reduced sample of countries corresponding to the countries for which data is available for *Txtrdg*. The results are presented in columns 13 to 18 of table 2.8. Reduced sample IV analysis for *Lcopen* is carried out for general model specification 2 only, where *Sch99* is regressed alongside openness and institutions. The results do not change in favour of openness. For reduced sample of countries also, *Lcopen* has been insignificant, and the IV model either fails over-identification tests or suffers from large 2SLS bias. One can confer from these results that if human capital is present in the model in combination with *Lcopen,* OLS gives more reliable results. Furthermore, the poor results for even reduced samples of *Lcopen* now strongly favours the use of incidence based measures for this kind of IV analysis on growth equations.

There is another way to look at these results. The one instance of significance of *Lcopen* with the right sign in column 8 (table 2.8) should also be highlighted. The specification for this result corresponds to large sample of Rodrik at (2004) where regressors are instrumented by *Engfrac* and *Eurfrac* and they always failed over identification test. Unlike their results, in our case *Lcopen* do not fail over identification test when it is significant. This also means that insignificance and wrong signs of *Lcopen* were more of an outcome of endogeniety in the analysis rather than signaling towards the validity of their results in Rodrik et al (2004).

Significance of Trade Policy

This thesis includes more specific proxies of trade restrictiveness (tariffs and non-tariff barriers), in an attempt to identify the optimal trade policy tools for policymakers. In Table 2.7, *Owti* (tariffs on intermediate inputs and capital goods) and *Owqi* (non-tariff barriers on intermediate inputs and capital goods) have been insignificant under all specifications

of the per-capita income equation and with any of the institutional combinations. Though *Ntarfov* (overall non-tariff barriers) shows significance for specification 3 when it enters the equation with rule of law, it does not say much about the role of non-tariff barriers (*NTBs*), as *Ntarfov* remains insignificant for the other five institutional proxies under the same specification. The insignificance of *TB* and *NTBs* does come as a surprise. Dollar and Kraay (2002) share this skepticism over the relevance of these measures of trade policy with the likes of Rodriguez and Rodrik (2000) and Frankel and Romer (1999). Perhaps this is why trade policy variables are virtually absent in the recent empirical debate over trade and institutions. For example, Frankel and Romer (1999), Acemoglu, Johnson and Robinson (2001), Alcala and Ciccone (2002), Dollar and Kraay (2002) and Rodrik et al. (2004) all tried to find partial effects of trade and institutions on per-capita income or its growth by taking into account only the general openness indicator (trade over GDP ratio). Many studies tried to capture the effects of trade policy on economic development: Sachs and Warner (1995), Edwards (1998) and Greenaway, Morgan and Wright (2002) are among the prominent studies that employed direct proxies of trade policies. They confirm that the countries with policy-induced barriers to international trade grow at a slower pace. Notwithstanding the important role of these studies in providing useful insights into the 'trade and growth' debate, they have two shortcomings. First, in light of recent evidence provided by Rodrik et al. (2004), and Dollar and Kraay (2002), their studies are likely to suffer from misspecification bias, as their growth equations do not account for institutions. Second, they assumed that trade policy is purely exogenous.

Wood (2004), commenting on the 'trade and growth' debate not only emphasized that a more convincing basis for trade policy recommendations could only be provided if trade policy variables are included in the regressions. He also pointed out that any such attempt should consider trade policy as an endogenous concept as no trade policy recommendations can be given without taking second best effects into account. This is because trade policies crucially depend on the functioning of domestic markets of any particular country, and if these are imperfect, second best

considerations enter the picture. The analysis here addresses the endogeneity of trade policy variables by regressing them on a set of instruments. Although the instruments remain general in nature, they do capture certain country specific characteristics. Moreover, as the per-capita, income equation has institutional proxies and human capital along with trade policy variables, the analysis goes a step further from previous cross-sectional studies, which attempted to gauge the effects of trade policy on economic development. Although some of the present trade policy variables are insignificant, certain trade proxies do appear that show that trade policy matters in determining economic prosperity. The importance of any such cases is self-evident because this thesis deals not only with trade policy as an endogenous concept. It includes institutions and human capital in the per-capita income determining equation, to avoid the misspecification bias that cross-section studies, including the recent ones by Rodrik et al. (2004) and Dollar and Kraay (2002), suffer. Overall, the results suggest that the general openness variables fail to explain per-capita income differences compared to direct proxies of the trade policy stance. For example, *lcopen*, *Impnov* and *Tarshov* show insignificance in all specifications, suggesting their weak relationship with income. By contrast, the results suggest that decreases in overall trade taxes are associated with strong improvements in economic performance.

The present work employs *composite* measures of openness that are really indices of the trade policy stance, as well as measures based on residuals, regressed with the six institutional concepts. Again, showing that, although significant in many instances, institutions are not the most significant factor in determining per-capita income differences. Here too, the evidence indicates that trade liberalization does matter as *Open80s* (the Sachs–Warner openness measures) enters Eq. (2.1) with a correct sign in 17 out of 18 cases including the ones it is significant for. Similarly *Leamer82* (Leamer's measure of trade restrictiveness based on residuals) is significant with regulatory quality under specifications 2 and 3 and generally enters Eq. (2.1) with a correct sign (see Table 2.7).

Table 2.8

Second stage regression results for Lcopen and institutions

	Dependent Variable: lnY											
	Complete sample of Lcopen (n = 170)											
Independent Variables	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Nominal Trade Shares (Lcopen)	0.027 (0.23)	0.036 (0.20)	-0.307 (-0.69)	-0.126 (-0.56)	-0.75 (-0.7)	-0.236 (-1.14)	0.104 (0.84)	0.389 (2.20)**	-0.021 (-0.10)	-0.237 (-1.02)	1.189 (0.88)	-0.406 (-1.8)*
Voice and Accountability (Va)	0.427 (1.79)*	1.070 (8.02)***										
Political Stability(Ps)			2.37 (1.51)	1.788 (5.27)***								
Government Effective-ness (Ge)					3.54 (1.08)	1.519 (6.08)***						
Regulatory Quality (Rq)							1.003 (2.69)***	1.486 (7.03)***				
Rule of law (Rl)									0.333 (0.63)	1.802 (4.85)***		
Control for Corruption (Ctc)											-2.81 (-0.85)	1.488 (5.57)***
Average Years of Schooling (Sch99)	0.272 (3.43)***		-0.194 (-0.39)		-0.528 (-0.4)		0.154 (1.69)*		0.293 (2.18)**		0.532 (0.85)	
Disteq	0.004 (0.62)	0.012 (2.34)**	-0.015 (-0.65)	-0.009 (-0.61)	-0.011 (-0.4)	0.001 (0.18)	0.014 (2.43)**	0.022 (3.97)***	0.002 (0.32)	-0.016 (-1.16)	1.077 (1.30)	-0.0004 (-0.04)
N	88	130	84	119	85	120	87	127	87	127	86	122
F-statistic	76.59***	78.99**	8.98***	24.95***	5.55	41.26***	63.01***	80.21***	89.54***	35.51***	6.27***	42.56***
R-Square	0.80	0.53	0.57	0.08	0.05	0.44	0.76	0.51	0.84	0.33	0.85	0.457
Maximal 2SLS Bias	0.009	0.000	0.746	0.005	0.886	0.000	0.013	0.000	0.393	0.002	0.80	0.000
Sargan (P)	0.017**	0.27	0.748	0.67	0.928	0.24	0.24	0.405	0.001***	0.128	0.88	0.021**

	Dependent Variable: lnY					
	Reduced Sample of Lcopen if (Dum Txtrdg, n=54)					
Independent Variables	13	14	15	16	17	18
Nominal Trade Shares (Lcopen)	0.077 (0.53)	-0.71 (-0.8)	-0.07 (-0.5)	0.071 (0.39)	-0.2 (-1.1)	0.246 (0.82)
Voice and Accountability (Va)	0.206 (0.68)					
Political Stability(Ps)		2.917 (0.97)				
Government Effective-ness (Ge)			0.666 (2.2)**			
Regulatory Quality (Rq)				1.459 (1.8)***		
Rule of law (Rl)					1.22 (2.0)**	
Control for Corruption (Ctc)						-0.50 (-0.73)
Average Years of Schooling (Sch99)	0.321 (3.1)***	-0.24 (-0.3)	0.131 (1.48)	0.061 (0.31)	0.041 (0.21)	0.543 (2.5)***
Disteq	0.004 (0.52)	-0.04 (-0.8)	0.004 (0.69)	0.011 (1.58)	-0.01 (-0.88)	0.009 (0.95)
N	45	43	43	45	45	44
F-statistic	37.7***	4.71	38.2***	23.95*** *	36.71**	21.7***
R-Square	0.816	0.39	0.83	0.70	0.81	0.69
Maximal 2SLS Bias	0.009	0.870	0.198	0.362	0.413	0.337
Sargan (P)	0.01***	0.777	0.08***	0.222	0.059	0.067

- t- Values in the parenthesis. ***, **, * denotes significance at 1%, 5 % and 10% levels respectively, Standard errors corrected for as run Durbin–Wu–Hausman test (augmented regression test) for endogeneity (see Davidson and MacKinnon. 1993)

Table 2.9

Second stage regression results for Txtrdg and institutions

	Dependent Variable: Log of Per-Capita Income					
Independent Variables	**19**	**20**	**21**	**22**	**23**	**25**
Trade Taxes (Txtrdg)	-18.14	3.293	-23.21	-23.248	-16.67	-9.514
	(-2.1)**	(0.21)	(-1.69)*	(-1.93)*	(-2.13)**	(-0.62)
Voice and Accountability (Va)	0.258	1.11				
	(0.65)	(2.72)***				
Political Stability			1.160	1.337		
(Ps)			(1.89)*	(3.16)***		
Government Effectiveness (Ge)					0.597	1.188
					(2.18)**	(3.53)***
Regulatory Quality (Rq)						
Rule of law (Rl)						
Control for Corruption (Ctc)						
Average Years of Schooling (Sch99)	0.1707		-0.056		0.035	
	(1.25)		(-0.34)		(0.33)	
Disteq	0.004	0.008	-0.011	-0.017	0.005	-0.007
	(0.51)	(0.94)	(-0.65)	(-1.07)	(0.75)	(-0.65)
N	45	52	43	50	43	50
F-statistic	34.69***	35.22***	19.50***	12.12***	32.23***	22.64***
R-Square	0.76	0.66	0.49	0.25	0.79	0.61
Maximal 2SLS Bias	0.20	0.13	0.46	0.08	0.13	0.06
Sargan (P)	0.143	0.311	0.97	0.507	0.24	0.244

	Dependent Variable: Log of Per-Capita Income					
Independent Variables	**25**	**26**	**27**	**28**	**29**	**30**
Trade Taxes (Txtrdg)	-12.261	2.38	-19.408	-22.135	-26.903	-21.909
	(-1.24)	(0.18)	(-2.16)**	(-2.10)**	(-1.77)*	(-2.20)**
Voice and Accountability (Va)						
Political Stability(Ps)						
Government Effectiveness (Ge)						
Regulatory Quality (Rq)	1.088	1.62				
	(1.48)	(2.96)***				
Rule of law (Rl)			0.751	1.281		
			(2.06)**	(2.68)***		
Control for Corruption (Ctc)					0.575	0.882
					(1.24)	(3.29)***
Average Years of Schooling (Sch99)	0.050		0.018		-0.022	
	(0.36)		(0.17)		(-0.10)	
Disteq	0.010	0.019	-0.0015	-0.021	0.004	-0.007
	(1.49)	(2.23)**	(-0.16)	(-1.19)	(0.36)	(-0.57)
N	45	52	45	52	45	51
F-statistic	63.76***	36.79***	53.34***	18.49***	23.68***	24.08***
R-Square	0.79	0.61	0.80	0.49	0.61	0.61
Maximal 2SLS Bias	0.52	0.198	0.18	0.074	0.48	0.043
Sargan (P)	0.14	0.361	0.33	0.257	0.36	0.143

- Values in the parenthesis. ***, **, * denotes significance at 1%, 5 % and 10% levels respectively, Standard errors corrected for as run Durbin–Wu–Hausman test (augmented regression test) for endogeneity (see Davidson and MacKinnon. 1993), Please also refer to Table 2.11, where give results for Eq. (2.5); Txtrdg, when compared with Lcopen is highly significant.

Here the significance and correct signs of *open80s* reinforces the importance of the overall trade policy stance, showing that even if tariffs and non-tariff barriers are unimportant at times, the composite trade policy package, especially taxes on exports and controls in the foreign exchange market can be crucial in explaining per-capita income differences across nations. However, according to the evidence provided by Rodriguez and Rodrik (2000), the Sachs-Warner composite measure (*open80*) mainly derives its strength from the combination of black market premia and the state monopoly of exports. A state monopoly on major exports captures cases in which governments tax major exports and therefore reduce the level of trade (exports and imports), and the black market premia captures foreign exchange restrictions as a trade barrier. Though Rodriguez and Rodrik (2000) accepted state monopoly of exports as an appropriate proxy of trade restrictiveness, they felt that black market premia was not a good choice as it is correlated with inflation, the debt/export ratio, wars and institutional quality and may simply capture the effect of widespread macroeconomic and political crisis. The IV regression analysis presented here solves the problem of endogeneity of black market premia by regressing *open80s* with sets of institutional and openness instruments. It may be, therefore, that both government monopoly over major exports and black market premia are robust proxies of trade restrictiveness.

Comparative relevance of different institutional concepts to income generation

This chapter has employed outcome based and some very general definitions of institutions capturing some of the key governance characteristics. To really differentiate between them is difficult. They are all proxies of good governance. Nevertheless, presence of six different identifications of the general definition of institutions does in the end brings about certain subtle differentiations between these proxies of good governance and which have been discussed by Kaufman et al(2003) in detail.

This section analyses the results on institutions and their apparent role in economic development, specification 3 in Table 2.10, which corre-

sponds to the Rodrik et al. (2004) specification and which supplements their assertion that institutional development is the key to economic development. As the six institutional proxies shown below have largely been significant when paired with any of the openness and trade policy variables under specification 3; it would be of interest to know which institutional concepts are relatively more relevant or more sensitive in explaining income differentials across countries.

Table 2.10 shows that regulatory quality is the most relevant institutional definition in determining economic performance as it has one of the highest coefficients in nearly all instances. The superiority of regulatory quality is self-evident because it captures the policy choices that dictate market outcomes. For example, it measures the incidence of market-unfriendly policies such as protection of imports, control on foreign ownership, obstacles to foreign bidders on public contracts, real personal tax as a burden to enterprise, real corporate tax as a disincentive for entrepreneurship, the legal framework as an obstacle to competitiveness, customs as an impediment to international trade, price controls and competition laws as obstacles to competition. The key to development may lie in market-friendly regulations through which the workings of financial and commercial institutions improve and adequate business development takes place amid increased competition. The importance of prudential regulation shows in the fact that many developing countries have done well, despite being autocratic states. China and South Korea are the prime examples in this regard. Glaeser et al. (2004a, 2004b) suggest that China, South Korea and Taiwan witnessed unprecedented increases in their growth rates under the reign of one-party dictatorships all due to the promotion of pro-market, pro-growth policies, securing property rights and securing competition.

Table 2.10
Institutional comparisons

	Voice and Accountability (Va)	Politcal Stability (Ps)	Government Effectiveness (Ge)	Regulatory Quality (Rq)	Rule of Law (Rl)	Control for Corruption (Ctc)
Control Variables						
(Lcopen)	1.037	2.132	1.375	1.546	1.837	1.181
	(4.52)***	(2.86)***	(4.04)***	(4.07)***	(2.76)***	(5.03)***
(Impnov85)	1.109	2.242	1.805	1.464	2.35	1.682
	(6.64)***	(3.53)***	(4.13)***	(6.44)***	(3.11)***	(3.71)***
(Tarshov85)	1.484	1.543	1.568	2.192	1.412	1.474
	(10.93)***	(9.84)***	(10.30)***	(10.73)***	(12.12)***	(9.34)***
(Tariffs)	1.23	1.357	1.354	1.683	0.811	0.885
	(1.64)*	(2.95)***	(2.19)**	(3.28)***	(2.16)**	(1.30)
(Owti)	1.456	1.481	1.701	1.928	1.341	1.491
	(6.37)***	(7.76)***	(5.94)***	(7.11)***	(8.38)***	(5.93)***
(Txtrdg)	1.110	1.337	1.188	1.62	1.281	0.882
	(2.72)***	(3.16)***	(3.53)***	(2.96)***	(2.68)***	(3.29)***
(Totimpov85)	1.113	1.906	2.417	1.542	1.821	2.434
	(5.31)***	(3.96)***	(3.88)***	(5.61)***	(4.27)***	(4.72)***
(Owqi)	1.46	1.481	1.701	1.928	1.341	1.490
	(6.37)***	(7.76)***	(5.90)***	(7.11)***	(8.38)***	(5.93)***
(Ntarfov87)	0.616	1.861	2.68	0.707	0.936	1.181
	(1.78)***	(2.24)**	(1.68)*	(1.09)	(1.73)*	(1.93)***
(Open80s)	1.085	1.3904	1.258	1.296	0.095	0.225
	(3.89)***	(2.63)***	(3.13)***	(2.92)***	(0.12)	(0.33)
(Leamer82)	0.983	1.094	0.951	1.387	0.9036	0.774
	(4.97)***	(2.54)***	(2.16)**	(3.59)***	(1.79)*	(1.75)*

t- values are in the parentheses. *, **, *** denotes significance at 1%, 5 % and 10% levels respectively, Control variables are in first column in paranthesis, Note: The above table provides IV regression coefficients of institutions under specification 3 of the per-capita income equation (Eq. 2.1). Note that specification 3, which only employs institutions and openness in order to explain income differences, is the one followed by Rodrik et al. (2004).

Following regulatory quality, government effectiveness is the relevant proxy. Again, this meets expectations because government effectiveness is very close to regulatory quality in the sense that the former focuses on inputs required for the government to produce and implement robust policies whereas the latter captures these policies itself. 'Government effectiveness' measures the quality of public service provision, the quality of bureaucracy, independence of civil service from political pressures, and credibility of the government's commitment to policies. In other words, it captures the efficient functioning of government machinery.

The third more relevant institutional concept is political stability. It actually captures political instability arising from conflict via armed con-

flict, social unrest, politically motivated violence or terrorist threats. Large-scale conflict in the contemporary world mainly takes the form of internal wars in developing countries. There have been more than 40 civil war episodes since the end of the cold war. These conflicts are a major cause of development failure, contributing to the persistence of poverty.

Rule of law and control for corruption follow political stability. Rule of law measures, respect for societal rules, and confidence in the supremacy of law and captures the public perception of the incidence of both violent and non-violent crime, the effectiveness and predictability of the judiciary, and the enforceability of contracts. In short, it accounts for the success of a society in developing an environment in which fair and predictable rules form the basis for economic and social interactions. On the other hand, control for corruption measures corruption within the legal, financial or economic system, which distorts the competitive environment, and reduces the efficiency of government and business by enabling people to abuse positions of power through bribes, patronage and nepotism.

Voice and accountability, corresponding to democracy, is the institutional proxy that would be comparatively less effective in explaining per capita income differences. It captures various aspects of the political process, civil liberties and political right and measures the transparency of political, commercial and legal institutions. The view of Barro (1996) is that democracy can positively affect growth when personal and political freedoms are very weak, but lowers growth when some liberties are already in place. This suggests a quadratic relationship between democracy and growth, it is first positive and then negative. Voice and accountability may matter less when government effectiveness, regulatory capacity and the rule of law are well established and function well. However, democracy may be of greater importance when these other factors are weak.

Does human capital also explain good institutions?

In the literature, there is already confusion among selection of growth regressors or instruments in growth regressions which may be considered

as proxies of institutions, but in reality may simply explain human capital formation. There are very close complementarities between a defined concept like human capital and relatively more elusive concepts like institutions. Good institutions, rather than anything else, mostly well developed societies and such societies comprise of more skilled work force. Better educated societies have better skills and also form strong institutional frameworks, whereas less educated societies suffer from many institutional failures. Though institutional failure can also happen in a society with better educated people, the probability of such is much lower when compared to a society comprised of less educated.

The presence of high degree of complementarities between human capital and institutions are evident in case of Settler Mortality, which is considered by AJR (2001) and Rodrik at al (2004) as good instrument to capture the historic trend of contemporary governance practices in developed and developing countries. While Glaeser et al (2004a) quite convincingly argued that settler mortality may capture differences in human capital better than differences in institutional development between cross section of countries.

In contrast to the results for specification 3 apropos institutional superiority over trade, specifications 1 and 2 include human capital, which brings us back to the work of Rodrik el al (2004). Rodrik and colleagues did not take into account human capital in their log of per-capita income equations and thus their analysis may have misspecification biases as can be seen from the very low R^2 values they get for their growth equations. The analysis here includes human capital, which significantly improves the explanatory power of the model as can be seen from highly significant F statistic and high R^2 in tables 2.8 and table 2.9. Furthermore, this study is in line with recent cross-sectional work on institutions and economic growth, which also brings human capital into the picture as an equally important determinant of economic development. (Glaeser et al. 2004a)

In comparison to the findings of Rodrik et al. (2004) regarding the pre-eminence of institutions over trade, in a better specified model (refer to specifications 1 and 2 in Tables 2.7, 2.8 and 2.9), this thesis indicates

that institutional superiority vis-à-vis trade policy has diminished. In many instances, institutions enter the per-capita equation insignificantly especially when human capital is present. Although institutions always carry right signs if significant, there have been many instances when they entered Eq. (2.1) with wrong signs too. For example in Table 2.7, voice and accountability, regulatory quality and control of corruption have the wrong (negative) sign whenever they enter the equation with overall non-tariff barriers (*Ntarfov*). Rule of law is also insignificant in many combinations with the 11 openness or trade policy variables for specifications 1 and 2, as well as entering with a wrong sign in some instances. This is an interesting finding in light of the Rodrik et al. (2004) paper, which employed the rule of law as the only proxy for institutions and then goes on to claim the superiority of institutions over openness. Although the present finding is that institutional superiority is somewhat retained in a per-capita income equation that has openness proxies, with the introduction of trade policy variables the superiority of institutions diminishes especially in the case of trade taxes and *open80s*.

One reason for insignificant values for institutions in specifications 1 and 2 could be because human capital influences economic development by improving the working of institutions, as suggested by Lipset (1960) and recently reemphasised in Glaeser et al. (2004a and 2004b). The current results support this finding that human capital mostly significant when it enters in eq. (2.1) under specifications 1 and 2, taking over from institutions in explaining differences in per-capita income (table 2.7). To investigate possible complementarities between institutions and human capital it is important to investigate the interrelationship between human capital formation and institutional quality further. To this effect, it was necessary to modify the current explanatory equation for per-capita income determination in Eq. (2.1), by including an interaction term to interact human capital with the six available concepts of institutional quality. The object is to determine the impact of human capital on institutional development, while at the same time accounting for and solving the endogeneity problems in institutions and human capital.

Table 2.11

Interaction between human capital and institutions

Independent Variables	Dependent Variable: Log of Per-Capita Income											
	1	2	3	4	5	6	7	8	9	10	11	12
Nominal Trade Share (Lcopen)	-0.115 (-0.79)	-0.181 (-0.78)	-0.399 (-1.47)	0.009 (0.06)	-0.323 (-1.92)*	-0.303 (-2.38)**						
Trade Taxes (Txtrdg)							-0.559 (-1.82)*	-16.72 (-1.90)*	-0.332 (-1.10)	-0.391 (-1.95)*	-18.63 (-2.49)**	-0.433 (-1.96)*
Voice and Accountability (Va)	-0.076 (-0.11)						-1.078 (-0.71)					
Political Stability (Ps)		2.11 (1.75)*						0.285 (0.62)				
Government Effectiveness (Ge)			2.53 (2.24)**						-0.019 (-0.02)			
Regulatory Quality (Rq)				0.132 (0.24)						1.59 (1.74)*		
Rule of law (Rl)					1.45 (2.02)**						0.945 (2.87)*	
Control for Corruption (Ctc)						0.164 (0.19)						-0.431 (-0.71)
Interaction(hk.va)	0.3037 (2.00)**						0.360 (1.21)					
Interaction(hk.Ps)		-0.136 (-0.58)						0.116 (1.17)				
Interaction(hk.Ge)			-0.204 (-0.97)						0.161 (0.81)			
Interaction(hk.Rq)				0.301 (3.38)***						-0.026 (-0.21)		

Interaction(hk.RI)					-0.04 (-0.27)						-0.04 (-0.47)	
Interaction(hk.Ctc)						0.232 (2.25)**						0.248 (1.68)*
N	85	83	84	84	84	84	42	42	42	43	43	43
F	51.13***	24.43***	14.38***	76.89***	47.43***	44.08***	10.68***	42.19***	24.93***	29.95	66.11***	18.78***
R2	0.57	0.03	0.07	0.62	0.66	0.67	0.59	0.81	0.76	0.65	0.83	0.67
Maximal 2SLS Bias	0.132	0.63	0.95	0.02	0.04	0.11	0.77	0.70	0.45	0.11	0.09	0.185
Sargan (P)	0.02**	0.23	0.36	0.003***	0.208	0.47	0.41	0.09*	0.09*	0.86	0.09*	0.28

- t- Values in the parentheses. *, **, *** denotes significance at 1%, 5 % and 10% levels respectively
- Standard errors are corrected for as run Durbin-Wu-Hausman test (augmented regression test) for endogeneity (see Davidson and MacKinnon. 1993)
- Further regressions run for Eq. (2.5), when *Open80s, Owti* and *Owqi* enter Eq. (2.1) alternatively as openness or trade policy proxies. The results, especially for interaction terms remain the same suggesting strong complementarities between institutions and human capital. However, results not stated here due to space limitations.

$$\log y_i = \ell + \hbar N_i + \lambda Tp_i + \zeta (Hk.N)_i + \tau Pk_i + Geo + \varepsilon_{2i} \quad (2.5)$$

$$N_i = \psi_{1i} + \hbar_1 Engfrac_i + \delta_1 Eurfrac_i + \kappa_1 FR_i + \varphi_1 Drop90 + \ell_1 Schday + \partial_1 Geo_i + \in_{Ni} \quad (2.6)$$

$$Tp_i = \psi_{2i} + \hbar_2 Engfrac_i + \delta_2 Eurfrac_i + \kappa_2 FR_i + \varphi_2 Drop90 + \ell_2 Schday + \partial_2 Geo_i + \in_{Ni} \quad (2.7)$$

$$(Hk.N)_i = \psi_{3i} + \hbar_3 Engfrac_i + \delta_3 Eurfrac_i + \kappa_3 FR_i + \varphi_3 Drop90 + \ell_3 Schday + \partial_3 Geo_i + \in_{Ni} \quad (2.8)$$

Here N_i and Tp_i are respectively the predicted values for institutions and integration, and $(Hk_t.N_i)$ is the interaction term, which treats each institutional variable as a dummy by assigning a score of 0 for negative values and 1 for positive values. The only difference between equation (2.1) and equation (2.5) is that in the latter case, human capital enters the per-capita difference equation as part of the interaction term. Since institutions enter the interaction term in dummy variable form, $(Hk_t.N_i)$ can be instrumented by $Drop90_i$ and $Schday_i$ as can be seen from eq. (2.8). Table 2.11 shows the results for eq. (2.5). The results confirm that institutions and human capital relate significantly to each other especially for voice and accountability, regulatory quality and control for corruption.

An important observation from table 2.11 is that interaction terms which are significantly related with per capita income differences always carry positive signs. The interaction model fails over identification tests in 5 out of 12 cases while 2SLS bias is large in 5 out of 12 cases and it is highlighted in grey. Interaction terms are significant in cases when IV analysis fails over-identification tests. This result is similar to Rodrik et al (2004), where problem of endogenienty persisted. Significance of interaction terms and presence of endogeniety indicates that institutions and human capital are complements and any improvement in human capital will promote institutional quality of the country and vice versa. Here it is clear that human capital is as important in explaining per-capita and growth differentials as institutions. This is in line with the findings of

Glaeser et al. (2004a) who concluded their study with following remarks, '… the existing research cannot convincingly show that institutions rather than human capital have a causal effect on economic growth.' (41)

In that respect this research addresses the 'institutional dilemma'[4] mentioned in Rodrik et al. (2004) finding that human capital and institutions are complements. Thus if institutional improvement is at the fore of the policymakers' priority list, investment in education is a prerequisite for meeting goals on the institutional front.

2.5 Conclusions and Policy Implications

Do institutions dominate international economic integration in explaining differences in per-capita income across countries? It is impossible to overemphasize the importance of institutions in determining the economic development of a country. Institutions, whether the rule of law, voice and accountability, political stability, regulatory quality, control of corruption or government effectiveness, are all prerequisites for development and are the catalyst for the success of any development strategy. The fact remains that institutions or institutional development is a long-term phenomenon, and is not an objective policy concept for short-term economic strategies to achieve higher economic growth. That is why even after finding institutions rule over integration, Rodrik et al. (2004) appropriately conclude their paper with following the following heading:

> '*The Hard Work is still Ahead:* How much guidance do our results provide to policy makers who want to improve the performance of their economies? Not much at all. Sure, it is helpful to know that geography is not destiny, or that focusing on increasing the economy's links with world markets is unlikely to yield convergence. But the operational guidance that our central result on the primacy of institutional quality yields is extremely meager.' (157)

Mere institutional superiority has no practical application for policymakers in the short-term. Since institutions cannot be modified in a short span of time, they may be beyond the scope of a lot of policymaking. How can the importance of institutions become more relevant for

policymakers, by unlocking this 'institutional dilemma'? To this effect, the current research sought a close substitute for institutions, which would also respond to the short-term policy time-frame. According to Glaeser et al. (2004a), the existing research cannot convincingly show that institutions rather than human capital have a causal effect on economic growth. They provide evidence to suggest that it is human capital, which also contributes to institutional development and not the other way around. 'Education is needed for courts to operate and to empower citizens to engage with government institutions. Literacy encourages the spread of knowledge about government malfeasance. Social connections make it possible to form private groups, which then take on the task of challenging the state. According to this view, countries differ ultimately in their stocks of human and social capital, and the institutional outcomes depend on this endowment.' (Ibid 2004:19) An important message one can extract from their paper is that human capital can be a close substitute for institutions, as human capital and institutions tend to move together: 'All or nearly all high human capital countries are stable democracies. All or nearly all low human capital countries are dictatorships, with virtually no checks and balances.' (Ibid 2004a: 41)

To summarize, opening up domestic markets to foreign competition by revoking trade restrictions and trade barriers can be good for economic performance. Second, developing human capital is as important as superior institutional functioning for economic wellbeing. Indeed the accumulation of human capital stocks via increased education might lead to improved institutional functioning, and the utilization of policies like trade liberalization. The evidence regarding the importance of human capital is clear in the growth literature. Indeed any currently developed country, or any country on the verge of development, has first seen significant improvements in human capital. Policies aimed at educational improvement yield a double dividend: they improve institutions in the long-term and in the short-term, they will allow for greater gains to the economy from trade liberalisation. Eventually, superior institutional functioning will lead to greater home grown (endogenous) democracy and make absolute poverty unacceptable.

With regard to the role of international integration versus institutions, the finding here is that openness counts for little *per se* in explaining income differences across countries. This is because it is an outcome and not a cause. *Trade policies*, and liberalization, on the other hand, are significant in explaining cross-country per-capita income variation. With regard to trade policies, the data show that the overall policy stance, particularly those associated with black market premia in foreign exchange markets and export taxes, are most important. The presence of these two phenomena relate closely to poor institutional performance. Tariffs and quotas on imports, however, are of secondary importance, indicating that they are less growth retarding.

Finally, a cautionary note on the institutional data (Kaufmann et al. 2002) is in order. Much of this data, as Glaeser et al. (2004a and 2004b) argue, are outcome variables, except perhaps for the rule of law. Future studies need to employ better indicators of institutional policies.

Notes

[1] Trade policy means, governmentally induced mechanisms that restrict, relax or facilitate the international exchange of certain or all goods and services.

[2] For detailed discussion on outcome based and incidence based measures of trade policy, see Rose (2004) and Pritchett (1996).

[3] This occurs when import protection increases per-capita income.

[4] Institutional superiority fails to have any operational value for policymakers.

3 How May International Trade Affect Poverty in a Developing Country Setup? The Inequality Channel

'The real challenge is establishing a development strategy aimed at reducing poverty is not so much in the essentially arithmetic relationships that exist between poverty and growth on the one hand and poverty and inequality of the other. It lies in the interactions between distribution and growth. There is indeed little controversy among economists about the fact that growth is essential for (income) poverty reduction under the assumption that the distribution of income remains more or less constant. Likewise, there is very much evidence that a worsening of the distribution tends to increase poverty and to lessen the effects of growth on poverty.' (Bourguignon, 2004; ii)

3.1 Introduction

To date most of the countries in our global village have embraced or initiated processes of liberalization. The idea is to follow a neo-classical paradigm of free markets in order to achieve a variety of economic as well as social objectives, as the assumption is that free markets are one of the key catalysts for growth and its determinants. This belief in the efficacy of free markets has also been the basic guiding principle of contemporary globalization.

Although globalization seems to promise a lot for both North and South, poor and rich, developed and underdeveloped, empowered and impoverished, such promises are not yet realized especially for those who live in underdeveloped, destitute and distant lands in the South. The underprivileged Southern peripheries question the fairness of globalization propagated by proponents of free markets and that justifies the stand of

those who believe that globalization is nothing but a Northern tool to exploit and marginalize the South.

Since it is tempting to over indulge in the rhetoric for or against globalization, examining the issue with objectivity and care is imperative. As an economist, this researcher is bound to peer into the issue through the prism of economics rather than environment, sociology or anthropology. To economists, the movements in international trade and finance that took place between different countries and regions best capture the processes of contemporary globalization. Evidence on the role of capital market liberalization in developing countries suggests a weak relationship with growth. Hence, this chapter is restricted to international trade.

The first relevant question that arises: how do economists view the notion of *free trade*? Thankfully, there is a consensus among all opinions[1] that openness to international trade is imperative for economic development. Many studies show that trade is not only the engine of growth but it also sustains it (for example, Sirinivasan and Bhagwati 2001; Dollar and Kraay 2004). Proponents of *free markets* believe that the countries, developing as well as developed, that opened up their economies farther, achieved better economic performance. However, the assertion is that the non-globalizing part of the developing world is falling further and further behind. (Dollar and Kraay 2004) The accession of the global economy indeed brought prosperity to different areas of the world. (Sen 2002) In contrast with the general perception[2], there is also some evidence that world poverty and inequality is declining. Sala-i-Martin (2002) in his much publicized paper, showed that the fraction of the world's population below the poverty line (defined as an income of USD $2 a day in constant 1985 dollars) fell to 18 per cent in 1998 from 44 per cent in 1970, whereas overall inequality (Gini-coefficient)[3] fell to 0.63 in 1998 from 0.66 in 1970.[4]

Dollar and Kraay (2004)[5] also showed that openness to international trade in particular appears to benefit poor people as much as everyone else. The study pointed out the experience of countries in the Asia and Pacific region (that is, the Republic of Korea, Singapore and Taipei, China), which contains a broad range of examples concerning both trade

liberalization and poverty reduction. Their paper implied that reforms on average had little effect on income distribution. Other recent cross-country studies have also emphasized opening up as necessary policy tools for poverty alleviation (see Anderson 1999).

All in all proponents of globalization are confident that free trade carries significant pro-poor growth effects.[6] However the increasing concentration of world poverty in regions of the world like sub-Saharan Africa, the transition economies of central Asia and the rise in spatial inequality[7] in developing countries (such as China, Vietnam, Mexico, Brazil, Chile, Colombia and Venezuela) that opened up, implies that processes of growth need careful evaluation.

> 'The ambiguity arises partly because of heterogeneity of poverty: there are many reasons why people are poor; and even within broadly defined groups there are huge differences in the circumstances of individual households …so a crucial part of any specific analysis must be to identify the different characteristics of the poor including information about their consumption, production and employment activities. Outcomes will also depend on the specific trade reform measures being undertaken, and the economic environment in which they take place. Given the variety of factors to take into account, it will hardly be surprising that there are no general comparative static results about whether trade liberalisation will increase or reduce poverty. Simple statements about "the poor" will lose information, at best, and simple generalisation about all countries will just be wrong.' (Winters, McCulloch and McKay, 2004)

It is also necessary to exhaust all possible channels through which poverty is affected. In other words, trade might very well be good for the poor because it is good for growth but if trade amplifies inequalities between regions, countries or income groups, it cannot claim to be the harbinger of welfare generation because income distribution is no less a vital determinant of poverty than growth itself.

Many studies have tried to capture the relationship between trade liberalization and income inequality. The *right* is of the view that liberalization does not carry any significant effects on income distribution and, at best, the relationship is of neutral nature (Dollar and Kraay 2004). How-

ever, there is ample empirical evidence that suggests otherwise. For example, Behrman et al. (2001) noticed that in seven out of 18 Latin American countries that initiated market reforms in the mid 1980s, inequality actually increased in recent times. The rest of the economies in their sample showed that inequality was approximately the same in the 1990s as the levels of the 1980s. Jayasuriya (2002), although accepting that liberalization tended to reduce consumption poverty in South Asia, also joins the critics[8] of Dollar and Kraay's findings concerning neutral distributional effects of liberalization.

Another fact, which undermines the results of Dollar and Kraay (2004), is that cross-country analysis has long been the source of criticism by many on the basis that such analysis can only capture average effects. The embedded drawbacks of such studies are best summarized by Sirinivasan and Bhagwati (2002), 'The choice of period, of the sample, and of proxies, will often imply many effective degrees of freedom where one might almost get what one wants if one tries hard enough!' Along similar lines, Dollar and Kraay (2004) have been accused of sample selection bias. Murshed (2003) pointed out that Dollar and Kraay only considered successful globalizers, mainly from Asia, in their analysis and in order to capture trade and poverty relationships, excluded the unsuccessful globalizers from their sample.

Rodrik (2000) provides a detailed discussion on methodological weaknesses and sample selection bias which may have derived the results for Dollar and Kraay (2004) in favour of trade. One criterion Dollar and Kraay (2004) used for countries that have globalized is their accession to WTO/GATT (general agreement of trade related tariffs). The total of a 42 did from developing world, but Dollar and Kraay (2004) only include 6 out of them. Then including India and China can be questioned because of high rates of tariffs still prevalent in these countries and also the growth rates started rising much before liberalization in these countries. There is a controversy over the binary distinction between countries by putting them into the basket of globalizers or non globalizers by looking at their trade shares.

> 'Using "change in the trade/GDP ratio" as the measure of globalization skews the results. The globalizers then include China and India, as well as countries such as Nepal, Cote d' Ivoire, Rwanda, Haiti, and Argentina. It is quite possible that "more globalized" countries are less open than many "less globalized" countries both in terms of trade/GDP and in terms of the magnitude of tariffs and non tariff barriers. A country with high trade/GDP and very free trade policy would still be categorized as "less globalized" if its increase in trade/GDP over 1977-97 put it in the bottom of the two thirds of the sample. Many of the globalizing countries initially have very low trade/GDP in 1977 and still had relatively low trade/GDP at the end of the period in 1977 (reflecting more than just the fact that larger economies tend to have lower ratios of trade/GDP.' (Wade, 2004: 14)

Even if it is accepted that trade is good for growth, the gains to growth are not equal. The rich get the far bigger share of the pie than the poor. 'The gains "one-for-one" has been expressed in percentage terms so that a poor person whose increase is one-hundredth of that of rich person also gain one-hundredth of a rich person.' (Milanovic, 2003; 667)

Srinivasan and Bhagwati (2001), although admitting that cross-country analysis does provide some important information, advocate for more empirical evidence based on country-specific case studies to gain a clearer and more detailed picture regarding distributional effects of reforms on the individual countries.

To this effect, many single country case studies have been undertaken on the subject and evidence suggests that the distribution of positive effects of liberalization is somewhat skewed towards urban households rather than rural, and wealthy households rather than poor.[9] Many studies further note[10] that the liberalization process in many developing countries seems biased against low-skilled labour. The empirical verification comes mainly from the Latin American region because most of the economies in the region undertook rigorous reform policies in the mid-1980s as part of their structural adjustment plans and grappled inequality in post-reform periods. Ligovini et al. (2001) found that inequality in Mexico rose sharply between 1984 and 1994 and rising returns to skilled labour accounted for 20 per cent of the increase in inequality in house-

hold per-capita income. Similarly, Hanson and Harrison (1999) found that reduction in tariffs and elimination in import licenses accounted for a 23 per cent increase in relative wages of skilled labour over the period 1986-1990; thus providing evidence for the role liberalization played in rising inequality in Mexico. Other country studies on Brazil, Chile, Colombia and Venezuela also show that skilled workers received increased premiums after liberalization when compared to their unskilled counterparts. (World Bank 2001a)

Such empirical evidence contradicts the basic trade theory, which suggests that trade liberalization would result in an increase in demand for low-skilled workers in a developing country, thereby improving the relative earnings of this group compared with the more skilled. The evidence further feeds the fears of Ravallion (2003), who cited the possibility that openness to trade, can lead to the demand for relatively skilled labour, which tends to show less equitable distribution in poor countries than rich ones. He also proposed caution regarding the results of David and Dollar's (2004) paper concerning neutral inequality effects of trade reform based on methodology and referred to his own empirical work, which found that reform processes do carry unequal distributional effects.

3.2 International Trade and Inequality: Why the Debate is Important

As mentioned earlier, there is little dispute among economists regarding the benefits of increased international trade. Increased trade certainly leads to more efficient economic outcomes through augmented market access and the processes of learning by doing. While international trade is one of the most important policy tools for economic growth, growth is not only one of the most commonly targeted macroeconomic phenomena, but also considered the barometer of economic well-being.

Growth has been one of the key policy objectives for any economy at the times when the world was obsessed with Structural Adjustment Plans or now, when the world switched its attention to newly improvised Poverty Reduction Strategies. Apparently, the end objective of any economic

policy devised to date is to generate welfare and well-being of the public and the same is true for growth, which must also fall into the category of welfare generating strategies. Since the idea has always been that in the end, growth should be good for the poor (see Mamoon 2004), it makes sense because in economics, poverty decomposition identifies two channels through which poverty is affected. One is the growth channel and the other is inequality. Growth is good for the poor whereas inequality is not. Since growth sometimes puts an upward pressure on inequality, the more relevant question here is how to align growth with poverty alleviation? The simple answer is to sterilize any adverse distributional effects of growth to make it a 'chaste pro-poor experience.' However, as simple as it looks, the answer is much more complex and tricky when put into practice.

Recently the World Bank realized this fact.

> For a given rate of growth, the extent of poverty reduction depends on how the distribution of income changes with growth and on initial inequalities in income, assets and access to opportunities that allow poor people to share in growth…how growth affects poverty depends on how the additional income generated by growth is distributed within a country. (2001b: 52)

As mentioned before, international trade is one of the key determinants of growth and thus is a key policy tool for alleviating poverty. However, there is increasing evidence that more trade has been associated with more unequal outcomes throughout the integrating the South. Although poverty is decreasing in China and India, the rural and urban divide is growing in these purported success stories of globalization. The persistent qualitative inequalities in the South transform into income inequalities only when sectors or groups that are more affluent benefit from the international flow of goods and services. For example, prevalent education inequalities cause increased wage inequality in the South as it opens up, where the rich or urban are more educated or skilled than the poor or rural. (Mamoon 2005)

Additionally, there is no expectation for inequality to be good for growth itself. (Aghion et al. 1999; Kakwani et al. 2000) The World Bank

supports the notion that lower inequality can increase efficiency and economic growth through a variety of channels. The report says, '… policies to improve the distribution of income and assets can have a double benefit—by increasing growth and by increasing the share of growth that accrues to poor people.' (2001b: 56)

Any adverse distributional effects arising from opening up become all the more important because it can also hamper growth potential of the economy. This concern is eloquently summarized in Slaughter, who pointed out that many developing countries recently saw income inequality rise, not fall, subsequent to trade and FDI liberalization. 'The clear policy message is that developing country policymakers should not regard liberalization as a sure-fire poverty reduction program—of course, with the caveat that rising inequality can coexist with declines in absolute poverty.' (2000a)

In light of the above examples, it becomes imperative to discern whether the observed patterns of inequality offset any pro-poor dynamic benefits of trade liberalization. This is particularly true since pro-poor growth can only occur when people invest in productive activities and the subsequent benefit accrues to poor households more than to non-poor households. It is crucial to understand the relationship between international trade and inequality in a developing country context in detail to understand why exposure to foreign markets tends to benefit certain more affluent segments of society then the rest. In other words, why trade creates disparities in factor incomes by favouring certain economic activities (for example manufacturing) over others (for example agriculture) in a developing economy?

3.3 International Trade and Uneven Development: A Spiral

There can be several reasons why liberalized trade carries an asymmetrical effect. Economic literature has long been proposing models and frameworks that incorporate the possibilities of uneven development within regions due to international trade. An important point to note here is

that this paper is primarily concerned with intra-state disparities as an outcome of exposure to free trade and not inter-state disparities.

This section endeavours to explain how uneven development in the South takes place at the individual level. The model proposed by Fischer (2001), who developed a general framework to study the effects of trade liberalization on income distribution, is used to this effect. He argued that liberalization leads to capital gains or losses, which in turn affect inequality. According to his model, an economic agent's income has two components: wages, which are equal for all agents and wealth, which is unequally distributed. Wages are the reward for unskilled labour. Whereas wealth corresponds to the value of assets, which can include holdings of capital, human capital, land, natural resources or any other factors of production. Agents in a particular group receive unequal bequests from their parents. Reducing group inequality leads to a reduction in the inequality of bequests to the descendants. Thus according to Fischer, changes in inequality are time sensitive. An increase in wages relative to wealth reduces inequality by increasing the importance of the component of income that is equitably distributed. This model quite amicably captures the developing country dynamics because in developing countries, income from unskilled labour is more equitably distributed (Ravallion 2003) and any increase in income of unskilled labour would mean a fall in inequality. However, Fisher's framework suggests that the long-term evolution of inequality depends only on the effect of trade liberalization on interest rates. In the short-term, inequality very much depends on wage wealth ratio and the distribution of inheritance between the groups.

Assume that in an economy, agents earn wages, w_t by supplying labour in-elastically to the market. Also, presume that labour is homogenous so that the wage is the same for every agent. In other words w_t is the reward for unskilled labour. At the end of their lives, each agent provides a bequest to her sole descendent so that the subsequent agents possess wealth at birth. Since the distribution of bequests is uneven among agents, wealth is a measure of inequality. This is in line with a developing country context, where people start their lives as unequal stakeholders because each individual's income is determined partly by his level of edu-

cation, his exposure and access to unevenly distributed resources among the population and partly because of unequal bequests or investments made by their parents through their own equal/ unequal wealth/ bequest. Thus, bequests are the most important part of any agent's wealth and determine his status in society[11]. Galor and Tsiddon (1996) also supported the above argument by suggesting that the initial distributions of income determine both aggregate income and distribution of human capital.

Let the total income of any agent be the sum of wages, w_t and bequests/wealth, b_t, such that $w_t + b_t = y_t$.

Each agent divides her income between consumption and the amount saved to make a bequest. There is a continuum of agents in each generation. Agents have different propensities for consumption and receive different inheritances from their ancestors. This implies that inequality in the income of agents in a society also depend on the inequality in initial wealth or inheritance. The ones with the more affluent inheritance are more likely to be affluent in their lives and vice versa. Trade liberalization can affect the level of inequality if it affects the assets of agents. A liberalization process, which favours a certain segment of society, can lead to greater inequality if it increases the share of bequests in total wealth. This is because inheritance disperses unequally among individuals.

Assume that in period t-1, the economy received a shock due to trade liberalization, whereas, the physical allocation of assets through inheritance has already been made. The value of bequests changes in the liberalized scenario[12]. Consider the income of an agent z with and without shock, (the primes denote variables that changed).

$$w_t + b_t(z) = y_t(z)$$

$$w'_t + b'_t(z) = y'_t(z), \ \forall z \in [o, L]. \tag{3.1}$$

Whereas, w_t is the wages for the unskilled labour.

Assuming all agents invest their wealth in the different assets in the same proportions, a change in the price of any asset will affect all be-

quests in the same proportion. Denoting by B_t the aggregate value of the bequests:

$$B_t = \int_0^L b_t(z)dz \tag{3.2}$$

Denote the ratio of aggregate wealth with the shock to aggregate wealth without the shock by

$$V'_t = B'_t / B_t .$$

If there is no shock $V'_t = B'_t / B_t = 1$. Then Eq. (3.3) can be written

$$w_t + b_t(z)v_t = y_t(z)$$

$$w'_t + b'_t(z)v'_t = y'_t(z), \ \forall z \in [o, L]. \tag{3.3}$$

This means that the scale of the original stocks of assets is by the percentage change in aggregate wealth change. The second distribution is Lorenz preferred (see Fisher 2001) if the Lorenz curve for the income of agent z, with trade shock, lies everywhere above the Lorenz curve for the income of the same without the shock. This implies:

$w_t / v_t < w'_t / v'_t$ Whereas $v_t = 1$

For any variable z, let $\hat{z} \equiv dz/z$ denote the percentage change in z and let a bar over a variable denote its steady state value. It follows from Eq. (3.2) that the effects of a shock on the distribution of income depends on Sign $\overline{(w_t / v_t)}$ where Sign $\overline{(w_t / v_t)}$ = Sign $\overline{(w_t / B_t)}$.

Thus, it implies that any shock that leads to increase (fall) in the ratio of inherited to total income raises (lowers) inequality, given the distributions of bequests (see Fischer 2001 for more details).

According to the above framework, if trade liberalization leads to a greater demand in human capital relative to unskilled labour, inequality shall increase further. Tinbergen (1975) suggested that the opposing effects that technology (skilled labour demand) and education (skilled labour supply) exerted on the relative wage ultimately determined inequal-

ity. With increased openness, if the demand for skilled labour increases and if a developing country fails to match this rise in demand, relative wages of skilled labour will swell and increased inequality is a natural outcome. Whereas, trade leading to an increase in the wages of unskilled labour is predictive of a more equitable outcome. Spilimbergo et al. (1999) found that inequality correlates positively with the interaction effect between openness and human capital. This means that if there were an unequal distribution of human capital, then trade would contribute to increased inequality if it favours the skilled or more educated.

3.4 Inequality as an Outcome of Education Policy

Generally in most developing countries, human capital is unevenly distributed (Ravallion 2003). Thomas, Wang and Fan (2000) and Castello and Domenech (2002) found that Gini coefficient of distribution of human capital in sub-Saharan Africa and South Asia respectively, is the highest in the world. Berthelemy (2004) came to the same conclusion not only for sub-Saharan Africa and South Asia but also for the Middle East and North Africa (MENA). Furthermore the unequal distribution of income in these regions are due to inequitable education policies of their respective governments who, on average, focus more attention on secondary and tertiary education compared to primary education. Chowdhury (1994) also suggests that there is misallocation of resources by the governments of developing countries that favour higher education to the neglect of primary education.

In many countries a considerable proportion of public expenditures for education go to middle- and upper-income families, because richer groups are over-represented at all levels of education, and particularly at the university level. Public expenditure per student increases by each level of education. In African countries, public expenditure per student on higher education is 28 (Francophone Africa) and 50 (Anglophone Africa) times that on primary education. Further, only a small number of people benefit from high public expenditure per student in higher education. For the developing countries as a whole, only seven per cent of the

school-age population enrolled in higher education. (Mingat and Tan 1985)

One reason for these developing countries bias towards higher education may lie in the belief that elementary education has a limited direct role in determining growth rates. According to Barro (1999), the rate of economic growth responds more to secondary or higher education levels rather than elementary schooling. For example developing countries' international trade, which is one of the key determinants of growth, favours either highly qualified university graduates or those who have at least finished high school. Therefore it is no surprise that in order to be competitive, many developing countries have a tendency to invest in higher education at the cost of primary education to achieve greater growth.

Here there is an important role for the government to reverse this situation. The government, through investing in the education sector and following a balanced education policy, can improve the human capital on a more equitable basis. Here a balanced education policy would be to give special attention to rural areas/shanty towns where human capital is low versus urban areas/affluent urban zones (Mamoon 2005).

While the above attempts to show how trade can lead to greater inequality among individuals, the basic question remains. Why is it that international trade only benefit skilled or more educated in developing countries? This question leads to another equally important question: What linkages between trade and labour markets can explain such behavior?

3.5 Trade Inequality Inter-linkages and the Heterogenic South

The rationale for expecting an effect of trade on wage inequality is the standard Heckscher-Ohlin-Samuelson (H-O-S) trade model. As Slaughter (2000a) puts it, '… [Free] trade lowers the real wage of the scarce factor and raises that of the abundant factor compared to autarky.' (131) Assuming that developed countries are generally abundant in skilled labour, increasing trade with developing countries, which are unskilled la-

bour abundant, should raise wages of skilled workers relative to unskilled in developed countries. Whereas, the returns to unskilled labour should increase in developing countries with the opening up of trade with developed countries. Since evidence does not support the H-O-S theorem in the case of developing countries, what can account for this?

To work through some possibilities, Slaughter (2000b) summarized Stolper-Samuelson intuition with a line of algebra. Suppose a developing country produces *I* different tradable goods, each of which requires some combination of *J* primary factors and *I* intermediate inputs. Then for each sector *I,* one can write the 'zero profit' condition as:

$$P_i^G = \sum_{j \in J} a_{ji} w_j + \sum_{j \in I} b_{ii} P_i^G \quad \text{i} = 1 \ldots . I \tag{3.4}$$

where P_i^G is the domestic gross-output price in sector *i;* w_j is the unit cost of the *j*th factor (common across all sectors i); a_{ji} is the employment of factor *j* per unit of output in sector *I*, (which depends on production technology and assuming technology is not Leontif, factor prices) and b_{ii} is the amount of intermediate input hired per unit of good *I* (which depends on production technology and assuming technology is not Leontif, input prices). Equation (3.4) has *I* equations, one for each sector, each of which says price only covers cost in equilibrium.

The Stolper-Samuelson logic is readily apparent in Eq. (3.4). Domestic product prices p_i^G depend on both domestic trade barriers and world product prices. Given technology, trade liberalization changes domestic product prices, which in turn changes domestic factor prices. w_j differ based on differences in production technology and/or trade barriers.

3.5.1 Protection effect

In the simple H-O-S theorem, Eq. (3.4) contains only two equations for two sectors, and only two factors of production. In this basic framework, an explanation for rising inequality after liberalization can be that developing countries protect the unskilled-intensive of the two goods and not the skill-intensive prior to liberalization. Therefore, after liberalization the producers of unskilled-intensive goods face increased costs amid in-

tensifying outside competition in the absence of government subsidies. Thus, exerting an increased downward pressure on the wages of the unskilled labour force employed in the production of unskilled goods.

3.5.2 Endowment effect

However, in the real world there are more than two countries, more than two products and sufficiently dissimilar factor endowments across all the countries. A country that is unskilled abundant in a global sense can still experience wage inequality from opening up if that country is skill abundant in the regional sense. There may be a sufficiently wide range of endowments across countries so that different countries make different products. That is, countries are in different *cones*, with the set of sectors I in Eq. (3.4). Thus even if developing countries produce in similar sectors say I among themselves, they will have different comparative advantages because patterns of protection might not only reflect that they are unskilled abundant globally, but also that they are unskilled abundant regionally. A middle-income developing country, which is unskilled-abundant relative to developed countries but skill-abundant relative to low-income developing countries, can have a comparative disadvantage in unskilled labour vis-à-vis these low-income countries and protection of unskilled labour in these middle-income developing economies is a natural outcome. Thus when the tariffs are abolished, unskilled labour sees a drop in their wages. Leamer (1998) provides supporting evidence by showing that world relative labour endowments distribute much more finely than the simple skill-abundant or unskilled-abundant dichotomy. Countries like Mexico may very well be globally unskilled abundant yet locally skilled abundant, whereas countries such as China may be unskilled abundant both globally and locally. This explains why unskilled labour enjoys protection in Mexico.

Wood (1999) argues that the entry of countries like China, India, Bangladesh, Pakistan and Indonesia in the world market for goods with a high content of unskilled labour in the mid-1980s had an important impact on income inequality of middle-income countries, particularly those in Latin America. His argument is that increased supply of unskilled la-

bour and intensive goods changed the structure of supply in the world market, reducing their prices and the return to factors involved in the production of such goods. This harmed the countries that had some comparative advantage in their production. Vos (2003) noted that Latin American exports lost their competitiveness in the global markets after trade liberalization. Consequently, these countries feel pressured to change their production techniques in search of a comparative advantage in the production of goods that use semi-skilled labour. This results in an increase in the demand for this type of labour therefore causing wage dispersion. Although this set of arguments explains inequality in middle-income countries, inequality in low-income countries remains a question.

3.5.3 Technology transfer effect

In order to deal with the discrepancy between traditional theory and empirics in low-income developing countries (that is, China and India), it is important to examine the trade and technology nexus. The greater openness of these societies intrinsically brings with it a greater inflow of technology that may be skill biased and thus act to increase the demand for skilled labour. The argument is that the South improves its technological base through learning from the technology available in the North. Learning takes place through technology transfers either through the South's efforts to imitate technologies or through importing capital goods available in the North. Whereas, in both cases the demand for skilled labour has been increased. Increasing trade between the North and South opens up new opportunities for developing countries' producers to learn Northern technologies. Liberalized trade allows easier imports of technology intensive capital goods from the North while allowing southern firms to export to northern markets. Thus, through competition with northern firms, southern firms learn and imitate this new technology. Since the introduction of new technologies in the South requires skilled labour, demand for this skill group increases and hence, skilled wages rise.

This explanation modifies the benchmark H-O-S framework in Eq. (3.4) by allowing the production technique coefficients a_{ji} to fall (as-

suming technology improvement) as liberalization also alters prices p_i^G. Here the tight link from changes in product prices to changes in factor prices eases because it is necessary to account for technology changes. Even if liberalization lowers the domestic price of skill-intensive sectors, liberalization induces sufficient innovation in these sectors such that their profitability relative to unskilled intensive sectors rises and subsequently wage inequality rises, not falls, by the Stolper-Samuelson mechanism of cross-industry shifts in factor demands. Gould et al. (2000) and Galor and Moav (2000) suggest that technology-driven labour demand is central to explaining inequality. Gorg and Strobl (2002) also agreed that after liberalization, purchase of foreign machinery for technological progress in Ghana attributed to the relative demand for skilled labour although they could not find any direct role of technology in the skill composition via export activity.

3.5.4 International outsourcing and technology catch-up effect

Outsourcing means that sometimes a skilled labour intensive activity (component) moves to a lower wage economy whereas that low-wage economy should be more abundant in both skilled and unskilled labour in absolute terms when compared to other lower wage economies.

It has been widely witnessed that international outsourcing by multinational corporations is increasing, especially in developing countries where cheaper semi-skilled labour is available. In the case of India and China, inequality might be partly because these countries are able to export skilled and semi-skilled intensive goods because of international outsourcing.

The Indian software industry, which is concentrated in Bangalore, Mumbai and Pune is highly export oriented, with export growth rates above 50 per cent per year, during the 1990s. The current rate is still impressive at 23 per cent. Whereas the goods exports have shown an average yearly increase of 7.5 per cent between 1997 and 2001, which is quite modest when compared with that of the software industry. According to Tharakan and Beveren (2003: 8), 'The reasons for the remarkable success of Indian software exports... include the rapidly growing demand

for software in the countries of the clients, the cost difference between India and the outsourcing countries in employing software professionals….' Additionally, this is also on par with Arndt's reasoning for the rationale behind international outsourcing.

The factor intensity of the end-product, which has been the focus of traditional trade theory, is the weighted average of the associated component factor intensities. Evaluating comparative advantage at the level of components is not very different from doing so for products. From the factor–proportions point of view, a capital-rich, high wage country, endowed with plenty of skilled workers, will tend to have a comparative advantage in the more capital and skill-intensive components of a product and comparative disadvantage in components' relatively heavy inputs of semi-skilled and unskilled labour. (2000: 3)

It is true that Indian software exports owe it to international outsourcing more than anything else since the nature of Indian software is routine programming and maintenance services, whereas the final product and package only constitute a 3.16 per cent share in total software exports. (Natarajan 2008)

In the last decade, China has become a haven for international outsourcing for companies searching for semi-skilled and skilled factors of production at cheaper prices. Kwan (2002) writes about this phenomenon.

> China has been taking advantage of its cheap and abundant labour to attract direct investment by multinationals, thereby accelerating the pace of industrial development. Exports of manufactured goods have increased sharply in recent years to account for 90 percent of China's overall exports in 2001. Processing trade, which represents roughly half the overall trade of China, has come to play a more important role in the Chinese economy. With its share of the world's manufactured exports rising, China has been widely recognized as the "factory of the world."

While *Business Week* in January 2002, commented on the impact of Chinese options on Japanese companies.

> Some doomsayers predict the decimation of Japan's high-tech manufacturing base—and sayonara to all those nice-paying engineering and production jobs—as cheaper labour, land, and utility costs in China prompt more and more Japanese companies to shutter factories at home...China could be a "win-win" proposition for Japanese companies. They would save billions in production costs, keep at home high-end research-and-development, design, and other critical jobs, plus plug into a vast consumer market for their goods…. True, big players like NEC and Matsushita already know this and are shifting more and more resources to China.

Zhu and Trefler (2003) observed that developing and newly industrialized countries that experienced the sharpest increases in wage inequalities are those whose export shares shifted towards more skill intensive goods. They term it 'technology catch-up.' This observation, in addition to giving a very convincing reason regarding the cause for inequality because of trade liberalization, also challenges the core of H-O-S theorem. Along with importing skilled-labour intensive goods, the developing countries also indulge in exporting skill intensive intermediate goods. Zhu and Trefler elabourated on this behavior by developing a model in which the South catches up, causes production of the least intensive northern goods to migrate South (where they become the most skill-intensive southern goods), thus raising wage inequality both in the South and the North. The empirical evidence presented in their study suggested that southern catch-up shifts export shares towards the South's most skill-intensive goods. Second, the resulting shift in export shares increases the level of wage inequality. Third, southern catch-up does not directly raise wage inequality. Rather, southern catch up raises wage inequality only indirectly by raising the export shares of the South's most skill-intensive goods.

3.5.5 Technology catch-up effect under factor endowment dynamics

One of the implications of trade on inequality can be examined by furthering the argument of Leamer (1998) of 'global and local differences in skill intensities' and combining it with the theory of 'technology catch

up.' To specify an addendum to Leamer's model, simply take into account intra-country disparities in skill intensities, in addition to global verses local. Please note that intra-country disparities capture regional inequalities within a country whereas global and local disparities capture regional inequalities across countries.

China and India are globally and locally less skill-intensive when compared to medium to high-income countries. However, within China and India there are patterns of uneven development because of unequal factor intensities. There are certain regions that are skilled-labour intensive while others are low-skilled intensive. As discussed above, the IT sector in India is concentrated in only three locations where skilled labour is abundant. These geographic locations are relatively high-income regions. They are the same regions that also benefited most from post liberalization technological change or catch-up, since they possess relatively higher amounts of skill intensive factors of production. Thus in developing countries, post liberalization technology catch up, which happens in an uneven manner, because of uneven domestic factor endowments across various regions, has implications for income inequality.

3.5.6 Familiar factor endowments effect

In an attempt to understand inequality in less developed countries, it is also edifying to ask what distributional effects trade carries when these countries trade with each other. Actually, Bourguignon and Morrison (1999) coined the idea to analyze the effects of international trade on income distribution based on similar factor endowments and levels of development. They noticed that northern economies trade with each other more than they do with the South. They found that in North-North trade, increased trade volumes are associated with lower skilled wages and higher unskilled wages.

However, to date, there has been no analysis of the distributional effects of South-South trade undertaken. The need for such a study comes from the fact that developing countries lie in different stages of technological catch-up, which makes it functional to analyze the dynamics of South-South trade in relation to inequality, while accounting for intra-

country disparities. As a developing country moves forward in technology, it naturally indulges in more advanced production patterns and more trade, exports especially are concentrated in products involving high skilled labour. As one developing country is climbing the technology ladder, another developing country at a lower stage starts taking over the production activities, which are least skill-intensive in the former as part of its own technology catch-up phenomenon. For example, China has a higher pace of technology catch-up than many less developed countries in East Asia, Latin America or sub-Saharan Africa. China has built a sound technology base primarily because of its low factor costs. Chinese exports are getting more and more skill intensive as a result. As China advances in technology and produces goods and services involving higher skill intensive labour, there is an increasing chance for other developing countries, at lower stages of the technology ladder, to exploit this situation by taking-up the production of goods and services that require relatively less skill intensities in factor inputs if produced in China.

Ianchovichina and Walmsley (2003) hinted on the effects of China's technology catch-up on the developing countries of Asia.

> As China becomes a more efficient supplier of services or a more efficient producer of high-end manufactures, its comparative advantage will shift into higher end products. This is good news for Vietnam. Indonesia and other developing countries…. Vietnam and Indonesia will benefit the most if China's economy becomes more efficient in the production of high-end manufactures. In contrast, the most favourable outcome for the NIEs is for China to continue to specialize in labour intensive products. (20)

From 1991 to 2001, trade between China and Vietnam grew nearly 100 times, and China is a major investor in Vietnam, which indicates that the latter country is an important outsourcing destination for Chinese companies. Although Chinese investments are good for the growth of the Vietnamese economy, the distributional impact of trade with China might not be as favourable. Jensen and Tarp (2003) found that in Vietnam, the short- to medium-term impact on poverty levels among the poor relate inversely to changes in investment expenditure, whereas re-

duction in trade taxes that have adverse distributional effects. Although the study captures distributional effects of trade or investment in general for the Vietnamese economy, it is conceivable to implicate these results for a case that accounts for the effect of investment or trade with a major trading partner (that is, China). Assuming that the same results hold for Chinese investments in Vietnam and also employing 'technology catch-up' and 'international-outsourcing' arguments; the implication is that the Vietnamese economy is taking over the products in which its trading partners no longer have comparative advantage because these products employ relatively less skill intensive inputs. This is beneficial for the economy and its growth potential, which favours the skilled labour in (urban) Vietnam, which in turn causes greater inequality.

The purpose of this discussion is to show that trade between countries with similar factor endowments also has implications for inequality, especially in a developing country context. Nevertheless, a more pertinent and comprehensive empirical analysis is desired to demonstrate whether South-South trade could expound trade-inequality liaisons in developing countries.

3.5.7 Price elasticity effect

Rodrik (1997) and Slaughter (2001) identified yet another route through which trade might cause an increase in inequality. Rodrik (1997) partly blamed the rise in inequality in the US economy on the easing labour demand elasticities. He also emphasized that in an imperfectly competitive context, the elasticity of demand for labour is higher with greater openness. Slaughter (2001) pointed out that establishing the link between factor demand elasticities and product market elasticities is possible directly through Hicks' well-known *fundamental law of factor demand*. Since product market elasticities are likely to rise with trade liberalization, this implies that, with greater trade openness, one should see an increase in labour demand elasticities as well.

Rodrik (1997) argued that openness could put labour markets under greater pressure because rising elasticities shift the wage or employment incidence of non-wage labour costs towards labour and away from em-

ployers. Secondly, higher elasticities trigger increasing volatile responses of wages and employment to any exogenous shocks (arising from shocks to productivity or to output demand) to labour demand. In addition, increase in elasticities leads to erosion of bargaining power of labour vis-à-vis capital in sharing abnormal profits.

Using industry-level data disaggregated by states, Hasan, Mitra and Ramaswamy (2003) find a positive impact of trade liberalization on labour demand elasticities in the Indian manufacturing sector. These elasticities negatively relate to protection levels that vary across industries and over time. Furthermore, they find that these elasticities are not only higher for Indian states with more flexible regulations; trade reforms greatly affect them, as well. Finally, they find that after reforms, volatility in productivity and outputs translates into larger wage and employment volatility: a consequence of larger labour demand elasticities. However, Krishna, Mitra and Chinoy (2001) suggest that for Turkey, the putative linkage between greater trade openness and labour demand elasticities is somewhat weak. They attributed the weakness to the variety of frictions that affect labour demand decisions of the firm.

3.5.8 Wage premium effect

Yet another link in the trade inequality argument develops by employing the concept of efficiency wages/wage premiums. Wage premiums represent the portion of worker wages not explained through worker or firm characteristics, but attributed to worker industry affiliation. Wage premiums are also associated with higher productivity. Moreover, worker industry affiliation plays a crucial role in explaining the impact of trade reforms on worker wages especially in trade models with imperfect competition and rent sharing. Studies that do not consider industry affiliation miss an important channel through which trade affects wage distribution. In developing countries as well as developed countries, there are restrictions on labour movements, thus again calling for the inclusion of industry affiliation wage-premiums in the trade-inequality debate.

According to Pavcnik et al. (2003), the effect of trade policy on industry wage premiums has important implications for wage inequality.

> Since different industries employ different portions of educated and skilled workers, changes in industry wage premiums translate to changes in the relative incomes of skilled and unskilled workers. If tariff reductions are proportionately larger in sectors employing less-skilled workers, and if these sectors experience a decline in their relative incomes as a result of trade liberalisation, these less-skilled workers will experience a decline in their relative wages. This effect is distinct from the potential effect of trade liberalisation on the economy-wide skill premium. Moreover, industry wage premiums might vary across workers with different levels of skill or education. For example, the more educated workers may be more (or less) mobile in the labour market, have accumulated more sector specific human capital, or have bargaining power over industry rents. If wage premiums differ across workers with different levels of education, and trade liberalisation increases the industry specific skill premiums, this could provide an additional channel through which the reforms affect wage inequality. (3)

Pavnick et al. (2003) is one of the very few studies to focus on the relationship between trade policy and industry wage premiums. Their results suggest that in Brazil, trade liberalization has not meant lower industry wages in the short-term. They conclude that although there is no evidence that tariff declines worsened inequality through changes in the structure of wage premiums, industry wage premiums do vary widely across the Brazilian manufacturing sector. In addition, they found that the former are smallest in sectors with high shares of unskilled workers suggesting that unskilled workers earn relatively low wages, not only because of the growing economy-wide skill premium, but also because they are employed disproportionately more in industries with low wage premiums. Nevertheless, Goldberg and Pavcnik (2004) found a positive link between trade protection and the average wage premium for Colombia. Similarly, Dutta (2003) also concluded that for the Indian economy, the impact of trade liberalization on the inter-industry wage premium is substantial and better-protected industries tend to have higher relative wages; whereas, the industries that undergo larger tariff reductions have lower wages relative to other industries.

3.6 Conclusions

This chapter contributes towards the understanding of processes of globalization and growth and their relationship with pro-poor outcomes. The discussion suggests that although more trade might be good for the poor in the short-term, there are welfare distorting effects that might hamper the positive returns in the end as international trade carries unequal effects. Whether inequality matters or not in a pro-poor, pro-growth debate is no longer an issue for discussion. Inequality certainly matters.

The recent reports of the World Bank and United Nations, 'Equity and Development, 2006' and 'The Inequality Predicament, 2005' respectively, try to press that reducing inequality is central to tackling poverty and bringing about sustainable economic growth.

The 2006 World Bank report concludes that inequality of opportunity, both within and among nations, sustains extreme deprivation, results in wasted human potential and often weakens prospects for overall prosperity and economic growth, whereas the 2005 United Nations report suggests that, inequalities between and within countries accompanied globalization. These inequalities had negative consequences in many areas, including employment, job security and wages. However, both reports accept that there is still a debate concerning the specific role of liberalization policies in these trends.

In summary the chapter is an outcome of the recent concern in the echelons of policymaking whether the potential benefits of trade liberalization (that is, increased efficiency and welfare) outweigh the potential costs of trade reforms (that is, increased inequality, potential 'race to the bottom' in wages). The author endeavours to contribute positively to the debate by illustrating many conduits through which international trade sets out to favour skilled or affluent in a developing country context and cause inequality. Most of the empirical approaches/ methodologies reviewed are in their primary stages and increased empirical evidence is expected.

Notes

[1] Dani Rodrik, though, critical to Dollar and Kraay (2002; and 2003), accept that trade liberalisation and growth are positively related. (see Rodriguez and Rodrik 2000) However he also emphasises that it should not be considered a substitute for other development strategy/ies.

[2] See for example Aisbett (2003) for detailed commentary about the basis of general perception among public that global poverty or inequality is on the rise.

[3] There are three categories of Gini-coefficients. Category 1 inequality takes into account per-capita incomes of the respective countries. In category 2, the per-capita incomes are weighted by population size. However, category 3 inequality takes into account within country inequalities, which makes it superior to the former categories. Sala-i-Martin (2002) employs category 3 measure of inequality. For a brief commentary on the three categories of inequality, see Murshed (2003).

[4] The paper also estimates other popular indices of inequality, such as the variance of log-income, two of Atkinson's indices, the mean logarithmic deviation, The Theil index and the coefficient of variation. All indices show the same decreasing trends in inequality over the selected period. However, Milonovic (2002) argued that Sala-i-Martin made many oversimplifying assumptions and failed to address two basic data problems (too few data to derive countries' income distributions, and sparseness of such data in time). According to Milanovic, Sala-i-Martin ended up producing a population-weighted inter-national distribution of income augmented by a constant shift parameter and not a distribution of income among world citizens, which made his results dubious. Additionally in his recent paper, Milanovic (2003a) showed that openness leads to regional inequality for populous regions with some getting ahead and others falling behind.

[5] Dollar and Kraay (2004) is primarily an extension of their earlier work (Dollar and Kraay 2000), which focused on the poverty impacts of growth.

[6] Srinivasam and Bhagwati (2002) mention that the high growth rates achieved by China and India are partly due to their opening up in the 1980s and 90s. The same period is also associated with a decline of incidence of poverty from 28 per cent in 1978 to 9 per cent in 1998 in China and from 51 per cent in 1978 to 27 per cent in 2000 in India respectively.

[7] Salai-i-Martin (2002) in his popular paper accepts that despite decreasing trends of global poverty and inequality levels, there is some increase in within-country disparities.

[8] Many studies criticised the results of Dollar and Kraay by raising the apparent weaknesses their methodology and variable choice suffered from. See Ravallion (2003); Amann et al. (2002); Srinivasam and Bhagwati (2002).

[9] See Chen and Ravallion (2003); Cockburn (2001); Friedman (2000); Lofgren (1999).

[10] Behrman et al (2001) noticed that seven out of 18 Latin American countries that initiated market reforms in the mid-1980s, inequality increased in recent times. Whereas most Latin American economies in their sample showed that inequality was approximately the same in the 1990s to the levels of the 1980s.

[11] Though there might be some cases when individuals do break the class barrier by becoming richer or poorer than they started out, such cases would not be very common in a typical developing country environment.

[12] The change of bequest can be due to technological spillover affecting the labour productivity thus increasing returns to human capital.

4 Good Institutions and Fair Trade: A Road Map to an Equal Society

'No one should be worried about greater inequality so long as everybody's income is increasing. It is only with incomes of those who are poor that economists need to be concerned*: This is an argument not infrequently heard. As some one who has worked on the issues of inequality for more than twenty years, I had had a chance to see it expressed quite a few times.'* (Milanovic, 2003: 2)

The protesters usually claim that globalization is a disaster for the workers, throwing them into "downward wage spirals in both the North and the South". They point out that the total income of the poorest half of humanity is less than the worth of just 475 billionaires. (Easterly, 2004: 58)

4.1 Introduction

Today it has become a cliché to say that the world is a global village. One may ask, what are the social and economic characteristics of this global village when around the globe, information is just a click away for individuals or is increasingly available to them via their local, regional or global media outlets? As one looks through the eyes of the media, it seems that the world is ever dividing into conflicting political and social ideologies as different interest groups strive for different realities. Nevertheless here one can safely say that economics has been resolute to bring a single mutually acceptable point of reference to different stakeholders; connecting the concepts of fair globalisation with economic empowerment, freedom of speech, human rights and preservation of environment.

Unlike in business ethics, in economics, not all is about profit making, but about maintaining efficiency while harnessing social harmony.

However, what is *good* economics is still a question to be given a wholesome answer. Economic freedom has leaded the world closer in many ways. One way is that global inequalities have become evident more than ever. The world is more dividing not only on basis of mere ideologies but more importantly there is unequal distribution of economic gains. Developed countries have gained more in recent decades than developing countries. But they also trade among each other freely and enjoy precedence of good institutions with populations who are on average more educated than the populations in developing countries. Developing countries on the other hand suffer from underdeveloped institutions and trade and commerce is still in many cases (i.e., Sub Saharan Africa) an underdeveloped concept and more so because of the presence of many internal conflicts based on ethnicity, language or religion. On average, developing countries are hostile among each other when compared to developed countries and that can be the legacy of cold war which ended in 1991 with dismantling of Union of Soviet Socialist Republics (USSR).[1]

Irrespective of negative fallout of cold war, and with the end of it in 1990s, a new era started which is now better known as the post Washington consensus period, which saw an increased call of globalization by asking developing countries to decrease their protection in order to be an integral part of a growing global demand and supply chains. More trade and economic cooperation among developed and developing countries had been seen as one of the best ways through which incomes in developing countries would converge to the levels of their developed counterparts. The focus of recipes of development ever since had been on income generation. The question of distribution of incomes was largely never asked only until recently when there is a significant rise in global income inequality (i.e. see Milanovic, 2006; and Wade, 2004; for a detailed discussion on global income inequality). Rise in global inequalities is seen to be linked with prevalent inequalities among different strata of population within countries which stifle the potential of a country to

grow or converge. (A discussion of intra-country inequality has already been carried out in chapter 3, and which is the focus of the larger thesis and this chapter also).

In most of the last 20 years, the criterion of good economic policy and the barometer of good governance focused itself on their effects on per capita income growth in developing countries. Economic efficiency models were transferred to many developing countries who had become adherents to the Washington consensus. Structural Adjustment Plan (SAP) is the most well known one of the recommended programs of economic development, which has been implemented in many developing countries with the help of Bretton Woods's institutions like the World Bank and the International Monetary Fund (IMF).

As per the advice of Bretton Woods's institutions and in an effort to achieve economic efficiency, most developing countries dismantled their barriers to international trade in goods and services during the last 20 years. As a result, the size of world trade in goods and services dramatically increased. Success stories also emerged as an outcome of contemporary globalisation. China and India, witnessed unprecedented rise in their growth rates as well as significant poverty alleviation. However, for most countries, globalisation came with mixed experiences. Despite integration to the world economy, most countries of Latin America, Africa (sub-Saharan) and some in Asia failed to accomplish decent growth rates. In many countries in the South, poverty increased. Even if some grew at a decent rate, they failed to put a downward pressure on the increasing trends in poverty levels. For example, Pakistan, which recently witnessed a growth rate of eight per cent, has also witnessed increase in poverty levels from 30 per cent to 35 per cent as of 2005. Even in China and India, the falling poverty trends are not sustainable, as there is evidence of rapidly rising inequalities.

Irrespective of rising trends of poverty in some developing countries and rising within country inequalities in some, a more important fact is that many developing countries encountered conditions of severe economic collapse amid Structural Adjustment Plans. These include mostly the countries in Latin America like Argentina who embraced free market

ideology far more intensively than any other country in the developing world. Surprisingly, Argentina had historically been far more developed per capita wise than countries like India, Pakistan, Bangladesh, Cambodia, or regions like Sub Saharan Africa or Mena countries, but instead of converging to the developed country incomes its path to development has seriously been hampered by significant economic collapse post 1980s economic reforms and Argentina is stagnating ever since, still struggling with one macro-economic crises after another.

Where did Argentina go wrong may tell a whole lot about where do most developing countries have gone wrong? It is a story of good policies but bad timing. The policies fail because larger determinants of development are not taken into account. A focus on income generation without looking at prevalent institutions may lead to economic disaster. Chapter 2 has shown that institutions are as important as good economic policies (i.e. trade policy). Though the focus in chapter 2 was on income and its determinants, the debate needs to be extended to income distribution which can then capture such unequal outcomes which prevent some segments of the societies from gaining goods of economic gains (rising per capita income). In developing countries, other than being poor of the poorest, many are relatively poorer than the others because they are economically and socially excluded because of their ethnic origin, religion or geographical region. It is observed that when these developing countries generate more incomes through policies like integration, the incomes are further distributed un-equally.

This is the same phenomenon as global inequality; where some countries (regions) of the world have gained less than the other countries because of their geographical location, underdeveloped institutions or mere lack of economic capability (because of the presence of deep rooted informal markets). With the exception of China and India, more developing countries have failed to alleviate poverty even though they have witnessed some short to medium term spurts in per capita income growth rates. The poor remained poorer but rich got richer. Has income inequality prevented growth to trickle down to the poor?

In this retrospect, the problem of poverty cannot be separated from the way in which growth is achieved. Other than economic growth, what is the point of reference to economic development, especially when it is about ensuring equity?

Under global processes of production, where trading societies learn and coordinate among each other to find common ground for carrying out contemporary social norms that fit international standards and where business protects labour rights, promotes gender sensitivity, brings efficient social welfare systems while following best commerce practices, there are not one but a myriad combination of common institutions, which simultaneously play a role in facilitating each country's smooth exposure to global markets and international competition. Thus, it is important to look at the different institutional structures countries may have while working along with the surge of globalisation.

One of the most commonly quoted institutional factors for determining any country's intellectual, social, economic and cultural progress is the notion of *democracy*. Since all developed nations are well-practiced democracies, this notion generally forms the popular opinion that democracy is the first step to any country's progress. However to change the kaleidoscope a bit, one may also argue that it is their very own economic progress that has been able to sustain democracy in the West. It is a well-developed combination of social, legal, political and economic institutions, which has worked in an intricate net of coordination to sustain western economic progress, thus enabling the region to maintain its scientific niche. Where did the West really start it all? There are different answers for different times. To go down a timeline, say a hundred years, western economic progress links to colonialism, which was an act of resource exploitation and dictatorial precedence in the garb of monarchies rather than following any course of democratic values. Today western economic models work under the prime of information accuracy and thus keep their edge over other regions based on their enhanced level of technology.

In developing countries, there is evidence of rapid economic progress leading to democracy or moving towards democratically aligned eco-

nomic models of governance. China, South Korea and Taiwan have been growing under one-party dictatorships, the last two eventually turning completely to democracy. Today China is for the first time seriously emphasising property rights, to protect private ownership, within its own borders. Among the transition economies, Kazakhstan under Nazarbaev achieved rapid economic growth. Here one may assume that these countries performed well under market-friendly policies and thus successfully achieved robust economic performance. However, the analogy is not that simple and mere good economics is not enough to sustain economic progress.

In 2003, Pakistan had become one of the fastest growing economies in South Asia, even surpassing India, under General Musharraf, and finally moving towards democracy while for the first time in Pakistan's politically chequered history, nearly all political parties accepted the electoral verdict as an outcome of free and fair elections. However, the increase in political instability in the last years of Musharraf's rule has already stifled the growth rates in the country and currently an economic and political crisis is looming asking whether the good policies of the dictators are sustainable or whether autocratic rules corrupt the prevalent institutions, irrespective of a possibility of short term economic good will, such that the period, which represents transition to democracy , would be mired with political upheavals which would eventually cause economic collapse. Sometimes, democratic transitions are risky and produce bad economic outcomes. (See Rodrik and Wacziarg, 2005; for a detailed discussion on this).

Thus market-friendly policies may not work in the absence of good institutions. In Russia, the lack of a supportive legal, regulatory and political apparatus has been responsible for the failure of the economy and its reform process. In Latin America, little attention paid to the mechanisms of social insurance and to the safety nets has resulted in dissatisfaction with market-oriented reforms. India, in comparison to the countries mentioned above, is not only the largest democracy in the world in terms of population, but the country is also one of the fastest growing economies in the world with a precedence of sound legal institutions. Due to

robust legal institutions, the country is politically less volatile when compared to its neighbour Pakistan, even though both countries have seen an emergence of multiparty governance setups. However, because they are developing countries, much like those in Latin America, social institutions are underdeveloped, which means that a well-meaning democracy may not exist in India until economic progress reaches out to the masses and benefits the impoverished peripheries.

Reliance of economic growth by giving more weight to short term growth strategies is to promote a half baked development recipe which is bound to fail. Most governments have focused on macro-economic gains. That is why policy advice post Washington Consensus on structural adjustment had a blind following by most developing countries, without asking whether good macro-economics is a sufficient condition for good development. Globalization is accused of increasing poverty as well as inequality in many countries, due to numerous cases of growth collapse. While at the same time, many suggest that the developing countries have not done enough to avoid disaster. Under the dynamic Heckscher-Ohlin model discussed in chapter 3, it may be that developing countries can not do enough under the biased competition environment prevailing in international markets due to certain protectionary policies of developed nations which is much evident by the political economy of the WTO (World Trade Organization). (Stiglitz, 2006) Good economic policy advice has to accommodate indigenous limitation of each country. Currently international initiatives like WTO are becoming a symbol of protection than promoter of equal competition opportunities and the bias is seen in favour of the developed countries partly because the negative fall out of globalization has been felt even in developed countries as most rich and middle-income countries are experiencing rising economic inequality generated by skill-biased technological change, international trade and other factors related to globalization. (Smeeding 2002)

For India and China, it is equal distribution of economic gains which has become more relevant in recent times, while in Latin American countries like Argentina and Brazil, growth and distribution go hand in hand.

So what are the key characteristics which matter equally good to income generation and re-distribution of income?

In developing countries, income inequalities can be affected in two ways. (1) Adopt policies which have a redistributive outcome by shifting gains from rich to the poor. (2) Or raise the share of income in sectors which mostly employ the poorer segments of the society. In this context, both institutions and trade may have a strong redistributive power. For example, democracies, as against, oligarchic societies redistribute resources equally to all sections of the society. In a real democratic set-up voice of farmers and industry workers are weighed equally and policies are structured to raise the share of income for both manufacturing and farm industry. Outcomes like increased accountability, preservation of property rights and control for corruption may all have redistributive power. Trade can also lead to redistribution if developing countries are able to trade more in agriculture produce in international markets thus raising the returns to agriculture sector. However, if developing countries fail to compete in international markets, governments may adopt regulation policies which can protect their labour. The scope of protection of agriculture sector in developing countries by means of trade policy measures is limited. However, more exports in agriculture are necessary for economic empowerment of the rural population whose livelihoods are directly connected with the performance of agriculture sector. Protection of agriculture sector is very common in developed countries, while it has been negatively affecting the farmers in developing countries. To remedy this problem, developing countries can increase trade among each in labour intensive agriculture produce causing rise in income share of agriculture in economic growth. Government Measures such as subsidies can also be utilized to improve on-farm activities. Subsidies on pesticides and alike, can improve the produce of agriculture sector while significantly improving the livelihoods in rural areas. So it is a combination of good institutions and trade, which eventually leads to inequality mitigation and redistribution.

Thus to analyze what makes for good economics where not only economic growth is achieved but most importantly economic dividends are

also distributed equally among different strata of the population, this chapter conducts a cross-sectional analysis of developed and developing countries as a follow-up of chapter 2. In this chapter also, different institutional variables, along with different proxies of openness\trade policy are employed while focusing on their impact on inequality.

4.2 Inequality as Important as Growth

After the surge of colonialism, the world became a land of unequal opportunities. The last century witnessed global inequalities partly lead to regional inequalities. With the return of contemporary globalization, post-modernism brought inequality to the doorstep of each country where rural and urban divides have been ever increasing so that it recently became of policy importance to consider inequality as a significant factor that may stifle growth promoting strategies and even reverse what good growth may bring to society. Income inequality has become as important an issue as per capita income growth because over the last twenty years it is observed that the distributions in poor, middle income and rich countries have grown more unequal.

To account for inequality one may start with observations of high levels of inequalities in most countries of Latin America. For example, due in part to the recession in the 1980s, which hit the poor harder than the rich, inequality in most Latin American countries, except three (Colombia, Uruguay and Costa Rica), witnessed sharp rises. Gini coefficients in Latin America ranged between 0.45 and 0.60 since the early 1950s, which are among the highest in the world. The severe polarisation of income has been due to highly unequal distribution of land and educational opportunities. (Cornia et al. 2004). These prevalent inequalities are still stifling the economic potential of the region while institutions remain underdeveloped.

In China, income concentration has been rising rapidly since 1985 so that the Gini coefficient reached 0.43 by 1995 and remained more or less at the same level until recently. The widening of the urban-rural divide from faster expansion of urban activities amid China's active participation in international markets is responsible for the rise in income dispar-

ity. Among South-East Asian economies, the Gini coefficient for Indonesia increased to 0.38 by 1997 from 0.32 in 1987-90. In South Asia, inequality also followed a U-shape pattern, although less pronounced. In India, the experience of the 1990s points to a moderate rise in both urban and rural inequality and a larger rise in overall inequality due to a widening gap between urban and rural areas. In the 1990s, urban inequality rose to 0.36. The Gini coefficient in Pakistan rose from 0.39 in the 1960s to 0.41 in the 1990s. Much like India, the sharp rise in rural inequalities resulted in the rise in overall inequality. Inequality in sub-Saharan Africa has been among the highest in the world. There is some evidence of a falling urban-rural gap but there is rising intra-urban and at times intra-rural inequalities. For example in Tanzania, the Gini coefficient for rural inequality rose from 0.53 in the early 1980s to 0.76 in the early 1990s. Similarly for Kenya, the rural inequalities increased by nine points from 1980 to 1992 and stands at 0.49. (Ibid 2004)

Rise in inequality is not only a developing country phenomenon: 'Canada excepted, all the countries of English settlement, led by the United States, have experienced big increases in income inequality over the past 20-30 years. In the United States, the top 1% of the families enjoyed a growth of after-tax income of almost 160 % over 1979-97, while families in the middle of the distribution had a 10% increase. Within the top 1% most of the gains have been concentrated in the top 0.1%. This is not a matter of reward to education. Inequality has expanded hugely among the college-educated. Whatever the causes, the fact is that the United States is now back to the same level of inequality of income as in the decades before1929, the era of the "robber barons" and the Great Gatsby. Income distribution in the United Kingdom grew more unequal more quickly than even in the United States during the 1980s, and is now the most unequal of the big European countries.' (Wade, 2004; 12)

The next section captures the inter connection between institutions, integration and inequality.

4.3 Different Types of Institutions, Integration, Inequality and the Endogeneity Factors

Forbes (2000) finds positive correlation between growth and within country income inequality across a sample of countries. In his paper, he has been able to isolate the relationship of institutions which would introduce a negative bias in results because good institutions are negatively related with inequality and positively related with growth. Once controlling for institutions, what are the factors which are deriving the positive sign between inequality and growth in results obtained by Forbes (2000)? If it is not institutions (omitted variables bias), then it must be market forces partly because the relationship between inequality and growth in Forbes (2000) could only be established for shorter time periods.

Forbes (2000) fails to say more about the determinants of growth and inequality but does emphasize on a need for further empirical evidence where determinants of inequality and growth are also investigated upon:

> 'Even if this short-term within country, positive relationship between inequality and growth is proven to be robust, this paper does not investigate how these two variables and their underlying determinants are interconnected. The introduction outlines several theories that could explain a positive association between inequality and growth, but none has bee subject to rigorous empirical tests. Therefore, this paper suggests the need for not only a further careful reassessment of the reduced0form relationship between these two variables, but also further theoretical and empirical work evaluating the channels through which inequality, growth, and any other variables are related.' (886)

It is important to analyse inequality with its relationship with processes of economic growth while simultaneously controlling for the negative and the positive bias which may be deriving the relationship between growth and inequality. Forbes (2000) explains the bias and its role in deriving the nature of relationship between inequality and growth:

> 'If there is strong uni-variate correlations between an omitted variable, inequality, and growth, however, these relationships can outweigh any multivariate effects and generate a significant, predictable bias. For example, if a

country's degree of capitalism, support for entrepreneurship, and/or amount of labour market flexibility is omitted from the growth equation (and each of these variables tends to be positively correlated with both inequality and growth), this could generate a positive bias on estimated inequality coefficients. On the other hand, if the level of corruption (which tends to be positively correlated with inequality and negatively correlated with growth) is omitted from the growth equation, this could generate a negative bias on the estimated inequality coefficients. Given the numerous variables that are difficult to measure and include in a growth regression, it is difficult to predict a priori how omitted variables could affect estimates of the relationship between inequality and growth.' (p.870)

One way to control for this bias is to carry out a reduced form analysis by separately analyzing the role of determinants of growth on growth and then on inequality. Chapter 2 has already undertaken a detailed analysis on the role of markets and institutions in economic growth. In this chapter, the author will focus on inequality. Though, Forbes (2000) establishes a positive relationship between short term growth and inequality, a simple interpretation is that short term growth rate is usually triggered by market forces (positive bias) in most developing countries and that may be irrespective of prevalent institutions. Good institutions (negative bias), on the other hand, ensure that benefits of growth are also distributed equally in a society. Easterly (2007) finds out that inequality explained through – institutions and schooling (lack of it) - has been a significant cause of under development (and low long term growth rates presumably). The paper explains the positive and negative bias and confusion surrounding their separate effects on the relationship between inequality and economic development as follows:

'One confusion in the theoretical and empirical analysis of inequality is between what we could call structural inequality and market inequality. Structural inequality reflects such historical events as conquest, colonization, slavery, and land distribution by the state or colonial power; it creates elite by means of these non-market mechanisms. Market forces also lead to inequality, but just because success in free markets is always very uneven across different individuals, cities, regions, firms, and industries. So the re-

> cent rise in inequality in China is clearly market-based, while high inequality in Brazil or South Africa is just as clearly structural. Only structural inequality is unambiguously bad for subsequent development in theory; market inequality has ambiguous effects – it could have some of the adverse effects.' (p.756)

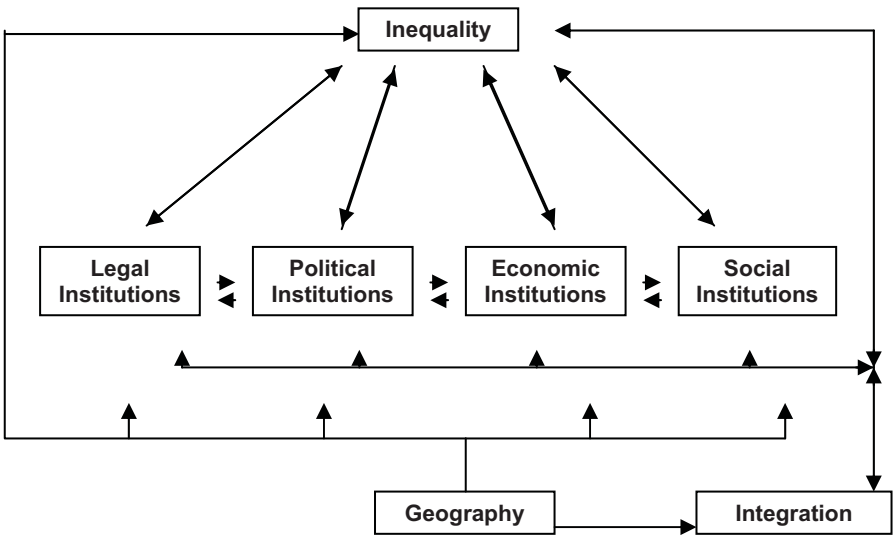
In the light of Easterly (2007), one has to look at the negative bias which Forbes (2000) overlooked in his empirical analysis. Whether good institutions (negative bias or structural inequality) is more prominent than the positive bias (market forces or market inequality) in determining relationship between inequality and economic development, we will find out in next sections where the author would carry out an empirical exercise to investigate the relationship of inequality with institutions while controlling for market forces and vice versa.

Before we carry out our empirical analysis, there are issues of two-way causality to be resolved between inequality and institutions (see Keefer and Knack 2002; Chong and Gradstein 2004), and between different types of institutions as shown by Figure 4.1 and discussed below. Many recent studies also show that international trade relates significantly to inequality (see Chen and Ravallion 2003; Cockburn 2001; Friedman 2000; Lofgren 1999), while institutions and integration are also endogenous. (Rodrik et al. 2004) Any empirical analysis that takes institutions or international trade as purely exogenous factors while analyzing their effects on inequality may lead to miss-specification bias.

Regarding endogeniety between inequality and institutions, Easterly (2001) and Keefer and Knack (2002) suggest that social polarisation negatively affects institutional quality. Rising inequalities may lead to political instability and even civil unrest. Chong and Gradstein (2004) find strong evidence of bi-directional causality between institutions and inequality. Inequality may affect the quality of institutions. For example high inequality will prevent the poor from investing in education or the ruling class may not invest in education so that the poor majority will not be politically active, thus undermining the development of necessary social and political institutions:

'High inequality can impede the economic performance of a country by obstructing the formation of governance structures that enhance productivity. Where this is the case, inequality is likely to be the result of a distribution of property rights that is inefficient as well as inequitable. If so, there may be a plausible set of alternative distributions that are both more equitable and more efficient; i.e., which foster competition on the basis of a more level playing field.' (Roy and Weeks 2003: 3)

Figure 4.1
Endogeneity between institutions, integration and inequality



Brink (2008) has also emphasized on addressing inequalities in a society to enable the institutions work better: ' Even the best institutions require (some more than others, depending not so much on their quality as on their design) a personal investment on the part of the claimant, sufficient to overcome the resistance of the respondent. Some basic capability on the part of the claimant is a precondition for the effective exercise of rights. Secondly, institutions are the result of political struggles that also require the investment of substantial personal resources, sufficient to overcome the resistance of those who can anticipate their consequences

and would be adversely affected by them. Both the development and the operation of institutions respond to the core inequalities present in society. Until those inequalities are addressed, it is unlikely that a full democratic rule of law will take hold' (p. 23)

The countries with poor institutions are also likely to have high inequality. For example in Russia in the 1990s, a small group of entrepreneurs were successful in exploiting their political clout to promote their own interests, subverting the emergence of institutions committed to the protection of smaller shareholders and businesses. According to the Corruption Perceptions Index published by Transparency International, among the transition economies, Estonia is 28 and Hungary 31; whereas Russia is 79 and Ukraine 83. In these transition economies, poor performance of public institutions, absence of effective implementation on property rights, and presence of business regulation which favour of influential parties, absence of trust in the courts to resolve business disputes, tax evasion and higher levels of rent seeking have strong correlation with high inequality in the society. (Hellman and Kaufman 2002) Similarly, in several Latin American countries, the ruling elites, the military and large businesses impeded smaller business interests. Chong and Gradstein (2004), show that when the political bias in favour of the rich is large, income inequality and poor institutional quality may reinforce each other, confirming endogeneity between the two.

Table 4.1
Different Kinds of Institutions

Institutions	**What they capture**
Political Institutions:	Political stability, democracy, the separation of powers
Legal Institutions:	Laws and their enforcements
Economic Institutions:	Promotion of private wealth
Social Institutions:	Human motivations and social structure.

There may also be inter-linkages between various institutions. For example, nearly all developed countries are democracies and most develop-

ing countries are one-party systems, dictatorships or military regimes. The countries with lower levels of economic and human development tend to have lower levels of education, limited political rights, weak or non-existent political competition, lower level of economic freedom and openness, ethno-linguistic factionalism, lack of judicial independence and a free press, and high levels of permissiveness towards corruption.

Before discussing in detail the interdependence of different institutions, it is important first to differentiate between them. There are four types of institutions identified: legal, political, economic and social (Williamson, 1999). A hierarchy of institutions is presented in table 4.1. Social institutions capture socioeconomic conditions such as health, education and nutrition and can be analogous to human capital which has basis in its historic evolution. For example the reference of Glaeser et al (2004a) towards the endogeniety between AJR settler mortality with settlers' human capital is one indication of long run transformation of social institution in developing countries. Legal institutions capture the transparency and fairness of the legal system, preservation of political rights of the citizens, state legitimacy, freedom of speech, independence of judiciary, enforceability of contracts, police effectiveness, access to independent and impartial courts, confidence in judicial system in insuring property rights, prevention of improper practices in public sphere, control of corruption and so on. Political institutions represent political stability, democracy, autocracy or dictatorship or rules which promote political process, civil liberties and political rights. Economic institutions comprise state effectiveness at collecting taxes or other forms of government revenue. As well as, the ability to create, deliver and maintain vital national infrastructure, the ability to respond effectively to domestic economic problems; independence of government economic policies from pressure of special interest groups, trade and foreign exchange; competition policy, privatization, banking reform and interest rate liberalization, securities and non-bank financial institutions.

The legal, political, economic and social institutions are strong in developed countries while developing countries have mixed experiences. For example, the US and most advanced societies vigorously protect in-

tellectual property rights, but this is not the case in many developing countries. (Rodrik 1999) Engerman and Sokoloff (2002) link the development of public education, as a social institution, to democratization as a political process in the US. They argue that while starting at a similar level of development in the 18th century, the US led the way in setting up a system of common schools and promoting literacy, whereas countries in South America and the Caribbean delayed implementing these processes. Gupta et al. (1998) find that if government officials use their authority for private gain and indulge in corruption, it affects the effectiveness of social spending and the formation of human capital by perpetuating an unequal distribution of asset ownership and unequal access to education. Corruption also affects government effectiveness as it weakens tax administration and can lead to tax evasion and improper tax exemptions. Higher corruption is associated with increased inequalities in education, land distribution and health spending. Wealthy urban elites can lobby the government for biased social expenditure towards higher education and tertiary health, which tends to benefit high-income groups. (Ibid 1998)

As mentioned, market outcomes (trade) and prevailing institutions are also correlated and endogenously determine income distribution. Trade opening in societies with weak institutions may lead to worse economic policies with rising inequalities unless and until poor institutions are controlled for by giving them ample time to develop. (Segura-Cayuela 2005) For example, the transition economies that implemented trade reforms slowly and where government institutions were able to perform well with time, smaller increases in inequality and smaller output decline occurred. However, the transition economies which opened up rather vigorously without considering prevalent corrupt government structures (and other underdeveloped institutions) performed poorly. In such countries poverty and inequality increased while high trade deficits had occurred after trade liberalization accounting for a capital flight. (Yudaeva 2002) Rising inequalities as an outcome of bad policies (mismanagement or mistiming) may even lead to political upheavals against globalization and further integration.

Table 4.2
Summary Statistics

Variables	Code	Source	Obs	Std . Dev
Dependent				
GINI Coefficient in Percentage Points as calculated by WIDER, 1995	Gini	UNU/WIDER World Income Inequality Database (WIID) http://www.wider.unu.edu/wiid/wiid.htm	117	(35.00)
UTIP-UNIDO Wage Inequality THEIL Measure, 1999	Theil99	University of Texas Inequality Project (UTIP) http://utip.gov.utexas.edu	155	(0.099)
Lowest income decile, 1995	Low10	UNU/WIDER World Income Inequality Database (WIID) http://www.wider.unu.edu/wiid/wiid.htm	117	(1.05)
Fifth income percentile/ First income percentile , 1995	High20/ Low20	UNU/WIDER World Income Inequality Database (WIID) http://www.wider.unu.edu/wiid/wiid.htm	117	(2.28)
Third income percentile, 1995	Thrd20	UNU/WIDER World Income Inequality Database (WIID) http://www.wider.unu.edu/wiid/wiid.htm	117	(2.22)
Highest income decile, 1995	High10	UNU/WIDER World Income Inequality Database (WIID) http://www.wider.unu.edu/wiid/wiid.htm	117	(7.50)
Endogenous Independent				
Openness Variables				
(Exports +Imports)/GDP at current dollar prices, 1985	Lcopen	World Development Indicators	170	(0.589)
Import Penetration: overall, 1985	Impnov85	Pritchett (1996)	96	(21.08)
Import Penetration: overall, 1982	Impnov82	Pritchett (1996)	95	(23.85)
TARS trade penetration,: overall, 1985	Tars85	Pritchett (1996)	96	(36.91)
TARS trade penetration,: overall, 1982	Tars82	Pritchett (1996)	93	(83.10)
Trade Policy Variables				
Import duties as % imports,1985	Tariffs	World Development Indicators	99	(8.903)
Tariffs on international inputs and capital goods, 1985	Owti	Sachs and Warner (1995)	98	(0.165
Trade taxes/ trade, 1982	Txtrdg	Pritchett (1996)	54	(0.031)
Weighted average of total import charges, 1985	Totim-pov85	Pritchett (1996) (Available for developing countries only)	76	(21.30)
Non trade barriers frequency on intermediate inputs, 1985	Owqi	Sachs and Warner (1995)	96	(0.24)
Non-tariff barriers Coverage: overall, 1987	Nontarr87	Pritchett (1996) (Available for developing countries only)	76	(36.305)
Sachs and Warner's composite openness index, 1980	Open80s	Edwards (1998)	61	(0.446)

Institutions				
Political				
Voice and Accountability, 1999 Range: 2.5 to -2.5	Va	Kaufmann, Kraay and Mastruzzi (2003)	170	(0.952)
Political stability, 1999 Range: 2.5 to -2.5	Ps	Kaufmann, Kraay and Mastruzzi (2003)	156	(0.954)
Democracy, 2000 Range = 0-10 (0 = low; 10 = high), Democracy Score: general openness of political institutions. The 11-point Democracy scale is constructed additively	Demo	Polity IV dataset)	123	(4.33)
Autocracy Range = 0 to -10 (0 = low; -10 = high), general closeness of political institutions. The 11-point autocracy scale is constructed additively	Auto	Polity IV dataset)	123	(3.69)
Legal				
Rule of Law, 1999 Range: 2.5 to -2.5	Rl	Kaufmann, Kraay and Mastruzzi (2003)	166	(0.937)
Control for Corruption, 1999 Range: 2.5 to -2.5	Ctc	Kaufmann, Kraay and Mastruzzi (2003)	159	(0.910)
Economic				
Government effectiveness, 1999 Range: 2.5 to -2.5	Ge	Kaufmann, Kraay and Mastruzzi (2003)	157	(0.893)
Regulatory quality, 1999 Range: 2.5 to -2.5	Rq	Kaufmann, Kraay and Mastruzzi (2003)	166	(0.892)
Social				
Average years of Schooling, 1999	Sch99	Baro and Lee (2001)	109	(2.914)
Instruments				
Natural logarithm of predicted trade shares computed from a bilateral trade equation with 'pure geography' variables,	Lfrkrom	Frankel and Romer (1999)	163	(16.75)
Fraction of the population speaking English	Engfrac	Hall and Jones (1999)	182	(0.236)
Fraction of the population speaking one of the major languages of Western Europe: French, German, Portugese or Spanish	Eurfrac	Hall and Jones (1999)	185	(0.380)
Drop out rate, 1990s	Drop90	Barro and Lee (1996)	125	(0.802)
Number of school days	Schday	Barro and Lee (1996)	139	(23.43)
Distance from the equator of capital city measured as abs (Latitude)/90	Disteq	Acemoglu, Johnson and Robinson (AJR) (2001)	208	(16.65)

Some developing countries may trade with developed countries because of common polity, whereas some countries cannot effectively trade because there lays ideological differences between governance structures. For example, despite Iran being an Oil rich country, do not trade with United States or Israel on ideological grounds while it may establish stronger trade relations with the competitors of United States e.g. Russia and Venezuela. Conflict and political instability also cause countries to

trade less effectively with rest of the world causing negative externalities in terms of increased costs of trade. For-example Pakistan and India, despite being neighbours, have a history of conflict, and they do not trade with each other more, despite high costs incurred in terms of competitions and economic rivalry. India is traditionally a democracy, while Pakistan has scored usually low in democracy. A detailed chapter is allocated on the negative effects of conflict of bilateral trade and larger costs of conflict. (i.e., see chapter 6) Thus there is a strong correlation between inequality and trade through institutions.

4.4 Data and Methodology

There are different measures of inequality which may determine within country inequality and they have been widely discussed in recent literature (see for example Wade, 2004; Milanovic, 2006). Most studies concentrate on the positive or negative effects of globalization or integration on income distribution while employing diverse proxies of income distribution. Not many studies concentrate on the effects of institutions on inequality. There is a need to simultaneously model the effects of institutions and integration on income distribution.

The six governance indicators utilized in chapter 2 are the same employed here for the analysis. They are categorized as rule of law (*Rl*), political stability (*Ps*), regulatory quality (*Rq*), government effectiveness (*Ge*), voice and accountability (*Va*) and control of corruption (*Ctc*). This chapter divides them into four classifications based on their definitions considering *Rl*, and *Ctc* as legal institutions. *Ge* and *Rq* are economic institutions whereas Va and *Ps* is a proxy for Political institutions. This analysis adds two more political indicators namely, democracy (*Demo*) and autocracy (*Auto*) to the analysis from Polity dataset whereas, both range from 0 to 10. The analysis also includes average schooling years in the total population at 25 (*Sch*)) in order to capture the quality of social institutions.

As mentioned above, international trade is also a significant determinant of inequality. Thus international trade enters the regression model to enhance its explanatory power and we can also test whether globaliza-

tion is one of the significant determinants of rising inequalities in developed and developing countries while controlling for institutions. Similar to chapter 2, this chapter incorporates not one but eight various concepts of integration based on outcome as well as incidence based measures of trade barriers. The ratio of nominal imports plus exports to GDP (*Lcopen*) is the conventional openness indicator. Two other measures of openness are overall trade penetration (*tarshov*) derived from the World Bank's TARS system and overall import penetration (*Impnov*) respectively. Import tariffs as percentage of imports (*Tariffs*), tariffs on intermediate inputs and capital goods (*Owti*), trade taxes as a ratio of overall trade (*Txtrg*) and total import charges (*Totimpov*) can all be considered as good proxies for trade restrictiveness and have also been employed in this study. Other measures that capture restrictions in overall trade are non-tariff barriers. Overall non-tariff coverage (*Ntarfov*) and non-tariff barriers on intermediate inputs and capital goods (*Owqi*) are used here as two proxies for non-tariff barriers. Sachs and Warner's (1995) openness index (O*pen80*) is utilised as a composite measure of trade policy.

The debate in previous sections had provided us with enough information to decide about the right hand side variables. Now, we need to select inequality measures (related with incomes) or re-distribution (of income) to enter the left hand side of the empirical model. Our first concern is to know how income inequality is generally determined in empirical literature. It is a difficult question because comparable and consistent measures of income inequality, whether on a household level or per head basis are difficult, almost implausible and generally even if obtained fail to provide adequate or accurate longitudinal and cross-country coverage. For this, recent literature on income inequality prefers global income inequality indicator over country specific ones (see Milanovic, 2006). Nonetheless, cross country income inequality indices representing global inequality are also prone to controversies. For example, between-country world PPP income inequality using per capita GDPs, equal country weights (China=Uganda), through a GINI estimate has been found to have increased since 1980s. However between country world

PPP income inequalities with countries weighted by population has been found to be constant or falling since around 1980s. (See Wade, 2004)

As mentioned several times in the text, in this thesis we are only interested in within country effects of inequality in order to partly differentiate between recent (post reform) evolution of within country inequality between developed and developing countries. Despite its apparent weaknesses, to capture within country income inequality, we have little choice but to employ controversial and much criticized upon within country GINI income inequality index (*Gini*) which is available from UNU/WIDER World Income Inequality Database (WIID).

Before moving ahead with the analysis, it is important to highlight the vulnerabilities in the use of within country *Gini* and the limitations which are associated with its calculation. WIDER User Guide (2008) discusses the measurement problems in detail:

> 'There are no easy ways to use income/consumption distribution data. Unlike national accounts data which are in principle comparable across countries, there is no agreed basis of definition for the construction of distribution data. Sources and methods might vary, especially across but within countries. This may be the case even if the data comes from the same source. In their influential article on the use of secondary data in studies on income distribution, Atkinnson and Brandolini (2001) discuss quality and consistency in income distribution data both within and across countries. They show how both levels and trends in distributional data can be affected by data choices. In light of this, it is not easy task to construct a secondary database with distribution data. Regardless of different views, the collection of inequality observations is restricted to what in practice is available. In most industrialized countries inequality and poverty are assessed with reference to income, not consumption (Deaton and Zaid, 2002). This tradition is followed in much of Latin America. By contrast, most Asian and African surveys have always collected detailed consumption data. The fact that distribution data can be based on both income and consumption is the first step stone in the construction of comparable statistics. In WIID (reference to WIDER data base) we strived to collect observations with reference to both income and consumption, whenever possible.' (p.4)

These are introductory lines of the user manual which have quite nicely summarized the problem faced with the collection of comparable data to construct within country GINI index across a set of countries. To address this critique regarding the data problem faced with GINI, this chapter has employed other concepts of within country inequality. UTIP-UNIDO Theil measure (*Theil*), calculated by the University of Texas Inequality Project (UTIP), is one such measure which captures wage inequality between skilled and unskilled labour in manufacturing pay sector. *Theil* is available for both developed and developing countries. On the data methodological front manufacturing pay, based on UNIDO Industrial Statistics provides indicators of inequality that are more stable, more reliable and more comparable across countries because UNIDO measures are based on a two or three digit code of International Standard Industrial Classification (ISIC), a single systematic accounting framework. Furthermore, for nearly 40 years most countries around the world have measured manufacturing pay with reasonable accuracy as a matter of official routine. (Galbraith and Kum 2002) Like GINI, wage inequality is also rising for both developed and developing countries. Though Dollar and Kraay (2005) down play the negative fall out of rise in wage inequality by suggesting that manufacturing sector represents only a minority of population in developing countries and unskilled are a minority in developed countries, the point is not valid and labour market distortions in manufacturing sector cannot be ignored for such sector is a high growth oriented sector of the economy.

In literature some relate more to the behavior of relative factor supplies in determining wage inequality (see Acemoglu, 2003). However, rising wage inequality can be explained as an outcome of relative factor supplies or relative factor demand or a combination of both. In developing countries, supply of unskilled labour is more elastic than skilled labour. International trade, through a skill biased technical change, can affect relative wages in favour of skills by raising the demand of skilled over unskilled. In developed countries, where supply of skilled labour is more elastic when compared to developing countries, skilled bias technical change raises skill premia by still raising the relative demand of skilled

over unskilled. Under skilled bias technical change, relative factor demand leads to wage inequality through at least four distinct effects:

1. Own technology development by different countries with different degrees of skill bias.
2. Lack of technical capabilities in some countries to adapt to most recent skilled-bias technologies.
3. Efficiency in adoption of more skilled biased technologies from a global technology frontier.
4. Different trading regimes with different levels of trade opening affecting the demand of skills differentially.

If skills are captured by education levels, then other than trade, relative factor supplies and demand are closely related with prevalent institutions. If so then different degrees of skill bias, or a country's potential to adapt to most recent skilled bias technologies or its efficiency in choosing skilled bias technologies from global technology frontier may also be determined by institutional outcomes. Efficient economic, social and political institutions would enable the countries to adopt or benefit from skill biased technologies thus raising the demand for skills. For-example, countries like India and China, where a significant population has been educated and skilled in urban clusters, a skilled bias technical progress is underway which coincide with strong legal institutions in India and promotion of private property rights in China. Relatively, cheaper educated (skilled) labour under favourable institutional outcomes has resulted in outsourcing of jobs from the developed countries to India and china's business capitals. The skill premia has significantly gone up, while the relative wage of low skilled has fallen down. Within the manufacturing sector, low skilled wage usually rise at a far less proportion than the rise in skilled labour wage. In most cases in India and China, the low skill wage is stagnant because of excess supply of low skilled. The excess supply is sustained by continuously increasing trends of migration from rural to urban.

Some studies argue that international trade plays a limited role in the increase in the relative demand for skills (see i.e., Acemoglu 2002). How-

ever, such works focus on wage patterns in developed countries. The evidence of trade in determining skill premia for many developed countries is limited because of their market status as leaders in technology. Generally, leaders in technology do not import new technologies from other countries. Technical change for all such technology leaders is an indigenous process. Nevertheless, a skill biased technical diffusion effect through trade in developed countries is possible when they trade among each other. For the larger world, which mostly comprises of developing countries, trade is one of the significant sources of technical change especially in the presence of lax intellectual property rights. Acemoglu (2002) suggest that most developing countries are in any case unprepared to utilize most of the technologies adopted by developed countries and thus the scope of technical change through trading with developed countries remain very limited. Here the case of China and India may refute this hypothesis as they have been able to adopt and transfer relatively sophisticated technologies. In recent times, more and more Indian and Chinese enterprises are appearing in the list of fortune 500 companies. Further opening up of India and China to world markets post 1990 has brought significant technical change to their economies which inturn has a significant relationship with a rise in skill premia in these countries. Currently many Indian multinationals are incorporating new technologies for indigenous use. For example, TATA has been offering to build the cheapest car in the world, the production of which has only been delayed because of relocation of assembly line to another location due to a dispute over procured land for the plant in State of Bengal.

Acemoglu's (2002) skepticism over trade in affecting skill premia is more of an empirical contention. Earlier, Acemoglu (1999) introduces a dynamic model to discuss the possibility of rise in skill premia for both developed and developing countries due to trade between each other. The paper explains its motivation in favour of rise in relative wage inequality among skilled and unskilled, due to trade between developed and developing countries, by incorporating technical change as the dynamic externality:

> 'increased international trade will have an effect on skill premia by changing the nature of technologies that are being developed, as well as its more direct standard effect. Under most plausible circumstances, trade between U.S and the LDCs (Least Developed Countries) will induce skill-biased technical change in the U.S., and will cause a large increase in U.S. skill premia. Contra to the standard models, this induced technology effect also implies that trade may increase skill premia in the LDCs'. (p.26)

Similarly, by drawing comparison of globalization with soccer, Milanovic (2003b) comes up with an interesting analogy which can partly explain the skill bias in high growth oriented manufacturing sector activities across the globe and its unequal outcomes within countries. As in soccer today where the quality of the game has arisen with the rise in players' skills with matching salaries and where best players are paired to only play with those who are also among the best; to compete in global markets, countries have to raise the share of skills (good jobs) in their population to match the skills (good jobs) in the developed countries because skilled intensive production activities may only take place where appropriate skills are present and these activities in addition to directly benefiting these skills with a high premium, also benefit the country through technology spill over effects which improves the growth potential of the country. India and China have successfully transformed a significant portion of population which can match the rising global skill demand (good jobs) and thus the skilled labour are directly benefiting from globalization. For unskilled labour though whose relative wage is falling, the solution can vary. In the short run, one solution is to protect low wage labour through regulations such that high wage (good) jobs and low-wage (bad) jobs can co-exist. (Acemoglu, 2001a) Minimum wage law in developing countries is also becoming common.

United States and United Kingdom, who are leaders in technology among other developed nations, have been witnessing a rise in skill premia. In contrast to India and China, the upward pressure on skilled wages through skill premia may not have lot to do with international trade as contended by Acemoglu (2002). However, the downward pressure on the relative wages of lower skilled is partly attributed to job out-

sourcing to developing countries by many business enterprises located in these technology leaders from the North, most of whom have found many urban commerce havens in South Asia and East Asia where skilled labour, only relative to local market standards, is employed in outsourced job market. One may note that without efficient technology transfer by developed countries to (or adoption by) the developing ones and by already creating skills among strata of urban population through investment in education, outsourcing business would not have been a cost efficient one. And in the first place, to make technology transfer and adoption possible, trade between developed and developing countries have been a pre-requisite. Thus Skill bias technical change and trade go hand in hand for both developed and developing countries to determine skill premium as is rightly modeled by Acemoglu (1999).

There is another angle to the debate. Trade may lead to rise in wage inequality because many developing countries pay protection premium to skilled labour in order to pursue a local path to technological development. While availability of cheap and relatively unskilled labour in global technical frontier may cause a downward pressure on wages of unskilled relative to skilled in developed countries. Developed countries, who produce at the frontiers of new technologies, try to retain their niche in technology. For such countries (i.e., USA and U.K), skill bias economic activity always require higher skills which would then always follow excess demand of higher skills in the context of local and global factor supply market. The developing countries which can imitate technology leaders can increasingly move in to adopt technologies by providing a limited but a rich supply of higher skills from within. In all such developing countries, the higher skilled would be available at relatively cheaper costs in international markets, which would cause production activities to relocate from developed countries to these developing countries. In this way, production technologies would always move places relative to their skill intensity globally and locally to find cost effective supply of skilled labour which best matches their skill (level) requirement. While international trade would provide the basic frame work for the very possibility of relocation of these technologies. That way, in a

technology driven world, where countries introduce or adapt to new technologies, the returns to relative skills would rise irrespective of production location.

The above discussion points out towards two distinct effects of labour markets on wage inequality. One effect comes from relative factor supplies and it is more closely related with institutional outcomes and yet only supplemented by market processes like trade. The other effect comes from relative factor demand that is more closely related with market outcomes and yet only supplemented by prevalent institutions. Like in case of income inequality, here also we can distinguish between institutional (structural) effect and trade (market) effect of wage inequality, which is a similar characterization earlier made by Easterly (2007), while both effects are endogenous to each other.

The possibility to find a negative relationship between wage inequality and trade for developing countries would come about if trade between them would increase. This is especially true for countries which are at similar technical frontier but their access to technology is unequal: some are ready to adopt more skill biased technologies than the others. A detailed discussion of this scenario has already been presented in chapter 3. The structural (institutional) argument in favour of decreasing inequality can be put forward in the context of raising the mean level of education in the population; developing countries, where education is distributed homogenously among the population, wage inequality would fall. (Mamoon and Murshed 2008) To explore further onto the structural determinants of wage inequality, and by going beyond the education variable, in this chapter we also investigate whether presence of better legal, political and economic institutions enable the economy to absorb the upward pressure which is put by skill bias technical change on relative factor returns.

Another issue in the empirical debate on income inequality revolves around redistribution of resources. Redistribution is opposite to inequality. *Gini* and *Theil* are measures of inequality. In order to add direct measures of redistribution into the empirical exercise, this chapter employs income deciles and percentiles derived from UNU/WIDER World

Income Inequality Database (WIID). Institutions or integration will be good for redistribution of resources if they are positively related with the incomes of the bottom 10 per cent (*low10*) and negatively related with the income of the top 10 per cent (*high 10)*. Income groups are also divided into quintiles anticipating the effect of markets or institutions to be negative for the ratio between the top 20 per cent and bottom 20 per cent (*high20/low*20) and positive for the middle-income groups (*Middle20*). Of special interest is how quality of institutions relates to the incomes of the middle-class or the ones living in the bottom income share. Each country observation for all inequality measures come from the last year for which data is available and in most cases represent inequality in the mid-1990s. Our basic inequality and income share equations would look like:

$$Inequality = f(Institutions, Integration, Geography) \tag{4.1}$$

and

$$Income\ Share = f(Institutions, Integration, Geography) \tag{4.2}$$

Corresponding to Eq. (4.1), the inequality model based on *Theil index* has eight equations whereas each equation corresponds to a different institutional or integration classification. The model specifications for *Gini*, *High20/Low20*, *Middle20*, *Low10* and *High10* contain the same eight equations each with the same variable specifications.

$$Theil_{1i} = \alpha_1 + \beta_1 LI_i + \chi_1 Open_i + Geo + \varepsilon_{1i} \tag{4.3}$$

$$Theil_{2i} = \alpha_2 + \beta_2 PI_i + \chi_2 Open_i + Geo + \varepsilon_{2i} \tag{4.4}$$

$$Theil_{3i} = \alpha_3 + \beta_3 EI_i + \chi_3 Open_i + Geo + \varepsilon_{3i} \tag{4.5}$$

$$Theil_{4i} = \alpha_4 + \beta_4 SI_i + \chi_4 Open_i + Geo + \varepsilon_{4i} \tag{4.6}$$

$$Theil_{5i} = \alpha_5 + \beta_5 LI_i + \chi_5 TP_i + Geo + \varepsilon_{5i} \tag{4.7}$$

$$Theil_{6i} = \alpha_6 + \beta_6 PI_i + \chi_6 TP_i + Geo + \varepsilon_{6i} \tag{4.8}$$

$$Theil_{7i} = \alpha_7 + \beta_7 EI_i + \chi_7 TP_i + Geo + \varepsilon_{7i} \tag{4.9}$$

$$Theil_{8i} = \alpha_8 + \beta_8 SI_i + \chi_8 TP_i + Geo + \varepsilon_{8i} \quad (4.10)$$

The variable $Theil_i$ is Theil index in a country i, LI_i, PI_i, EI_i, and SI_i are respectively measures for legal, political, economic and social institutions, whereas $Open_i$ measures general openness in the economy and TP_i is a measure for trade policy and ε_i is the random error term. Equations based on *Gini*, *High20/Low20*, *Middle20*, *Low20* and *High10* have similar specifications.

As discussed, there are potential endogeneity problems between institutions and integration and between institutions and inequality itself. Therefore the institutional, trade policy and openness proxies presented here were first regressed on a set of instruments. This chapter takes the same set of instruments which were used in chapter 2 to instrument for openness/ trade policy, legal, political and economic institutions and education (social institution). Frankel and Romer (1999) (FR) makes up for the instrument for all the outcome and incidence measures of trade barriers utilized in this chapter. FR instrument uses trade/GDP shares constructed based on a gravity equation for bilateral trade flows. Following, Hall and Jones (1999), the extent to which the primary languages of Western Europe are the first languages are taken as instruments for Legal, Political and Economic institutions. Hall and Jones argue that the instruments do not correlate with the error term. Though, it is good to briefly mention again that Acemolgu, Johnson and Robinson (2001) (AJR) identify the mortality of European settlers as a potential instrument. Using two ex post assessments of institutional quality—risk of expropriation by the government and constraints on the executive—as measures of institutions, they showed that settler mortality is a strong predictor of institutions.

However, there are two drawbacks for the AJR instrument as mentioned in chapter 2. According to Glaeser et al. (2004a), AJR instrument of settler mortality fails to be orthogonal to the error term. 'Settler mortality is strongly correlated not just with ancient, but also with the modern, decease environment, suggesting that it might be the decease environment, rather than history, that matters for economic development.

Secondly, settler mortality is strongly correlated with human capital accumulation, suggesting that it cannot be used as an instrument for institutions.' (Glasear et al. 2004a: 8)

Since, 'years of schooling' is a proxy for social institutions, dropout rates (*drop90*) and school days in a year (*Schday*) are used as educational instruments. Distance from the equator is the fifth instrument (proxy for geography). The IV analysis in chapter 2 has already established the statistical validity of these instruments. However, here the instruments enter first stage of the analysis under slightly different specifications. For Legal, Political and Economic institutions, the first stage of the regression models corresponds to specification 3 in chapter 2 when human capital was absent from Eq. 2.1.

Other than that, a new specification has been introduced where Social institutions (education) would enter different inequality equations with a combination of different outcome based (openness, Open) or incidence based (trade policy, TP) respectively. Following are the model specifications for first stage regressions based on IV:

$$LI_i = \sigma_1 + \varsigma_1 Eng_i + \theta_1 Eur_i + \vartheta_1 FR_i + \tau_1 Disteq + \mathrm{E}_{1i} \tag{4.11}$$

$$PI_i = \sigma_2 + \varsigma_2 Eng_i + \theta_2 Eur_i + \vartheta_2 FR_i + \tau_2 Disteq + \mathrm{E}_{2i} \tag{4.12}$$

$$EI_i = \sigma_3 + \varsigma_3 Eng_i + \theta_3 Eur_i + \vartheta_3 FR_i + \tau_3 Disteq + \mathrm{E}_{3i} \tag{4.13}$$

$$Open_{1i} = \sigma_4 + \varsigma_4 Eng_i + \theta_4 Eur_i + \vartheta_4 FR_i + \tau_4 Disteq + \mathrm{E}_{4i} \tag{4.14}$$

$$TP_{1i} = \sigma_5 + \varsigma_5 Eng_i + \theta_5 Eur_i + \vartheta_5 FR_i + \tau_5 Disteq + \mathrm{E}_{5i} \tag{4.15}$$

$$SI_i = \sigma_6 + \varsigma_6 Drop90_i + \theta_6 Sch_i + \vartheta_6 FR_i + \tau_6 Disteq + \mathrm{E}_{6i} \tag{4.16}$$

$$Open_{2i} = \sigma_7 + \varsigma_7 Drop90_i + \theta_7 Sch_i + \vartheta_7 FR_i + \tau_7 Disteq + \mathrm{E}_{7i} \tag{4.17}$$

$$TP_{2i} = \sigma_8 + \varsigma_8 Drop90_i + \theta_8 Sch_i + \vartheta_8 FR_i + \tau_8 Disteq + \mathrm{E}_{8i} \tag{4.18}$$

where Eng_i and Eur_i are the instruments for legal (*LI*), economic *EI*) and political institutions (*PI*) referring to fractions of population speaking English and European languages respectively. *Drop90* is annual drop

out rate and *Sch* is schooling day in a year which is already introduced in chapter 2. Both are instruments for average years of schooling. FR_i is instrument for openness/trade policy. $Disteq_i$ is proxy for geography showing distance from the equator. At the second stage, the income share equations employ the predicted values of respective institutional, openness / trade policy variables.

4.5 Results

4.5.1 1st Stage Results

The first stage results are presented in table 4.3. All instruments seem to work quite well for the outcome based (openness) measures of trade barriers and high R-square and F-statistic show that instruments significantly explain the variation in trade shares. However for incidence based (trade policy) measures of trade barriers, F-statistics have declined and range between 7 and 5. For tariffs on international inputs and capital goods (Owti), weighted average for total import charges (*Totimpov85*), Non-tariff barrier coverage (*Nontarr87*) and Sachs and Warners composite openness index (*Open80*), the FR instrument is significant. FR trade shares are weekly related with import duties (*Tariffs*) and trade taxes (*Txtrdg*). For NTBs, instruments are insignificant in all cases, while F-statistics is mere 0.73. Here Low F-statistics for incidence based measures may indicate that instruments employed are weakly related with the regressors. Instruments work quite well for Legal, Political, Economic and Social institutions with F-statistic much higher than 10, and high R2, while all instruments are significantly related with all institutional regressors.

Discussion on relevance and validity of instruments has already been carried out in chapter 2 and suggests that low F-statistics may not necessarily confers to weakness of instruments. Staiger and Stock (1997) rule of thumb of F-test to be equal to or greater than 10 for the good fit of instruments may only hold in case of one instrument and one regressor. When the number of instruments are moderate or large, higher order asymptotic tests, which are already proposed in chapter 2, needs to be

carried out. Higher order asymptotic tests include (1) obtaining Craag and Donald (1993) critical values to reject 2SLS bias and (2) Anderson-Rubin test of joint significance of endogenous regressors for relevance of instruments; (3) Hansen or Sargan over identification test statistics for endogeneity; and (4) Baum, Schaffer and Stillman's recommended test for heteroskedasticity robust 1st stage estimates for reducing omitted variable bias. To carry out all these tests, the author refers to IV stage analysis where these higher order asymptotic testing is done and made it available for many of the 2SLS specifications which are run under Eq. 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, and 4.10. In all these specification different definitions of inequality are utilized along with different specifications of Legal, Political, Economic, Social institutions and integration as regressors.

4.5.2 IV Results

Relevance and Exogeniety of Instruments

This section undertakes relevance and exogeniety tests under higher order asymptotic framework for the institutional and integration regressors for *GINI, Theil*, *High20/Low20* and *Mid20* for some selected number of combinations of these regressors. Relevance and exogeniety tests are also carried out for *Low10* and *High10*, but they are not presented here as the results obtained by former tests would already provide enough information to conclude whether instruments have worked well.

Table 4.4 provides results for *Gini*. Instruments pass the relevance test for any of the combinations of institutions and integration except for *Owqi. Owqi* fails relevance test for not only *Gini*, but also for *Theil* in table 4.5, *High20/Low20* in table 4.6 and *Mid20* in table 4.7. This is expected as we already know from 1st stage results that all instruments have been insignificant in case of *Owqi,* while the F-statistic was approximating to 0.

Instruments have been found to be weakly related with *Taiffs* for *Theil99*. For other dependent variables also like *Gini*, *High20/Low20* and *Mid20*, the 2SLS bias in case of *Tariffs* is large. This is also in line with 1st stage results, where most instruments fail to significantly explain *Tariffs* with the only exception of *Disteq*.

Table 4.3
First Stage Regression

First Stage Results: Openness and Trade Policy												
	Nominal Trade share (Icopen)	Import penetra-tions 1985 (Impnov85)	Import penetra-tions 1982 (Impnov82)	TARS trade penetra-tion 1985 (Tar-shov85)	TARS trade penetra-tion 1982 (Tar-shov82)	Import duties as % Im-ports (Tariffs)	Tariffs on interna-tional inputs and capital goods (Owti)	Trade taxes (Txtrdg)	Weighted average of total import charges 1985 (Totim-pov85)	Non trade barriers (Owqi)	Non tariff barriers 1987 (Ntarov87)	*Sachs and Warner open-ness 1980 (Open80s)*
Lfrkrom	0.533	11.616	19.811	29.88	46.47	-1.02	-0.078	0.0048	0.3739	-0.036	-18.08	*0.195*
	(11.5)***	(7.9)***	(7.2)***	(7.4)***	(4.0)***	(-0.8)	(-3.4)***	(0.98)	(3.0)***	(-0.9)	(-3.0)***	*(2.9)****
Engfrac	0.407	19.71	20.609	29.78	115.99	-1.49	-0.01	0.001	-0.113	-0.105	4.254	*-0.018*
	(2.1)**	(2.4)***	(2.2)**	(2.0)**	(2.9)***	(-0.3)	(-0.1)	(0.08)	(-0.23)	(-0.77)	(0.17)	*(-0.08)*
Eurfrac	-0.208	-6.656	-7.67	-5.23	-4.598	-3.56	-0.067	-0.016	0.164	-0.006	-28.107	*0.208*
	(-1.9)*	(-1.23)	(-1.21)	(-0.53)	(-0.17)	(-1.30)	(-1.29)	(-1.63)*	(0.67)	(-0.07)	(-2.3)***	*(1.43)*
Disteq	-0.003	-0.015	-0.21	0.052	-0.534	-0.208	-0.002	-0.0007	0.022	-0.001	-0.238	*0.010*
	(-1.26)	(-0.14)	(-1.60)	(0.26)	(-0.99)	(-3.8)***	(-2.1)**	(-3.8)***	(2.9)***	(-0.84)	(-0.65)	*(3.6)****
N	122	82	84	85	82	85	85	52	66	83	83	*54*
F	39.00***	18.54***	15.98***	15.56***	7.12***	5.47***	5.36***	5.09***	4.57***	0.73	7.21***	*7.44****
R2	*0.57*	*0.49*	*0.44*	*0.43*	*0.27*	*0.24*	*0.21*	*0.30*	*0.23*	*0.03*	*0.03*	*0.38*

First Stage Results: Economic, Legal, Political and Social Institutions

	Voice and Accountability (Va)	Political Stability (Ps)	Government Effectiveness (Ge)	Regulatory Quality (Rq)	Rule of law (Rl)	Control for Corruption (Ctc)	Democracy (Demo)	Autocracy (Auto)	*Average years of schooling, 1999 (Sch99)*
Lfrkrom	0.154	0.234	0.229	0.081	0.238	0.254	0.364	0.108	*-0.274*
	(2.0)**	(2.7)**	(2.9)***	(1.31)	(3.8)***	(3.3)***	(0.83)	(0.28)	*(-1.01)*
Engfrac	0.621	0.395	0.573	0.324	0.586	0.832	2.623	-0.505	
	(2.0)**	(1.09)	(1.90)*	(1.32)	(1.9)*	(2.7)***	(1.5)	(-0.33)	
Eurfrac	0.698	0.478	0.457	0.572	0.302	0.0326	4.79	-4.73	
	(3.7)***	(2.4**	(2.5)**	(3.8)***	(1.6)*	(1.8)*	(4.7)***	(-5.2)***	
Drop90									*-0.049*
									*(-4.4)****
Schday									*-0.0092*
									(-0.68)
Disteq	0.029	0.032	0.027	0.014	0.031	0.030	0.085	-0.051	*0.0761*
	(7.8)***	(6.3)***	(7.3)***	(4.8)***	(8.3)***	(8.3)***	(4.8)***	(-2.81)***	*(4.8)****
N	122	116	117	122	122	118	108	108	*85*
F	27.1***	40.4***	22.2***	14.4***	24.9***	26.6***	16.4***	12.7***	*22.1****
R2	*0.48*	*0.59*	*0.44*	*0.31*	*0.46*	*0.49*	*0.38*	*0.33*	*0.52*

- t- Values in the parenthesis. ***, **, * denotes significance at 1%, 5 % and 10% levels respectively

Table 4.4

Multiple Tests for the Relevance and Quality of Instruments for Gini Index

			Relevance				Exogeneity
	Endogenous Dependent Variable: GINI Coefficients in Percentage Points as calculated from consumption expenditure by WIDER (Gini)	N	1st Stage het-eroske-dasticity-robust	Maximal 2SLS Bias (b)	Cragg-Donald N*minEval stat. Chi-sq(3)	Anderson-Rubin test of joint signifi-cance of endogenous regressors F-Statistic	Sargan statistic (overidentifica-tion test of all instruments) Chi-Sq(2)
Endogenous Independent Variables : Openness, Institutions (Instruments= Disteq, Lfrkrom, Engfrac, Eurfrac)							
1	Nominal Trade Shares, Voice and Accountability (Lcopen, Va)	97	Robust	0.00	107.83**	4.95***	0.063 (0.969)
2	Nominal Trade Shares, Political Stability (Lcopen, Ps)	89	Robust	0.00	65.24**	4.83***	0.170 (0.918)
3	Nominal Trade Shares, Government Effectiveness (Lcopen, Ge)	90	Robust	0.00	73.53**	5.03***	0.146 (0.929)
4	Nominal Trade Shares, Regulatory Quality (Lcopen, Rq)	96	Robust	0.00	68.52**	4.97***	0.019 (0.988)
5	Nominal Trade Shares, Rule of Law (Lcopen, Rl)	96	Robust	0.00	92.08**	4.79***	0.116 (0.943)
6	Nominal Trade Shares, Control for Corruption (Lcpopen, Ctc)	92	Robust	0.00	69.77**	4.60***	0.102 (0.9505)
7	Nominal Trade Shares, Democracy (Lcopen, Demo)	90	Robust	0.00	53.05**	5.05***	0.031 (0.984)
8	Nominal Trade Shares, Autocracy (Lcopen, Auto)	90	Robust	0.00	46.43**	5.05***	0.016 (0.992)
9	Nominal Trade Shares, Average Years of Schooling (Lcopen, Sch99)	73	Robust	0.00	74.84**	2.39*	1.072 (0.585)
10	Import Penetration, 1985, Rule of Law (Impnov85, Rl)	69	Robust	0.00	62.63**	2.49*	0.268

							(0.874)
11	Import Penetration, 1982, Rule of Law (Impnov82, RI)	69	Robust	0.00	95.07**	17.74***	11.532
							(0.0031)***
12	TARS trade Penetration, 1985, Rule of Law (Tarshov85, RI)	69	Robust	0.00	52.35**	2.49*	0.162
							(0.922)
13	TARS Trade Penetration, 1982, Rule of Law (Tarshov82, RI)	68	Robust	0.00	73.80**	16.61***	10.942
							(0.004)***
Endogenous Independent Variables: Trade Policy, Institutions (Instruments= Disteq, Lfrkrom, Engfrac, Eurfrac)							
14	Import duties, Rule of Law (Tariff, RI)	71	Robust	0.37	3.14**	19.52***	0.778
							(0.677)
15	Tariffs on International Inputs and Capital Goods, Rule of Law (Owti, RI)	71	Robust	0.078	6.79**	2.62**	2.28
							(0.319)
16	Trade Taxes, Rule of Law (Txtrdg,RI)	46	Robust	0.072	6.99**	18.20***	0.943
							(0.624)
17	Weighted Average of Total import Charges, 1985, Rule of Law (Totimpov85, RI)	52	Robust	0.019	9.91**	0.92	0.06
							(0.970)
18	Non Trade Barriers, Rule of Law (Owqi,RI)	70	Robust	0.846	0.81	3.30***	0.928
							(0.628)
19	Non Tariff Coverage, 1987, Rule of Law (Ntarfov87, RI)	52	Robust	0.042	8.27**	0.92	1.762
							(0.414)
20	Sachs and Warner Openness, 1980, Rule of Law, (Open80s, RI)	48	Robust	0.00	7.97**	1.92*	3.45
							(0.178)

- t- Values in the parenthesis. ***, **, * denotes significance at 1%, 5 % and 10% levels respectively

Table 4.5

Multiple Tests for the Relevance and Quality of Instruments for Theil99

			Relevance				Exogeneity
	Endogenous Dependent Variable: UTIP – UNIDO Wage Inequality THEIL Measure, 1999 (Theil99)	N	1st Stage het-eroske-dasticity-robust	Maximal 2SLS Bias (b)	Cragg-Donald N*minEval stat. Chi-sq(3)	Anderson-Rubin test of joint signifi-cance of endogenous regressors F-Statistic	Sargan statistic (overidentifica-tion test of all instruments) Chi-Sq(2)
Endogenous Independent Variables : Openness, Institutions (Instruments= Disteq, Lfrkrom, Engfrac, Eurfrac)							
21	Nominal Trade Shares, Voice and Accountability (Lcopen, Va)	122	Robust	0.00	113	3.92***	1.738 (0.419)
22	Nominal Trade Shares, Political Stability (Lcopen, Ps)	116	Robust	0.00	72.73	3.23**	1.058 (0.589)
23	Nominal Trade Shares, Government Effectiveness (Lcopen, Ge)	117	Robust	0.00	91.62	3.38**	1.46 (0.48)
24	Nominal Trade Shares, Regulatory Quality (Lcopen, Rq)	122	Robust	0.00	58.87	3.54***	1.69 (0.42)
25	Nominal Trade Shares, Rule of Law (Lcopen, Rl)	122	Robust	0.00	101.83	3.54***	1.72 (0.42)
26	Nominal Trade Shares, Control for Corruption (Lcpopen, Ctc)	118	Robust	0.00	107.42	3.30**	1.76 (0.41)
27	Nominal Trade Shares, Democracy (Lcopen, Demo)	108	Robust	0.00	68.23**	3.86***	1.877 (0.391)
28	Nominal Trade Shares, Autocracy (Lcopen, Auto)	108	Robust	0.00	47.94**	3.86***	1.393 (0.498)
29	Nominal Trade Shares, Average Years of Schooling (Lcopen, Sch99)	108	Robust	0.00	85.17**	6.85***	2.647 (0.266)
30	Import Penetration, 1985, Rule of Law (Impnov85, Rl)	85	Robust	0.00	75.48	5.28***	1.094

							(0.578)
31	Import Penetration, 1982, Rule of Law (Impnov82, RI)	84	Robust	0.00	60.64	4.87***	0.981
							(0.612)
32	TARS trade Penetration, 1985, Rule of Law (Tarshov85, RI)	85	Robust	0.00	66.09	5.28***	1.339
							(0.511)
33	TARS Trade Penetration, 1982, Rule of Law (Tarshov82, RI)	82	Robust	0.00	28.20	5.08***	0.329
Endogenous Independent Variables: Trade Policy, Institutions (Instruments= Disteq, Lfrkrom, Engfrac, Eurfrac)							
34	Import duties, Rule of Law (Tariff, RI)	85	Robust	0.71	1.37	6.46***	6.289
							(0.04)**
35	Tariffs on International Inputs and Capital Goods, Rule of Law (Owti, RI)	85	Robust	0.06	7.41	4.86***	5.596
							(0.06)*
36	Trade Taxes, Rule of Law (Txtrdg,RI)	52	Robust	0.08	6.74	3.47***	4.23
							(0.12)
37	Weighted Average of Total import Charges, 1985, Rule of Law (Totimpov85, RI)	66	Robust	0.02	9.52	3.12***	3.97
							(0.13)
38	Non Trade Barriers, Rule of Law (Owqi,RI)	83	Robust	0.83	0.86	4.71***	0.074
							(0.96)
39	Non Tariff Coverage, 1987, Rule of Law (Ntarfov87, RI)	66	Robust	0.08	6.73	3.12***	6.69
							(0.03)**
40	Sachs and Warner Openness, 1980, Rule of Law, (Open80s, RI)	54	Robust	0.11	5.93	4.86***	6.769
							(0.033)**

- t- Values in the parenthesis. ***, **, * denotes significance at 1%, 5 % and 10% levels respectively

Table 4.6

Multiple Tests for the Relevance and Quality of Instruments for High20/Low20

			Relevance				Exogeneity
	Endogenous Dependent Variable: Fifth Income Percentile/ First Income Percentile (High20/Low20)	N	1st Stage het-eroske-dasticity-robust	Maximal 2SLS Bias (b)	Cragg-Donald N*minEval stat. Chi-sq(3)	Anderson-Rubin test of joint signifi-cance of endogenous regressors F-Statistic	Sargan statistic (overidentifica-tion test of all instruments) Chi-Sq(2)
Endogenous Independent Variables : Openness, Institutions (Instruments= Disteq, Lfrkrom, Engfrac, Eurfrac)							
41	Nominal Trade Shares, Voice and Accountability (Lcopen, Va)	97	Robust	0.00	107.83**	8.65***	9.459 (0.008)***
42	Nominal Trade Shares, Political Stability (Lcopen, Ps)	89	Robust	0.00	65.24**	8.05***	5.894 (0.052)**
43	Nominal Trade Shares, Government Effectiveness (Lcopen, Ge)	90	Robust	0.00	73.53**	8.41***	5.815 (0.054)*
44	Nominal Trade Shares, Regulatory Quality (Lcopen, Rq)	96	Robust	0.00	68.52**	8.33***	12.546 (0.002)***
45	Nominal Trade Shares, Rule of Law (Lcopen, Rl)	96	Robust	0.00	92.08**	8.33***	5.237 (0.072)*
46	Nominal Trade Shares, Control for Corruption (Lcpopen, Ctc)	92	Robust	0.00	69.77**	8.10***	10.155 (0.006)***
47	Nominal Trade Shares, Democracy (Lcopen, Demo)	90	Robust	0.00	53.05**	8.71***	13.916 (0.001)***
48	Nominal Trade Shares, Autocracy (Lcopen, Auto)	90	Robust	0.00	46.43**	8.71***	15.919 (0.0003)***
49	Nominal Trade Shares, Average Years of Schooling (Lcopen, Sch99)	73	Robust	0.00	74.84**	7.34***	2.624 (0.269)
50	Import Penetration, 1985, Rule of Law (Impnov85, Rl)	69	Robust	0.00	62.63**	7.25***	2.463 (0.292)

51	Import Penetration, 1982, Rule of Law (Impnov82, RI)	69	Robust	0.00	95.07**	2.93**	2.415 (0.298)
52	TARS trade Penetration, 1985, Rule of Law (Tarshov85, RI)	69	Robust	0.00	52.35**	2.95**	2.378 (0.304)
53	TARS Trade Penetration, 1982, Rule of Law (Tarshov82, RI)	68	Robust	0.00	73.80**	2.78**	2.242 (0.326)
Endogenous Independent Variables: Trade Policy, Institutions (Instruments= Disteq, Lfrkrom, Engfrac, Eurfrac)							
54	Import duties, Rule of Law (Tariff, RI)	71	Robust	0.37	3.14**	5.92***	1.563 (0.457)
55	Tariffs on International Inputs and Capital Goods, Rule of Law (Owti, RI)	71	Robust	0.078	6.79**	9.75***	3.829 (0.146)
56	Trade Taxes, Rule of Law (Txtrdg,RI)	46	Robust	0.072	6.99**	8.16***	1.956 (0.376)
57	Weighted Average of Total import Charges, 1985, Rule of Law (Totimpov85, RI)	52	Robust	0.019	9.91**	5.55***	4.602 (0.101)
58	Non Trade Barriers, Rule of Law (Owqi,RI)	70	Robust	0.846	0.81	9.02***	1.497 (0.368)
59	Non Tariff Coverage, 1987, Rule of Law (Ntarfov87, RI)	52	Robust	0.040	8.27**	5.55***	0.264 (0.876)
60	Sachs and Warner Openness, 1980, Rule of Law, (Open80s, RI)	48	Robust	0.046	7.97**	7.37***	1.791 (0.408)

- t- Values in the parenthesis. ***, **, * denotes significance at 1%, 5 % and 10% levels respectively

Table 4.7
Multiple Tests for the Relevance and Quality of Instruments for Mid20

			Relevance				Exogeneity
	Endogenous Dependent Variable: Third Income Percentile (Mid20)	N	1st Stage het-eroske-dasticity-robust	Maximal 2SLS Bias (b)	Cragg-Donald N*minEval stat. Chi-sq(3)	Anderson-Rubin test of joint signifi-cance of endogenous regressors F-Statistic	Sargan statistic (overidentifica-tion test of all instruments) Chi-Sq(2)
Endogenous Independent Variables : Openness, Institutions (Instruments= Disteq, Lfrkrom, Engfrac, Eurfrac)							
61	Nominal Trade Shares, Voice and Accountability (Lcopen, Va)	97	Robust	0.00	107.83**	18.79***	22.109 (0.000)***
62	Nominal Trade Shares, Political Stability (Lcopen, Ps)	89	Robust	0.00	65.24**	19.45***	13.469 (0.0012)***
63	Nominal Trade Shares, Government Effectiveness (Lcopen, Ge)	90	Robust	0.00	73.53**	19.49***	14.334 (0.0008)***
64	Nominal Trade Shares, Regulatory Quality (Lcopen, Rq)	96	Robust	0.00	68.52**	18.78***	22.543 (0.000)***
65	Nominal Trade Shares, Rule of Law (Lcopen, Rl)	96	Robust	0.00	92.08**	18.78***	11.946 (0.0025)***
66	Nominal Trade Shares, Control for Corruption (Lcpopen, Ctc)	92	Robust	0.00	69.77**	18.41***	13.925 (0.001)***
67	Nominal Trade Shares, Democracy (Lcopen, Demo)	90	Robust	0.00	53.05**	21.00***	26.038 (0.000)***
68	Nominal Trade Shares, Autocracy (Lcopen, Auto)	90	Robust	0.00	46.43**	21.00***	29.529 (0.000)***
69	Nominal Trade Shares, Average Years of Schooling (Lcopen, Sch99)	73	Robust	0.00	74.84**	26.10***	0.380 (0.827)
70	Import Penetration, 1985, Rule of Law (Impnov85, Rl)	69	Robust	0.00	62.63**	16.67***	7.951 (0.018)**
71	Import Penetration, 1982, Rule of Law (Impnov82, Rl)	69	Robust	0.00	95.07**	17.02***	8.349

							(0.015)**
72	TARS trade Penetration, 1985, Rule of Law (Tarshov85, RI)	69	Robust	0.00	52.35**	16.67***	7.114
							(0.028)**
73	TARS Trade Penetration, 1982, Rule of Law (Tarshov82, RI)	68	Robust	0.00	73.80**	16.96***	7.855
							(0.019)**
Endogenous Independent Variables: Trade Policy, Institutions (Instruments= Disteq, Lfrkrom, Engfrac, Eurfrac)							
74	Import duties, Rule of Law (Tariff, RI)	71	Robust	0.37	3.14**	19.37***	0.997
							(0.607)
75	Tariffs on International Inputs and Capital Goods, Rule of Law (Owti, RI)	71	Robust	0.078	6.79**	22.43***	3.910
							(0.142)
76	Trade Taxes, Rule of Law (Txtrdg,RI)	46	Robust	0.072	6.99**	16.92***	0.297
							(0.862)
77	Weighted Average of Total import Charges, 1985, Rule of Law (Totimpov85, RI)	52	Robust	0.019	9.91**	6.77***	8.673
							(0.013)**
78	Non Trade Barriers, Rule of Law (Owqi,RI)	70	Robust	0.846	0.81	20.23***	2.144
							(0.342)
79	Non Tariff Coverage, 1987, Rule of Law (Ntarfov87, RI)	52	Robust	0.040	8.27**	6.77***	1.037
							(0.597)
80	Sachs and Warner Openness, 1980, Rule of Law, (Open80s, RI)	48	Robust	0.046	7.97**	21.25***	3.783
							(0.151)

- t- Values in the parenthesis. ***, **, * denotes significance at 1%, 5 % and 10% levels respectively

Table 4.8
Rule of Law

Independent Variabl es	Dependent Variables					
	Wage Inequality (Theil)	Income Inequality (Gini)	High20/Low20	Middle20	Low10	High10
Rule of Law (Lcopen)	-0.02	-7.30	-5.08	1.82	0.48	-5.75
	(-1.48)	(-5.01)***	(-3.44)***	(5.59)***	(3.03)***	(-5.14)***
Rule of Law (Impnov85)	-0.04	-7.35	-5.49	1.81	0.48	-5.61
	(2.30)**	(-4.17)***	(-2.76)***	(4.48)***	(2.50)**	(-4.04)***
Rule of Law (Impnov82)	-0.03	-7.23	-5.23	1.77	0.49	-5.55
	(-1.80)*	(-4.48)***	(-2.91)***	(4.81)***	(2.79)***	(-4.39)***
Rule of Law (Tarshov85)	-0.04	-7.62	-5.66	1.86	0.52	-5.79
	(-2.49)**	(-4.18)***	(-2.77)***	(4.46)***	(2.63)***	(-4.05)***
Rule of Law (Tarshov82)	-0.04	-7.32	-5.31	1.79	0.50	-5.61
	(-2.43)**	(-4.37)***	(-2.82)***	(4.69)***	(2.75)***	(-4.26)***
Rule of Law (Open80s)	-0.02	-11.58	-9.05	2.43	1.09	-8.32
	(-0.70)	(-3.42)***	(-2.15)**	(3.76)***	(2.68)***	(-3.60)***
Rule of Law (Tariffs)	0.02	-18.23	-10.64	3.44	2.24	-12.07
	(0.33)	(-2.38)***	(-1.85)*	(2.51)***	(2.00)**	(-2.41)**
Rule of Law (Owti)	-0.05	-10.45	-6.22	2.31	0.97	-7.69
	(-2.22)**	(-3.57)***	(-2.51)**	(3.69)***	(2.78)***	(-3.44)***
Rule of Law (Txtrdg)	0.02	-15.05	-9.16	3.37	1.31	-11.24
	(0.74)	(-2.17)**	(-2.17)**	(2.95)***	(2.26)**	(-2.85)***
Rule of Law (Totimpov85)	0.007	-6.84	-8.57	1.59	0.61	-5.06
	(0.18)	(-1.37)	(-1.30)	(1.42)	(1.14)	(-1.30)
Rule of Law (Owqi)	-0.09	-3.25	-1.09	1.13	0.17	-3.05
	(-1.04)	(-0.53)	(-0.24)	(1.06)	(0.33)	(-0.76)
Rule of Law (Ntarfov87)	0.02	-16.03	-12.71	2.82	1.38	-9.71
	(0.48)	(-1.72)*	(-1.60)	(1.80)*	(1.58)	(-1.72)*

-***, **, * corresponds to 1%, 5% and 10% level of significance respectively.

- Control variables are in parentheses in the first column

The 2nd stage regressions have suffered more from the problem of endogeniety, especially in case of *High20/Low20* and *Mid 20* whenever, Legal, Political, Economic and Social institutions enter with outcome based (openness) measures of trade barriers. This brings us back to the analysis by Rodrik et al (2004), which was run on per capita income differences and problem of endogeniety was present in all regressions. High20/Low20 and Mid20 are also estimates of incomes but based on percentiles. The persistent of the presence of endogeniety in specifications where nominal trade shares enter as a regressor reconfirm that such specifications may suffer from omitted variable bias. Nevertheless, no

presence of 2SLS bias which is seen to approximate to 0 in all cases where openness is the regressor show that IV analysis is superior to simple OLS in present specifications.

In case of trade policy, over-identification tests are generally passed for all those trade policy proxies that have passed the Cragg-Donald maximal 2SLS bias test of relevance. Only in case of *Theil99* few trade policy proxies such as *Owti*, *Ntarfov* and *Open80s* in addition to *Owqi* fail over-identification tests. Though the presence of endogeniety between regressors and the error term is not good news for the empirical analysis, it has come as a good news for the theoretical validation of the very regressions which analyze the role of trade in determining wage inequality because it refutes the assertion put forward by Acemoglu (2002) that trade is only weekly related with technology bias which creates increase demand for skilled labour. Presence of endogeniety suggest that trade policies in both developed and developing countries are correlated with the adoption of skill bias technologies in more ways then what is generally perceived in literature. The theoretical discussion carried out in section 4.4 to this effect also validates the above finding. Tables 4.4, 4.5, 4.6 and 4.7 show that for all combinations of regressors and for all dependent variables heterskedasticity robust estimates are utilized.

Results on Institutions

Due to the sheer number of specifications for which the regressions are carried out for six different dependent variables, it is not possible to present results for both institutions and integration together in single table. Thus, in order to cover all specifications, we discuss results by summarizing them into different categories. First we provide results of institutions, divided into 4 categories as Legal, Political, Economic and Social. In later sections, results for integration would be separately discussed.

Table 4.9
Control for Corruption

Independent Variables	Dependent Variables					
	Wage Inequality (Theil)	Income Inequality (Gini)	High20/Low20	Middle20	Low10	High10
Control for Corruption (Lcopen)	-0.02	-3.390	-5.39	1.87	0.46	-5.88
	(-1.44)	(-4.84)***	(-3.31)***	(5.47)***	(2.76)***	(-5.03)***
Control for Corruption (Impnov85)	-0.03	-6.481	-5.01	1.64	0.37	-5.01
	(-2.21)**	(-3.95)***	(-2.52)***	(4.32)***	(2.05)**	(-3.88)***
Control for Corruption (Impnov82)	-0.02	-6.458	-4.81	1.62	0.41	05.02
	(-1.71)*	(-4.32)***	(-2.69)***	(4.72)***	(2.42)**	(-4.29)***
Control for Corruption (Tarshov85)	-0.03	-6.72	-5.20	1.69	0.41	-5.19
	(-2.41)**	(-3.93)***	(-2.52)***	(4.29)***	(2.15)**	(-3.87)***
Control for Corruption (Tarshov82)	-0.04	-6.51	-4.88	1.64	0.41	-5.04
	(-2.41)**	(-4.16)***	(-2.60)***	(4.55)***	(2.35)**	(-4.12)***
Control for Corruption (Open80s)	-0.02	-11.32	-9.33	2.47	1.03	-8.38
	(-0.70)	(-3.07)***	(-1.89)*	(3.32)***	(2.34)**	(-3.25)***
Control for Corruption (Tariffs)	0.05	-22.77	-13.10	4.32	2.77	-15.19
	(0.57)	(-1.78)*	(-1.45)	(1.87)*	(1.54)	(-1.81)*
Control for Corruption (Owti)	-0.05	-10.22	-6.29	2.35	0.91	-7.74
	(-2.19)**	(-3.26)***	(-2.19)**	(3.31)***	(2.44)**	(-3.11)***
Control for Corruption (Txtrdg)	0.02	-12.50	-7.56	2.84	1.04	-9.89
	(0.94)	(-3.09)***	(-2.12)**	(3.20)***	(2.30)**	(-3.09)***
Control for Corruption (Totimpov85)	0.02	-0.13	-5.13	0.33	-0.32	-0.27
	(0.34)	(-0.03)	(-0.73)	(0.30)	(-0.59)	(-0.07)
Control for Corruption (Owqi)	-0.10	-1.26	0.12	0.79	-0.10	-1.78
	(-0.94)	(-0.17)	(0.02)	(0.63)	(-0.14)	(-0.36)
Control for Corruption (Ntarfov87)	0.04	-16.14	-15.14	2.82	1.06	-9.29
	(0.34)	(-1.30)	(-1.33)	(1.37)	(1.02)	(-1.29)

-***, **, * corresponds to 1%, 5% and 10% level of significance respectively. Control variables are in parentheses in the first column

Legal institutions

Tables 4.8 and 4.9 give coefficients for legal institutions. As explained in section 4.4, control for corruption and rule of law are considered as legal institutions. Rule of law broadly defines it self as measures to enforce public and private contracts for protection of public and private property through implementation of property rights and provisions for dispute settlement through an efficient judicial system. Control for corruption measures nepotism, rent seeking behavior, state capture of private resources or dishonest courts. Both definitions of legal institutions are quite endogenous to each other.

Barreto (1996) finds that corruption correlates positively and significantly with inequality, implying that increased income inequality is associated with greater corruption. Tanzi (1995) argues that the benefits from corruption are likely to accrue to the better-connected individuals in society, who mostly belong to high-income groups. It has been further contended that corruption creates incentives for higher investment in capital-intensive projects and lower investment in labour intensive projects (UNDP 1997), thus increasing wage inequality. Gupta et al. (1998) show that a worsening of the corruption index of a country by one standard deviation (2.52 points on a scale of 0 to 10) is associated with an increase in the GINI coefficient of about 4.4 points.

Less corruption can only be practiced through an effective system of property rights and the rule of law. Rule of law provides protection and safety to people and their businesses. The society is respectful to law only when they see that the justice system is fair which treats people equally. A corrupt justice system may shield dishonest elites from re-distribution. Fairness of legal system is more important than fair political process where democracy is about equal access and power for all who have voted. Elections show participation of interest groups that mobilize masses to their own interest and thus the outcome may still depict the hold of power of the few upon the interest of many. In contrast only fair judicial system can ensure effective accountability. In some cases democratic politics has actually played a role in undermining rule of law by disfavouring underprivileged groups (Ahnen, 2007).

Rule of law ensures transparency of the political process: 'an effective democratic legal order provides the necessary underpinnings for elections to be truly free and fair, and thus for democracy to exist at all' (O' Donnell 2001; 71). Re-distribution is ensured when political power is equally distributed (populist democracy) against oligharic society where political power remains with the few ruling elites. However the causality from democracy to redistribution runs through enforcement of property rights (Acemoglu, 2003b).

The relationship between good legal institutions and other institutions in redistribution is highly correlated. Thus, it remains important to

disentangle the effects to determine relative relevance of different areas of governance in inequality mitigation. Democratic political institutions may also be relevant, and no less than rule of law, to capture redistribution among different income groups while social institutions play a key role to ensure that equality prevails in a society, especially when countries open up to increased international trade. Glaser (2004a) and Williamson (1999) argue that causality goes from social institutions to legal institutions because only well developed (educated) societies can enable the courts to function effectively and more people would respect rule of law. Nevertheless, legal institutions, in comparison to political or social institutions and in context of their strong correlation with each other, cannot be considered less important, if not more important. Brinks (2008) quite nicely summarize the problem as he tries to disentangle effects of different institutions on inequality:

> Does it mean institutional differences ultimately do not matter and all the focus on judicial and legal reform is misguided? Clearly not. The inquisitorial nature of Uruguay's system makes judges more prosectorial, giving victims a stronger, less impartial ally) if simultaneously raising due process concerns). Institutional change can be effective precisely when it builds lateral support for the claims and the claimants at issue, taking into consideration the respondent's capacity for and modes of resistance. In the context of criminal prosecutions for rights violations, states could create more effective internal controls within the police and more protections for whistle blowers. Special-purpose prosecutorial agencies with independent investigative resources would be dramatic improvement. In short, one can imagine a series of improvements to state apparatus that could help; this is, essentially, the process of developing lateral support for the substantive right in question. The precise nature of the lateral support required, however, will vary with nature of the right conferred and with the situation of the claimant-respondant dyad' (p.22)

Tables 4.8 and 4.9 show the results for legal institutions. The results suggest that legal institutions significantly affect income inequalities for both developing and developed countries and the relationship is negative. High coefficients of *Gini* and incidence of significance at 1% level in 9

out of 12 instances when rule of law and control for corruption has been found to be significantly related with *Gini*, suggest that good legal institutions play a vital role in decreasing within country income inequalities. Legal institutions are also negatively and significantly related with wage inequality, however low coefficients indicate limited role played by legal institutions in effecting the skill premia in favour of unskilled. Results based on the ratio of income percentiles (*High20/Low20*), show that rule of law and control for corruption have strong redistributive power. The relationship between legal institutions and income of the middle-income groups (*Middle20*) as well as low-income groups for *Rl* and *Ctc* is positive and significant. This means that good quality legal institutions do not only reach out to the middle income groups but they are also altruistic to the poorest of the poor. The evidence quite robustly suggests that redistribution of income takes place from the richest to the middle-class or lower middle-class as both proxies of the legal institutions are negatively related with *High10* and *High20* in 9 out of 12 cases and the relationship is mostly significant at 1 %. The high coefficients for *High10* and low coefficients of *low10* may confer that more effective redistribution takes place from the richest to the middle income or lower middle income group, whereas lowest income group is relatively less sensitive to this redistribution process. It may not be sound legal institutions that can really lift the poor from the bottom of the pyramid but it is good economic policies which can ensure higher GDP growth, which may more effectively trickle down to improve the incomes of the poorest of the poor through targeted development strategies e.g. micro finance.

Political institutions

Four proxies for political institutions namely, political stability (*Ps*), voice and accountability (*Va*), democracy (*Democ*) and autocracy (*Autoc*) are used in this section.

Table 4.10
Political Stability

Independent Variables	Dependent Variables					
	Wage Inequality (Theil)	Income Inequality (Gini)	High20/Low20	Middle20	Low10	High10
Political Stability (Lcopen)	-0.03	-8.70	-6.39	2.19	0.58	-6.87
	(-1.57)	(-4.98)***	(-3.57)***	(5.49)***	(3.11)***	(-5.10)***
Political Stability (Impnov85)	-0.04	-8.71	-6.72	2.17	0.54	-6.68
	(-2.23)**	(-3.69)***	(-2.67)***	(4.03)***	(2.28)**	(-3.69)***
Political Stability (Impnov82)	-0.03	-8.38	-6.31	2.09	0.54	-6.47
	(-1.76)*	(-3.94)***	(-2.72)***	(4.20)***	(2.41)***	(-3.87)***
Political Stability (Tarshov85)	-0.04	-9.10	-6.95	2.24	0.59	-6.91
	(-2.41)**	(-3.68)***	(-2.69)***	(3.99)***	(2.38)**	(-3.68)***
Political Stability (Tarshov82)	-0.04	-8.73	-6.54	2.17	0.57	-6.69
	(-2.38)**	(-3.90)***	(-2.70)***	(4.13)***	(2.48)**	(-3.81)***
Political Stability (Open80s)	-0.05	-15.04	-13.32	3.21	1.25	-10.64
	(-1.14)	(-2.40)***	(-1.95)*	(2.80)***	(2.12)**	(-2.70)***
Political Stability (Tariffs)	-0.002	22.35	-13.51	4.32	2.69	-14.72
	(-0.02)	(-1.91)**	(-1.59)	(2.01)**	(1.61)	(-1.95)***
Political Stability (Owti)	-0.07	-13.55	-7.36	2.84	1.09	-9.31
	(-2.33)**	(-2.83)***	(-2.27)**	(3.13)***	(2.39)**	(-2.94)***
Political Stability (Txtrdg)	-0.03	-14.12	-8.26	3.25	1.14	-11.23
	(-0.29)	(-3.49)***	(-2.09)**	(3.64)***	(2.47)**	(-3.54)***
Political Stability (Totimpov85)	0.0003	4.63	-4.33	-0.03	-0.69	1.45
	(0.01)	(0.78)	(-0.55)	(-0.03)	(-1.05)	(0.33)
Political Stability (Owqi)	-0.09	-2.84	-1.16	1.28	0.10	-3.40
	(-1.10)	(-0.37)	(-0.23)	(1.05)	(0.17)	(-0.75)
Political Stability (Ntarfov87)	-0.03	-16.61	-14.16	1.98	0.42	-5.59
	(-0.42)	(-0.93)	(-1.19)	(0.98)	(0.44)	(-0.82)

-***, **, * corresponds to 1%, 5% and 10% level of significance respectively.
- Control variables are in parentheses in the first column

Political stability generally measures conflict including military coup risk, major insurgency rebellion, political terrorism, political assassination, civil war, major urban riots and the new government honouring commitments of the previous government. (Kaufman et al. 2002) There is rich literature that suggests inequality as a cause of conflict and civil violence. For example, Murshed and Gates (2003) find that the causes of conflict in Nepal are persistent inequalities in the region. 'It has also to be remembered that poverty, the lack of employment opportunities and other forms of horizontal inequality assist Maoist recruitment and retention, making life in Maoist cadres a relatively attractive option.' (10) Justino (2004)

shows that redistributive policies have played an important role in the prevention and reduction of internal unrest in India and such policies have been a central factor in preventing smaller scale conflicts from escalating into violent civil wars. Although many recent studies show that conflict and civil unrest is endogenous to prevalent inequalities, it may also be that these conflicts further deepen inequalities in society. That this is exactly what happens as per the results in table 4.10. Political stability ensures a more equal society. High coefficients for *Gini* with negative signs and significance at 1% level in most cases show high effectiveness of political stability in decreasing income inequalities. Countries who address factors of instability and achieve greater social harmony among the population by addressing the concerns of marginalized can more effectively address the problem of rising income inequalities. In comparison to *Gini*, low coefficients of *Ps* for *Theil99* suggest that good politics has a limited role to play for smoothening out the average wage rate in favour of unskilled. It may be education (secondary education) which can play a more effective role to improve relative wage gap between skilled and unskilled. (Mamoon and Murshed, 2008) Nevertheless, for a sample of developed and developing countries, a negative relationship between *Theil99* and *Ps* means that politically stable economies, which are also democracies in most instances pay higher average wages in labour markets thus putting a downward pressure on wage inequality. (Rodrik, 1998) For businesses to perform better, stable political landscape is a pre-requisite. All politically stable economies also have thriving manufacturing sectors with profitable industries and high rates of employment - both skilled and unskilled. All such countries would also pay relatively higher wages to unskilled due to, probably, higher profits and thus a downward pressure is exerted on relative wage gap. There is a strong redistributive effect present for *Ps* which further suggests that internal conflict resolution leads to populist governance structures which redistribute resources from the very rich to the lesser. Opposite of political stability – occurrence of internal conflict may indicate towards power struggle between different interest groups or different classes which would then be highly correlated with concentration of wealth in the

hands of the few elites. The results suggest that politically stable societies not only redistribute incomes to the middle-income groups, but they also benefit the lowest segments of society equally as coefficients of *low10* are close to the half of the coefficients for *Middle 20*.

Internal conflicts can be resolved and political stability can be achieved only through a transparent political process which takes on board all stakeholders and give equal space to each to raise their respective concerns and by holding fair accountability for all. If rich can get away with accountability process through manipulation of justice system, then larger public discontent may lead to public unrest resulting in the possibility of a violent conflict where larger segments of the society would take law in their hands. Class struggles in many developing countries have lead to civil unrest and cause internal conflict. The origins of many ethnic conflicts have also arisen due to lack of equal representation in sharing public offices and other positions of power by minorities. The root cause of every civil conflict links up with discontent which aggrieved parties show towards biased accountability process where one law is for the powerful and another is for the Junta. Results in tables 4.11, indicate that voice and accountability is another important institutional process for an equal society. A strong evidence of redistribution is present in line with other empirical literature: 'The channels of communication are vital for development, particularly for electoral democracies in the process of establishing effective political and economic institutions. In societies where press freedom is combined with widespread access to mass media, this is positively associated with good governance and with human development, through the role of the press in promoting the voice of disadvantaged groups in the policymaking process and strengthening the accountability of governments to citizens and thus decreasing inequality.' (Norris 2001: 8).

Table 4.11
Voice and Accountability

Independent Variables	Dependent Variables					
	Wage Inequality (Theil)	Income Inequality (Gini)	High20/Low20	Middle20	Low10	High10
Voice and Accountability (Lcopen)	-0.02	-5.46	-4.04	1.43	0.259	-4.37
	(-1.50)	(-4.04)***	(-2.92)***	(4.74)***	(1.71)*	(-4.20)***
Voice and Accountability (Impnov85)	-0.03	-5.28	-4.53	1.39	0.17	-3.99
	(-2.07)**	(3.03)***	(-2.28)**	(3.38)***	(0.87)	(-2.82)***
Voice and Accountability (Impnov82)	-0.02	-5.63	-4.29	1.51	0.26	-4.50
	(-1.64)*	(-3.34)***	(-2.62)***	(4.05)***	(1.49)	(-3.51)***
Voice and Accountability (Tarshov85)	-0.03	-5.35	-4.68	1.42	0.187	-4.07
	(-2.27)**	(-2.96)***	(-2.25)**	(3.31)***	(0.91)	(-2.76)***
Voice and Accountability (Tarshov82)	-0.04	-5.60	-4.81	1.52	0.28	-4.48
	(-2.48)**	(-3.43)**	(-2.57)**	(3.91)***	(1.51)	(-3.37)***
Voice and Accountability (Open80s)	-0.06	-4.20	-6.18	1.13	-0.11	-3.01
	(-1.12)	(-1.21)	(-1.28)	(1.54)	(-0.24)	(-1.14)
Voice and Accountability (Tariffs)	-0.05	-19.34	-16.18	3.91	2.34	-11.68
	(-0.75)	(-1.05)	(-0.90)	(1.10)	(0.89)	(-1.05)
Voice and Accountability (Owti)	-0.05	-5.80	-4.14	1.50	0.23	-4.39
	(-2.21)**	(-2.11)**	(-1.42)	(2.13)**	(0.64)	(-1.81)*
Voice and Accountability (Txtrdg)	0.08	-12.74	-7.76	3.15	0.82	-10.76
	(1.10)	(-2.33)**	(-1.58)	(2.52)**	(1.46)	(-2.40)**
Voice and Accountability (Totimpov85)	0.01	3.06	-0.34	-0.56	-0.69	2.59
	(0.47)	(0.91)	(-0.08)	(-0.76)	(-1.84)*	(1.02)
Voice and Accountability (Owqi)	-0.07	0.70	0.924	0.27	-0.46	0.054
	(-1.24)	(0.09)	(0.17)	(0.17)	(-0.52)	(1.01)
Voice and Accountability (Ntarfov87)	-0.03	-0.61	-3.77	0.16	-0.26	-0.06
	(-0.67)	(-0.14)	(-0.72)	(0.17)	(-0.52)	(-0.02)

-***, **, * corresponds to 1%, 5% and 10% level of significance respectively.

- Control variables are in parentheses in the first column

As mentioned in section 4.4, the chapter has also employed direct proxies for democracy (Demo) and autocracy (auto), to see direct relationship of democracy or autocracy with income inequality or redistribution. This is done more so because existing evidence does not find any robust relationship between democracy and inequality in a cross-country regression. 'Indeed a casual inspection of recent events in East Europe as well as in East Asia casts doubts that any such simple relationship may exist. It has been argued that, in the East European countries, democratisation of the 90's actually resulted in an increase income inequality. Similarly, some of the East Asian countries such as South Korea, Taiwan, Singapore have

had among the most egalitarian income distributions in the world, yet their political record is far from democratic.' (Gradstein et al. 2001: 1) According to Glaeser et al. (2004b), good leadership is what matters and not whether a country is a democracy or a dictatorship. Irrespective to their convincing argument, there is a strong correlation run from democracy to redistribution through political stability: 'Regimes controlled by rich elite often collapse and make way for democracy amidst widespread social unrest. Such regime changes are often followed by redistribution to the poor at the expense of the former elite.' (p683) Our empirical analysis also finds that democracy is significantly and negatively related with income inequality, but the relation is indeed weak as can be seen by the low coefficients of *Demo* for *Gini.* In comparison to other measures of political institutions, a high number of cases of insignificance are observed. (Table 4.12)

A comparison of results for *Auto* in table 4.13 and *Demo* in table 4.12 for *Theil99* suggest that democracies put a downward pressure on wage inequality while autocracies may favour skilled over unskilled. In light of redistributive potential of democracy, this result shows presence of skill bias among autocracies. Since a comparison is drawn between democracies and autocracies for a sample of developed and developing countries, this result on autocracies is more relevant for developing countries that may represent dictatorships who may promote such growth policies which would have unequal outcomes in labour markets. (*Auto* may be capturing the developing country effect as autocracies by default exclude developed countries from the data set) As discussed in detail in chapter 3, there is evidence that skill bias technologies have lead to higher wage inequalities in many developing countries and due to developing country bias in defining *Auto*, results are obtained in favour of rise in wage inequality. Nevertheless, literature also suggests that differentiation between political make-ups is important in determining the wage structure in a country. For example, democracies on average pay higher wages to the manufacturing sector. Rodrik (1999b) finds out that average wages improve in the manufacturing sector with the enhancement of democratic institutions: 'average wages in a country like Mexico would be expected to

increase by 10 to 40 percent were Mexico to attain a level of democracy comparable to that prevailing in United States.' (p.707) Rockey (2007) adds up to this evidence as he finds that it is parliamentary democracies that are more effective in raising the average wage share of labour in manufacturing when compared to Presidential democracies. That may be true for a larger sample of countries including both developed and developing countries, but only for developing countries where democracies are performing relatively poorly, the results may change. For Africa, parliamentary system leads to higher inequality than the presidential system. (Milanovic 2003c)

Table 4.12
Democracy

	Dependent Variables					
Independent Variables	Wage Inequality (Theil)	Income Inequality (Gini)	High20/Low20	Middle20	Low10	High10
Democracy (Lcopen)	-0.004	-0.77	-0.649	0.23	-0.01	-0.63
	(-1.25)	(-1.84)*	(-1.66)*	(2.68)***	(-0.25)	(-2.15)**
Democracy (Impnov85)	-0.005	-0.69	-0.79	0.21	-0.01	-0.51
	(-1.53)	(-1.64)	(-1.65)***	(2.13)**	(-0.02)	(-1.56)
Democracy (Impnov82)	-0.004	-0.88	-0.915	0.27	0.02	-0.74
	(-1.04)	(-2.20)**	(-1.99)	(2.93)***	(0.36)	(-2.41)**
Democracy (Tarshov85)	-0.006	-0.62	-0.79	0.19	-0.01	-0.45
	(-1.77)*	(-1.42)	(-1.56)	(1.90)**	(-0.27)	(-1.33)
Democracy (Tarshov82)	-0.005	-0.91	-0.97	0.27	0.02	-0.73
	(-1.50)	(-2.15)**	(-2.02)**	(2.79)***	(0.51)	(-2.27)**
Democracy (Open80s)	-0.007	0.56	-0.67	-0.02	-0.17	0.34
	(-1.15)	(0.57)	(-0.67)	(-0.11)	(-1.32)	(0.48)
Democracy (Tariffs)	-0.01	2.09	0.43	-0.39	-0.24	1.58
	(-1.81)*	(0.95)	(0.33)	(-0.81)	(-1.10)	(0.92)
Democracy (Owti)	-0.007	0.33	0.13	-0.05	-0.13	0.41
	(-1.99)**	(0.38)	(0.19)	(-0.24)	(-1.12)	(0.53)
Democracy (Txtrdg)	0.023	-1.83	-1.16	0.52	0.06	-1.72
	(1.14)	(-1.80)*	(-1.13)	(2.20)**	(0.55)	(-2.06)**
Democracy (Totimpov85)	0.0009	1.35	0.59	0.24	-0.19	0.97
	(0.17)	(2.25)**	(0.74)	(1.84)*	(-2.86)***	(2.11)**
Democracy (Owqi)	-0.01	0.74	0.40	-0.07	-0.13	0.458
	(-1.47)	(0.37)	(0.06)	(-0.17)	(-0.72)	(0.31)
Democracy (Ntarfov87)	-0.007	0.96	0.44	-0.19	-0.12	1.52
	(-1.13)	(1.30)	(0.85)	(-1.28)	(-1.50)	(-0.61)

-***, **, * corresponds to 1%, 5% and 10% level of significance respectively.
- Control variables are in parentheses in the first column

Table 4.13
Autocracy

Independent Variables	Dependent Variables					
	Wage Inequality (Theil)	Income Inequality (Gini)	High20/Low20	Middle20	Low10	High10
Autocracy (Lcopen)	0.006	0.37	0.70	-0.17	0.07	0.38
	(1.24)	(0.70)	(1.11)	(-1.49)	(1.23)	(0.98)
Autocracy (Impnov85)	0.006	0.43	0.92	-0.16	0.06	0.29
	(1.35)	(0.75)	(1.45)	(-1.20)	(0.96)	(0.65)
Autocracy (Impnov82)	0.0041	0.69	0.64	-0.26	0.03	0.63
	(0.85)	(1.20)	(0.97)	(-1.94)*	(0.49)	(1.43)
Autocracy (Tarshov85)	0.006	0.29	0.94	-0.12	0.07	0.17
	(1.60)	(0.49)	(1.43)	(-0.92)	(1.06)	(0.37)
Autocracy (Tarshov82)	0.005	0.63	-0.19	-0.23	0.02	0.55
	(1.34)	(1.08)	(-0.18)	(-1.74)*	(0.38)	(1.22)
Autocracy (Open80s)	0.004	-1.69	-0.47	0.26	0.27	-1.16
	(0.75)	(-1.47)	(-0.38)	(1.11)	(2.02)**	(-1.39)
Autocracy (Tariffs)	0.01	-1.899	-0.71	0.361	0.21	-1.14
	(2.39)**	(-1.19)	(-0.75)	(1.00)	(1.38)	(-1.15)
Autocracy (Owti)	0.008	-1.13	-0.55	0.23	0.22	-1.04
	(2.04)**	(-0.96)	(-0.34)	(0.77)	(1.60)	(-1.04)
Autocracy (Txtrdg)	-0.02	-0.70	-0.88	-0.04	0.25	-0.03
	(-0.97)	(-0.46)	(-0.93)	(-0.12)	(1.28)	(-0.03)
Autocracy (Totimpov85)	0.0002	-1.78	-0.62	-0.31	0.23	-1.28
	(0.04)	(-2.43)**	(-0.44)	(-2.07)**	(2.88)*	(-2.34)**
Autocracy (Owqi)	0.011	-0.10	-0.25	0.13	0.18	-0.68
	(1.88)*	(-0.45)	(-0.62)	(0.26)	(0.91)	(-0.40)
Autocracy (Ntarfov87)	0.008	-1.27	-0.44	0.27	0.16	-1.11
	(1.46)	(-1.54)	(-0.25)	(1.59)	(1.64)	(-1.83)*

-***, **, * corresponds to 1%, 5% and 10% level of significance respectively.

- Control variables are in parentheses in the first column

Coming back to the results on autocracy, they reveal that autocracies also perform poorly in favour of redistribution and if anything they are negatively related with the incomes of the poor and the middle class. In contrast, democracies seem to favour middle-class more than anybody else, confirming the median voter argument that democratized countries with greater inequality of factor income tend to redistribute from more to the less affluent. (Milanovic 2000)

So what lessons are available from these results? Should it be that a country might compromise on democracy and follow a politically repressed system of dictatorial rule? Both questions are applicable to devel-

oping countries where most of the underperforming economies are lead by dictatorial regimes whether in Asia, Africa or Latin America. However, there are salient exceptions too where it seems that the definition of western democracy remains unfulfilled but an enlightened model of economic management has been adopted and success has been achieved as far as growth dividends are concerned. So how may one contrast such exceptions with the ones where autocracy has lead to repressed market structures? Is it all about market efficiency to defend an autocratic structure? The present results illuminate these questions of whether equity and not only growth is the objective for a developing country's policy apparatus. If somehow a less democratic political system may strengthen legal, social and economic institutions and promote political stability, it would not matter whether a western model of democracy is implemented by its word and spirit or some case specific combination of political and social methodologies adopted.

Democracy is definitely not a sufficient condition in itself for contributing towards the equity or even economic progress of a country. Rather democracy is just another part of the jigsaw puzzle, which may only fit in properly at its right time when other institutional variables have evolved appropriately to support its conceptual application. Most democracies must have been autocracies or near autocracies when the political process started out and this means mere concentration on democracy is futile to find solutions for institutional or macroeconomic progress. Rather consider democracy a notion suggesting an objective and well-developed end for the confirmation of economic, social, cultural and scientific development rather than a means to an end. However, in today's rapidly transforming world where some developing countries may benefit from global markets more than others, they would find themselves under increasing pressure from their populations to transform into a more democratized system of governance once they witnessed higher levels of economic and institutional development. In such scenarios, countries that may be doing well under well-defined autocratic set ups may not only have to decide to bring western models of democracy to align their social development with global standards, but more impor-

tantly, they have to decide the timing of such critical transitions. This will ensure the sustainability of the economic progress they achieved as any abrupt changes always carry higher risks. (Rodrik and Wacziarg, 2005)

Nevertheless, all such autocratic regimes which are controlled by ruling elites have a high risk of collapse amidst widespread social unrest. Thus it is beneficial for the ruling class to bring increased democratization in the country because temporary concessions in light of social pressure can be viewed as a sign of weakness and this may give way to further unrest and cause dramatic change in regimes and increasing the risk of a civil war unless the most generous concession, a transition to full democracy, is not made. Finally, democratization lies in the very interest of autocracy while the transition to democracy is often followed by redistribution to the poor at the expense of the former elite. Acemoglu and Robinson (2000)

Finally, democracy does matter in equal distribution of resources but not necessarily. In some countries democratization process may have no effect on income distribution because of prevailing culture. For-example, Gradstein et al (2001) find out that in Judeo-Christian societies, increased democratization may lead to lower inequality, while in comparison, in Muslim and Confucian societies, democratization has an insignificant effect on equality. For such societies where equality is highly valued, increase in democratization may have negligible effect on inequality.

The validity of the inference drawn by Gradstein et al (2001) regarding insignificant role of democracy in inequality mitigation for certain societies can also be tested under the empirical framework established in this chapter. The results in table 4.12 and 4.13 are presented for a larger sample of developed and developing countries. Changing the sample may change the results. Since all developed economies are also stable democracies, restricting the sample for developing countries only would exclude developed country bias from the analysis. The results discussed here, which clearly favour democracy over autocracy, may actually be showing other effects which are so peculiar to developed countries only. Exclud-

ing developed countries may allow developing country specific effects to become more pronounced in the results and thus one can test for the effects of culture. For instance, most Muslim and Confucian states are developing countries and are also and mostly run by one party dictatorships or monarchies. Thus in most cases, countries with Muslim or Confucian orientation would also score high on *Auto* and low on *Demo*. And if Muslim and Confucian societies are more egalitarian by social preference as claimed by Gradstein et al (2001), then for a reduced sample of developing countries only, results may change for both *Demo* and *Auto* in relation to income inequality.

Results are obtained for *Demo* and *Auto* by restricting the sample to developing countries only and presented in tables 4.17 and 4.18. (See the section on 'Trade and Inequality') Surprisingly Democracy is positively related with *Gini* and autocracy is negatively related with *Gini* and the relationship is significant and it also holds various robustness checks.

Economic institutions

Here we examine institutions which capture economic outcomes. Government effectiveness (*Ge*) measures outcomes like bureaucratic delays, states ability to formulate and implement national policy initiatives, effectiveness in collecting taxes other other government revenue, maintenance of government infrastructure, responsiveness to economic problems, decentralisation, and independence from pressure from interest groups, sound social development policies and pro-business orientation. Regulatory quality (*Rq*) captures outcomes like price liberalization, trade and foreign exchange system, competition policy, commercial law effectiveness, privatization, financial regulations and banking reforms, interest rate liberalization, and promotion of market friendly regulatory framework.

Table 4.14
Government Effectiveness

Independent Variables	Dependent Variables					
	Wage Inequality (Theil)	Income Inequality (Gini)	High20/Low20	Middle20	Low10	High10
Government Effectiveness (Lcopen)	-0.025 (-1.54)	-8.60 (-5.00)***	-6.56 (-3.61)***	2.19 (5.63)***	0.552 (2.97)***	-6.817 (-5.17)***
Government Effectiveness (Impnov85)	-0.039 (-2.34)**	-8.03 (-4.19)***	-6.47 (2.87)***	2.02 (4.56)***	0.49 (2.40)**	-6.17 (-4.13)***
Government Effectiveness (Impnov82)	-0.028 (-1.86)*	-7.86 (-4.47)***	-6.13 (-2.99)***	1.97 (4.84)***	0.51 (2.67)***	-6.08 (-4.43)***
Government Effectiveness (Tarshov85)	-0.04 (2.55)**	-8.31 (-4.17)***	-6.67 (-2.89)***	2.08 (4.53)***	0.53 (2.49)**	-6.37 (-4.12)***
Government Effectiveness (Tarshov82)	-0.04 (-2.53)**	-7.87 (-4.30)***	-6.21 (-2.90)*	1.98 (4.68)***	0.51 (2.57)***	-6.07 (-4.25)***
Government Effectiveness (Open80s)	-0.05 (-1.30)	-11.85 (-2.69)***	-11.46 (-1.89)*	2.72 (3.02)***	0.96 (2.00)**	-8.91 (-2.92)***
Government Effectiveness (Tariffs)	0.07 (0.39)	-25.83 (-1.59)	-15.53 (-1.36)	4.99 (1.69)*	3.11 (1.38)	-17.08 (-1.63)
Government Effectiveness (Owti)	-0.07 (-2.40)**	-13.23 (-3.11)***	-8.17 (-2.29)**	3.02 (3.25)***	1.12 (2.44)**	-9.79 (-3.04)***
Government Effectiveness (Txtrdg)	0.04 (0.94)	-14.73 (-2.74)***	-8.72 (-1.93)*	3.40 (2.80)***	1.18 (2.09)**	-11.76 (-2.71)***
Government Effectiveness (Totimpov85)	-0.01 (-0.13)	1.62 (0.31)	-4.59 (-0.63)	0.18 (0.16)	-0.48 (-0.84)	0.75 (0.19)
Government Effectiveness (Owqi)	-0.09 (-1.08)	-3.11 (-0.48)	-1.47 (-0.33)	1.26 (1.16)	0.04 (0.07)	-3.28 (-0.80)
Government Effectiveness (Ntarfov87)	-0.05 (-0.47)	-21,39 (-1.11)	-17.76 (-1.27)	3.42 (1.30)	1.19 (0.98)	-10.64 (-1.21)

-***, **, * corresponds to 1%, 5% and 10% level of significance respectively.

- Control variables are in parentheses in the first column

Every effective government must maintain a sustainable fiscal policy, which includes a deficit that is manageable in the short-term, and the associated public debt it creates being serviceable. More concentration of resources on social sector is always pro-poor. Capital market liberalization and broader financial sector reforms are necessary to integrate with global markets. Decentralization is important for effective implementation of government policies at grass roots level which can promote redistribution through effective social development. Incorporation of effective tax structure where value added tax gives way to a more pro-poor tax system is at the heart of good fiscal policy. (Roy and Weeks 2003) Inflation

in many developing countries is an outcome of political decisions when government has a lax monetary policy and is unable or unwilling to increase taxes. High inflation has a negative distribution effect. In developed countries sometimes, monetary policy outcomes relate to increased inequalities. Khalifa (2005) shows that a positive shock to Federal Reserve fund rates in the US induced a larger and more persistent increase in the unemployment ratio of the low skilled relative to that of high skilled, indicating that low skilled bear the brunt of the increase in unemployment after a contractionary policy. The results in table 4.14 show that government effectiveness is significantly and negatively related with *High10*, *Gini* and *Theil99*. The coefficients for *Gini* and *High10* are large while significant is mostly achieved at 1% level for *Gini* and *High10*. This indicates that government policies like decentralization, effective tax structure and implementation of social development policies significantly decrease income inequality and also redistribute income from the elite to lower segments of the society. Effective governments are more democratic in nature as well: ' Decentralization can be defined as meaningful authority devolved to local unites of governance that are accessible and accountable to the local citizenry, who enjoy full political rights and liberty.' (Blair, 2000; 21) While the democratization and empowerment of administrative bodies can enhance participation of such groups that have been marginalized before thus bringing more potential for social development and improvement of livelihood opportunities for these marginalized. Table 4.14, shows that effective governments are positively and significantly related with the incomes of the bottom deciles and medium percentile establishing its strong redistributive power.

In contrast to government effectiveness, the results on regulatory quality in inequality mitigation and redistribution of wealth are not that encouraging. (See table 4.15) *Rq* mostly remains non responsive to *Gini* and *Theil99*. There is even an instance when *Rq* enters into the *Gini e*quation with the wrong sign while it is significant at 5 % - highest level achieved in any of the cases for *Gini*.

Table 4.15
Regulatory Quality

Independent Variables	Dependent Variables					
	Wage Inequality (Theil)	Income Inequality (Gini)	High20/Low20	Middle20	Low10	High10
Regulatory Quality (Lcopen)	-0.03	-3.44	-4.48	1.72	0.10	-5.01
	(-1.44)	(-1.31)	(-1.93)*	(3.10)***	(0.40)	(2.65)***
Regulatory Quality (Impnov85)	-0.04	-4.69	-4.72	1.44	-0.07	-3.75
	(-1.73)*	(-1.53)	(-1.48)	(2.05)**	(-0.23)	(-1.54)
Regulatory Quality ity (Impnov82)	-0.03	-5.54	-5.30	1.71	0.05	-4.73
	(-1.37)	(-1.89)*	(-1.73)*	(2.52)***	(0.16)	(-2.30)**
Regulatory Quality (Tarshov85)	-0.05	-4.41	-4.66	1.39	-0.09	-3.53
	(-1.92)*	(-1.40)	(-1.40)	(1.92)*	(-0.28)	(-1.41)
Regulatory Quality (Tarshov82)	-0.05	-4.86	-5.00	1.53	0.02	-4.09
	(-2.13)**	(-1.64)*	(-1.60)	(2.24)**	(0.07)	(-1.74)*
Regulatory Quality (Open80s)	-0.02	4.71	-4.44	-0.14	-1.22	2.34
	(-0.36)	(0.67)	(-0.62)	(-0.10)	(-1.43)	(0.47)
Regulatory Quality (Tariffs)	0.04	3.53	-3.09	-4.40	-0.46	3.50
	(0.46)	(0.30)	(-0.32)	(-0.15)	(-0.40)	(0.36)
Regulatory Quality (Owti)	-0.05	0.35	0.47	0.25	-0.73	0.50
	(-1.57)	(0.06)	(0.10)	(0.18)	(-1.01)	(0.10)
Regulatory Quality (Txtrdg)	0.15	-26.61	-16.89	6.64	1.67	-22.75
	(1.19)	(-1.74)*	(-1.36)	(1.82)*	(1.21)	(-1.77)*
Regulatory Quality (Totimpov85)	-0.005	10.33	3.60	-1.87	-1.47	7.49
	(-0.11)	(1.99)**	(0.56)	(-1.66)	(-2.40)**	(1.91)*
Regulatory Quality (Owqi)	-0.08	4.84	3.93	0.53	-0.32	2.56
	(-1.23)	(0.37)	(0.45)	(0.17)	(-0.15)	(0.27)
Regulatory Quality (Ntarfov87)	-0.13	5.85	-3.70	-1.00	-0.97	4.48
	(-1.15)	(0.68)	(-0.37)	(-0.58)	(-1.03)	(0.74)

-***, **, * corresponds to 1%, 5% and 10% level of significance respectively.

- Control variables are in parentheses in the first column

Though, some signs of redistribution are present from richest to middle class, but for incomes of the poorest, *Rq* is mostly insignificant. However, the wrong signs of the coefficients of *Rq*, which are highlighted in grey, suggests that regulatory quality actually disfavour the poor. On the hindsight this may be an expected result. Regulatory quality captures outcomes like trade and financial (capital market) liberalization which has been increasingly related with crises and growth failures recently. This extract which is taken from the Nobel Prize lecture of Joseph Stiglitz tells about a thin line that exists between a good economic policy and the bad ones.

> They (IMF) actually promoted contractionary fiscal policies for countries facing an economic downturn - and they advocated polices like capital market liberalization, for which there was little evidence that growth was promoted, while there was ample evidence that such policies generated instability.' (Stiglitz, 2001b)

Most developed and developing countries have encountered exchange rate crises, capital market crises and financial recessions in last few decades. Thus what regulatory quality may also be picking up is increased risk of crises which integrated capital markets and free or floating exchange rate regimes put on countries. There is a strong correlation between capital market crisis and financial liberalization. (See Kawai and Takagi, 2008; for detailed literature review on risk of financial crises and capital market management) Measures to open capital markets put developing countries at a higher risk of financial crises.

United States Sub prime mortgage crises has transformed into a global financial crises while factors like oil price hike and staple food inflation has added up to the welfare distorting effect of the crises for developing many countries who are now facing increased inflationary pressures which are mostly beyond the control of monetary policy. Thus regulatory quality, which has been very relevant to income generation, has been found to be less relevant for inequality mitigation.

Social institutions

Education enhances the earnings potential of the poor, both in competing for jobs and earnings and as a source of growth and employment. The distribution of physical and human capital emerges from the theoretical and empirical literature as key to distributional consequences of growth, and a determinant of growth itself (Kanbur 1998: 20). Along with the processes of globalization, the comparative advantage of developed nations lie in high skill intensive goods and services as production of lower skill intensive goods and services is outsourced to developing nations. As the demand for skills is increasing at greater pace than its supply, so are the wages of high skilled and educated labour which in turn increases wage inequalities in developed and developing nations.

Harrigan and Balaban (1999), show that relative factor supply is an important factor in determining the growing return to skills in the US during 1963-91. Given the current situation of increasing inequality in most developed societies, with globalisation as the most oft-cited culprit, policymakers have been very keen to demand further public funding for schooling. (Pereira and Martin 2000: 2) Similarly, education inequalities lead to wage inequality in developing countries, specifically Latin America. Coincidently Latin America has a *Gini* coefficient of 0.50 for the region as a whole, which is approximately 15 points above the average for the rest of the world. (Mamoon 2005) Londoño and Székely (1997) estimate that the low level of education of Latin American workers and the enormous inequality in educational assets account for most of the region's excessive inequality, larger than other contributing factors—lower physical capital accumulation, relative abundance of natural resources, and high concentration of land resources. In Latin America, only a relatively small proportion of the total population completed secondary or higher education. These relatively few skilled workers earn a substantial wage premium due to their limited supply. Thus, a poor distribution of education contributes to differentials in the returns to different levels of education, magnifying the effect of education gaps on income inequality. Increased educational attainment leads to less wage inequality.Acemoglu (2001) provides a good discussion on the role of human capital (education) in determining income and wage inequality in a number of OECD countries: 'Increased income inequality in OECD economies reflects greater wage inequality and higher skill premia and that the most likely casue of the rise in skill premia is technical change that has increased the demand for skills and education, though changes in labour market institutions, such as minimum wage laws and the importance of union bargaining, are also likely to have played some role. Although increasing the supply of skills may have some beneficial effects, the most useful policies to reduce inequality would be those that can close the gap of skills between the top and the bottom of the income distribution, such as policies to improve the quality of secondary schooling and to encourage on-the-job training'. (p. 0)

Table 4.16
Average Years of Schooling

Independent Variables	Dependent Variables					
	Wage Inequality (Theil)	Income Inequality (Gini)	High20/Low20	Middle20	Low10	High10
Average Years of Schooling (Lcopen)	-0.02 (-4.37)***	-3.34 (-5.70)***	-1.07 (-2.75)***	0.58 (4.49)***	0.17 (2.89)***	-1.90 (-4.03)***
Average Years of Schooling (Impnov85)	-0.02 (-3.73)***	-3.00 (-4.65)***	-0.79 (-1.80)*	0.48 (3.29)***	0.16 (2.14)**	-1.57 (-3.06)***
Average Years of Schooling (Impnov82)	-0.03 (-3.79)***	-3.091 (-4.95)***	-0.85 (-1.99)**	0.50 (3.52)***	0.15 (2.11)**	-1.63 (-3.30)***
Average Years of Schooling (Tarshov85)	-0.02 (-3.72)***	-3.00 (-4.56)***	-0.79 (-1.73)*	0.49 (3.24)***	0.17 (2.26)**	-1.60 (-3.00)***
Average Years of Schooling (Tarshov82)	-0.02 (-3.85)***	-3.04 (-4.83)***	-0.86 (-1.96)*	0.51 (3.52)***	0.17 (2.28)**	-1.66 (-3.28)***
Average Years of Schooling (Open80s)	-0.02 (-2.92)***	-3.13 (-3.82)***	-0.12 (-0.20)	0.16 (0.71)	0.004 (0.03)	-0.56 (-0.69)
Average Years of Schooling (Tariffs)	-0.004 (-0.24)	-4.34 (-2.13)**	-1.92 (-1.02)	1.12 (1.43)	0.52 (1.19)	-3.56 (-1.37)
Average Years of Schooling (Owti)	-0.02 (-3.17)***	-2.77 (-3.13)***	-0.27 (-0.38)	0.33 (1.36)	0.15 (1.43)	-1.10 (-1.34)
Average Years of Schooling (Txtrdg)	-0.01 (-1.45)	-7.46 (-1.63)*	-1.38 (-1.89)*	0.64 (2.70)***	0.14 (1.26)	-2.18 (-2.63)***
Average Years of Schooling (Totimpov85)	-0.02 (-2.05)**	-4.93 (-2.47)**	0.82 (0.74)	-0.12 (-0.38)	-0.14 (-0.97)	0.46 (0.42)
Average Years of Schooling (Owqi)	-0.01 (-2.47)**	-1.52 (-0.62)	0.34 (0.23)	0.07 (0.13)	-0.09 (-0.35)	-0.26 (-0.14)
Average Years of Schooling (Ntarfov87)	-0.04 (-1.02)	-4.94 (-2.44)**	1.93 (0.90)	-0.51 (-0.75)	-0.27 (-1.15)	1.77 (0.77)

-***, **, * corresponds to 1%, 5% and 10% level of significance respectively.

- Control variables are in parentheses in the first column

The results in Table 4.16 show that average years of schooling (*Sch*) is negatively related with the *Gini,* and the relationship is significant at 1% level in most cases suggesting countries that have a more educated population are also the ones where distribution of income is relatively less unequal. The relationship between schooling and *Theil99* has also been highly significant and negative. The results suggest that countries with well educated population are better prepared to absorb the unequal effects of rise in technical change bias skill demand. Since technical change in sectors like manufacturing have high potential to raise the productivity levels in favour of higher economic growth rates, countries would always

promote such technical changes. Any negative effects they may exert on relative wages may then be avoided by raising the average levels of education through allocation of sufficient funds into the education sector. Investment in education through an increase average years of schooling have a strong redistributive power. The results can easily be substantiated by cross country comparisons between countries that differ in average years of schooling: In comparison to Latin America, the US has a highly educated population with average years of schooling at little more than 12 years and 99 per cent of the adult population literate. In the US, the per-capita income of the richest decile exceeds that of the second richest decile by 60 per cent only. In Latin America where *Gini* is also one of the highest among developing countries, the richest decile exceeds that of the second richest decile by 160 per cent.

Integration and inequality

'Globalization and Inequality' has recently become a hot topic of debate. Trade liberalization is evidently among many of other pro-market measures, which countries take to integrate with world markets and thus benefit from factors like technological spill-over. Effects of pro market measures like capital market integration and financial liberalization has already been captured in the last section through variables like regulatory quality. The results show that, at best, a weak relationship is present between regulatory quality and income distribution or wage inequality. Chapter 3 already establishes the importance of trade as a key variable of interest in understanding rise and fall in this measure of inequalities in developing countries. A brief discussion which has been carried out in earlier sections suggests that inequalities (especially skilled bias wage inequality) are also rising in developed countries and, other than indigenous technical bias, there may be some external factors, which may determine the rising trend in inequalities in developed countries, whereas international trade may be an important one of such factors.

Since the inequality models analyzed in this chapter also include many trade measures (both outcome based and incidence based) as a control group, a rich set of information is obtained on the link between

integration and income inequality or wage inequality for larger sample including developed and developing countries. This section presents relationship between trade and inequality for many specifications already highlighted in last section, while focusing only on institutions and their effects of inequality. Here the author will analyze the correlations between different measures of trade openness and trade policy with *Gini* and *Theil99*, while institutional outcomes would serve as control group. Milanovic (2005), by using Panel data and under a more comprehensive model specification by adding variables like foreign direct investment into inequality equation, looks at the impact of openness on the relative income shares of low and high deciles and finds that for poor (least developed) countries openness benefits the rich, whereas for countries who belong to relatively higher income groups within developing countries, openness does appear to favour poor and the middle class. Our results based on income percentiles and deciles echo his finding. In coming lines, only the results for *Gini* and *Theil99* are discussed.

Integration and Income Inequality

Dollar (2005) undertakes a comprehensive study to investigate the effects of globalization on poverty and inequality for the post reform period (1980). Apart from showing that poverty trends have declined in developing countries post 1980 reforms, the paper manages to find no general trend towards higher inequalities within developed and developing countries. In comparison, rise in inequalities is more pronounced in manufacturing sector pay, though wages only constitute a small part of household income in developing countries. The focus of Dollar (2005) has been on global inequality which he finds to be on declining trends. There are many studies that refute this claim (i.e, see Milanovic 2006; 2005; and Wade, 2004). The claims on significant poverty reduction amidst high growth rates in developing countries has also been refuted since many studies are able to show that excluding India and China from the sample may capture rising trends in poverty in many developing countries. Whether developing countries, who faced increasing trends in poverty, have been unsuccessful globalisers and categorizing India and China as

success stories of free market reform is a generalization which can then easily be questioned and thus the claim that 'globalization has been pro poor'. (Milanovic, 2003)

In this section, the author would look at the issue of within country income inequality and its relationship, if any, with international trade while controlling for Legal, Political, Economic and Social institutions. Table 4.17 shows the results for openness with income inequality. There is no evidence of a significant relationship between openness and within country income inequality except for two cases (columns 3 and 4). Institutions are significantly and negatively related with income inequalities. Reducing the sample to developing countries only makes insignificance of trade more pronounced. The relative significance of institutions has also declined. Nevertheless, social institutions captured by average years of schooling, significantly decrease inequality for developing countries and the relationship is significant at 5% level. High values of coefficients for *Sch99* suggest that education is highly effective in inequality mitigation. Further confidence comes from the statistical validity of the results for *Sch99* because model specifications (coloumn 6 and 12) with *Sch99* do not suffer from endogeiniety which has been observed in case of *Rl, Va* or *Ge*. (All such cases are highlighted in grey) Another interesting observation comes forth. For a larger sample, including developed and developing countries, democracy is significantly and negatively related with the *Gini,* telling that democracies are more likely to put a downward pressure on income inequality. However when the sample is reduced for developing countries only (columns 9 and 10), the signs change in favour of autocracy. Now democracy is positively and significantly related with *Gini* and autocracy, which was insignificant for the larger sample, is now significantly and negatively related with income inequality.

The result is simple to interpret. Democracies in developing countries are associated with higher income inequality and autocracies are associated with less income inequality. There are several reasons why democratic experience in developing countries is related with higher income inequality and why autocracies may in fact show a negative relationship. First and foremost, there is a direct link between democracy and higher

inequality because there is evidence that transition to a democracy in many developing countries have produced political instability, ethnic conflict and resultantly poor economic outcomes. (Kaplan, 2000; Zakaria, 2003; and Rodrik and Wacziarg, 2005) In literature there is also a distinction between real democracy (Populist democracy) and oligarchic society. (Acemoglu, 2003b) In real democracy, the political power is more equally distributed among different social and income groups of the society and thus the poorer segments can use their political voice in favour or redistribution. Also in a real democracy, implementation of property rights prevent barriers to entry as against oligarchic society, which may look like a democracy by holding elections but political power lies with economic elites who create monopoly positions in the domestic markets for their businesses and violate property rights. In this context, an autocratic set up, where the leaders have effectively implemented property rights and significantly improved the level playing field for all social groups to carry out good business practices, may lead to decrease in income inequality. (Glaser et al, 2004a; and 2004b) Secondly, as explained by Gradstein et al (2001), culture and social value system also has a very important role to play in inequality mitigation: 'For Muslim, Buddhist/ Hindu and Confucian societies, democracy has either hardly discernible or even a positive, effect on inequality. Yet these societies seem to possess some features which make them intrinsically more equal that the Judeo-Christian societies. It could be - although our empirical test does not account for that -that, the same "desired" level of inequality which in the Judeo-Christian societies is achieved through expanded franchise and government-sponsored redistribution , is implemented in the Muslim, Buddhist/Hindu, and Confucian societies, informally, through family and ethnic ties.' (p35)

The results in table 4.17 and 4.18 give credence to such analysis because results for *Demo* and *Auto* do not change even if Africa is excluded from the developing country sample. Instead, the results become more pronounced (columns 13, 14, 27 and 28), with improved coefficients and significance level for both *Demo* and *Auto* to suggest that the cause of unequal distribution of resources in developing countries is much

more than the risky transitions to democracy as suggested by Rodrik (2005). It seems to also matter what kind of democracies these developing countries implement and practice and what kind of societies they make up.

Table 4.18 actually shows the results based on trade policy (*Owti*). They are similar to the ones already discussed above for *Lcopen*. For the larger sample of developed and developing countries, decrease in tariffs rates on international inputs and capital goods bring a significant decrease in income inequality. However, similar to the results obtained for Lcopen, results for *Owti* remain highly case sensitive and largely insignificant. *Owti* is only significant for 2 (columns 17 and 18) specifications out of total number of 14 specifications including the ones which represent results for reduced samples (developing country only). On basis of these results we cannot claim with surety that trade is significantly related with income inequality.

Overall, insignificant results on the relationship between trade and inequality should not be taken as evidence in favour of globalization or against it. What the results at best show is that the very construction of *Gini,* and related methodological problems (also mentioned at the start of the chapter), have a part to play in these results. Further more, despite the sophistication of the analysis, the major deficiency in the kind of analysis done in this section would remain the very limited number of observations utilized for *Gini* against to what could available in WIDER dataset. The author only includes one yearly observation for every country to best suite the cross section methodology employed in this manuscript. That has significantly decreased the degrees of freedom. This could have been avoided under a Panel analysis. For a Panel of countries, observations for *Gini* go as high as 5313 under WIDER data set.

However, it is also important to note here is that a panel analysis may not necessarily lead to different results as many studies (i.e, Dollar, 2005) have already utilized such methodology to find no evidence of significant relationship between trade and income inequality. Yet again, such results can always be questioned on the basis of model specifications and certain

case sensitivities. Finally, similar to Dollar (2005), our results contribute to the empirical debate and motivate further research into the topic.

Integration and Wage Inequality

The rationale for expecting an effect of trade on wage inequality comes from the standard Heckscher-Ohlin-Samuelson (H-O-S) trade model. As Slaughter (2000) puts it, '[Free] trade lowers the real wage of the scarce factor and raises that of the abundant factor compared to autarky.' (p131) Assuming that developed countries are generally abundant in skilled labour, increasing trade with developing countries, which are unskilled labour abundant, should raise the wages of skilled workers relative to unskilled in developed countries. However, wage inequality may also be an outcome of more trade in the developing country context. An explanation for rising wage inequality after liberalization can be that developing countries protect the unskilled intensive of the two goods, and not the skill intensive prior to liberalization. After liberalization, the producers of unskilled intensive goods face increased costs amid more outside competition in the absence of government subsidies. Thus, exerting increased downward pressure on the wages of the unskilled labour force employed in the production of unskilled goods.

Table 4.17 Gini and Openness (Lcopen)

Dependent Variables	Dependent Variable : Gini													
	(Developed + Developing)						(Developing Only)						(Developing Only) Minus Africa	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Openness														
Nominal Trade Shares (Lcopen)	-0.49 (-0.2)	-2.11 (-0.8)	-4.71 (-1.6)*	-5.22 (-1.8)*	1.22 (0.4)	-0.59 (-0.19)	-0.59 (-0.2)	-1.08 (-0.3)	-0.10 (-0.03)	1.33 (0.37)	-1.26 (-0.3)	0.67 (0.1)	-0.93 (-0.2)	1.09 0.27
Institutions														
Legal														
Rule of law(RI)	-7.30 (-5.0)***						-6.44 (-1.3)							
Political														
Voice and Accountability (Va)		-5.46 (-4.0)***						1.40 (0.5)						
Democracy (Demo)			-0.71 (-1.8)*						1.35 (2.4)**				2.28 (3.2)***	
Autocracy (Auto)				0.369 (0.7)						-1.59 (-2.6)**				-2.80 (-3.5)***
Economic														
Government Effectiveness (Ge)					-8.60 (-5.0)***						7.64 (0.9)			
Social														
Average years of schooling (Sch99)						3.80 (-2.7)***						-4.27 (-2.2)**		
N	95	96	89	89	89	72	70	71	66	66	64	52	44	44
F-Statistics	13.27***	8.96***	3.14**	1.67	12.62***	9.16***	0.88	0.21	2.87*	3.35	0.44	2.27	5.10*	6.10
R-Square	0.16	0.14	0.03	0.02	0.16	0.15	0.16	0.01	0.11		0.19	0.00	0.36	0.34
2SLS Bias	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.208	0.009	0.000	0.000
Sargan (p)	0.001***	0.000***	0.000***	0.000***	0.000***	0.876	0.001***	0.000***	0.011***	0.025**	0.000***	0.817	0.072*	0.187

Table 4.18 Gini and Trade Policy (Owti)

Dependent Variables	Dependent Variable : Gini													
	(Developed + Developing)						(Developing Only)						(Developing Only) Minus Africa	
	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Trade Policy														
Tariffs on intermediate inputs & capital goods (Owti)	-30.05 (-1.04)	3.73 (0.2)	56.50 (1.9)*	66.69 (2.4)**	-48.34 (-1.1)	16.57 (0.6)	-25.02 (-1.1)	-18.61 (-1.10)	-9.18 (-0.5)	-12.46 (-0.7)	-32.26 (-1.1)	-1.29 (-0.1)	3.38 (0.1)	-0.69 (-0.03)
Institutions														
Legal														
Rule of law(RI)	-0.45 (-3.5)***						-7.13 (-1.3)							
Political														
Voice and Accountability (Va)		-5.80 (-2.0)**						2,61 (0.80)						
Democracy (Demo)			0.33 (0.4)						1.31 (2.2)**				2.34 (2.5)**	
Autocracy (Auto)				-1.13 (-0.9)						-1.68 (-2.5)**				-3.01 (-2.8)***
Economic														
Government Effectiveness (Ge)					-13.23 (-2.8)***						-4.01 (-0.58)			
Social														
Average years of schooling (Sch99)						-2.77 (-2.6)***						-3.29 (2.1)**		
N	70	71	68	51	68	59	53	54	51	51	51	44	34	34
F-Statistics	17.07***	11.80***	3.57**	2.79*	13.57***	14.13***	0.98	1.22	2.79*	3.26**	0.64	2.12	3.16**	3.88**
R-Square	0.18	0.18	0.59	0.15	0.48	0.06	0.45	0.11	0.15	0.22	0.40	0.57	0.06	0.52
2SLS Bias	0.073	O124	0.155	0.027	0.166	0.051	0.041	0.001	0.027	0.019	0.144	0.029	0.181	0.123
Sargan (p)	0.036**	0.000***	0.002**	0.037**	0.028**	0.346	0.027**	0.005***	0.038**	0.092*	0.009***	0.504	0.185	0.336

Note for Tables 4.17 and 18:

***, **, * denotes significance at 1%, 5 % and 10% levels respectively; Standard errors corrected for as run Durbin–Wu–Hausman test (augmented regression test) for endogeneity (see Davidson and MacKinnon. 1993)

The dynamic trade models add the role of technology to the equation which is always skilled biased. Acemoglu (1999) explains this effect quite nicely: 'Trade also induces skill-biased technical change, creating a powerful force towards higher skill premia in both skill-abundant and skill-scarce countries. As a results trade opening can cause a rise in inequality in the U.S. and the LDCs, and thanks to the induced skill-biased technical change, this can happen without the usual intervening mechanism of standard trade models, a rise in the relative prices of skill intensive goods in the U.S.' (p.0)

Table 4.19 provides a summary of results for all outcome based (openness) and incidence based (trade policy) measures of trade barriers for all possible model specifications available under *Theil* inequality equations 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9 and 4.10. The results for openness indicators confirm that increased trade leads to higher wage inequality for both developed and developing countries. In order to validate the assertion put forward by Acemoglu (1999) that for developed countries in Europe, trade may be related with relatively stable wage inequality, the author has run regressions for *Theil99* for a reduced sample with European countries only. The cross section of one year observations on *Theil99* does not allow enough degrees of freedom to significantly relate wage inequality with trade. However, the sign does change to a negative for *Lcopen* under various specification tests, providing weak evidence to the trade explanation of paradoxical European trends in wage inequality as pointed out by Acemoglu (1999): ' So the reason may be that demand for skills has increased much less in Europe than in US because trade may have caused labour-biased technical change in Europe, contrary to its effect on U.S.: most LDCs use U.S. technologies, and with the increased productivity of skilled workers both in the U.S. and in the LDCs following trade, the supply of skill intensive goods in the economy may increase so much that their relative world price may be below their pre-trade European level.' P (26)

Table 4.19 Openness / Trade Policy (All Specifications)

Independent Variables	Dependent Variable: Theil index								
	1	2	3	4	5	6	7	8	9
	Institutions serve as control variables and are presented within parentheses below								
	(Va)	(RI)	(Ctc)	(Rq)	(Ge)	(Ps)	(Demo)	(Auto)	(Sch)
Nominal Trade Shares	0.032	0.036	0.039	0.029	0.039	0.039	0.041	0.035	0.013
(Lcopen)	(1.54)	(1.68)***	(1.77)***	(1.39)	(1.82)***	(1.78)***	(1.70)***	(1.41)	(0.89)
Import Penetrations	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.0002
(Impnov85)	(2.66)*	(2.87)*	(2.88)*	(2.48)**	(3.01)*	(2.86)*	(2.57)*	(2.28)**	(0.38)
Import Penetrations	0.001	0.002	0.002	0.0002	0.002	0.002	0.002	0.002	0.0003
(Impnov85)	(2.68)*	(2.91)*	(2.92)*	(2.63)*	(3.06)*	(2.93)*	(2.67)*	(2.41)**	(0.42)
TARS trade penetration	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.0001
(Tars85)	(2.84)*	(3.06)*	(3.08)*	(2.66)*	(3.24)*	(3.06)*	(2.75)*	(2.44)**	(0.32)
TARS trade penetration	0.0005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.0002
(Tars85)	(2.62)*	(2.56)*	(2.65)*	(2.44)**	(2.74)*	(2.59)*	(2.20)**	(1.98)**	(0.43)
Sachs and Warners Open-	0.007	-0.033	-0.025	-0.062	0.052	0.030	-0.007	-0.047	0.047
ness (Open80s)	(0.51)	(-0.41)	(-0.28)	(-0.08)	(0.46)	(0.28)	(-0.09)	(-0.84)	(0.60)
Tariffs on intermediate inputs	-0.004	0.008	0.012	0.007	0.015	0.004	-0.004	-0.001	0.006
and capital goods (Owti)	(-0.34)	(0.80)	(0.89)	(1.11)	(0.55)	(0.37)	(-0.96)	(-0.63)	(0.81)
Trade taxes (Txtrdg)	-0.230	-0.324	-0.302	-0.149	-0.425	-0.366	-0.136	-0.058	-0.129
	(-1.34)	(-1.53)	(-1.50)	(-0.86)	(-1.78)***	(-1.63)	(-0.96)	(-0.49)	(-0.86)
Total import charges	4.810	2.281	2.504	4.509	2.986	2.441	5.713	4.364	1.079
(Totimpov85)	(1.50)	(1.84)***	(1.91)***	(1.63)	(1.75)***	(2.03)**	(1.46)	(1.39)	(1.76)***
Non trade barriers (Owqi)	-0.003	-0.002	-0.002	-0.002	-0.002	-0.002	-0.003	-0.003	-0.001
	(-2.32)**	(-1.82)***	(-1.70)***	(-2.31)**	(-1.84)***	(-2.04)**	(-2.56)*	(-2.33)**	(-1.18)
Non trade barriers (Owqi)	-0.800	-1.082	-1.243	-0.522	-1.101	-1.010	-0.487	-0.264	0.050
	(-1.03)	(-0.92)	(-0.85)	(-0.98)	(-0.95)	(-0.94)	(-1.01)	(-0.94)	(0.27)
Non tariff barriers (Ntarfov87)	-0.002	-0.001	-0.0005	-0.002	-0.002	-0.002	-0.002	-0.002	-0.003
	(-1.64)	(-0.82)	(-0.26)	(-1.66)***	(-1.04)	(-1.30)	(-2.09)**	(-2.12)**	(-0.73)

- -*, **, *** corresponds to 1%, 5% and 10% levels of significance respectively
- - Control variables are in parentheses

Table 4.20
Theil99 and Openness (Lcopen)

Dependent Variable: Theil99 for (Developed + Developing)

Independent Variables	**Complete sample of Lcopen (n = 170)**						**Reduced Sample of Lcopen if (Dum Txtrdg, n=54)**					
	1	2	3	4	5	6	7	8	9	10	11	12
Nominal Trade Share (Lcopen)	0.032*	0.04**	0.04*	0.029	0.036*	0.039*	0.049**	0.059***	0.054***	0.051**	0.056***	0.056***
	(0.018)	(0.039)	(0.027)	(0.028)	(0.029)	(0.029)	(0.239)	(0.023)	(0.021)	(0.022)	(0.022)	(0.022)
Voice and Accountability (Va)	-0.02**						-0.02*					
	(0.011)						(0.011)					
Political Stability(Ps)		-0.03*						-0.03***				
		(0.014)						(0.012)				
Government Effectiveness (Ge)			-0.02**						-0.024**			
			(0.01)						(0.01)			
Regulatory Quality (Rq)				-0.03**						-0.03		
				(0.02)						(0.02)		
Rule of law (Rl)					-0.02*						-0.02***	
					(0.01)						(0.009)	
Control for Corruption (Ctc)						-0.02*						-0.022**
						(0.01)						(0.008)
N	122	116	117	122	122	118	52	50	50	52	52	51
F-statistics	2.85*	2.46*	2.13*	2.98**	2.01*	2.24*	4.34**	5.10***	5.85***	4.46**	6.51***	5.53***
R-Square	0.08	0.08	0.07	0.05	0.07	0.09	0.15	0.15	0.24	0.15	0.23	0.20
Maximal 2SLS Bias	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sargan (P)	0.42	0.60	0.48	0.42	0.41	0.60	0.067	0.156	0.09	0.04	0.13	0.09

Independent Variables	Dependent Variable: Theil99 for (Developed + Developing)					
	Reduced Sample of Lcopen if (Dum Totimpov, n=76) Representing Developing countries only					
	13	14	15	16	17	18
Nominal Trade Share (Lcopen)	0.072**	0.068***	0.071***	0.074***	0.069***	0.070**
	(0.031)	(0.026)	(0.027)	(0.029)	(0.026)	(0.029)
Voice and Accountability (Va)	0.004					
	(0.029)					
Political Stability(Ps)		0.0081				
		(0.036)				
Government Effectiveness (Ge)			-0.0002			
			(0.04)			
Regulatory Quality (Rq)				-0.009		
				(0.36)		
Rule of law (Rl)					0.010	
					(0.26)	
Control for Corruption (Ctc)						0.008
						(0.43)
N	67	64	65	66	66	65
F-statistics	3.47**	3.17**	3.34**	3.16**	3.40**	3.08*
R-Square	0.04	0.05	0.05	0.05	0.04	0.03
Maximal 2SLS Bias	0.00	0.004	0.004	0.0017	0.00	0.007
Sargan (P)	0.473	0.447	0.433	0.476	0.488	0.47

- - ***, **, * denotes significance at 1%, 5 % and 10% levels respectively, Robust Standard Errors are in the parenthesis; Standard errors corrected for as run Durbin–Wu–Hausman test (augmented regression test) for endogeneity (see Davidson and MacKinnon. 1993)

In comparison to openness measures, the results for trade policy are mixed. Trade policy variables that have a significant relationship with wage inequality are overall trade taxes (*Txtrdg*), total import charges (*Totimpov85*) and non-tariff coverage (*Ntarfov87*). *Totimpov85* and *Ntarfov87* are negatively associated with wage inequality and the relationship is significant in 8 out of 9 cases for *Totimpov85* and only 3 out of 9 cases for *Ntarfov87*. *Txtrdg* in contrast has a positive relationship with wage inequality and it is significant in 5 out of 10 cases. The conflicting results on different measures of trade policy may have to do with country coverage of the variables. For example *Txtrdg* covers both developed and developing countries while *Totimpov85* and *Ntarfov87* covers developing countries only

Thus before moving further with the analysis, the possibility of case sensitivity bias, that arises due to the presence of significant differences in the coverage of the sample of countries in different proxies of openness and trade policy variables, needs to be addressed. Country tables at the end of manuscript and summary statistics presented in table 4.2, show that trade policy proxies cover a much smaller sample of developed and developing countries when compared to openness proxies. Trade shares (*Lcopen)* is available for 170 countries, whereas maximum number of countries, for all such trade policy variables which are found to be significantly related with *Theil99* is 76 for *Totimpov85,* 54 for *Txtrdg* and 76 for *Ntarfor87.* To solve the problem of omitted country bias, one possibility is to also undertake regressions for reduced samples of *Lcopen* which can correspond to the countries available in *Totimpov85*, *Txtrdg*, and *Ntarfov87.*

Table 4.20, show the results for *Lcopen* for compete sample (N=170) and reduced samples of (N=54) corresponding to *Txtrdg* and (N=76) corresponding to *Totimpov.* Since *Natarfov87* has generally been insignificant, it would not be included in further analysis. The results for *Lcopen* for reduced sample do not change. If anything the positive relationship between openness and wage inequality is more pronounced. For the same number of countries covered in *Txtrdg*, *Lcopen* is significantly related with wage inequality at 1% level, where as in comparison to the

complete sample of 170 countries, where the significance could be achieved at 10 % only, the explanatory power of *Lcopen* for reduced sample has increased. For the reduced sample corresponding to countries available for *Totimpov87,* the results on *Lcopen* have improved further with even higher coefficients and significance achieved at 1% in all cases. Overall, table 4.20 suggest that opening up to international trade significantly cause wage inequality in both developed and developing countries.

However, the results reveal more than that. The negative effect of trade on wage inequality is more pronounced for developing countries as can be seen from the stronger results achieved for *Lcopen* in columns 13 to 18, where only developing countries are included. Results on *Lcopen* in columns 7 to 12 may also be capturing the developing country effect. We know that the sample of countries which corresponds to the *Txtrdg* have even fewer developed countries than the larger sample of *Lcopen*. Developed countries covered by *Txtrdg* are Australia, Austria, Belgium, Canada, Denmark, Spain, Finland, France, UK, Ireland, Netherlands, Norway, Sweden and United States. With exception of U.S. wage inequality in most of these countries has been more or less stable. (See figure 4.2) In contrast, wage inequality has been sharply increasing for most developing countries. (See chapter 5 for details)

What constitutes the opposite signs of *Totimpov85 and Txtrdg* observed in table 4.19? The positive sign for *Txtrdg* (also see table 4.21) suggests that decrease in trade taxes improve average wages of the unskilled labour and resultantly wage inequality would decline. Presence of European countries in the sample, where technical change may have been more labour intensive as proposed by Acemoglu (1999), might have drawn this result. For developing countries, decrease in trade taxes may improve export potential of the country which would then favour unskilled labour as much as skilled labour in the manufacturing sector by causing wage inequality to fall. In some East Asian countries, (i.e., South Korea) wage inequality has declined significantly with a sharp rise in exports. However, South Korea is an outlier among developing countries. Decline in relative wage gap may very well be due to overall higher levels of education distributed homogenously among the population when

compared to other developing countries. On the whole, we cannot be sure that decreasing trade taxes may lead to fall in wage inequality in most developing countries. The author tried to isolate developing country specific effect of *Txtrdg* on wage inequality, but loss of degrees of freedom by dropping developed countries from the sample has reduced the statistical validity of the model as 2SLS bias are increased in favour of OLS. (Table 4.21)

The detailed results are presented for *Totimpov85* in table 4.21. The results depict that if a country follows a more open policy by decreasing import taxes, it will have a positive effect on wage inequality. Lower import taxes or non-tariff barriers may cause increase in wage inequality in the manufacturing in developing countries because opening up to more imports from outside world for a developing country means increase in trade in skill intensive goods and that may lead to further technology diffusion in skilled intensive sectors through higher imports of technology goods and finally further raising the skill premium. Thus there is definite distinction between exports and imports and their relative effect of wage gap in developing countries.

If developed and developing countries can trade more, they can also trade more in labour intensive goods leading to a rise in average wages in manufacturing for developing countries. However, a general observation is that only few developing countries can export to developed countries whereas developing countries trade among each other far less than what they should do due to many conflicts prevailing within or in between many developing countries. Thus trade in developing countries, how they stand today, may always raise skill premia relative to wages of unskilled unless developing countries find ways to trade with each other more through arrangements like 'regional trade agreements' and thus also go through the 'Acemoglu's European paradox' where more trade may lead to labour intensive technical change.

Figure 4.2
Wage Inequality in U.S., U.K., and Belgium

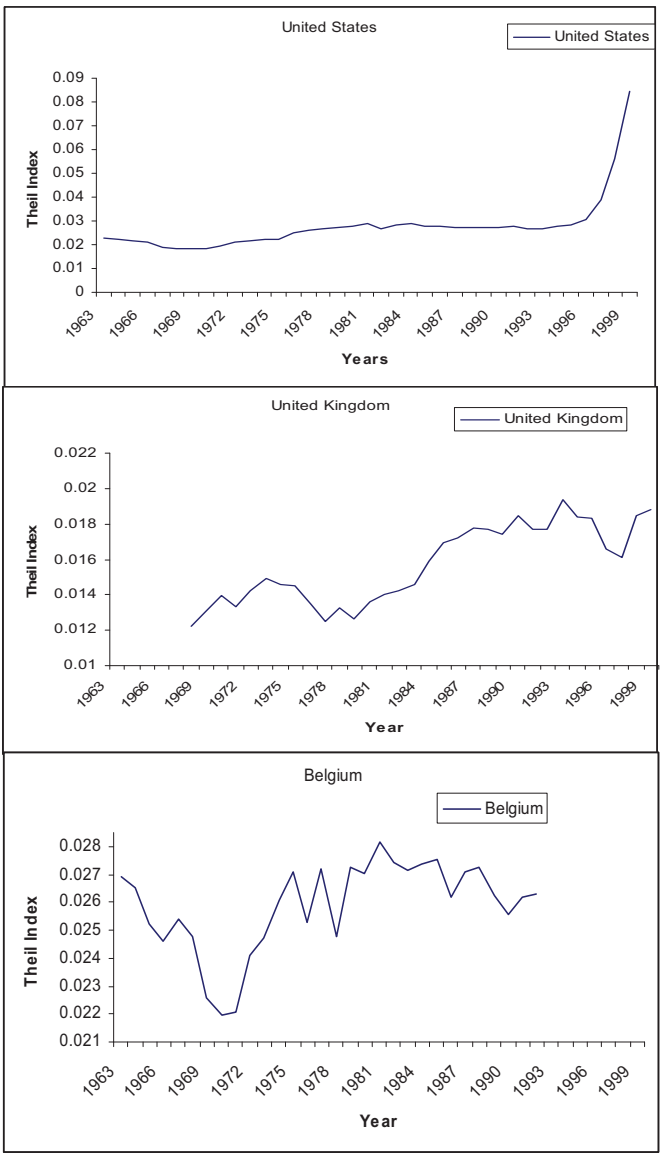


Table 4.21 *Theil99 and Trade Policy (Txtrdg and Totimpov85)*

Independent Variables	Dependent Variable: Theil99 (Developed + Developing)											
	19	20	21	22	23	24	25	26	27	28	29	30
Trade Taxes (Txtrdg)	0.071	2.44**	2.98*	0.059**	2.28**	2.50**						
	(0.045)	(1.17)	(1.77)	(0.031)	(1.14)	(1.30)						
Total import charges (Totimpov85)							-0.002**	-0.002**	-0.002**	-0.002***	-0.002*	-0.002*
							(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Voice and Accountability (Va)	0.06						0.015					
	(0.05)						(0.48)					
Political Stability (Ps)		0.028						0.002				
		(0.96)						(0.035)				
Government Effectiveness (Ge)			0.03						-0.007			
			(0.95)						(0.043)			
Regulatory Quality (Rq)				0.094						-0.005		
				(0.078)						(0.044)		
Rule of law (Rl)					0.021						0.007	
					(0.02)						(0.210)	
Control for Corruption (Ctc)						0.026						0.017
						(0.98)						(0.045)
N	52	50	50	52	52	51	67	64	65	66	66	65
F-statistics	2.14	3.60**	2.65*	2.57*	4.07**	3.11**	2.60*	2.71*	2.32*	2.31*	2.39*	2.42*
R-Square	0.02	0.29	0.05	0.15	0.33	0.24	0.09	0.06	0.07	0.002	0.023	0.015
Maximal 2SLS Bias	0.13	0.04	0.16	0.13	0.08	0.07	0.00	0.00	0.073	0.002	0.023	0.015
Sargan (P)	0.72	0.14	0.27	0.92	0.12	0.18	0.153	0.136	0.135	0.142	0.137	0.139

Independent Variables	Dependent Variable: Theil99 (Developing Only)					
	31	32	33	34	35	36
Trade Taxes (Txtrdg)	5.21	-0.7	-0.6	3.07	-0.5	-0.9
	(3.5)	(2.3)	(3.4)	(3.3)	(2.2)	(2.7)
Total import charges (Totimpov85)						
Voice and Accountability (Va)	0.2*					
	(0.1)					
Political Stability (Ps)		0.1*				
		(0.08)				
Government Effectiveness (Ge)			0.23			
			(0.17)			
Regulatory Quality (Rq)				0.24		
				(0.14)		
Rule of law (Rl)					0.11*	
					(0.06)	
Control for Corruption (Ctc)						0.2**
						(0.09)
N	36	34	34	36	36	35
F-statistics	1.42	1.49	0.87	1.28	1.82	1.98
R-Square	-5.0	-2.2	-5.6	-4.5	-1.6	-3.6
Maximal 2SLS Bias	0.662	0.36	0.59	0.66	0.33	0.33
Sargan (P)	0.74	0.432	0.76	0.55	0.21	0.94

- ***, **, * denotes significance at 1%, 5 % and 10% levels respectively, Robust Standard Errors are in the parenthesis; Standard errors corrected for as run Durbin–Wu–Hausman test (augmented regression test) for endogeneity (see Davidson and MacKinnon. 1993)

4.6 Conclusions

This chapter has analyzed the effects of different institutions on inequality. Although the literature is limited on the subject, what there is, suggests that there are two-way causalities between institutions and inequality. To explore this it was necessary to solve the problem of endogeneity by utilizing a rich set of instruments and employing higher order validation techniques of relevance and exogeniety, and thus a very fine econometric analysis is carried out to understand the role of good institutions, which represent a vast set of legal, political, economic and social outcomes, in inequality mitigation and redistribution. Further more, the rich model specification also enabled the analysis to shed light on the link between trade and inequality which is also subject of great interest for many studies lately.

The results reconfirmed that good quality institutions lead to decreases in inequality. It also appears that voice and accountability and political stability are more important than democracy. In line with previous studies, the current findings suggest that it may not matter much whether a country is working under a democracy or autocracy if it is about income inequality, but good policies enacted by the country's leaders determine the welfare-enhancing effects through preservation of property and other rights. Good leadership, which not only follows more market friendly policies, also keeps institutional development at the fore of their policy choice and is keen for economic development to succeed. For developing countries, transition to democracies also comes with higher risks of political stability which in turn lead to greater income inequality. Culture and social set up capture democratic outcomes more than democracy itself in developing countries. Societies who highly value equality may redistribute income from rich to the poor even if the larger political set is autocratic in the country. However, autocracies are significantly related with wage inequality, where as democracies may pay higher wages on average in the manufacturing sector.

Table 4.22 summarizes the results of institutions based on relative significance, and shows that rule of law, control for corruption, political stability, government effectiveness and education are the key institutional

outcomes which if secured can ensure equal societies. If education is more equally distributed among the population, relative wages of skilled and unskilled labour will have the least amount of distortions, especially when the country opens up to international trade. Among economic institutions, regulation is less important when compared to government's independent fiscal and monetary policy, its effective capacity to decentralize and its pro-business orientation. Table 4.22 also shows that the middle-class comes out to be the main beneficiary of good quality institutions over any other income group as *Middle20* equations give the most significant results.

Regarding integration, the findings indicate that openness generally relates to higher wage inequality, although its impact on income inequality is relatively insignificant. This result is also in line with recent literature. However, the findings strongly suggest that levels of trade or trade policies may carry significant positive effects on wage inequality. Especially, international competition by revoking import taxes lead to higher wage inequality. To remedy for rising wage inequalities in developing countries, the analysis favour more regional trade among developing countries where trade may bring labour intensive technical change in the economies of participant countries as has been the case in Europe, where countries trade among each other more due to the EU (European Union), when in comparison with U.S. For example, in countries like China and India, the pace of development suggest that both countries are fast climbing the technology ladder and would form significant pockets of services' sector-oriented high technology dependent production areas, which may draw similarities with developed nations in both supply and demand and relative factor prices. Trade within developing countries may seek to exploit such emerging pockets. Countries like Pakistan may also increasingly join in if regional economics is a priority and conflicts of interest are resolved or set aside for preparation of economic grounds for social harmony within their populations.

Table 4.22 Significance count of institutions

Independent Variables	Dependent Variables							
	Gini	Theil	High20/Low20	Middle20	Low10	High10	Cases of Significance by rows	Total cases of correct signs
Legal Institutions								
Rule of Law (Rl)	10 out of 12	5 out of 12	9 out of 12	10 out of 12	9 out of 12	10 out of 12	53 out of 72	53 out of 53
(Negative sign)	(10 out of 10)	(5 out of 5)	(9 out of 9)	(0 out of 10)	(0 out of 9)	(10 out of 10)		
Control of Corruption (Ctc)	9 out of 12	5 out of 12	8 out of 12	9 out of 12	8 out of 12	9 out of 12	48 out of 72	48 out of 48
(Negative sign)	(9 out of 9)	(5 out of 5)	(8 out of 8)	(0 out of 9)	(0 out of 8)	(9 out of 9)		
Economic Institutions								
Government Effectiveness (Ge)	8 out of 12	5 out of 12	8 out of 12	9 out of 12	8 out of 12	8 out of 12	46 out of 72	46 out of 46
(Negative sign)	(8 out of 8)	(5 out of 5)	(8 out of 8)	(0 out of 9)	(0 out of 8)	(8 out of 8)		
Regulatory Quality (Rq)	4 out of 12	3 out of 12	2 out of 12	6 out of 12	1 out of 12	5 out of 12	21 out of 72	19 out of 21
(Negative sign)	(3 out of 4)*	(3 out of 3)	(2 out of 2)	(0 out of 6)	(1 out of 1)*	(5 out of 5)		
Political Institutions								
Political Stability (Ps)	9 out of 12	5 out of 12	8 out of 12	9 out of 12	8 out of 12	9 out of 12	48 out of 48	48 out of 48
(Negative sign)	(9 out of 9)	(5 out of 5)	(8 out of 8)	(0 out of 9)	(0 out of 12)	(9 out of 9)		
Voice and Accountability (Va)	7 out of 12	5 out of 12	5 out of 12	7 out of 12	2 out of 12	7 out of 12	33 out of 72	31 out of 33
(Negative sign)	(7 out of 5)	(5 out of 5)	(5 out of 5)	(0 out of 7)	(1 out of 2)*	(7 out of 7)		
Democracy (Dem)	5 out of 12	3 out of 12	4 out of 12	7 out of 12	1 out of 12	5 out of 12	25 out of 72	23 out of 25
(Negative sign)	(5 out of 5)	(3 out of 3)	(4 out of 4)	(0 out of 7)	(1 out of 1)*	(4 out of 5)*		
Autocracy (Aut)	1 out of 12	3 out of 12	0 out of 12	3 out of 12	2 out of 12	2 out of 12	11 out of 72	9 out of 11
(Negative signs)	(1 out of 1)	(0 out of 12)	(0 out of 0)	(3 out of 3)	(0 out of 2)*	(2 out of 2)		
Social Institutions								
Average Schooling Years (Sch)	11 out of 12	9 out of 12	6 out of 12	6 out of 12	5 out of 12	6 out of 12	43 out of 72	43 out of 43
(Negative sign)	(9 out of 9)	(9 out of 9)	(6 out of 6)	(0 out of 7)	(0 out of 5)	(6 out of 6)		
Cases of Significance (by columns)	64 out of 120	51 out of 120	51 out of 120	68 out of 120	47 out of 120	62 out of 120	-	-

- * Observation made that a variable has entered the equation significantly but with a wrong sign
- Significance is observed at 1%, 5% and 10% levels

Country List for Weighted Average of total Import Charges, 1985(Totimpov85)
(Available for Developing Countries Only)

Angola
Argentina
Antigua and Barbuda
Burundi
Benin
Burkina Faso
Bangladesh
Bahrain
Bahamas, The
Belize
Bolivia
Brazil
Barbados
Central African Republic
Chile
China
Cote d'Ivoire
Cameroon
Congo, Rep.
Colombia
Costa Rica
Cuba
Cayman Islands
Algeria
Ecuador
Egypt, Arab Rep.
Ghana
Guinea
Grenada
Guatemala
Guyana
Hong Kong, China
Haiti
Indonesia
India
Iran, Islamic Rep.
Jamaica
Jordan
Kenya
Korea, Rep.
Kuwait
Sri Lanka
Morocco
Madagascar
Mexico
Malawi
Malaysia
Nigeria
Nicaragua
Nepal
Oman
Pakistan
Peru
Philippines
Papua New Guinea
Paraguay
Qatar
Sudan
Senegal
Singapore
Sierra Leone
El Salvador
Syrian Arab Republic
Thailand
Trinidad and Tobago
Tunisia
Turkey
Tanzania
Uganda
Uruguay
St. Vincent and the Grenadines
Venezuela, RB
Yemen, Rep.
Congo, Dem. Rep.
Zambia
Zimbabwe

Country List for Non Tariff Barrier Coverage, 1987 (Nontarr87)
(Available for Developing Countries Only)

Angola
Argentina
Antigua and Barbuda
Burundi
Benin
Burkina Faso
Bangladesh
Bahrain
Bahamas, The
Belize
Bolivia
Brazil
Barbados
Central African Republic
Chile
China
Cote d'Ivoire
Cameroon
Congo, Rep.
Colombia
Costa Rica
Cuba
Cayman Islands
Algeria
Ecuador
Egypt, Arab Rep.
Ghana
Guinea
Grenada
Guatemala
Guyana
Hong Kong, China
Haiti
Indonesia
India
Iran, Islamic Rep.
Jamaica
Jordan
Kenya
Korea, Rep.
Kuwait
Sri Lanka
Morocco
Madagascar
Mexico
Malawi
Malaysia
Nigeria
Nicaragua
Nepal
Oman
Pakistan
Peru
Philippines
Papua New Guinea
Paraguay
Qatar
Sudan
Senegal
Singapore
Sierra Leone
El Salvador
Syrian Arab Republic
Thailand
Trinidad and Tobago
Tunisia
Turkey
Tanzania
Uganda
Uruguay
St. Vincent and the Grenadines
Venezuela, RB
Yemen, Rep.
Congo, Dem. Rep.
Zambia
Zimbabwe

Notes

[1] High military expenditures as a proportion to GDP in many developing countries indicates towards prevalent internal or external conflict, while high military

expenditures are born at the cost of public exchequer by crowding out much needed development expenditures.

5 Education Bias of Trade Liberalisation and Wage Inequality in Developing Countries

The only way to globalisation is not to push it too hard. (Dani Rodrik 2007: 31)

In (developing) countries, trade liberalisation is likely to have had conflicting effects on the distribution of earnings. On the one hand, standard trade theory implies that trade liberalisation should result in a reduction in the skill premium. On the other hand, trade flows bring in new technologies and ideas that enhance the productivity of all workers, but especially that of skilled workers. Clearly, the notion of "skilled" and "Unskilled" workers differs across countries. In less developed economies, those at the top of the earning distribution often have no more than a secondary degree. Yet, they have skills that will be enhanced by the arrival of new technologies, thus increasing their wage relative to that of uneducated workers. An empirical investigation of the evolution and the determinants of income inequality in these countries stand as a question to be tackled. (Aghion and Penalosa, 1999: 1655)

5.1 Introduction

Unequal distribution of the benefits of accelerated globalization, since 1980, has disadvantaged sub-Saharan and even, Latin American countries in terms of either negative or indifferent growth rates (Murshed 2003). This has occurred, despite the fact that most of these nations became more open in the sense of rising shares of international trade in national income. Associated with this phenomenon of increasing openness is, rising within-nation income inequality post-1980. Increased trade, particularly of the inter-industry variety, alters the composition of output

in the economy away from non-traded goods towards traded products. This will affect the functional distribution of income, usually raising the demand for the factor of production employed intensively in the traded sector. In the developed world, it is skilled labour and we have witnessed an increase in the skilled-unskilled labour relative wage premium. In many OECD countries, this has meant a more unequal personal distribution of income. As far as developing countries are concerned, especially in those that export unskilled labour intensive manufactured goods, we would expect a fall in the skilled-unskilled labour relative wage premium leading to reduced inequality, since the unskilled are more numerous within the population. Yet this is generally not true, and inequality in the developing world has risen, mirroring events in the OECD. What accounts for this paradox? Perhaps developing countries have such quantities of unskilled labour that unskilled wages will not respond to increased demand. This certainly appears likely in cross-country studies where China and India are included. Alternatively, other less populous developing countries may be exporting relatively more skilled labour intensive products such as semi-conductors or capital-intensive commodities as is the case with fuels and minerals. Finally, an expansion in international trade may raise the demand for, and reward of, skilled labour even when the country in question is exporting unskilled labour intensive products due to skill shortages and other factor complementarities.

Many studies have tried to capture the relationship between trade liberalization and income inequality. A paper by Dollar and Kraay (2004) concludes that liberalization does not significantly affect the distribution of income, and at most, the relationship is of neutral nature. However, their results have been widely challenged because of their methodology and variable choice. (Ravallion 2003; Amann et al. 2002) Ravallion (2003) points out that increased openness can lead to a rise in the demand for relatively skilled labour, which tends towards less equal distribution in poor relative to rich countries. Arbache, Dickerson and Green (2004) find that imported technology raised the relative demand for highly skilled labour in Brazil and thus lowered the relative wages of less educated groups. Behrman, Birdsall and Szekely (2001) observe that ine-

quality has increased in seven out of 18 Latin American countries that initiated market reforms in the mid-1980s. Jayasuriya (2002) accepts that trade liberalization may have reduced consumption poverty in South Asia, but is skeptical about the purportedly neutral distributional effects of liberalization. Many suggest that the distribution of the positive effects of liberalization is somewhat skewed towards urban households rather than rural ones, and to wealthy rather than poor households (see Chen and Ravallion 2003; Cockburn 2001; Friedman 2000; Lofgren 1999). The evidence in this regard comes mainly from Latin America because most of the economies there undertook rigorous reform policies in the mid-1980s following the debt crisis in that decade. Legovini, Bouillon and Lustig (2001) find that inequality in Mexico rose sharply between 1984 and 1994, and rising returns to skilled labour accounted for 20 per cent of the increase in the inequality in household income. Similarly, Hanson and Harrison (1999) find that the reduction in tariffs and the elimination of import licenses accounts for 23 per cent of the increase in the relative wages of skilled labour during 1986-90, thus providing evidence for the role liberalization played in rising inequality in Mexico. Other country studies on Brazil, Chile, Colombia and Venezuela, also show that skilled workers received increased premiums after liberalization when compared to their unskilled counterparts. (World Bank 2001b) Therefore, the balance of the evidence points to increased globalization inducing greater income inequality.

Irrespective of the exact nature of the cause of trade-induced inequality, it is sensible to presume that nations with higher stocks of human capital will experience less of the un-equalizing spiral consequent upon globalization and trade liberalization. Investment in education may yield a double dividend. It cannot only promote growth, but also suppresses inequality by both bequeathing skills as well as moderating rises in skill-premia following an expansion of international trade. More generally, Tinbergen (1975) pointed out that changes in wage inequality are a result of the opposing forces that technological change (skilled labour demand) and education (skilled labour supply/ human capital) exert on relative wages. Eiche and Garcia-Penalosa (2001: 19) suggest that human

capital accumulation plays a dual role in development. Because the stock of educated workers in an economy determines both the degree of income inequality and its rate of growth, making the parameters of the demand for and supply of labour crucial determinants of inequality increases or decreases as an economy accumulates human capital.

In light of the findings in Chapter 4, the aim of this chapter is to examine the impact of increased trade on inequality, and investigate whether a higher human capital stock moderates this unequalising aspect of international trade; specifically the skilled-unskilled wage differential. High initial endowments of human capital, captured by data on average years of schooling for example, imply a more egalitarian society compared to countries with a lower human capital endowment. When societies that are more equal, open up their economies further, increased trade is likely to induce less inequality because the supply of skills better matches demand. Yet greater international exposure also brings about technological diffusion, see Winters (2004), further raising skilled labour demand. This may raise wage inequality, in contrast to the initial egalitarian level effect of human capital. This chapter will attempt to measure these two opposing forces. An innovation of this thesis is to employ a broad set of openness indicators to measure trade-liberalization policies as well as general openness, which is an outcome, and not a policy variable. Another purpose of this analysis is to examine what type of education most reduces inequality. In settings of low human capital endowments, as measured by literacy or low primary school enrolment, a policy of relative neglect of primary in favour of expenditure on tertiary education may have a less than benign influence on inequality. The sample countries here exclude developed nations and economies in transition because of higher stocks of human capital in those regions (see table 5.1 at the end of the chapter). The rest of the chapter is as follows, section 5.2 presents the data and methodology, section 5.3 contains the empirical results, and finally section 5.4 concludes with some policy implications.

Table 5.2
Summary Statistics

Variables	Code	Source	Obs	Std . Dev
Dependent				
UTIP-UNIDO Wage Inequality THEIL Measure: Developing countries only, 1999	Theil99dev	University of Texas Inequality Project (UTIP) http://utip.gov.utexas.edu	109	(0.108)
Endogenous Independent				
Openness Variables				
(Exports +Imports)/GDP, 1985	Lcopen	Penn World Tables , Mark 6	170	(0.589)
Import Penetration: overall, 1985	Impnov85	Pritchett (1996)	96	(21.08)
Import Penetration: manufacturing, 1985	Impnov85m	Pritchett (1996)	96	(12.79)
Import Penetration: agriculture, 1985	Impnov85a	Pritchett (1996)	96	(3.818)
Import Penetration: resources, 1985	Impnov85r	Pritchett (1996)	96	(6.594)
Import Penetration: overall, 1982	Impnov82	Pritchett (1996)	95	(23.85)
Import Penetration: manufacturing, 1982	Impnov82m	Pritchett (1996)	95	(13.107)
Import Penetration: agriculture, 1982	Impnov82a	Pritchett (1996)	95	(3.67)
Import Penetration: resources, 1982	Impnov82r	Pritchett (1996)	95	(9.66)
TARS trade penetration: overall, 1985	Tars85	Pritchett (1996)	96	(36.91)
TARS trade penetration: manufacturing , 1985	Tars85m	Pritchett (1996)	96	(21.852)
TARS trade penetration: agriculture, 1985	Tars85a	Pritchett (1996)	96	(8.758)
TARS trade penetration: resources, 1985	Tars85r	Pritchett (1996)	96	(15.636)
TARS trade penetration,: overall, 1982	Tars82	Pritchett (1996)	93	(83.10)
TARS trade penetration: manufacturing , 1982	Tars82m	Pritchett (1996)	93	(26.47)
TARS trade penetration: agriculture, 1982	Tars82a	Pritchett (1996)	93	(9.786)
TARS trade penetration: resources, 1982	Tars82r	Pritchett (1996)	93	(54.652)
Trade Policy Variables				
Tariffs				
Import duties as % imports,1985	Tariffs	World Development Indicators	99	(8.903)
Tariffs on international inputs and capital goods, 1985	Owti	Sachs and Warner (1995)	98	(0.165
Trade taxes/ trade, 1982	Txtrdg	Edwards (1997)	54	(0.031)
Weighted average of total import charges: overall, 1985	Totimpv85	Pritchett (1996)	76	(21.30)
Weighted average of total import charges: manufacturing, 1985	Totimpv85m	Pritchett (1996)	76	(22.75)
Weighted average of total import charges: agriculture, 1985	Totimpv85a	Pritchett (1996)	76	(21.57)
Weighted average of total import charges: agriculture, 1985	Totimpv85r	Pritchett (1996)	76	(18.15)
Non Tariff Barriers				
Non trade barriers frequency on intermediate inputs, 1985	Owqi	Sachs and Warner (1995)	96	(0.242)
Non-tariff barriers Coverage: overall, 1985	Nontar85	Pritchett (1996)	76	(36.305)
Non-tariff barriers Coverage: manufacturing, 1985	Nontar85m	Pritchett (1996)	76	(37.914)
Non-tariff barriers Coverage: agriculture, 1985	Nontar85a	Pritchett (1996)	76	(35.268)
Non-tariff barriers Coverage: resources, 1985	Nontar85r	Pritchett (1996)	76	(43.111)
Composite Measures				
Sachs and Warner 1980s	Open80s	Edwards (1998)	61	(0.446)

Measures based on residuals				
Leamers Measure, 1982	Leamer82	Edwards (1997)	47	(0.527)
Gravity-residuals, basic model, 1982	Grmb	Hiscos and Kastner (2002)	77	(9.922)
Gravity-residuals, augmented model, 1982	Grma	Hiscos and Kastner (2002)	77	(9.341)
Price Based Measures				
Black market premium, 1985	Black	Haririson (1996)	61	(0.604)
Skills				
Average years of schooling, 1999	Skills99	Baro and Lee (2001)	109	(2.914)
Higher Skills				
Average years of higher schooling, 1999	Hyr99	Baro and Lee (2001)	102	(2.914)
Independent :				
Initial Skills				
Average years of schooling, 1985	Skills85	Baro and Lee (2001)	105	(2.799)
Average years of schooling, 1980	Skills80	Baro and Lee (2001)	105	(2.861)
Average years of schooling, 1975	Skills75	Baro and Lee(2001)	106	(2.703)
Average years of schooling, 1970	Skills70	Baro and Lee (2001)	101	(2.701)
Average years of schooling, 1965	Skills65	Baro and Lee (2001)	99	(2.516)
Average years of schooling, 1960	Skills60	Baro and Lee (2001)	99	(2.522)
Instruments				
Natural logarithm of predicted trade shares computed from a bilateral trade equation with 'pure geography' variables, 1999	Lfrkrom	Frankel and Romer (1999)	163	(16.75)
Drop out rate, 1980s	Drop80	Barro and Lee (1996)	125	(0.802)
Number of school days	Schday	Barro and Lee (1996)	139	(23.43)
Distance from the equator of capital city measured as abs (Latitude)/90	Disteq	Acemogolu (2001)	208	(16.65)

5.2 Data and Methodology

5.2.1 Data Description

In this chapter we are interested to look into the patterns of wage inequality in growth promoting Industrial sectors of developing countries. Here we would use Wage inequality index already introduced in chapter 4. The UTIP-UNIDO wage inequality Theil measure which is calculated by University of Texas Inequality Project (UTIP) measures the dispersion of pay across industrial categories in the manufacturing sector. The data on wages is drawn from the Industrial database published annually by United Nations Industrial Development Organization (UNIDO). The Theil index is decomposable. (Conceicao and Galbraith 2000) 'If individuals are grouped in a mutually exclusive, completely exhaustive way, overall inequality can be separated into a between group component and a within group component. Thus, there is no interaction be-

tween these two components and so these measures are additively decomposable. Moreover of all entropy-based measures, the Theil index is one of only two measures for which the weights in the within groups component add to one. Therefore, overall inequality is the result of adding the two independent components: inequality between groups and inequality within groups.' Second, pay is major source of household income. Changes in income inequality reflect changes in wage inequality. Fields (1980) offers evidence that pay inequalities in the manufacturing sector are the driving force behind the evolution of inequality in many developing countries. Furthermore as discussed above, processes of globalization through technological change raises the concentration of skilled workers in advanced sectors against unskilled workers in the backward sector. Since manufacturing is the sector most affected by modern technological change, income inequality would certainly have an inter-industrial feature that would show up in changing pay differentials between advanced and backward manufacturing industries. (Galbraith and Kum 2002) Third, the principal reason for using the UTIP-UNIDO wage inequality Theil measure is that the researcher is more interested in the functional distribution of income. Changes in the functional distribution between skilled and unskilled labour, will in turn affect the personal income distribution in countries that are unskilled labour abundant. Inequality will rise in developing countries as the skilled-unskilled labour wage premium increases and vice versa.

The UTIP- UNIDO wage inequality measure is the between-group component of Theil's T statistic, an entropy measure whose functional form is defined as:

$$T = \sum (\frac{Y_i}{Y}) T_i + \sum \frac{Y_i}{Y} \log(\frac{Y_i / Y}{N_i / N}) = T^W + T^B \qquad (5.1)$$

Where T^w and T^B indicate within-group and between-group inequality measures respectively. N and Y stand for total employment and total pay respectively, and subscript $_i$ denotes group identity. As mentioned, UTIP captures T^B as their inequality measure, where groups are defined as categories within the UNIDO industrial classification codes.

Theil is not a measure with a closed scale between 0 and 1 (or 0% and 100%), like in case of the GINI index. For resource distributions described by only two quantiles, the Theil index is 0 for 50:50 distributions, 0.5 for 74: 26 distributions, 1 for 82:18 distributions, 2 for 92:8 distributions and 4 at 98:2 distributions. Theil at 1 is close to an 80:20 distribution, which is very close to a distribution often referred to as "Pareto Principle".[1] The UNIDO-UTIP Theil Index provides inequality between groups only (One being skilled and other being unskilled). Though the data is not available for within group inequality, we cannot discount it because there may also be rise in inequality within skilled labour. For example if skills are captured by education level, rising within group inequality would mean that returns to higher levels of education and returns to lower levels of education do not change at the same proportion.

Here, we want to capture the effect of education (skilled) versus no education (unskilled) on relative wages. We would also analyze effect of higher skills within the framework to check if wage inequality between skilled and unskilled labour are rising also because of returns to higher education are rising at higher proportion when compared with overall levels of education. In other words, is wage inequality also pushed by favouring higher skills in developing countries, or presence of skills (having education) a factor decisive enough to explain rise in wage gaps between skilled labour and unskilled labour? There is already some evidence that secondary education is more important in alleviating wage inequality than higher levels of education suggesting close correlation between higher levels of education and wage dispersion (Acemoglu, 2001). Investing in higher education alone is less effective in alleviating

[1] This is a special case of the wider phenomenon of Pareto distributions. If the parameters in the Pareto distribution are suitably chosen, then one would have not only 80% of effects coming from 20% of causes, but also 80% of that top 80% of effects coming from 20% of that top 20% of causes, and so on (80% of 80% is 64%; 20% of 20% is 4%, so this implies a "64-4 law") http://management.about.com/cs/generalmanagement/a/Pareto081202.htm

wage inequality. Since Theil captures wage inequality and not wage equality, we can easily test the positive effect of higher education in wage inequality. We are not saying that decreasing higher levels of education would then decrease wage inequality as is generally true with interpretations upon getting a positive sign (say between Theil Index and higher levels of education). If there is a positive correlation, then the only way to minimize the education bias of inequality is to raise the overall education levels of the population, which in turn would distribute skills homogenously within the population.

The between group inequality, T^B, ranges from 0 to less than 1 (0.36 for the current UNIDO data set). On the hind sight, this suggests that adding within group inequality T^w would further add up to increase the value of T closer to 1 meaning that over all wage inequality between skilled and unskilled is steeper than what is captured by T^B only. As suggested; by checking the relationship between higher levels of education and 'between group wage inequality' T^B, we would be able to see whether between group inequality is also present. It is possible if higher levels of education are more sensitive to wage inequality than average levels of education which include primary, secondary and higher.

The UTIP data set provides Theil inequality measures for nearly 3,200 country/year observations, covering more than 150 countries during the period 1963 to 1999. Figure 5.1 illustrates trends in wage inequality between skilled and unskilled workers, over time in selected developing countries and is representative of different regions. All the country graphs, except one, show that wage inequality has been on the rise in the 1980s and 1990s. The only exception is Singapore, which belongs to a group associated with the 'East Asian Miracle' of the 1980s. However, this miracle remained confined to a few countries and as it is evident from the graphs, Singapore is not representative of the developing world. Since the 1980s and 1990s are associated with *Structural Adjustment Policies* under which many developing countries embraced trade liberalization, it is safe to suggest that the above trends in wage inequality also relate to these market reforms. The end of the chapter lists all

developing countries, and the latest year for which the Theil wage inequality index is available.

Singapore is one such country which invested heavily on social development and raised the average education levels of its population. Is this the reasons why wage inequality is falling in Singapore post liberalization? In social development, Singapore indeed represents the good side of the story. The other side of the story is more applicable to developing countries where larger segments of the population are un-educated. Over all trend in developing countries post liberalization should be a rise in wage dispersion when skill bias technical change raise skill premia by favouring the educated over uneducated.

In this respect, initial education levels in a country capture the relative factor supply effect. Trade on the other hand captures the relative factor demand effect through skill bias technical change as also suggested by Acemoglu (1999; 2001). Other than the initial levels of education, trade becomes the second variable of interest. In view of this, the basic model for wage inequality between skilled and unskilled workers, based on integration is as follows

$$WageInequality = f[Integration(Integration, Skills_0] \tag{5.1}$$

Skills represent education levels through out this manuscript. Average years of schooling have already been introduced in chapter 2 as a better measure of education among the several available. It has been referred to as human capital (skills) already in chapters 2 and 4. Here average schooling years obtained in years 1960, 1965, 1970 and 1980 can all be considered as human capital formation pre-liberalization. Thus initial skills $Skills_0$ in this chapter represent average years of schooling obtained before 1980s. Chapter 2 also contains a detailed discussion on measures of integration (trade liberalization). There are outcome based measures (openness) and incidence based (trade policy) measures. The literature often ignores the latter effect, which only employs openness indicators. Take note however, that openness is an outcome of trade and industrial policies and not a policy indicator *per se*. Our formal empirical model would have 2 separate identifications then:

Figure 5.1

Wage Inequality Trends in Some Selected Developing Countries

$$Inequality = f[Integration(Openness), Skills_0] \quad (5.2)$$
$$(+) \qquad (-)$$

$$Inequality = f[Integration(TradePolicy), Skills_0] \quad (5.3)$$
$$(+) \qquad (-)$$

Here wage inequality is a positive function of integration, which in turn relates positively to the degree of the openness of the economy in Eq. (5.2), or trade policies that promote greater openness in Eq. (5.3). Wage inequality negatively relates to the initial stock of skills in the economy as discussed.

A simple Heckscher-Ohlin or Stolper-Samuelson model would suggest that the overall return to skills would decline, and with it incentives for education, when a skill-scarce developing country opens up. (Wood and Ridao-Cano 1999) However in a multi-dimensional Stolper-Samuelson model approximating reality, endogenous growth with increasing returns to R & D, a skill-bias in tradables, skill shortages or unlimited supplies of unskilled labour could all lead to an increase in returns to skill following greater integration. (Arbache et al. 2004) Integration can also lead to the diffusion of more efficient education technologies, which would further augment the level of skills in the economy. (Winters 2004) The expected effect of openness and trade policy on wage inequality is positive in developing countries where a majority of the population is unskilled and uneducated.

The econometric form of the wage inequality model based on openness and trade policy is as follows:

$$THEIL_{1i} = \sigma_1 + \kappa_1 OPEN_i + \nu_1 skills65_i + \varepsilon_{1i} \quad (5.4)$$

$$THEIL_{2i} = \sigma_2 + \kappa_2 TP_i + \nu_2 skills65_i + \varepsilon_{2i} \quad (5.5)$$

Where $THEIL_i$ is wage inequality in a country i for the 1990s (employing the latest value available for the Theil index for every country: see table 5.1, end of the chapter for the exact year), ε_i is the random error term, $OPEN_i$ captures openness and TP_i is the indicator for the trade policy stance in the 1980s respectively. Also $skill65_i$ measures initial skill

levels proxied by average years of schooling for the population aged 25 in 1965. Note that the skill acquisition parameter refers to a period well before the trade liberalization episodes post-1980.

This analysis has a specific focus on trade and education. It employs 34 measures of openness and trade policy to carry out multiple regression analysis for Eqs (5.4) and (5.5), respectively. Average years of schooling for 1960, 1970, 1975 and 1985 are also employed for further robustness checks of the model with repeated specifications.

Below, the author presents the taxonomy for outcome based and incidence based measures of trade following the grouping offered by Rose (2004):

1. openness (e.g. the ratio of trade or imports to GDP), an outcome based measure,
2. trade flows, adjusted for country-characteristics (outcome based),
3. tariffs (policy incidence-based)
4. non-tariff barriers (NTBs) (incidence based),
5. informal or qualitative measures,
6. composite indices, and,
7. measures based on price on price outcomes.

All of these definitions have been used in the empirical literature. One can also note that some of the definitions have already been employed in previous chapters of this thesis. The details of the data and their exact definitions are provided in the appendix at the end of the manuscript. Rose (2004) provides a nice summary of all these variables. For the readers comfort, the author provides a brief nevertheless:

The core openness variable remains the overall trade share (the ratio of nominal imports plus exports to GDP), which has been extensively used in the literature. (Frankel and Romer 1999; Acemoglu, Johnson and Robinson 2001; Alcala and Ciccone 2002; Dollar and Kraay 2002; Rodrik et al. 2004)

Pritchett (1996) uses 16 cross-sectional measures of trade penetration for developing countries. These are provided for two different years (1982 and 1985) and four different categories (overall, manufacturing, agriculture and resources sectors). Trade penetration measures are only available for imports alone. According to Pritchett (1996), import data may be preferred over total data because adequate information is available on barriers to imports. Two other measures of openness are trade penetration (*TARS*) derived from the World Bank's TARS system and overall import penetration (*Impenov*) respectively. See table 5.2 for further yearly and sectoral decomposition of these variables.

There are many indicators of trade restrictiveness (incidence based) acting as measures of trade policy. (Edwards 1998;, Greenaway et al. 2001; Rose 2002) Literature recommends using simple averages of taxes on imports and exports (Rodriguez and Rodrik, 2000). Simple import duties as a percentage of imports (*Tariffs*) are available from World Development Indicators (WDI) from 1970 to the end of the sample in 1998. We select it for 1985, like in other measures of trade, capturing the start of the end of relative protection among many developing countries. Sachs and Warner provide (1995) constructed a composite measure of openness by using tariffs on intermediate inputs and capital goods (*Owti)*. Edwards (1997) collected data on total revenues from taxes on international trade as a proportion of total trade (*Txtrdg*). Pritchett (1996) provides weighted average of total import charges (*Totimpov*), as well as sectoral categories of import charges (manufacturing, agriculture and resources). They can all be considered good proxies of trade restrictiveness and have been employed in the analysis.

'The coverage of NTBs in terms of total imports is another widely used measure of trade policy.' (Rose 2004; 215) Sachs and Warner (1995) include frequency of non trade barriers on intermediate inputs (*Owqi*) in his index. Pritchett (1996) collects data on non-tariff barrier coverage for developing countries from UNCTAD (United Nations Conference on Trade and Development). They are available for four different categories —manufacturing, agriculture and resources respectively. Edwards (1997) provides several composite measures of countries extent

of liberalization. Sachs and Warner composite measure of openness (*Open80*) has already been utilized in chapters 2 and 4. '(However), it provides only a binary classification –a country is open or closed. As are result, countries with different degrees of trade intervention are equally classified as open.' (Edwards 1998; 385) 'Leamer (1988) used an empirical Hecksher_Ohlin model with nine factors to estimate net trade flows and trade intensity ratios for 183 commodities at the three digit SITC (Standard International Trade Classification) level for 53 countries. He took the differences between predicted and actual trade intensity ratios as indicators of trade barriers (*Leamer82*).' (Ibid; 386) 'A less structural approach is taken by Hiscox and Kastner (2002). They use fixed country-year residual effects from two gravity models of trade (*Grmb* and *Grma*) (a simple version which links imports to GDP and distance, and an augmented one which adds measures of wealth, land and capital) to derive measures of trade policy orientation' (Rose 2004; 216) Sachs and Warner (1995) and Harrison (1996) have utilized a number of price-based measures of trade policy. The black market foreign exchange premium (*Black*) is one of them.

Overall, we have been able to obtain 34 measures of integration. These 34 measures of integration would separately enter equations (5.4) and (5.5) along with initial skills to determine wage inequality in at least 34 different regression equations.

There could be potential endogeneity problems associated with the dependent variable, wage inequality and the explanatory variable, openness/trade policy. First, openness when measured by the trade share of national income is not truly exogenous, but an outcome of other factors. Second, the degree of wage inequality between skilled and unskilled workers, or the country's relative factor endowments (Tavares 1998) may determine a country's trade policy choices. Even though gradual and under the aegis of structural adjustment policies, decisions regarding openness were taken. It may be that more egalitarian labour abundant nations may choose to open up faster than less equal land (or mineral) abundant nations.

As in previous chapters, an instrument is required to solve for the openness and trade policy variables' potential endogeneity with wage

inequality. This chapter also uses the predicted trade share following Frankel and Romer (1999) from a gravity equation to instrument for openness/trade policy. Following Rodrik et al. (2004), distance from the equator is the second instrument for openness/trade policy variables because the level of integration of an economy also depends upon its location on the world map. The Instrumental Variable (IV) regression model is a two stage least squares (2SLS) estimate beginning with

$$OPEN_{1i} = \varsigma_1 + \tau_1 FR_i + \psi_1 Disteq_i + \varepsilon_{3i} \tag{5.6}$$

$$TP_{1i} = \varsigma_2 + \tau_2 FR_i + \psi_2 Disteq_i + \varepsilon_{4i} \tag{5.7}$$

Here FR_i stands for predicted trade shares from gravity equations computed by Frankel and Romer (1999), whereas $Disteq_i$ (distance from the equator) is a proxy for geography. In the first stage, Eqs (5.6) and (5.7) generate predicted values of openness and trade policy variables by regressing them on the two instruments. The second and final stage of the regression analysis involves employing the predicted openness and trade policy variables in Eqs (5.4) and (5.5) respectively.

Before carrying out the IV analysis, it is informative to look at simple bi-variate relations between integration (predicted trade shares and predicted tariff rates) with the Theil index. First column graphs are between openness, trade policy and Theil index for developing countries only (*Theil99dev*). Trade indices show no clear relationship with wage inequality. They are not predicted yet. However, once predicted, clear relations develop between trade and wage inequality as the second column in figure 5.2 shows. *Increases* in trade shares after liberalization leads to higher inequality, and the second graph also suggests that *decreases* in import tariffs exerts a negative and unequal distributional effect on wages. Steep slopes show high responsiveness of wage inequality with changes in these measures of trade. One of the reasons for the decrease in relative wages of unskilled labour, as tariffs fall, is that the heavily protected sectors in many developing countries tend to be industries that employ a high proportion of unskilled workers. (Goldberg and Pavcnik 2004)

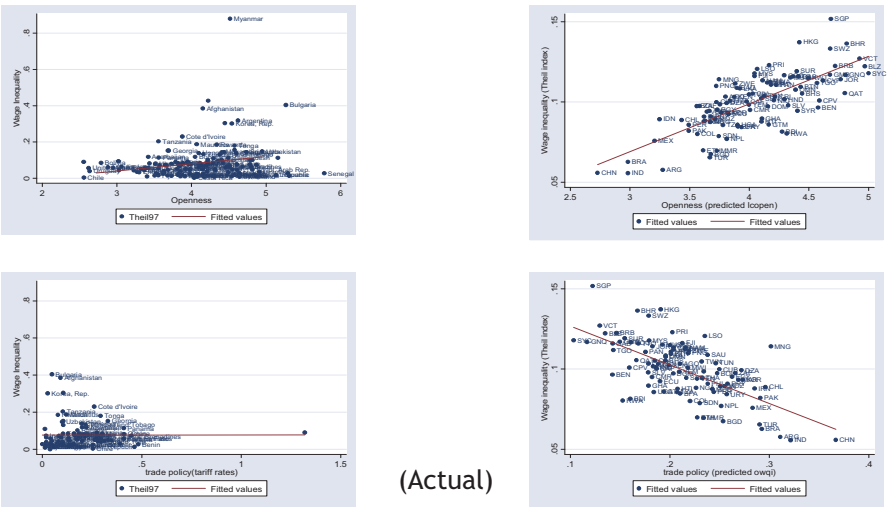
Table 5.3
2nd Order Relevance and Exogeneity Tests for Instruments

Variables	Instruments (1st Stage results)			Exogeniety (2nd Stage Higher Order)	Relevance (2nd Stage Higher Order)			
Endogenous Independent	Lfrkrom	Distq	F	Sargan statistic	Maximal 2SLS Bias (b)	1st Stage heteroskedasticity-robust	N	R2
Openness Variables								
(Exports +Imports)/GDP, 1985	0.689***	-0.013	40.68***	0.896	0.000	robust	63	0.67
Import Penetration: overall, 1985	21.073***	-0.186	14.05***	0.941	0.000	robust	51	0.47
Import Penetration: manufacturing, 1985	13.391***	-0.125	14.82***	0.925	0.000	robust	51	0.48
Import Penetration: agriculture, 1985	3.544***	-0.010	14.37***	0.900	0.000	robust	51	0.47
Import Penetration: resources, 1985	3.652***	-0.053	4.05**	0.825	0.003	robust	51	0.20
Import Penetration: overall, 1982	26.717***	-0.343	13.83***	0.718	0.000	robust	51	0.47
Import Penetration: manufacturing, 1982	13.823***	-0.213	14.88***	0.671	0.000	robust	51	0.48
Import Penetration: agriculture, 1982	3.792***	-0.013	13.60***	0.844	0.000	robust	51	0.47
Import Penetration: resources, 1982	8.888***	-0.096	6.53***	0.759	0.000	robust	51	0.29
TARS trade penetration: overall, 1985	33.041***	-0.599	11.48***	0.702	0.000	robust	51	0.42
TARS trade penetration: manufacturing , 1985	18.502***	-0.202	10.27***	0.894	0.000	robust	51	0.39
TARS trade penetration: agriculture, 1985	3.810***	-0.267***	10.18***	0.163	0.000	robust	51	0.39
TARS trade penetration: resources, 1985	9.991***	-0.101	4.44***	0.891	0.001	robust	51	0.22
TARS trade penetration,: overall, 1982	39.081***	-0.773	10.14***	0.580	0.000	robust	50	0.41
TARS trade penetration: manufacturing , 1982	19.468***	-0.312	10.78***	0.683	0.000	robust	50	0.41
TARS trade penetration: agriculture, 1982	4.900***	-0.297***	11.54***	0.193	0.000	robust	50	0.43
TARS trade penetration: resources, 1982	13.874***	-0.131	4.14**	0.800	0.001	robust	50	0.21

Trade Policy Variables								
Tariffs								
Import duties as % imports,1985	-2.565*	0.146	2.27*	0.129	0.083	robust	48	0.13
Tariffs on international inputs & capital goods, 1985	-0.124***	0.002	4.86***	0.756	0.001	robust	51	0.24
Trade taxes/ trade, 1982	-0.013	0.0002	0.70	0.914	0.297	robust	27	0.08
Weighted average of total import charges: overall, 1985	-18.861***	0.344	8.04***	0.711	0.000	robust	49	0.35
Weighted average of total import charges: manufacturing, 1985	-20.300***	0.401	8.38***	0.677	0.000	robust	49	0.36
Weighted average of total import charges: agriculture, 1985	-12.121*	0.164	3.73**	0.867	0.125	robust	49	0.20
Weighted average of total import charges: agriculture, 1985	-26.180***	1.075**	6.19***	0.338	0.000	robust	49	0.29
Non Tariff Barriers								
Non trade barriers frequency on intermediate inputs, 1985	-0.042	0.003	0.68	0.239	0.425	robust	51	0.04
Non-tariff barriers Coverage: overall, 1985	-17.042***	0.423	4.79***	0.6133	0.006	robust	49	0.24
Non-tariff barriers Coverage: manufacturing, 1985	-16.367**	0.392	4.29***	0.643	0.015	robust	49	0.22
Non-tariff barriers Coverage: agriculture, 1985	-12.121*	0.164	3.73**	0.867	0.125	robust	49	0.20
Non-tariff barriers Coverage: resources, 1985	-26.18***	1.075	6.19***	0.338	0.000	robust	49	0.29
Composite Measures								
Sachs and Warner 1980s	0.146	0.003	0.90	0.455	0.266	robust	31	0.09
Measures based on residuals								
Leamers Measure, 1982	0.162***	-0.0002	5.03***	0.544	0.001	robust	22	0.46
Gravity-residuals, basic model, 1982	-11.686***	0.179**	28.01***	0.436	0.000	robust	36	0.72
Gravity-residuals, augmented model, 1982	-10.863***	0.141	26.20***	0.419	0.000	robust	36	0.11
Price Based Measures								
Black market premium, 1985	0.260	0.012	1.13	0.312	0.187	robust	39	0.08

- ***, **, * denotes significance at 1%, 5 % and 10% levels respectively

Figure 5.2
Responsiveness of Wage Inequality w.r.t Openness and Trade Policy



5.3 Results

Before presenting second stage results, it is important to test the instruments. Unlike chapters 2 and 4, there is only 1 endogenous variable and 2 instruments. We have utilized a rich set of openness and trade policy proxies though. Generally for most of the definitions, FR bilateral trade share has not been used before as an instrument. Figure 5.2 show good results for the relevance of instruments. Nevertheless, usual first order and second order relevance and validity tests are required to have confidence on IV relationships. Table 5.3 presents first stage and higher order tests for the quality of instruments. The 2nd, 3rd and 4th columns present first stage results for all IV regression equations. FR trade shares significantly and positively determine all trade proxies. Though distance from the equator has been insignificant, we know that location does matter in trade. F-Statistics mostly pass Cragg and Donald rule of thumb test.

Table 5.4
OLS and IV Regression Results for Theil99Developing

Dependent Variable: Theil99dev						
	Endogenous Independent			**Independent**		
Eq.	Openness Variables	OLS	IV	Initial Skills	OLS	IV
1	Lcopen	0.031** (0.014)	0.391** (0.017)	Skills65	-0.014**(0.0064)	-0.015** (0.006)
2	Impnov85	0.005 (0.004)	0.0016** (0.0007)	Skills65	-0.072 (0.0084)	-0.015** (0.008)
3	Impnov85m	0.001 (0.0007)	0.0025**(0.001)	Skills65	-0.013* (0.008)	-0.016** (0.008)
4	Impnov85a	0.0027 (0.003)	0.0095** (0.004)	Skills65	-0.011 (0.007)	-0.012 (0.008)
5	Impnov85r	0.0002 (0.0017)	0.009* (0.0049)	Skills65	-0.011 (0.008)	-0.017* (0.010)
6	Impnov82	0.0005 (0.0004)	0.0012** (0.0005)	Skills65	-0.012 (0.0078)	-0.014* (0.0079)
7	Impnov82m	0.0004 (0.0007)	0.0024** (0.0011)	Skills65	-0.011 (0.0079)	-0.015* (0.0084)
8	Impnov82a	0.0004 (0.0027)	0.0091**(0.0043)	Skills65	-0.011 (0.0079)	-0.013 (0.0084)
9	Impnov82r	0.0021** (0.0008)	0.0038** (0.0016)	Skills65	-0.012 (0.0074)	-0.013* (0.0075)
10	Tars85	0.0005* (0.0002)	0.001** (0.0004)	Skills65	-0.013* (0.008)	-0.016** (0.008)
11	Tars85m	0.0002 (0.0004)	0.002** (0.001)	Skills65	-0.012 (0.0082)	-0.019** (0.009)
12	Tars85a	0.0001 (0.0017)	0.005 (0.0028)	Skills65	-0.011 (0.008)	-0.013 (0.008)
13	Tars85r	0.003*** (0.001)	0.003** (0.0013)	Skills65	-0.011 (0.007)	-0.011* (0.007)
14	Tars82	0.0003 (0.0002)	0.001** (0.0004)	Skills65	-0.012 (0.008)	-0.015* (0.008)
15	Tars82m	0.0003 (0.0004)	0.002** (0.001)	Skills65	-0.011 (0.008)	-0.017* (0.009)
16	Tars82a	0.001 (0.0014)	0.004 (0.003)	Skills65	-0.009 (0.008)	-0.014 (0.009)
17	Tars82r	0.002*** (0.002)	0.002** (0.001)	Skills65	-0.012 (0.007)	-0.012* (0.007)
	Trade Policy Variables Tariffs					
18	Tariffs	-0.001 (0.0013)	-0.007 (0.005)	Skills65	-0.018 ** (0.009)	-0.025** (0.012)
19	Owti	-0.054 (0.059)	-0.255* (0.132)	Skills65	-0.011 (0.008)	-0.013 (0.009)
20	Txtrdg	0.110 (0.493)	3.825 (2.971)	Skills65	-0.009 (0.015)	-0.005 (0.026)
21	Totimpv85	-0.001 (0.0004)	-0.002** (0.001)	Skills65	-0.009 (0.008)	-0.011 (0.008)
22	Totimpv85m	-0.001 (00004)	-0.002** (0.001)	Skills65	-0.010(0.008)	-0.012 (0.009)
23	Totimpv85a	-0.001* (0.001)	-0.002** (0.001)	Skills65	-0.010 (0.008)	-0.011 (0.008)
24	Totimpv85r	-0.0003 (0.001)	-0.003* (0.001)	Skills65	-0.010 (0.008)	-0.005 (0.010)
	Non Tariff Barriers					
25	Owqi	-0.038 (0.039)	-0.297 (0.289)	Skills65	-0.011 (0.001)	-0.016 (0.012)
26	Nontar85	-0.0003 (0.0004)	-0.002* (0.001)	Skills65	-0.011 (0.009)	-0.021* (0.012)
27	Nontar85m	-0.0003 (0.0003)	-0.002* (0.001)	Skills65	-0.010 (0.008)	-0.023* (0.013)
28	Nontar85a	-0.0003 (0.0003)	-0.003 (0.002)	Skills65	-0.012 (0.008)	-0.033* (0.019)
29	Nontar85r	-0.0003 (0.0003)	-0.001* (0.001)	Skills65	-0.010 (0.008)	-0.010 (0.008)
	Composite Measures					
30	Open80s	-0.043 (0.035)	0.127 (0.161)	Skills65	-0.002 (0.008)	-0.010 (0.015)
	Measures based on residuals					
31	Leamer82	-0.064 (0.063)	-0.058 (0.222)	Skills65	-0.005 (0.010)	-0.010 (0.011)
32	Grmb	-0.001 (0.001)	-0.001 (0.001)	Skills65	-0.010* (0.005)	-0.011** (0.005)
33	Grma	-0.001 (0.001)	-0.001 (0.001)	Skills65	-0.010* (0.005)	-0.010** (0.005)
	Price Based Measures					
34	Black	0.023* (0.014)	0.024 (0.048)	Skills65	-0.011 (0.007)	-0.011 (0.007)

***, **, * denotes significance at 1%, 5 % and 10% levels respectively .Standard errors are presented in parenthesis.

In most cases for trade policy variables, the F-statistics is close to 10. Higher order asymptotic test results are present in columns 5, 6 and 7. Heteroskedasticity robust estimates are used in the second stage. 2SLS bias is close to 0 in most cases confirming the observation made in figure 5.2 regarding the suitability and power of IV. The regressors are exogenous to the error term in all cases. Columns 8 and 9 provide R-square for each corresponding second stage regression equation. High R squares obtained in the second stage with no presence of endogeneity give further credence to the second stage results.

Tables 5.4 provide results for OLS and IV. Column 2 covers all openness and trade policy variables for 34 regression equations. Column 5 gives results for initial skills representing average years for schooling for 1965. Such early levels of schooling are rightly assumed to be uncorrelated with post 1980 trade and would exogenously determine wage inequality. OLS results depict the same trend of insignificance reported in figure 5.2. Both openness and trade policy variables are largely insignificant. Even Skill65 is insignificant in most cases. How ever, using FR trade shares (*Lfrkrom*) and distance from the equator (Disteq) as instruments improve the results significantly. The improvement has been observed for all regression equations. All openness and trade policy variables carry expected signs, and nearly all of them bear significant relationship to wage inequality. It would therefore, appear that trade liberalization does worsen the distribution of wages between skilled and unskilled labour in developing countries. A robustness test was conducted by regressing 28 selected proxies of openness and trade policy on the Theil index (*Theil99dev*) in Eqs (5.4) and (5.5) with five more proxies of skilled labour (i.e., *skills*60 , *skills*70 , *skills*75 , *skills*80 , *skills*85). As Table 5.5 shows, in all 150 cases, trade exacerbates inequality; the relationship is significant in 112 out of 150 cases.

The results in table 5.4 also show that initial skill endowments *skills*65 relates negatively to inequality showing that developing countries that are more educated to begin with do well on wage inequality. This is expected, and in-line with the theory that countries where skill endowment is more evenly distributed, they are less prone to an adverse

wage distributional effect. (Fisher 2001; Tuelings and van Rens 2002; Eiche 2001; Bourguignon and Morrisson 1990; Tilak 1989) Not only average years of schooling, but secondary years of schooling for all initial years 1960, 1965, 1970 and 1975 have been found to be negatively related with wage inequality. In contrast higher years of schooling for such initial years are weakly related with wage inequality (See Mamoon and Murshed, 2008 for details)

We checked the effect of relative factor supply for initial periods when they have been exogenous to trade reforms. Now we come to post reform effect known as skill bias technical change. Trade puts an upward pressure on skill demands. The dynamic trade models suggest that this is also true for developing countries. Many developing countries now invest in education and many have transformed a part of their populations into skilled labour to exploit increased opportunities of good jobs (skilled labour demand) which integration has brought to their door steps. Countries like China and India are good examples. In absolute terms they have more educated people than countries in North East Asia, where education levels are equally distributed among population. However we also know that populations in China and India have been less educated to start with. Education (years of schooling) has been heterogeneous, as only a segment of population (urban) have been provided with increased education opportunities. Whereas, the uneducated also take part in improved opportunities which international trade provides through industrial sector growth. Most of them form the unskilled of all such sectors. In other words, supply of unskilled labour is far more elastic than supply of skilled labour in both countries. Nowadays, many developing countries have been trying to jump into the Chinese and Indian bandwagon by investing in education. Since, developing countries face resource constraint; they can only focus at higher levels of education to exploit the dividends of growth through processes like trade. We would show in coming lines, this has caused further inequalities because the focus has not been on 'education for all'.

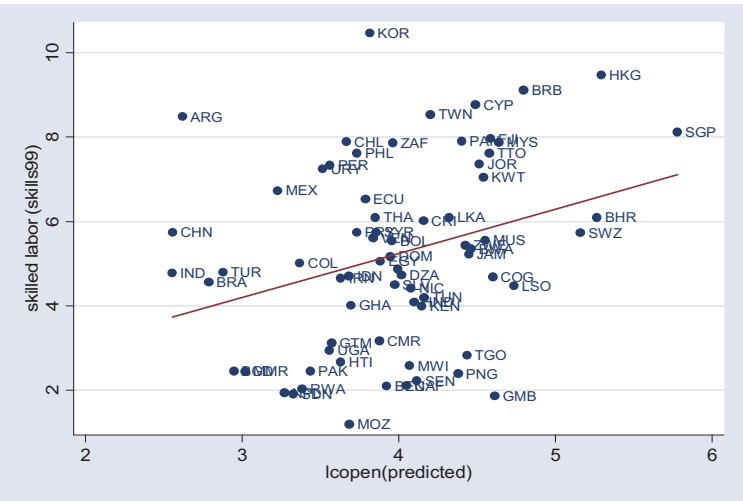
Table 5.5
Inequality Trade Nexus (A Robustness Check)

Endogenous Independent: **Openness/Trade Policy**	**(Dependent variable) TheiI99Dev**				
	1	2	3	4	5
(Exports +Imports)/GDP, 1985	Signif.	Signif.	Signif.	Signif.	Signif.
Import Penetration: overall, 1985	Signif.	Signif.	Signif.	Signif.	Signif.
Import Penetration: manufacturing, 1985	Signif.	Signif.	Signif.	Signif.	Signif.
Import Penetration: agriculture, 1985	Signif.	Signif.	Signif.	Signif.	Signif.
Import Penetration: resources, 1985	Signif.	×	Signif.	Signif.	Signif.
Import Penetration: overall, 1982	Signif.	Signif.	Signif.	Signif.	Signif.
Import Penetration: manufacturing, 1982	Signif.	Signif.	Signif.	Signif.	Signif.
Import Penetration: agriculture, 1982	Signif.	Signif.	Signif.	Signif.	Signif.
Import Penetration: resources, 1982	Signif.	Signif.	Signif.	Signif.	Signif.
TARS trade penetration: overall, 1985	Signif.	Signif.	Signif.	Signif.	Signif.
TARS trade penetration: manufacturing , 1985	Signif.	Signif.	Signif.	Signif.	Signif.
TARS trade penetration: agriculture, 1985	×	×	×	×	Signif.
TARS trade penetration: resources, 1985	Signif.	Signif.	Signif.	Signif.	Signif.
TARS trade penetration,: overall, 1982	Signif.	Signif.	Signif.	Signif.	Signif.
TARS trade penetration: manufacturing , 1982	Signif.	Signif.	Signif.	Signif.	Signif.
TARS trade penetration: agriculture, 1982	×	×	×	×	×
TARS trade penetration: resources, 1982	Signif.	Signif.	Signif.	Signif.	Signif.
Import duties as % imports,1985	×	×	×	×	×
Tariffs on international inputs and capital goods, 1985	Signif.	Signif.	Signif.	Signif.	Signif.
Trade taxes/ trade, 1982	×	×	×	×	×
Weighted average of total import charges: overall, 1985	Signif.	Signif.	Signif.	Signif.	Signif.
Weighted average of total import charges: manufacturing, 1985	Signif.	Signif.	Signif.	Signif.	Signif.
Weighted average of total import charges: agriculture, 1985	Signif.	Signif.	Signif.	Signif.	Signif.
Weighted average of total import charges: agriculture, 1985	Signif.	Signif.	Signif.	Signif.	Signif.
Non trade barriers frequency on intermediate inputs, 1985	×	×	×	×	×
Non-tariff barriers Coverage: overall, 1985	Signif.	×	Signif.	Signif.	Signif.
Non-tariff barriers Coverage: manufacturing, 1985	Signif.	×	Signif.	Signif.	×
Non-tariff barriers Coverage: agriculture, 1985	×	×	×	×	×
Non-tariff barriers Coverage: resourses, 1985	Signif.	Signif.	Signif.	Signif.	Signif.
	When	When	When	When	When

Control Variables	with Average Years of School-ing, 1960 (Sch60)	with Average Years of School-ing, 1970 (Sch70)	with Average Years of School-ing, 1975 (Sch75)	with Average Years of School-ing, 1980 (Sch80)	with Average Years of School-ing, 1985 (Sch60)

- Significant at 1%, 5% and 10% level. –Control Variables are in the parenthesis (last Row)

Figure 5.3
Skill Bias Technical Changes



Increased investments in higher education captures the demand side of skill bias technical change caused by international trade where demand of skills have been rising faster then the supply? Figure 5.3 shows that trade liberalization augments skills in developing countries. This is true because international trade between developed and developing countries is followed by technology transfer (processes like learning by doing: 'trade') which improves the general skill level. This means that part of the human capital stock is endogenous to the processes of trade, as hinted at by many endogenous growth models.

A skill bias technical change would also capture the social inequalities in the populations as we have been arguing that education in most developing countries is heterogeneously distributed among populations. Most are still uneducated. Here a change in skilled human capital, which is endogenous to integration, will have its own independent effect on relative wages and inequality. Because trade utilize skilled and unskilled labour but offer higher returns to the skilled relative to unskilled, the effect of education which can be explained through trade should be positively related with wage inequality as to against the overall effect of education. In other words, this positive effect will be different to that which is attributable to the initial level of human capital endowment.

Figure 5.4 shows two graphs. The first one illustrates a simple relationship between skill levels in 1999 and wage inequality, and suggests that countries with higher stocks of skilled labour will have less inequality. The second graph has a different measure of skills (based on predicted values by regressing *skill99* on FR trade shares; or those skills which can be measured in relation with trade), conversely suggests that skill accumulation due to greater global integration raises wage inequality. It implies that the skills that accrue directly through the processes of trade, contribute to wage inequality. This is in line with Tinbergen's (1975) arguments, and the earlier discussion regarding the dual role of skilled human capital in the economy.

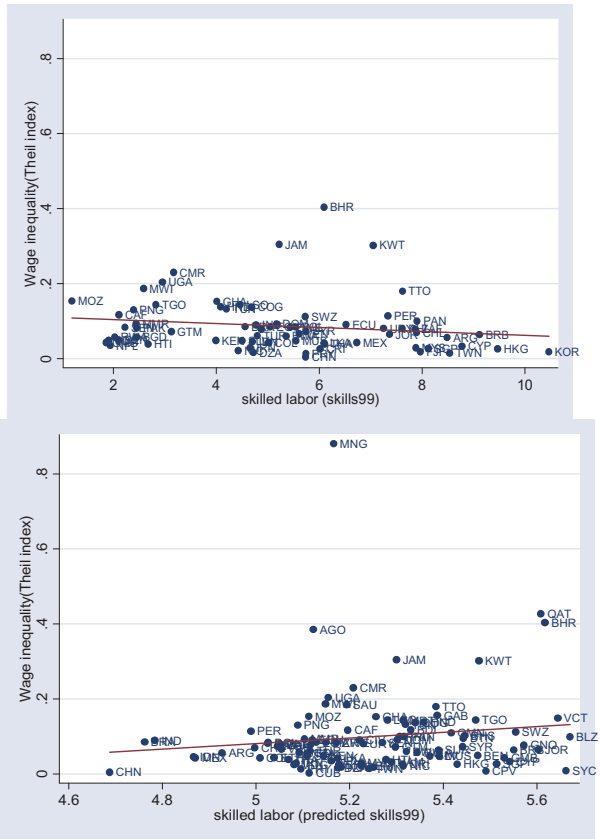
In order to examine the dual (positive and negative) impact of skilled labour stocks on the skilled-unskilled labour wage differential, it was necessary to modify the basic 'wage inequality model' by introducing an interaction term between skills and some selected openness and trade policy measures.

Conceptually speaking, the present wage inequality framework should contain:

$$Inequality = f[(Skills_i(openness), Skills_0] \qquad (5.8)$$
$$\qquad\qquad\quad (+) \qquad\quad (-)$$

$$Inequality = f[(Skills_i(tradepolicy), Skills_0] \qquad (5.9)$$
$$\qquad\qquad\quad (+) \qquad\quad (-)$$

Figure 5.4
Skills versus Skill Bias Technical Change



Skills which depend on *Initial* skill endowments have a negative effect on wage inequality in Eqs (5.8) and (5.9). The skills that accrue through trade liberalization exacerbate inequality such that $skills_i$ contains the effect of greater openness or trade policies..

The econometric form of the modified wage inequality model is:

$$THEIL_{3i} = \lambda_1 + \Omega_1 Interaction(OPEN \times Skills99)_i + \rho_1 Skills99_i + \varepsilon_{5i} \qquad (5.10)$$

$$THEIL_{4i} = \lambda_2 + \Omega_2 Interaction(OPEN \times Skills99)_{hyr_i} + \rho_2 Skills99_i + \varepsilon_{6i} \qquad (5.11)$$

$$THEIL_{5i} = \lambda_3 + \Omega_3 Interaction(TP \times Skills99)_i + \rho_3 Skills99_i + \varepsilon_{7i} \quad (5.12)$$

$$THEIL_{6i} = \lambda_4 + \Omega_4 Interaction(TP \times Skills99)_{hyr_i} + \rho_4 Skills99_i + \varepsilon_{8i} \quad (5.13)$$

*Skills*99 represents skill endowments in 1999; a point in time when earlier trade liberalization had had time to play a role in skill accumulation in developing countries through technology transfer. Hence *skills*99 would depend on initial skill levels and trade. To isolate the effect of trade from initial skill endowment effect in *skills*99, we need to first find instruments which can explain *skills*99 independent to its relation with trade and which are only related to initial skill levels. Chapter 2 already establishes that drop out rates (*Drop*) and schooling days in a year (*Schday*) exogenously determine average years of schooling for 1999 (*Sch99).* Note here average years of schooling are referred to as skills and hence *Sch99* as *Skills99*. Here, we can instrument *Skills99* with *Drop80* and *Schday*. Such exercise will enable us to isolate the effect of trade on *Skill99* and explain *Skill99* only with reference to initial endowments. To capture the effect of trade on *Skill99*, we first interact *Skills99* with some selected proxies of openness and trade policy to form *Interaction (OPENxSkills99)* and *Interaction (TPxSkills99)*. Following the observation made in figure 5.4 and to ensure that only trade can explain this interaction term, we instrument it on FR (1999) bilateral trade shares (*Lfrkrom*). Distance from the equator would be the fourth instrument which can exogenously determine the interaction terms. The interaction terms capture the effect of skills on inequality, while taking into account the extent to which each developing country has integrated with world markets. In the first stage *Interaction (OPENxSkills99)*, *Interaction (TPxSkills99)* and *Skills99* would be regressed over all four instruments identified above.

$$Interaction(OPEN \times Skill99)_{2i} = \partial_1 + \theta_1 FR_i + \kappa_1 Drop80_i + \gamma_1 Schday_i + \ell_1 Disteq_i + \varepsilon_{9i} \quad (5.14)$$

$$Interaction(TP \times Skill99)_{2i} = \partial_2 + \theta_2 FR_i + \kappa_2 Drop80_i + \gamma_2 Schday_i + \ell_2 Disteq_i + \varepsilon_{10i} \quad (5.15)$$

$$Skill99_{2i} = \partial_3 + \theta_3 FR_i + \kappa_3 Drop80_i + \gamma_3 Schday_i + \ell_3 Disteq_i + \varepsilon_{11i} \quad (5.16)$$

Here FR_i stands for predicted trade shares from gravity equations computed by Frankel and Romer (1999), *Drop80* stands for dropout rates in 1980, *Schday* represents schooldays in a year whereas $Disteq_i$ (distance from the equator) is a proxy for geography.

There is evidence that suggests unequal investments in higher education are important determinants of increasing inequalities in developing countries (Barro 1999). We want to know whether it is overall low education levels which are driving wage inequality in developing countries or it is that within education sector, it is higher level of education which is more closely related with skill bias technical change. According to Acemoglu (1999), trade induced skill bias technical change causes higher wage inequalities in developing countries through a wage premium effect induced towards higher levels of education. Rise in overall education levels by investing in secondary education may neutralize this effect. (Acemoglu, 2001) For developing countries, Mamoon and Murshed (2008) also find evidence that favours secondary education over higher education. However, Mamoon and Murshed (2008) do not analyze affect of trade on skill accumulation.

Here we are not only to test for effect of international trade on average levels of skills (*skill99*) but also on higher levels of skills (*Hyr99*). This provides us with additional interaction terms based on later category of skill levels. The interaction term *Interaction (OPENxSKILLS99)* and *Interaction (TPxSKILLS99)* are based on the first category of skills and represents the general skill level proxied by overall years of schooling in the total population at age 25 for 1999 and the interaction term *Interaction (OPENxHyr99)* and *Interaction (TPxHyr99)* are based on average years of higher schooling in the total population at age 25 for the same year. The latter category offers more-specific information about the relationship between inequality and higher levels of education. Equations (5.14), (5.15) and (5.16) would remain the same in the right hand side for higher skills (Hyr99). Only change in the left hand side would be that *Hyr99* would be used instead of *Skills99*. The same change is due on equations (5.10), (5.11), (5.12) and (5.13).

Table 5.6 1st Stage Regression results for Instrumental variables

First Stage Results: Interactions Between Openness/ Trade Policy and average Skills

	Lcopen × Skill99	Impen85 × Skill99	Impen82 × Skill99	Tars85 × Skill99	Tars82 × Skill99	Tariffs × Skill99	Owti × Skill99	Totimpv85 × Skill99	Owqi × Skill99	Nontar85× Skill99	Skill90
Lfrkrom	3.718	110.70	139.72	164.63	196.251	-16.769	-0.547	-75.181	-0.243	-70.47	0.0144
	(2.43)**	(3.82)***	(3.67)***	(3.18)***	(2.96)***	(-1.86)*	(-3.2)***	(-3.6)***	(-0.94)	(-2.7)***	(0.04)
Drop80	-0.203	-2.918	-3.356	-5.865	-6.242	-0.115	-0.004	-0.0063	-0.0037	-0.796	-0.039
	(-3.7)***	(-2.7)***	(-2.54)**	(-3.8)***	(-2.7)***	(-0.32)	(-0.65)	(-0.01)	(-0.39)	(-0.69)	(-3.2)***
Schday	-0.029	1.26	1.208	0.947	1.152	0.5491	-0.001	-0.247	0.0005	0.464	-0.006
	(-0.45)	(1.00)	(0.72)	(0.42)	(0.39)	(1.10)	(-0.18)	(-0.27)	(0.05)	(0.36)	(-0.45)
Disteq	0.063	0.063	-1.161	-1.875	-3.391	1.164	0.009	1.603	0.017	1.853	0.034
	(0.61)	(0.03)	(-0.46)	(-0.54)	(-0.77)	(2.02)**	(0.84)	(1.20)	(1.04)	(0.98)	(1.50)
N	64	55	54	55	53	47	54	52	54	52	64
F-statistics	6.42***	7.35***	7.18***	6.36***	5.72***	2.30*	3.14**	4.34***	0.68	2.60***	4.15***
R-square	0.30	0.37	0.37	0.34	0.32	0.18	0.21	0.27	0.05	0.18	0.219

First Stage Results: Interactions Between Openness/ Trade Policy and Higher Skills

	Lcopen × Hyr99	Impen85 × Hyr99	Impen82 × Hyr99	Tars85 × Hyr99	Tars82 × Hyr99	Tariffs × Hyr99	Owti × Hyr99	Totimpv85 ×Hyr99	Owqi ×Hyr99	Nontar85× Hyr99	Hyr99
Lfrkrom	0.1859	6.635	7.940	9.539	10.976	-16.04	-0.026	-3.87	-0.007	-3.210	0.00001
	(1.22)	(4.00)***	(3.82)***	(13.2)***	(3.12)***	(-1.78)*	(-2.32)**	(-2.33)**	(-0.38)	(-1.52)	(0.00)
Drop80	-0.0061	-0.109	-0.115	-.229	-0.229	-0.085	-0.0003	0.032	-0.0001	0.036	-0.0009
	(-1.12)	(-1.79)*	(-1.60)	(-2.11)**	(-1.88)*	(-0.24)	(-0.08)	(0.50)	(-0.16)	(0.45)	(-0.73)
Schday	-0.001	0.135	0.174	0.121	0.204	0.746	-0.0002	-0.01	-0.0001	0.006	-0.0005
	(-0.11)	(1.82)*	(1.85)*	(0.92)	(1.28)	(1.42)	(-0.35)	(-0.14)	(-0.14)	(0.06)	(-0.32)
Disteq	0.012	0.138	0.145	0.137	0.151	1.072	0.001	0.103	0.0005	0.152	0.004
	(1.17)	(1.24)	(1.05)	(0.67)	(0.64)	(1.85)	(0.91)	(0.94)	(0.41)	(1.10)	(1.47)
N	62	54	53	54	52	46	53	51	53	51	62
F-statistics	1.31	7.09***	7.00***	5.06***	5.12***	2.28*	1.87	2.00	0.11	1.14	0.87
R-square	0.08	0.37	0.37	0.29	0.30	0.18	0.13	0.15	0.009	0.09	0.05

- t- Values in the parenthesis. ***, **, * denotes significance at 1%, 5 % and 10% levels respectively

Table 5.7
Higher Order Relevance and Exogeniety Tests for Theil99dev

			Relevance				Exogeneity
Eq.	Endogenous Dependent Variable: **Wage Inequality in Developing Countries (Theil99dev)**	N	1st Stage heteroskedasticity-robust	Maximal 2SLS Bias (b)	Cragg-Donald N*minEval stat. Chi-sq()	Anderson-Rubin test of joint significance of endogenous regressors F-Statistic	Sargan statistic (overidentification test of all instruments) Chi-Sq()
Endogenous Independent Variables:Interactions Between Openness/ Trade Policy and Average Skills for 1999 (Instruments= Disteq, Lfrkrom, Drop80, Schday)							
35	Interaction (Lcopen × Skill99)	62	Robust	0.0005	17.76**	1.91	2.400 (0.301)
36	Interaction (Impen85 × Skill99)	55	Robust	0.0028	14.11**	2.29*	4.390 (0.111)
37	Interaction (Impen82 × Skill99)	54	Robust	0.0037	13.46**	1.88	3.316 (0.191)
38	Interaction (Tars85 × Skill99)	55	Robust	0.0027	14.16**	2.29*	3.795 (0.149)
39	Interaction (Tars82 × Skill99)	54	Robust	0.1699	5.03**	2.28*	5.265 (0.072)*
40	Interaction (Tariffs × Skill99)	47	Robust	0.2078	4.55**	2.61**	1.105 (0.574)
41	Interaction (Owti × Skill99)	54	Robust	0.0037	13.51**	2.27*	1.678 (0.432)
42	Interaction (Totimpv85 × Skill99)	52	Robust	0.007	11.86**	2.37*	2.04 (0.360)
43	Interaction (Owqi × Skill99)	54	Robust	0.5023	2.35**	2.27*	0.628 (0.730)
44	Interaction (Nontar85× Skill99)	52	Robust	0.0145	10.55**	2.37*	0.717 (0.698)
Endogenous Independent Variables:Interactions Between Openness/ Trade Policy and Higher Skills for 1999 (Instruments= Disteq, Lfrkrom, Drop80, Schday)							
45	Interaction (Lcopen × Hyr99)	62	Robust	0.286	3.78**	1.83	3.06 (0.215)
46	Interaction (Impen85 ×Hyr99)	54	Robust	0.167	5.06**	2.28*	6.295 (0.043)**
47	Interaction (Impen82 × Hyr99)	53	Robust	0.1279	5.69**	1.88	5.132 (0.076)*
48	Interaction (Tars85 × Hyr99)	53	Robust	0.0033	13.75**	1.83*	3.096 (0.212)
49	Interaction (Tars82 × Hyr99)	52	Robust	0.085	6.62**	1.84*	4.439 (0.110)
50	Interaction (Tariffs × Hyr99)	46	Robust	0.933	0.43	2.72**	0.040 (0.980)
51	Interaction (Owti × Hyr99)	53	Robust	0.082	8.25**	2.25*	3.779 (0.286)
52	Interaction (Totimpv85 × Hyr99)	51	Robust	0.395	2.98**	2.34*	2.350 (0.308)

53	Interaction (Owqi × Hyr99)	53	Robust	0.955	0.33	2.25*	0.204 (0.903)
54	Interaction (Nontar85× Hyr99)	51	Robust	0.348	3.29**	2.34*	1.059 (0.5669)

t- Values in the parenthesis. ***, **, * denotes significance at 1%, 5 % and 10% levels respectively

To investigate *integration,* six definitions of openness: *Lcopen*, *Impnov85*, *Impnov82*, *Tars85* and *Tars82* and five different proxies of trade policy namely *Tariffs*, *Owti*, *Totimpov85*, *Owqi*, and *Nontarr87* are used (see summary statistics provided in table 5.2 for details about the variables).

Table 5.6 provides results for the 1st stage. FR bilateral trade shares (*Lfrkrom*) and (*Drop80*) significantly explain the endogenous regressors. F-statistic is less than 10 in all cases; violating Cragg-Donald rule of thumb. However, we are dealing with 4 instruments and thus a first order tests are insufficient and higher order asymptotic tests are required. Higher order Crag Donald F-Statistics, which also corresponds to 2SLS bias, do relatively better in case of *Skills99* than in case of *Hyr99*. Largely for *Skills99*, 2SLS bias has been 0 or close to it. Only for equation 43, higher order asymptotes show a large 2SLS bias in favour of OLS. For *Hyr99*, 2SLS bias is large enough to fail the test for at least 4 equations (50, 52, 53 and 54). Over identification problem is not present for most of the equations for the interaction terms of *Skills99* or *Hyr99*. Good results for higher order asymptotic tests establish the statistical validity of the model while heteroskedasticity robust IV estimates are obtained for the second stage. The omitted variable bias has thus been addressed in all regression equations.

Table 5.8 presents results for *Interaction (OPEN×Skills99)*, *Interaction (TP×Skills99)* and *Skills99*. Interaction terms always enter wage inequality significantly at 5% and 10% levels of significance. *Interaction(OPEN× Skills99)* is positively related with wage inequality whereas *Interaction (TP×Skills99)* is negatively related with wage inequality confirming the presence of skill bias technical change for developing countries where skill demand has resulted in payment of skill premiums causing wages of

skilled (educated) to rise at greater rates than the wages of unskilled (uneducated). 1st column shows that *Skills99* are negatively related with wage inequality. Remember *Skills99* have been instrumented by *Drop80* and *Schday*, and thus represents post reform skills which only depend on the initial skills that have been prevailing in developing countries. Results confirm that countries that have integrated to world markets with skills (levels of education) that were homogenously distributed among the population have witnessed a fall in wage inequality. However for other measures of openness and trade policy, *Skills99* have been insignificant. That may be due to the reason that other trade proxies represent the importing sector. For most developing countries, importing sector is more closely related with the manufacturing sector and the technical bias effect of trade would be more prominent on importing sectors. Importing sectors employ more skilled labour. For such cases interaction terms are over riding explanatory power of results with respect to *Skills99*.

However, it is not necessary that skill bias technical change is restricted to importing sectors in developing countries. There are exceptions. The exceptions come from North East Asia where education levels in countries have been homogenously distributed. The trading activity for most of these countries comprise of exports where countries like South Korea have been facing with a trade surplus for many years. For all such countries, technically induced change is favourable to the overall labour force. The average levels of education have been higher, while industrial sector is developed when compared to other developing countries. Their exports form relatively skilled intensive industrial products (e.g. automobile and mobile industries are well established in many North East Asian economies). North East Asian economies did not only invest in education for all (see a detail discussion in chapter 2) but they have also followed a sound industrial policy where they earlier protected their manufacturing industry from outside competition. Once it was significantly developed, they entered the world markets in 1980s and have been exporting skill intensive goods. Thus what you export also matters as suggested by Ricardo et al (2007). What you export also show the national capabilities with respect to prevalent human capital.

This again shows that education does play a dual role. For developing countries, where it is more equally distributed, not only that these economies are relatively developed but they can also export skill intensive goods by exploiting relatively low costs at home for skills when compared to international costs and can out-compete the developed countries. South Korea has outcompeted USA in automobiles and now has a significant share for its products internationally. This could not have happened without earlier protection. But also this could not have happened without an educated population. Thus for countries like South Korea, the technical bias would be positively related with homogenous wage distribution in labour markets. Such examples are few and far between, and do not fall into the standard category of developing countries.

In countries like China and India, who have also been successful in international markets because of a significant number of educated people (China also has a trade surplus), the over all effect of trade on labour markets is not same as North East Asia. Wages inequality is actually rising. It may be due to education bias of international trade which favours educated (good jobs) more than uneducated (bad jobs).

In most developing countries, heterogeneity and low levels of education also represent their under-developed industrial sector where demands for skills increase at a much unequal rate when compared to demand for unskilled workers. Another reason for the rise in the relative wage gap in developing countries with low levels of education would be an effort towards import substitution by protecting the industrial sector. Import substitutions leads to higher premiums to skilled labour. Furthermore, developing countries protect unskilled-labour intensive goods prior to liberalization. So after liberalization, the producers of unskilled intensive goods face increased costs amid more outside competition, and their real wages and living standards decline in the absence of government subsidies.

Table 5.8
Interactions between Openness/ Trade Policy and Average Skills

Independent Variables	Dependent Variable: Theil99dev									
	1	2	3	4	5	6	7	8	9	10
Interaction Terms										
Lcopen × Skill99	0.0062 (2.25)**									
Impen85 × Skill99		0.0002 (1.67)*								
Impen82 × Skill99			0.00013 (1.64)*							
Tars85 × Skill99				0.00012 (1.87)*						
Tars82 × Skill99					0.0001 (1.64)*					
Tariffs × Skill99						-0.002 (-1.82)*				
Owti × Skill99							-0.053 (-1.9)**			
Totimpv85 × Skill99								-0.001 (-2.1)**		
Owqi × Skill99									-0.087 (-1.30)	
Nontar85× Skill99										-0.002 (1.96)**
Average Skills, 1999										
Skills99	-0.0279	-0.0034	-0.001	-0.005	-0.002	0.031	0.013	0.011	0.021	0.018
	(-1.80)*	(-0.27)	(-0.05)	(-0.41)	(-0.17)	(1.09)	(1.24)	(0.95)	(0.16)	(1.25)
N	64	55	54	55	53	47	54	52	54	52
F	2.42*	1.46	1.45	1.80*	1.42	1.56	2.14*	2.48**	0.98	2.15*
R2	0.63	0.51	0.53	0.52	0.52	0.18	0.42	0.48	0.32	0.28

t- Values in the parentheses.***, **, * denotes significance at 1%, 5 % and 10% levels respectively
Standard errors are corrected for as run Durbin-Wu-Hausman test (augmented regression test) for endogeneity (see Davidson and MacKinnon. 1993)×

Table 5.9
Budget allocated to higher education, 1990-94

EAST ASIA	% of Overall Education Budget
Malaysia	17
Thailand	17
Indonesia	18
Korea, Rep.	8
Average (simple)	15
LATIN AMERICA	
Argentina	17
Brazil	26
Chile	20
Colombia	17
Costa Rica	31
Dominican Republic	11
Ecuador	23
Honduras	20
Mexico	14
Uruguay	25
Venezuela	35
Average (simple)	22

Source: UNDP (1997) citing Birdsall, Nancy, 'Education: the People's Asset', CSED Working Paper No. 5, 1999

Yet there is another factor which can cause a rise of wage inequality. Does wage inequality in developing countries also follow the 'Pareto principle' where a rise in wages of 'higher educated' would be more than 'only educated'? Are we capturing an element of within group inequality also when we say that wage inequality between skilled and unskilled is rising? Because a rise in within group inequality can also capture a rise in wages of skilled labour which would be disproportional to not only less educated (low skilled) but also uneducated (unskilled). Is technical bias affecting the wages of highly skilled or "the proportional rise in returns to skills is across the board (for all education levels)"? By answering these questions, we can know 'how much education matters' and 'what level of education matters most'.

There is evidence of uneven development within the education sector. To chase good jobs, most developing countries have opted for a short cut. There is evidence that developing countries invest on higher levels of education more than all levels of education. As shown in Table 5.9, the

share of public spending on education in Latin America allocated to higher education has tended to be high—more than 20 per cent on average, compared to 15 per cent on average in East Asia. Venezuela and South Korea are extreme examples of this phenomenon. While in the early 1990s Venezuela allocated 35 per cent of its public education budget to higher education, South Korea allocated just eight per cent of its budget to post-secondary schooling. Public expenditure on education as a percentage of GNP was actually higher in Venezuela (5.1%) than in Korea (4.5%). However, after subtracting the share going to higher education, public expenditure available for basic education as a proportion of GNP was considerably higher in Korea (3.6%) than in Venezuela (1.3%).

Birdsall (1999) summarizes the debate on education and inequality with reference to Latin America and East Asia:

> 'By giving priority to expanding the quantity of education and improving quality at the base of the educational pyramid, East Asian governments stimulated the demand for higher education, while relying to a large extent on the private sector to satisfy that demand. In Latin America, government subsidies have disproportionately benefited high-income families whose children are much more likely to attend university. At the same time, low public funding of secondary education has resulted in poorly qualified children from low-income backgrounds being forced into private universities or opting out of the education system at higher levels.' (11)

The unequal education policies have resulted in rising social inequalities. The literature suggests that in most developing countries skills are unevenly distributed. (Ravallion 2003) Thomas, Wang and Fan (2000) and Domenech and Castello (2002) find that Gini coefficients of the distribution of human capital in sub-Saharan Africa and South Asia are the highest (most unequal) in the world. Berthelemy (2004) arrives at the same conclusion not only for sub-Saharan Africa and South Asia, but also for the Middle East and North Africa (MENA). The distribution of public resources on education is highly unequal, as shown in Table 5.10 based on Chowdhury (1994). The higher education bias widens disparities in incomes among different skill levels, following greater trade liber-

alization. In many countries a considerable proportion of public expenditures for education benefits middle and upper-income families, because richer groups are overrepresented at all levels of education, particularly at the university level. Table 5.10 illustrates that in African countries, public expenditure per student on higher education is 28 (Francophone Africa) and 50 (Anglophone Africa) times greater than the level on primary education. For developing countries as a whole, only seven per cent of the relevant population enrol in higher education.

Table 5.10
Public expenditure per student as a % of per- capita GNP by region (circa 1980)

Region	Primary	Secondary	Higher
Anglophone Africa	18	50	920
Francophone Africa	29	143	804
South Asia	8	18	119
East Asian and Pacific	11	20	118
Latin America	9	26	88
Middle East and North	2	28	150
Africa	14	41	370
Developing Countries	22	24	49

Source: Mingat and Tan (1985) cited in Chowdhury (1994).

The author already finds evidence that by ignoring 'education for all', developing countries have increased the wage gap among the labour force based on skill differentials. Here the author examines whether skill biased technical change benefits higher levels of education more. *Interaction(OPEN×Skills99) and Interaction(TP×Skills99)* will capture the trade effect of higher education on rising skill returns in developing countries. Table 5.11 finds supporting evidence that higher skills are related with wage inequality in developing countries. Higher coefficients for all cases when significance is achieved (columns 1, 4, 7, 8 and 10) for '*Hyr99* interaction terms' in comparison to coefficients for '*Skills99* interaction terms' suggest that wage inequality is more sensitive towards higher levels of education. The technical bias favours higher skills more than skills (secondary or primary education). It confirms that preference to higher

education in developing countries is causing distortions in labour markets where by following "Pareto Principle" the labour with higher levels of education earn more than just educated while uneducated are worse off.

Table 5.11
Interactions between Openness/ Trade Policy and Higher Skills

Independent Variables	Dependent Variable: Theil99dev									
	1	2	3	4	5	6	7	8	9	10
Interaction Terms										
Lcopen × Hyr99	0.1001									
	(1.85)*									
Impen85 ×Hyr99		0.002								
		(1.34)								
Impen82 × Hyr99			0.002							
			(1.35)							
Tars85 × Hyr99				0.002						
				(1.67)*						
Tars82 × Hyr99					0.002					
					(1.49)					
Tariffs × Hyr99						-0.004				
						(-0.82)				
Owti × Hyr99							-1.013			
							(-1.9)*			
Totimpv85 × Hyr99								-0.007		
								(-2.2)**		
Owqi × Hyr99									-3.221	
									(-0.59)	
Nontar85× Hyr99										-0.01
										(-1.89)*
Higher Skills, 1999										
Hyr99	-0.408	-0.056	-0.093	-0.067	-0.106	1.066	0.219	0.123	0.4601	0.213
	(-1.53)	(-0.33)	(-0.63)	(-0.40)	(-0.73)	(0.58)	(1.17)	(0.60)	(0.56)	(0.81)
N	62	54	53	54	52	46	53	51	53	51
F	2.63*	0.85	0.98	1.31	1.14	0.37	2.06*	2.39*	0.19	2.75*
R2	0.61	0.54	0.58	0.54	0.56	-	0.46	0.48	-	0.21

t- Values in the parentheses. ***, **, * denotes significance at 1%, 5 % and 10% levels respectively
Standard errors are corrected for as run Durbin-Wu-Hausman test (augmented regression test) for endogeneity (see Davidson and MacKinnon. 1993)

There is already rich evidence available which suggests that with additional years of schooling returns to schooling rise. In macro economic studies, returns to schooling have been analyzed with respect to its relationship with household incomes and wages. For micro level data also, *Mincerian wage equation* (1974) shows a positive relationship between school attainment and returns to schooling. (Mincer, 1974) Distance from the school or school availability have been used in literature to instrument for returns to schooling.

If not instrumented for, income level of a country would also determine returns to education.) In other words, returns to education for each additional year of schooling may be higher for countries that have higher GDP per capita. (Krueger and Lindahl, 2001) If returns to education are endogenously determined by income, they would be endogenously related with the process of income generation also. In other words, trade which is positively associated with incomes then have a role to play in returns to education. Trade liberalization, which brings skill bias technical change, should affect returns to education positively. Hence we rightly instrument years of schooling with FR trade shares in the interaction terms to explain wage inequality. Wage inequality if linked with education would then actually explain relative returns to education in a country. In this chapter, our empirical frame work has actually captured the disproportional rise in returns to education (rising wage inequality) due to trade liberalization which favours education and higher levels of education even more. This is to say that we also find that returns to schooling rise with additional years of schooling and the relationship is a dynamic one to determine rising wage inequality in developing countries. Higher levels of schooling are more sensitive to wage inequality than over all levels of education.

By taking the cue from previous chapters, the non linear relationship between different levels of education and its economic outcomes can also be extended to social returns to education and its potentially dual role. The different effects of different levels of education on economic development in this context are quite nicely stated by Krueger and Lindhal) ' The social return (to education) can be higher because of externalities

from education, which could occur, for example, if higher education leads to technological progress that is not captured by in the private return to that education, or if more education produces positive externalities, such as a reduction in crime and welfare participation or more informed political decisions. The former is more like if human capital (education) is expanded at higher levels of education while the latter is more likely if human capital (education) is expanded at lower levels' (1107)

Developing countries can invest in higher levels of education to exploit social externalities which can generate and sustain technical progress amid globalization. However, social returns to education by raising overall education level may carry more deep rooted positive effects in the economy. The results strongly support in favour of raising over all education levels in the society that is not only good for the distribution of labour market returns but analysis in chapter 2 and 4 suggest that 'education for all' has a strong correlation with larger economic development of the country. Human development precedes or accompanies economic growth in order for development to occur. (Ranis and Stewart, 2001)

The education bias of trade liberalization can be exploited in favour of the poor in a country through investments in all levels of education. That is one way to make trade induced growth good for the poor. The unequal returns to education in a dynamic trade fame work may partly explain why initial levels of education (captured by endogenously determined average years of schooling) are more closely related with good economic outcomes than higher education attainment (endogenously determined improved level of schooling) in developing countries as also pointed out by other studies (see i.e., Krueger and Lindahl, 2001).

This is not to say that basic education in itself as a target is enough. When the economy begins to trade more with the outside world, perhaps there is a need for a balanced education policy in the South. Providing the necessary higher/technical education should not, however compromise the achievement of primary education. Investing in higher education may not be as effective as investing in overall education levels of the population. Primary education is the first step towards a more skilled

labour force, and it is a pro-poor policy, as the overwhelming majority of the poor remain uneducated. (Mamoon 2005)

In the immediate time frame, in order to minimize the positive effects of trade on wage inequality in developing countries, one solution is to trade among each other, where more trade may take place in low skill intensive goods but developing countries can also trade in relatively skill intensive produce. As mentioned in chapter 3, developing countries lie in a heterogeneous plain where some may be following relatively skilled intensive (in local terms) production activities. Regional trade can absorb the negative effect of skill bias technical change. However in the longer run, investment in education sector would remain the key factor to effect wage dispersion in developing countries. More resources in education sector need to be channeled to secondary and primary education levels in addition to higher education as suggested by Acemoglu (2001).

5.4 Conclusions

In summary, the discussion here suggests that the earning inequalities in developing countries have two important determinants. First, there are significant entrenched inequalities in educational attainment. Second, increased international trade transforms these education inequalities into wage inequalities by favouring skilled labour over unskilled labour. In line with previous studies, this analysis found that education might be central to explaining the increasing gap in relative wages between skilled and unskilled workers in developing countries. Although the analysis supports the argument that those countries with a higher initial level of human capital do well on the inequality front, it also suggests that human capital, particularly the part related to higher education, which accrues after trade liberalization has in-egalitarian effects. Governments in developing countries tend to invest more in higher education at the cost of primary education in order to seize short-term benefits from globalization.

One reason for this bias towards higher education, in education policies in developing countries may lie in the belief that elementary education has a very limited direct role in determining growth rates. According

to Barro (1999), the rate of economic growth responds more to secondary or higher education levels rather than elementary schooling. International trade in manufacturing and services is one of the key engines for growth. This often requires college graduates or those who have at least finished high school. One reason why India and China became havens for international outsourcing and trade is that they have managed to accumulate relatively educated and skilled human capital by investing in higher education.[2] In the last two years, the United States has lost two million manufacturing jobs to China, India and other third world countries, mainly in the Far East. Consequently, in 2001, the manufacturing sector in the US shrank to just 18 per cent of GNP from 48 per cent in 1950 and it is expected to recede to just 10 or 11 per cent within the next 10 years[3]. Forrester Research, a market research firm predicts that at least 3.3 million white-collar jobs and $136 billion in wages will shift from the US to low-cost countries by 2015 and most of them will find their way to Indian or Chinese centers[4]. Countries in the South that are set to benefit most from globalization are those that transformed at least a *segment* of their labour force into a relatively skill intensive force by investing in higher education programs. Therefore, it is no surprise that in order to be competitive, many developing countries have a tendency to invest in higher education at the cost of primary education to achieve greater growth. For example, Pakistan's current education policy skews towards higher education. In fiscal year 2003, the government increased its higher education budget to Rs 5 billion from Rs 800 million five years ago—an increase of nearly 400 per cent. In 2004, the government doubled the previous year's expenditure on higher education. In contrast, the budget for primary education increased by a meager average of 4 per cent per annum for the last few years. This apparent pro-growth higher edu-

[2] In other export areas such as textiles, which use unskilled labour intensively, these countries vast populations dictate that the skilled-unskilled premia will not narrow even if the absolute real wages of the unskilled increased.

[3] http://www.freenewport.com/us/useconomy.asp

[4] http://www.tribuneindia.com/2004/20040223/login/main1.htm

cation policy of Pakistan at the expense of primary education may very well accelerate growth, but it excludes the poor and unskilled and will likely lead to increased wage and income disparities in the country.

As noted earlier, governments in developing countries tend to focus their education policies on higher education in anticipation that this investment will yield quick dividends in the current international business environment. Although they are right, they need to realize that promoting higher education at the cost of primary education breeds greater income inequality in the absence of countervailing policies and is not pro-poor. Consequently, governments need to increase the mean level of human capital through a balanced education policy where primary education is valued as much as higher education. An equitable education policy will decrease the skilled-unskilled wage premium, as the overall supply of low skilled and uneducated workers decreases and the supply of educated workers increases, as well as give rise to general equilibrium effects that reduce wage inequality. Additionally such policies are consistent with the millennium development goals (MDGs). This researcher agrees with the recent World Development Report (2006), which suggests that wider access to education and jobs could 'level the economic playing field' and improve livelihoods.

These results also have implications for the speed at which trade policies are liberalized. Developing countries require time to adjust to an open regime because of their low-skill level stocks; the implication being that better educated nations should liberalize faster. If skill levels were homogenously distributed, free trade would lead to a more-equal and pro-poor growth. In the short-run, it may be wiser for developing economies to first look for regional trade agreements by following the model of the European Union; something that is not easy to achieve amongst poor countries who contemporaneously do not trade much with each other. But there may be potential in that direction. The rationale for regional trade is that developing countries lie in a heterogenic plain where each country is located at different rungs of the technical ladder. To climb the ladder, the more efficient way may lie in increased South-South trade rather than North-South trade in a regional framework as in

the case of ASEAN (Association of South East Asian Network). Similar trade agreements would enable developing countries to liberalize their economies slowly, while at the same time enabling their workforce to ascend the skill ladder. (Mamoon 2004)

Table 5.1
List of Countries for Theil Index (Theil99devloping)

Afghanistan (1988)
Algeria (1997)
Angola (1993)
Argentina (1996)
Bahamas, The (1990)
Bahrain (1992)
Bangladesh (1990)
Barbados (1997)
Belize (1992)
Benin (1981)
Bhutan (1989)
Bolivia (1997)
Botswana (1997)
Brazil (1994)
Burkina Faso (1981)
Burundi (1990)
Cameroon (1997)
Cape Verde (1993)
Central African Republic (1993)
Chile (1997)
China (1985)
Colombia (1997)
Congo, Rep. (1988)
Costa Rica (1997)
Cote d'Ivoire (1997)
Cuba (1988)
Cyprus (1997)
Dominican Republic (1985)
Ecuador (1997)
Egypt, (1997)
El Salvador (1997)
Equatorial Guinea (1990)
Eritrea (1988)
Ethiopia (1997)
Fiji (1997)
Gabon (1994)
Gambia, The (1981)
Ghana (1995)
Guatemala (1997)
Haiti (1988)
Honduras (1994)
Hong Kong, China (1997)
India (1997)
Indonesia (1997)
Iran, Islamic Rep (1993)
Iraq (1985)
Jamaica (1990)
Jordan (1997)
Kenya (1997)
Korea, Rep. (1997)
Kuwait (1997)
Lesotho (1994)
Liberia (1985)
Libya (1980)
Macao, China (1997)
Madagascar (1988)
Malawi (1997)
Malaysia (1997)
Mauritania (1978)
Mauritius (1997)
Mexico (1997)
Moldova (1994)
Mongolia (1994)
Morocco (1997)
Mozambique (1994)
Myanmar (1997)
Namibia (1994)
Nepal (1996)
Nicaragua (1985)
Nigeria (1994)
Oman (1997)
Pakistan (1996)
Panama (1997)
Papua New Guinea (1989)
Paraguay (1991)
Peru (1994)
Philippines (1997)
Puerto Rico (1997)
Qatar (1994)
Rwanda (1985)
Saudi Arabia (1989)
Senegal (1997)
Seychelles (1988)
Singapore (1997)
Somalia (1986)
South Africa (1997)
Sri Lanka (1994)
St. Vincent and the Grenadines (1994)
Sudan (1972)
Suriname (1993)
Swaziland ((1994)
Syria (1997)
Togo (1981)
Thailand (1994)
Tonga (1994)
Trinidad and Tobago (1994)
Tunisia (1997)
Turkey (1997)
Taiwan (1997)
Tanzania (1990)
Uganda(1988)
United Arab Emirates (1985)
Uruguay(1997)
Venezuela (1994)
Western Samoa (1972)
Yemen (1986)
Zambia (1994)
Zimbabwe (1997)

6 Costs of Not Loving thy Neighbour as Thyself: Explanations behind India-Pakistan Rivalry

'Non-violence and truth are inseparable and presupposes one another.'
Mahatma Gandhi, 1939,

6.1 Introduction

Motivations to conflict may include such factors as historical grievances, clash of civilisations (Huntingdon 1996) or pure avarice. Outright hostility between states implies the absence of peaceful cooperation, manifesting itself in diminished interstate commerce, which in turn could further exacerbate the rivalry between the same countries. This paper is concerned with inter-state rivalry between India and Pakistan. Civil war is the most dominant form of war at present (see Harbom, Högbladh and Wallensteen 2006 for data and Murshed 2002 for a theoretical overview). Despite the preponderance of civil war, interstate rivalry has not withered away, and these too can divert substantial amounts of resources away from poverty reduction in developing countries.

International trade allows one country to benefit peacefully from endowments of another nation through voluntary exchange. Furthermore, free trade integrates the world economy. War is another way of expropriating the endowments of another country, but it is costly as it destroys part of both countries pre-existing wealth. Predation is an alternative to production, but it is not usually the most efficient, as predation (war or other forms of larceny) unnecessarily wastes resources. Such unenlightened behaviour may be rational or optimal from the standpoint of the

individual person or nation, but is inefficient in the global sense. The work of Francis Edgeworth, writing in the late 19th century, provides a useful starting point in understanding the economic rationale for violence. Edgeworth distinguished between consent—and its absence—in human economic interaction:

> The first principle of Economics is that every agent is actuated only by self-interest. The workings of this principle may be viewed under two aspects, according as the agent acts without, or with, the consent of others affected by his actions. In wide senses, the first species of action may be called war; the second, contract. (Edgeworth 1881: 16-7)

International economic interactions between nations may involve peaceful trade or it could be belligerent with reduced economic interaction. Outright war is just one manifestation of the rivalry between nations; armed peace is equally consistent with aggressiveness. India and Pakistan are a case in point with at least four large-scale military confrontations (1948, 1965, 1971 and 1999), but otherwise spend a great deal of time in uncompromising posturing with each other. India in particular, frequently accuses Pakistan of sponsoring terrorism in her territory, but occasionally they make goodwill gestures, such as sending out peace buses between cities like Delhi and Lahore, and agree to cricket tours. Less frequently, major concessions, mainly by Pakistan, such as President Musharraf's willingness to put aside the long-standing Pakistani demand and United Nations resolution for a plebiscite to settle the future of Kashmir, occur.[1] Figure (6.1) charts the hostility levels of the two states on a scale of 0-6. It has never been below two, but is usually at a high level of four, which measures belligerency short of outright war.

Both countries spend a considerable amount in military expenditure, measured as a proportion of GDP (see table 6.1). In fact, these two countries have among the highest military burdens in the world outside the Middle East. It is easy to surmise that such large-scale military expenditure detracts from development and poverty reduction in South Asia,

[1] See http://news.bbc.co.uk/2/hi/south_asia/3330031.stm.

which has the largest concentration of the world's poor, defined by purchasing power parity below $1 per day per-person.

Figure 6.1
Hostility between Pakistan and India

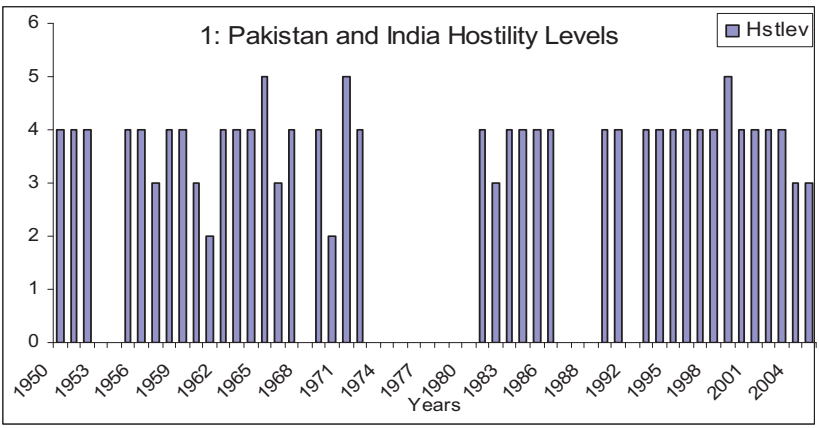
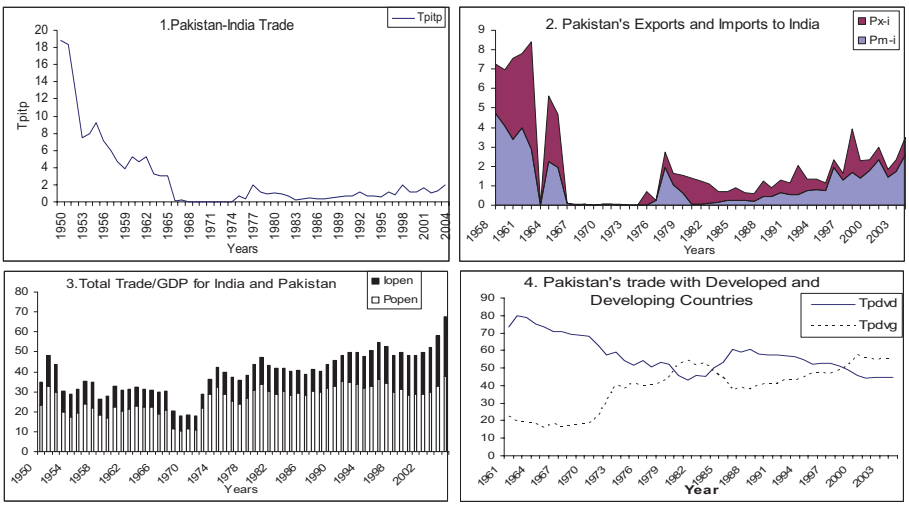


Table 6.1
Military burden in selected countries

Countries with Conflict	**Defence Expenditure** (% of GDP)	**Countries without conflict**	**Defence Expenditure** (% of GDP)
India (2004)	2.34	Canada (2004)	1.19
Pakistan (2004)	4.14	Germany (2004)	1.38
Egypt (2004)	2.76	Holland (2004)	1.73
Syria (2003)	6.97	Sweden (2004)	1.73
Israel (2004)	9.30	Argentina (2004)	1.01
Lebanon (2003)	3.92	Mexico (2004)	0.51
Saudi Arabia (2004)	7.70	Nicaragua (2004)	0.69
Oman (2001)	12.16	Panama (2004)	0.97
Yemen (1999)	5.28	Paraguay (2004)	0.70
South Korea (2004)	2.45	Peru (2004)	1.20
USA (2004)	3.98	Guatemala (2004)	0.40
UK (2004)	2.57	El Salvador (2004)	0.66

The most recent year for which data is available given in parentheses. Source: World Development Indicators (2006)

Figure 6.2
Patterns in India-Pakistan trade



Polachek (1997) and Polachek and Seiglie (2006) argue that wars and disputes between geographically contiguous states involve greater losses, as more efficient geographically proximate trade is displaced. [2] This effect depends on the absence of alternative trading partners, who despite greater distance may be equally or more efficient. Figure (6.2) shows that India-Pakistan official trade (as a proportion of Pakistan's total interna-

[2] When comparing trade and conflict with many nations, not just dyadic (pairwise) interactions, Dorussen (1999) argues that although trade reduces conflict, in the presence of many countries, an increase in the number of countries or the world's endowment may induce more conflict, as there are more countries to grab from. Formally, it lowers the minimum probability of military success needed to make conflict worthwhile in the presence or absence of trade with the target country. Hegre (2002) shows that by taking ratios of the probabilities (rather than differences as in Dorussen 1999) the benefits of trade rise as the number of countries increase. Thus, Dorussen (1999) establishes gains from conflict after globalisation, whereas Hegre (2002) models benefits from cooperation (or trade) as globalisation gathers pace.

tional trade) steadily declined from nearly 20 per cent in the early 1950s, plummeting to almost zero after their war in 1965, and has shown some signs of recovery in the 1990s. However, it remains below the levels of the 1950s, immediately after the two nations separated politically. This is despite the fact that India and Pakistan have relatively open economies at present. Pakistan has traditionally been more open than India (Figure 6.2, panel 3). Pakistan also trades more with developing countries compared to developed countries, as shown by panel 4 in Figure 6.2. Conflict and rivalry are symptomatic of the absence of cooperation including lower trade volumes. Equally, conflict is likely to be a consequence of the lack of trade.

A related issue concerns what is termed *democratic* peace[3], see Polachek (1997) and Polachek and Seiglie (2006) for a review of this substantial literature. The idea is that democracies will not fight each other because they share cultural norms that militate against forceful dispute resolution, or alternatively the checks and balances that characterise political processes in advanced democracies restrain violence. Put simply, the idea is that established democracies do not go to war with each other, but cooperate instead. The intellectual basis for this argument has been traced back to Immanuel Kant's (1795) work on the *Perpetual Peace*, where a like-mindedness referred to as *cosmopolitanism* would prevent outright war between republics; a tendency that could be reinforced by commercial interdependence. Polachek (1997) makes a case for the alternative notion of the *liberal* peace, presenting empirical evidence to suggest that advanced democracies cooperate, not because of their similar political systems, but due to their vast and multiplying intersecting economic interdependence. Barbieri (1996) demonstrates that the liberal peace based upon the specific effects of economic interdependence may be a chimera. Oneal and Russett (1999) and Hegre (2000) however, argue that economic interdependence reinforces peace, particularly be-

[3] Sometimes the literature refers to this concept as the liberal peace, which is a source of some confusion as some authors refer to the peace emanating from economic interdependence as the liberal peace.

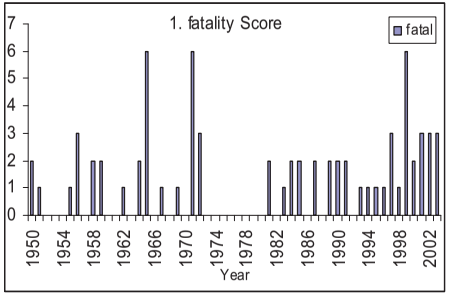
tween democracies. Perhaps we need a theory that embeds democracy with economic interdependence. Democracies however, may go to war with other, distant democracies that are culturally disparate and considerably poorer, something also echoed in Kant (1795). Indeed, Robst, Polachek and Chang (2006) present some evidence to suggest that more democratic nations could exhibit some degree of belligerence to less democratic countries, such as in the case of India's actions with Pakistan. Nevertheless increased democratic levels can mandate concessions and renegotiation with neighbours.

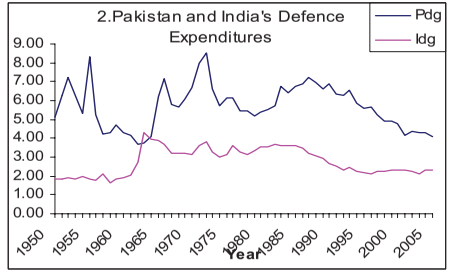
The Polity score of democracy (see, Polity 4 project) ranges from 0-10. Similarly, autocracy scores range between -10 to 0. Together the autocracy and democracy scores provide an average score, acting as an indicator of the overall political system, graphed in Figure (6.3). Panel 5 shows that India has one of the highest democracy scores in the developing world for the entire 50 year period (7-9), whereas Pakistan's experience with democracy fluctuates, with high autocracy scores associated with military coups in 1958, 1969, 1977 and 1999.

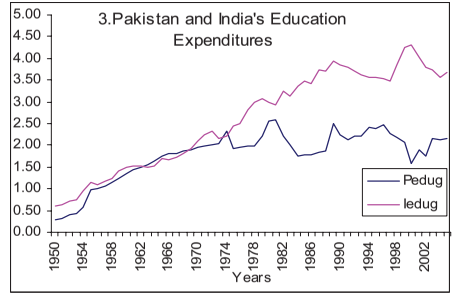
Comparisons of panels 2 and 3 in Figure (6.3) indicates that military expenditures tend to move inversely with development (education) expenditure, providing *prima facie* evidence that large military expenditure crowds out development in the social sector. Pakistan's military expenditure is consistently above India's except in the mid-1960s when India warred with both China and Pakistan. In Pakistan's case, military expenditure as a proportion of GDP has historically been at five per cent, but rose during and after its 1965 and 1971 wars with India to as high as eight per cent. The average defence expenditure of Pakistan is 5.5 per cent of GDP in the 1950-2005 period, whereas for India it is about half at 2.8 per cent of GDP. Since the 1990s military expenditure in Pakistan has been falling, and is now at a little above four per cent of GDP, which represents a historical low. As Indian education expenditure rose to four per cent of GDP in the 1990s, its defence expenditure fell from nearly four per cent of GDP in the mid-1960s to less than three per cent of GDP (it has rarely been below two per cent of GDP). Pakistan's public education expenditure is stagnating at around two per cent of GDP.

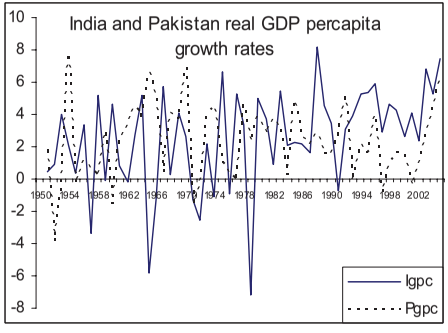
Figure 6.3

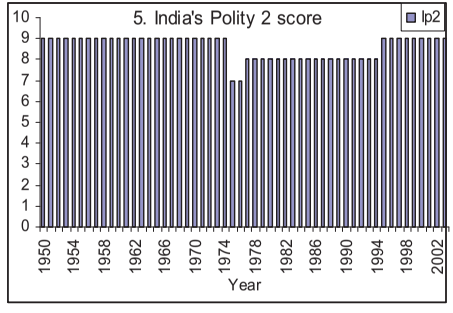
Conflict, development and democracy trends in India-Pakistan

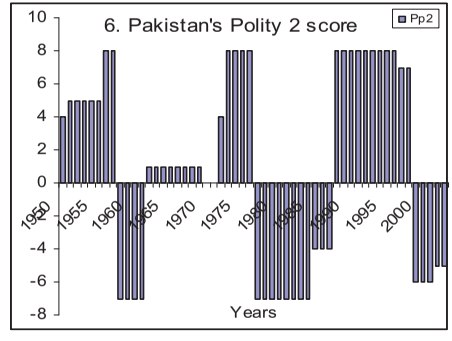












The opportunity costs of conflict could rise when countries move to higher stages of economic development as they have more to lose from conflict, and more resources to negotiate peaceful settlements. The 1990s were a golden decade for India as GDP growth rates on average in the Indian economy grew at five-to-six per cent annually. Pakistan has been growing at an average of six per cent for the last three-to-four years. Traditionally, from the early 1960s up to the early 1990s, Pakistan was the faster growing economy of the two. Both countries are in the second most rapidly growing region (South Asia) in the world. (World Development Indicators 2006)

There is more to the India-Pakistan conflict than Pakistan's political orientation and a comparison of bilateral economic growth rates. Despite high growth rates and relatively high democracy scores in Pakistan up to 1999, conflict between the countries escalated in the 1990s. Recently Pakistan with a strong military orientation, and therefore less democratic, has bee making major unilateral concessions to India with regard to their long standing disputes over Kashmir. Does this relate to the recent impressive growth record in Pakistan? Perhaps to understand conflict between these two nations it is best to use a multivariate framework that accounts for all the relevant variables and processes (economic performance, integration with rest of world, trade between conflicting nations, military expenditure, democracy and population). The purpose of this chapter is to examine whether greater interstate trade, democracy and reduced military spending lower belligerence between India and Pakistan. This chapter also investigates the causal links between bilateral conflict and these variables in a time-series framework, between 1950 and 2005 in most cases.

The rest of the chapter is organised as follows: section 6.2 covers the history of India and Pakistan bilateral relationships since 1947 to give a better perspective to the reader regarding the conflict; section 6.3 contains a brief review of liberal peace literature explaining how economic interactions abate conflict, section 6.4 contains the theoretical model of strategic interactions of cooperation under principle agent mechanism fitting India and Pakistan relationships, section 6.3 presents the econo-

metric analysis on the various determinants of conflict in light of these strategic interactions and section 6.4 concludes.

6.2 India Pakistan Conflict from a Historical Perspective

Pakistan and India have long standing history of hostilities and lack of cooperation. A brief look into history is also necessary to understand the dynamics of conflict better. India and Pakistan emerged as separate nation states in August 1947, when British India was partitioned following independence from colonial rule. Latterly, in 1971, the Eastern wing of Pakistan separated to become Bangladesh. In many ways, India and Pakistan share a common heritage, including overlapping languages and ethnicities, as two major provinces of British India were split up in the partition process (Punjab and Bengal). The ostensibly differentiating factor is religion; although Pakistan is predominantly Muslim, up to 10% of India's population continues to be Muslim, and as much as 15% of Bangladesh's population is non-Muslim.

The hostility between India and Pakistan dates back to the very inception of these countries as independent states. They have had six wars or fatal conflicts; three over the disputed territory of Kashmir in 1947-48, 1965 and 1999, the Rann of Kutch in 1965, one in connection with the secession of Bangladesh in 1971, and sporadic fighting over the uncharted Siachen Glaciers in the 1980s. The territorial dispute over Kashmir remains unresolved. Even when they are not engaged in outright war, Indian and Pakistani troops confront each other every day, with fingers literally on the trigger, along the ceasefire line or line of control established on 1st January 1949 in Kashmir. India also unilaterally amassed troops more generally along the Pakistan border in 1951 and 2002. India has, with considerable justification, accused Pakistan of fomenting, aiding and abetting the insurgency in Indian Kashmir since 1989, and wider acts of terrorism inside India (with less justification). India is not a signatory to the nuclear non-proliferation treaty, and Pakistan refuses to become party to this agreement unless India does. Both nations have a long history of accusing each other of espionage and sabotage. Despite these hostilities there are a few hopeful signs. India and Pakistan successfully

resolved any potential riparian disputes over the Indus in 1960. They do engage in talks, make occasional goodwill gestures involving travel links, and regularly engage in sporting exchanges, especially cricket tours.

Any search for the seeds of conflict between these two countries will stress the saliency of the Kashmir territorial dispute.[4] Kashmir was not directly ruled by the British, but was a quasi-autonomous princely state with a Hindu prince ruling over a predominantly Muslim population. The partition plan allowed princely states to opt for either India or Pakistan. While not a single princely state with a Hindu population was permitted to join Pakistan, the Hindu ruler of Kashmir was persuaded to accede to India; see Korbel (1954). This angered many, including tribesmen in Pakistan's North-West Frontier Province alongside Afghanistan. The tribal incursion into Kashmir led to a response by the regular Indian army, and later irregular and regular Pakistani forces were drawn into the fray. The rest is history, but the majority of Kashmir is in India (including the Kashmir valley) and Pakistan controls the smaller and more rugged mountainous chunk of Kashmir. The UN brokered ceasefire of 1949, which is still the *de facto* frontier at present, envisaged a plebiscite to determine the fate of Kashmir, but it has never been implemented due to Indian reservations.

But besides this seemingly irresolvable territorial dispute, there are other historical and cultural factors that have made the people of these two countries grow apart. These processes are embedded in the undivided Indian nationalist struggle for self-government. Following the formation of the Indian National Congress in 1885, another organisation, the Muslim League appeared in 1906, dividing the nationalist movement along sectarian lines (Wolpert, 2002). While many Muslims continued, and still continue, to be members of the Congress the real dispute between the two communities (the Hindu majority and the sizeable Mus-

[4] The first Indian Prime Minister, Jawaharlal Nehru's ancestry is from Kashmir, and in the acronymous version of Pakistan the letter K denotes Kashmir, originally conceived by a Cambridge undergraduate, Choudhary Rahmat Ali, in 1933.

lim minority) was over the federal or con-federal nature of a self-governing India. As is well known, a Westminster style unitary government with a majoritarian or first past the poll electoral system, can under-represent a sizeable minority (as in the case of Catholics in the old Northern Ireland Parliament), as well as stifling regional autonomy. The Congress's obduracy over this issue caused Jinnah (the founder of Pakistan) to seek a different political path; see Wolpert (2002). Even as late as 1946, the Cabinet Mission plan for a future independent India conceived a federation of three largely autonomous states with only three common areas of federal competence: defence, currency and foreign affairs; see Wolpert (2002). This formulation was accepted by Jinnah and his Muslim League, but rejected by the Congress led by Nehru who favoured a unitary majoritarian system. Secondly, we have the trauma of partition in 1947. Both the Indian and Pakistani Punjab were ethnically cleansed; some 6 million refugees were forced to flee the Indian Punjab to Pakistan and similarly 4 million people from the other side (Moon, 1962). At least half a million (but more likely a million) died in the violence associated with the partition of the Punjab province alone, something that has prompted many writers, including Wolpert (2006) to describe it as an act of stupendous mismanagement by the colonial administration. Thirdly, the language that was common to all communities in Northern India, has grown, and is still growing, apart since the late 19th century. What used to be Hindustani has gradually metamorphosised into Urdu for Muslims and Hindi for non-Muslims. Finally, the draconian consular practices of the two countries inhibit travel and cultural exchange, despite the much vaunted cricket tours. Initially, the two countries shared a common currency and no visas were required for travel. Prior to the advent of satellite television films or music in common or commonly understood languages could not be viewed in the other country except through clandestine means. There is little in terms of rail and air links between the two nations that promote peaceful networks (Gleditsch, 1967).

6.3 The Liberal Peace Hypothesis

Nation states have long been regarded to exist in a state of non-contractual anarchy vis-à-vis each other, making the exercise of power or the gathering of power by war an opportunistic act. Yet there are beliefs that common values, and/or inter-state commerce will moderate or eradicate these war-like tendencies; see Doyle (1986) and Oneal & Russet (1997), for example. These views of the liberal peace, in turn, may be subdivided into two types of theories: one set emphasising common norms between nation states (with democracy at the kernel of these shared beliefs), and another highlighting that conflict or war seriously disrupts international trade, thereby reducing the gains from trade, and thus inducing a rational leadership to eschew war. The former notion is more idealistic, and the latter idea is predicated upon a rational calculus of the opportunity costs of lost trade.

The idealist version of the liberal peace can be traced back to Immanuel Kant, who in his essay on the Perpetual Peace (1795) argues that although war is the natural state of man, peace can be established through deliberate design. This requires the adoption of a republican constitution simultaneously by all nations, which *inter alia* would check the war-like tendencies of monarchs and the citizenry; the *cosmopolitanism* that would emerge among the comity of nations would preclude war. Additionally, commerce between nations would grease the machinery that keeps the peace.[5] We may refer to this strand of the liberal peace, where trade plays only an indirect role, as the 'Kantian' peace. So do democracies never fight each other? There are the assertions of some, for example Gartzke (2007) who argues that: "Democracy cohabitates with peace. It does not,

[5] Interestingly, Kant (1795) argued that such arrangements between nations might exclude distant lands, and aggressive wars, such as those associated with colonialism, might be waged against peoples deemed to be outside the pale of civilization. A similar point has been recently made by Gartzke (2007) in a different context where development and common goals precludes wars between countries at a similar level of development, but makes wars with distant countries at a lower level of development more likely.

by itself, lead nations to be less conflict prone, not even toward other democracies", (Gartzke, 2007: 170). Mansfield & Snyder (2005) have argued that the road to democracy for countries at an early stage in the democratisation process may contribute to the risk of conflict. This is because national sentiments may rise to the fore in the presence of weak institutions. This may apply to Pakistan, and even to India given its widespread poverty.

The second liberal view that trade between nations *directly* contributes to the peace can be related to the Baron de Montesquieu's, Spirit of the Laws (1748), where he states that commerce tends to promote peace between nations; mutual self-interest precludes war; trade also softens attitudes of peoples towards each other. The analogy of these views with contemporary neo-classical economic theory is that trade reproduces the integrated economy. Free trade in a Heckscher-Ohlin framework leads to product and factor price equalization, hence producing economic integration, even if nation states continue to be politically separated. Polachek (1980) found that nations with the greatest amount of trade were least hostile to each other, and a doubling of trade would lead to a 20% decline in hostility.

The trouble with the pacific interpretation of international trade is that during the two world wars of the 20th century, highly interdependent economies went to total war with each other. Consequently, the economic interdependence argument for peace needs nuancing. There is, indeed, considerable debate on the empirical validity of the opportunity costs of lost gains from trade deterring inter-state conflict. As with Polachek (1980, 1997), Oneal & Russett (1999) show that trade and peace are highly correlated. While all analysts agree that war impedes trade, the realist view is that countries may choose to disrupt their potential enemy's gains from trade by ceasing trade with them, even if this means hostilities. There are also instances of nations trading even when there are at war. Barbieri & Levy (1999), using an interrupted time series framework found little impact of war on trading relationships for 7 dyads from 1870. They argue that any disruption to bilateral trade caused by war is, in many instances, remedied after peace emerges. Both trade and war

produce winners and losers. Even if there are losses to the aggregate economy from war or diminished trade, some groups may gain, and these groups may be the more politically influential. These results were disputed by Anderton & Carter (2001). Kim & Rousseau (2005) emphasise the simultaneity problem or reverse causality running between economic interdependence and conflict; instrumenting for this difficulty on data for 1960-88 they find that conflict diminishes economic interdependence, but not the other way around, providing only partial support for the opportunity cost of trade liberal peace theory. Keshk, Pollins & Reuveny (2004) also come up with a similar finding. Other factors, besides trade, may be at work.

Hegre (2000) points out that economic interdependence reinforces peace, but between more developed economies. Russet & Oneal (2001) argue that it is the economic dependence on trade of the least dependent on the other member of a pair of nations that will determine the pacific effect of trade. In the same spirit, Martin, Mayer & Thoenig (2008) argue both theoretically and empirically that it is the potential disruption to a high degree of bilateral trade dependence, rather than their general exposure to multilateral trade that is conflict abating. Their theoretical model, however, emphasises the presence of asymmetric information in producing war.

Among the updates proposed to the liberal peace theory based on economic interdependence is the 'capitalist' peace notion of Gartzke (2007) where the notion of interdependence is nuanced and the saliency of international trade in goods and services minimised. He argues that the intensity of trade is the least important feature in the peace engendered by modern capitalism, although McDonald (2004) demonstrates that it is not just the trade intensity between nations, but a commitment to the policy of free trade, that may promote the liberal peace as it serves to dampen domestic protectionist and pro-war interests, as will be demonstrated by our analysis. The nature of advanced capitalism makes territorial disputes, which are mainly contests over resources, less likely as the market mechanism allows easier access to resources. The nature of production makes the output of more sophisticated goods and services in-

creasingly reliant on 'ideas' that are research and development intensive, and skilled personnel can be acquired through more open global labour markets. Moreover, the disruption to integrated financial markets makes war less likely between countries caught up in that web of interdependence. We might also add the fragmented nature of production with components produced in different international locations. Much of world trade is trade in components between the same multi-national firms across national borders. Gartzke (2007) argues that common foreign policy goals reflected in the membership of international treaty organisations also produce peace; a point also made by Dorussen & Ward (2008), except that they emphasise indirect network links. There is little in terms of financial and investment flows between India and Pakistan ruling out this aspect of the capitalist peace in their case. Moreover, the Kashmir territorial dispute is not about resources. There is, however, less foreign policy divergence now as compared to the past. India under Nehru (1947-64) veered towards the non-aligned movement, and was closer to the Soviet Union in the 1960s, 1970s and 1980s, from whom it obtained concessionary military assistance. Pakistan, by contrast, was a member of the long defunct military pacts such as the Baghdad Pact or CENTO (Central Treaty Organisation) and SEATO (South East Asian Treaty Organisation) during the height of the cold war, and the USA showed some favour to Pakistan and gave it some military aid during the late 1950s, early 1960s and 1980s. Pakistan also moved closer to its enemy's enemy, China in the mid-1960s, when India had a serious border dispute with China. The Soviet Union is long gone, there has been rapprochement between India and China, and the USA might be seen to view both Pakistan and India as allies in its war on global terror, even if it is less wary of India's nuclear power. In the light of Maoz et al. (2006) even if ethnic affinity between India and Pakistan has steadily declined for over a century; external policy divergence has probably diminished recently.

In short, only advanced and highly economically inter-dependent democracies would be at peace with one another, which possibly precludes developing countries like India and Pakistan. Dorussen & Ward (2009), however, rehabilitate the role of trade in producing peace

through a novel channel. They argue that trade has important *indirect* effects over and above the interdependence induced by bilateral trade. Increased trade generally, may do little to mollify war-like tendencies between a pair of countries, but if each of these countries interacts considerably with third countries, it will be not in their interests to go to war with each other, as it disrupts other links and networks. In other words, any two countries are unlikely to go to war with each other if there trade with the rest of the world is substantial even when their bilateral trade dependence is low. They label this phenomenon as *mutual* dependence; although our formulation based on general openness is different to theirs it will have a key role to play in our results. Figure 1 above shows the insignificant levels of bilateral trade between India and Pakistan, but figure 2 demonstrates their increasing exposure to world trade.

6.4 Theoretical Model

This section consists of two parts: the first deals with the costs of belligerent behaviour in a single country context where the losses are displaced trade and the crowding out effects of defence expenditure. The second examines the cost of peaceful behaviour modelling the disutility of making concessions to an adversary in a two-country setting. The situations modelled here pertain to limited warfare, with negligible effects on national endowments, or alternatively could model the costs of an armed peace associated with large security and military establishments. In many ways, conflict has similar effects as other forms of trade wars.

6.4.1 Costs of war

Beginning with a single country's decision-making with regard to belligerence, based on Polachek (1997). The welfare of either country (U) depends upon consumption (E), and security (S), entering the utility function in a separable fashion.

$$U = u(E, S) \tag{6.1}$$

where:

$$E = cQ - X + M - T \tag{6.2}$$

Q is the total endowment of the country where a proportion c is devoted to private and public non-military consumption and investment; a fraction *1-c* to a public good covering security or military expenditure. X and M denote exports and imports to the rival country, and T represents trade (exports minus imports) with the rest of the world. θ is the price of the exportable and the price of the importable is the numeraire good, normalised at unity. There is also a balance of trade constraint; the value of exports must equal imports:

$$\theta X(S) - M + T = 0, \ldots X_S < 0 \tag{6.3}$$

Following Polachek (1997) let us postulate that conflict disrupts trade. Specifically it lowers exports, but unlike in Polachek's model both countries are hostile towards each other and not just one country (described as the actor) against a passive target. Therefore, in this model, both countries' exports to each other will decline, along with ambiguous effects on the terms of trade. The country whose goods show greater demand elasticity will experience the negative terms of trade effect. Nevertheless, exports displaced by conflict are a loss, as they represent foregone trade, especially in the context of neighbours expected to trade substantially in peaceful circumstances. Substituting Eq. (6.3) as a constraint and Eq. (6.2) into Eq. (6.1) allows us to write a Lagrangian function (L), where λ indicates the Lagrange multiplier.

$$L = u(cQ - X + M - T; S) + \lambda[\theta X(S) - M + T] - C(S) \tag{6.4}$$

The function C represents the distortionary (taxation and crowding out) costs of security expenditure, which rises with S, so that the partial derivative is positive. This is an additional cost associated with security spending, absent in Polachek's (1997) model. The first order condition with respect to S is:

$$u_s = -\lambda X_s + C_s \cdots u_s, C_s > 0, X_s < 0 \tag{6.5}$$

In Eq. (6.5) the marginal utility of security (u_s) equates to its marginal costs. The latter (on the right hand side of (6.5)) is comprised of the trade disruption due to conflict, and the cost of diverting resources to military and security expenditure. This last effect is absent from the Polachek models. The cost of conflict is not just confined to displaced trade, it also has a distortionary resource cost because of security expenditure, either because of distortionary taxation or due to the crowding out effect on other forms of investment, including government spending on health and education. (see Deger and Sen 1990) Note that security expenditure and benefits derived from confronting one's enemy does yield positive utility, but comes at a price. Therefore, there is an additional cost of belligerent behaviour above losses from trade displacement, which is likely to be substantial because it detracts from poverty reduction directly. It is worth noting that trade costs and losses from resource misallocation are *a priori* likely to be greater for the smaller economy, Pakistan. The same will be true of the terms of trade, which are likely to deteriorate for Pakistan. This is because a smaller economy's exports to its larger neighbour are usually a greater proportion of its total exports; its goods may see more elastic demand and the costs of an arms race are larger for the smaller nation.

6.4.2 Cost of peace

If peace is Pareto optimal, why do countries not engage in it?[6] This section illustrates the costs of peace, which include psychic non-pecuniary costs of making concessions to one's adversaries. Additionally this chapter demonstrates how increased globalisation and democratisation could help to reduce conflict by lowering the cost of making concessions to one's neighbours. To analyse these factors requires a two-country expected utility model of non-cooperative strategic interaction.

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[6] Sir Normal Angell, winner of the 1933 Nobel Peace price and former editor of *Foreign Affairs*, in his great book *The Great Illusion,* asserted that nations could never enrich themselves through war, and even a victorious nation would come off economically worse from a war; see Angell-Lane (1910).

The two countries: India and Pakistan are indexed by subscripts *I* for India and *P* for Pakistan. There are two states of nature, denoted by superscripts: one more peaceful or *dovish* (*D*), and the other associated with greater *hawkishnes*s (*H*). Their probabilities are defined as π and *1* - π, respectively. An important feature of this model is that states of conflict, or peace, are relative. The probability of either an action (*a*) by India and effort (*e*) by Pakistan, in turn, affects either state. These are also the strategic variables employed by the two sides to the conflict. The current thesis postulates that the probability of the peaceful state π rises with the input of action and effort by the two sides, but at diminishing rates. One can imagine a range of activities by one or both sides if they wish to promote peace, including a greater willingness to compromise, reduce military expenditure, devoting more resources to peaceful economic development or a greater willingness to respond to calls for peace by third parties such as the UN or under pressure from the United States.

Actions and efforts to seek peace entail costs for each party. The costs of actions to promote peace could take a variety of forms, but above all, there is the loss of face to either party's hawkish domestic political constituencies, including the military establishment. Increased globalisation may augment the stock of rhetoric available to politicians who wish to push their peace agenda through the political process. Second, and in a more palpable sense, increased international trade and the growth it brings may provide the additional resources to buy off domestic war lobbies. A more democratic government, following military rule, may similarly use its mandate from the people to justify greater peace and reduced military expenditure.

The expected utility of India given by

$$U_I = \pi(a,e)U_I^D(E_I^D + S_I^D) + (1-\pi)(a,e)U_I^H(E_I^H + S_I^H) - Z(a(T)) \quad (6.6)$$

Where $U^D{}_I$ and $U^H{}_I$ denote utilities or pay-offs in dovish and hawkish states respectively, weighted by the probabilities of the two states. $E_I^D + S_I^D$, $E_I^H + S_I^H$ indicate the exogenous pair of payoffs from consumption and security expenditure respectively in the less belligerent and

more belligerent states respectively. The difference is that in the dovish state, security spending is lower and private consumption higher than in the hawkish state. There will also be more trade between the two countries. Most importantly, the dovish state's nature will imply greater poverty reduction. Z is the cost function of undertaking the action, a. Action a increases the probability of peace, π; however, undertaking it entails a cost,as described above. T indicates greater globalisation (more trade with the rest of the world), and this is postulated to reduce the cost of making peace via the cost function (Z) as discussed above, $Z_{a1} < 0$.[7] In addition, $\pi_a > 0$, but $\pi_{aa} < 0$, there are diminishing returns to these actions. Note however that both $Z_a > 0$ and $Z_{aa} > 0$.

Turning to Pakistan, we symmetrically have

$$U_P = \pi(a,e)U_P{}^D(E_P{}^D + S_P{}^D) + (1-\pi)(a,e)U_I{}^H(E_P{}^H + S_P{}^H) - L(e(T,P)) \quad (6.7)$$

L is the cost of effort, e, which increases the probability of peace, π. As with India, greater globalisation lowers the marginal cost of making peaceful concessions, but so does, a hybrid concept called increased democratisation (P) for Pakistan. Given the nature of swings between democratically elected governments and military rule; L_{e1} and $L_{e2} < 0$, while $\pi_e > 0$, but $\pi_{ee} < 0$, $L_e > 0$, and $L_{ee} > 0$.

In the non-cooperative or Cournot-Nash game played by the two sides, both sides move simultaneously. Each side maximises its own utility function with respect to its own choice variable. For India, it implies maximising utility, Eq. (6.6), with respect to a as shown by

$$\pi_a\left[U_I{}^D(\cdot) - U_I{}^H(\cdot)\right] = Z_a \quad (6.8)$$

Pakistan maximises Eq. (6.7) with respect to e

$$\pi_e\left[U_P{}^D(\cdot) - U_P{}^H(\cdot)\right] = L_e \quad (6.9)$$

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[7] Increased globalisation is unlikely to affect *directly* the marginal productivity of actions or efforts (a, e) that raise the probability of peace (π).

Note that in Eqs (6.8) and (6.9) each side will equate its marginal benefit from exercising their own strategic choice to the corresponding marginal cost. Each side's strategic choices will depend on the first order conditions given in Eqs (6.8) and (6.9), along with a fixed conjecture about the opposition's strategic choice. These lead to the (linear) reaction functions for both sides, obtained by totally differentiating Eqs (6.8) and (6.9) with respect to *a* and *e*. For India indicated by

$$\frac{de}{da/R_I} = \frac{Z_{aa} + \pi_{aa}\left[{U_I}^H(\cdot) - {U_I}^D(\cdot)\right]}{\pi_{ae}\left[{U_I}^D(\cdot) - {U_I}^H(\cdot)\right]} \gtreqless \ldots 0 \ldots if \cdots \pi_{ae} \gtreqless 0 \tag{6.10}$$

and for Pakistan by

$$\frac{de}{da/R_P} = \frac{\pi_{ae}\left[{U_P}^D(\cdot) - {U_P}^H(\cdot)\right]}{L_{ee} + \pi_{ee}\left[{U_P}^H(\cdot) - {U_P}^D(\cdot)\right]} \gtreqless \ldots 0 \ldots if \ldots \pi_{ae} \gtreqless 0 \tag{6.11}$$

Note that $\pi_{ae} = \pi_{ea}$ by symmetry.

The reaction functions are positively sloped if $\pi_{ae} > 0$, implying that the two strategies are complements. This is the standard assumption in the literature on conflict. In this model that the postulate is $\pi_{ae} < 0$, the choice variables are strategic substitutes and the reaction functions slope downwards (see Figure 6.4). This can occur because peace defines the strategy space. Thus if one side behaves more peacefully, it increases the utility of both parties behaving peacefully. Moreover, the other side may obtain a free ride on this action by not bringing about a corresponding increase in their action.

In Figure 6.1, two non-cooperative equilibria, illustrated by points N and C respectively where point C is more cooperative and peaceful with greater inter-country trade and poverty reduction. A shift from N to C can occur because of greater globalisation (rise in *T*) because of, say, the establishment of a free trade area, and increased international (not necessarily just bilateral) trade lowers the marginal cost of peaceful behaviour (Z_{a1}, $L_{e1} < 0$). Analytically this means a change in the first-order condition for India:

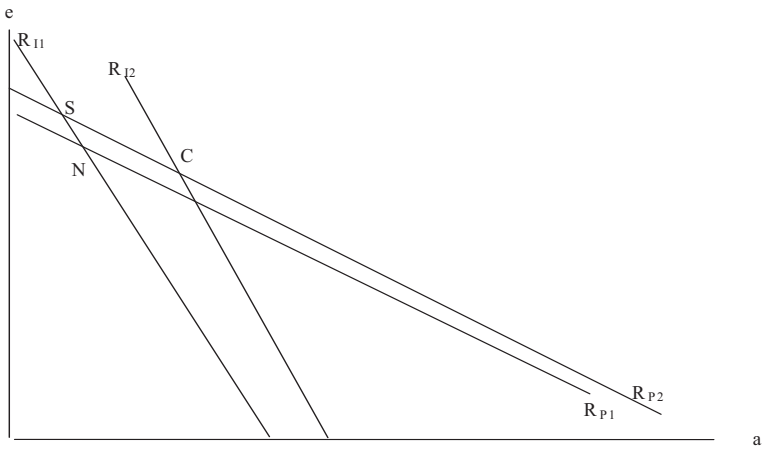
$$\pi_a\left[U_I^{\,D}(\cdot) - U_I^{\,H}(\cdot)\right] = Z_{a1}dT \tag{6.8'}$$

and for Pakistan

$$\pi_e\left[U_P^{\,D}(\cdot) - U_P^{\,H}(\cdot)\right] = L_{e1}dT \tag{6.9'}$$

This pertains to the liberal peace. Alternatively there could be a rise in the exogenous pay-offs in terms of consumption expenditure (*E*) in Equations (6.8) and (6.9') above, leading to the same outcome in Figure 6.4.

Figure 6.4
Reaction Functions of India and Pakistan



The costs of peaceful actions may be easier to bear when countries (in this case only Pakistan) are more democratic, as there may be a mandate from the people to engage in more poverty reduction, greater social sector spending and lower military expenditure. This corresponds to the democratic peace and causes the first order condition for Pakistan to become:

$$\pi_e\left[U_P^{\,D}(\cdot) - U_P^{\,H}(\cdot)\right] = L_{e2}dP \tag{6.9''}$$

This causes Pakistan's reaction function to shift outwards along India's, with a new equilibrium at point S. Note however, in the new equilibrium (point S) India has effectively passed on some of the burden of adjustment to Pakistan. In fact, the level of effort exercised by Pakistan is greater than even in the more cooperative solution (C), but not India's. It is feasible to argue that this is the case at present. As India moves closer to the United States and with the global war on terror, there are increased pressures on Pakistan to make unilateral concessions towards India since 2001. There is also room for the argument that India is free riding on Pakistan.

6.5 Empirical Analysis

6.5.1 Hypotheses

H_1: Greater bilateral interstate commerce, as well as greater multilateral trade with third countries lowers various forms of bilateral interstate conflict. This corresponds to the liberal peace. This hypothesis follows from the theoretical discussion, specifically the first order conditions in Eqs (6.8') and (6.9'), and inversely from the right side of (6.5).

H_2: More military spending because of increased insecurity raises conflict. The hegemonic power, however, may have internal conflict (India has many civil wars) and other neighbours to militarily confront. The marginal utility of security spending rises in Eq. (6.5), as well as in (6.8') and (6.9').

H_3: Development expenditure (such as public spending on education) should lower conflict, because of economic growth, which enables more consumption in Eqs (6.4) to (6.9''). This also relates to the increased democratisation hypothesis, below.

H_4: GDP growth will decrease interstate conflict; there is more to lose from war. This raises the utility from consumption in Eqs (6.4), (6.6) through to (6.9'').

H_5: Increases in dyadic democracy scores will lead to less conflict, related to the notion of the democratic peace. Increased democracy may lower

the cost of concessions and compromise with former enemies, as in Eq. (6.9'') above.

6.5.2 Data and methodology

Data

Since interstate conflict involves at least two parties, it is a dyadic concept. This current research involved constructing dyadic proxies for India-Pakistan interstate trade, military burden, development expenditure, economic development and democracy to test the five hypotheses presented above. Data definitions appear in the appendix.

Measuring conflict

The literature on interstate conflict classifies conflict data sets into two categories: 1) war data and 2) events data (Polachek and Seiglie 2006). War data sets focus on the more hostile aspects of interstate interactions such as crises, wars or militarised interstate disputes (Jones, Bremer and Singer 1996). The most comprehensive war data set is available under the Correlates of War Project (COW), which has updated war data sets employed by Wright (1942), Richardson (1960), and Singer and Small (1972). The other major data set on interstate armed conflict is hosted by the Uppsala Conflict Data Project (UCDP) with the collaboration of the International Peace Research Institute, Oslo (PRIO) and is collected on an annual basis and covers the full post-World War II period, 1946–2003.{update?} Events data focuses on all interstate events and bilateral interactions reported in newspapers. McClelland's (1978) World Events Interaction Survey (WIES) is probably the first of its kind based on bilateral interactions occurring during 1966-1992, reported in *The New York Times*. Azar's (1980) Conflict and Peace Data Bank (COPDAB) is an extensive longitudinal collection of about one million daily events reported from 47 newspaper sources between 1948 and 1978. Since this paper is interested in the evolution of the India-Pakistan conflict over the last 55 years, the Uppsala/PRIO and COW interstate war data set will be used instead of events-based data sets because the former data sets provide conflict data, which covers most of the period of 55 years (1950-

2005) selected for this analysis. Events data set is not available for the entire period. Although the events data set captures daily observations, the macroeconomic and democracy data varies annually, which limits the use of daily information on conflict. Second, as shown in graph 6.1, hostility between India and Pakistan has been high most of the last 55 years, enabling the COW data set to capture the severity of conflict during most of the dispute. Greater coverage by the COW and Uppsala data sets, and availability of macroeconomic and democracy data on an annual basis limits the scope of using the events data sets.

Six different measures of conflict are carefully compiled by using COW and Uppsala datasets:

1. Annual fatality Levels ranging 0-6 (*Fatal*)
2. Precise number of deaths (*Volfatal*)
3. Number of days of conflict in a year (*Dur*)
4. Highest action in disputes taken by both India and Pakistan (*Hiact*)
5. Annual hostility level severity (*Hstlev*)
6. Conflict intensity ranging 0-2 (*Cnf*)

There are several reasons for the selection of various proxies of conflict. The most appropriate proxy and the one which is most closely linked to conflict (or its severity) are number of deaths in the battlefield. Not only that, number of death variable has a higher level of variation among yearly observations but they are also more random, while subtly establishing nature of ongoing conflict which sometimes resulted in outright war. We know from *Hstlev* (figure 6.1) that hostilities have remained high through out periods of 1950-2005, but it is more interesting to know the ground realities of the battle field, where with the exceptions of three major wars when battle ground constitutes larger international borders between both States, Pakistan and India's exchange of fire concentrates on the 'Line of Control'. (See high conflict zone maps for India and Pakistan at the end of the chapter) There are two proxies for number of deaths in battle field. One is *Volfatal* capturing exact number of deaths and *Fatal* which capture annual fatality level to the scale of (0-6). *Volfatal* (exact number of deaths) have ever higher levels of variation among data, where number of deaths in three major wars

(1965, 1971 and 1999), reached highest thresh-holds of conflict (in thousands) with declaration of outright war and thus would appear as out-liars in such instances in the long term conflict where number of deaths have remained low (less than a 100). In contrast, the variation because of indexation in *Fatal* becomes more subtle as the score would only vary between 0 and 6.

That makes *Fatal* a preferred proxy and *Volfatal* as the second best one. *Dur* (Days of conflict), *Hiact* (Higest Action in disputes) and *Hstlev* (Annual Hostility Levels) are also useful proxies. They capture the severity of conflict with a different angle. Inclusion of these measures in the analysis would help us carry out robustness check for the results on *Fatal*. Larger set of conflict measures would enable us to evaluate the statistical validity of the larger model. Furthermore, utilizing more proxies of conflict provides better insight into the nature of conflict, especially when causality tests are undertaken. Remember, Causality tests would show which measures of conflict (if employed more than one, as in our case) would have an effect on our endogenous independent variables (i.e, military burdern, bilateral or multilateral trade).

Measuring international trade

Generally, the sum of imports and exports between actor and target countries captures dyadic trade. (Polachek and Seglie 2006) Graph 6.2 shows that in the last 55 years the patterns of interstate trade between Pakistan and India changed. Before trade between both countries collapsed to near zero in the early 1970s, Pakistan was exporting more to India. Since the 1970s, Pakistan imports more. In the 1950s, Pakistan and India's trade with each other constituted a significant amount of their respective total trade. However, after the 1965 war, India-Pakistan trade never reached more than two per cent of their respective total trade levels. Until the late 1980s, India had been a relatively closed economy, whereas Pakistan has traditionally been more open. The researcher constructed two composite measures of India-Pakistan trade. They are Pakistan's total trade with India as a percentage of Pakistan's total trade (*Tpitp*), and India's trade with Pakistan as a percentage of India's total

trade (*Tpiti)*. The expectation is for both trade proxies to relate negatively with conflict. It would be interesting to investigate whether trade between both countries as a share of each country's total trade also affects the responsiveness of bilateral trade in conflict mitigation. If trade reduces conflict, trade with more countries should reduce conflict even more. (Dorussen 1999) Thus, it is important to investigate how more trade with the rest of the world affects India-Pakistan hostilities. This research involves eight dyadic proxies to capture the combined international integration levels for both countries. Pakistan's total trade as a ratio of India's total trade (*Xmpi*), and its inverse, India's total trade as a ratio of Pakistan's total trade (*Xmip*) are the first two indicators. If both of these trade proxies relate negatively with hostilities, the clear conclusion is that any external trade competition does not increase bilateral rivalry between India and Pakistan, but instead both countries have similar trade policies or could integrate within regional bodies like SAARC (the South Asian Association for Regional Cooperation). However, any evidence of a positive relationship between conflict and these two trade proxies would suggest that the competition in international markets has significant implications in sustaining their rivalry.

Measuring military expenditure

Military expenditures can reflect hostility, as well as deterrence. (Polachek and Seglie 2006) In the India-Pakistan case, it is vital to examine how each county's military expenditure/military burden affects the dispute. Pakistan's spending on military expenditure as a proportion of GDP is higher than India's. Additionally, since military expenditures may also capture the capability of a country to deal with civil unrest or intra-state conflict, the high prevalence of continuing intra-state conflicts in various regions of India can also explain India's military expenditures. Pakistan has had fewer civil wars. This may mean that Pakistan's military burden captures its security concerns vis-à-vis India solely. If so, dyadic variables that take the military burden of Pakistan as a ratio of the Indian military burden, should affect conflict positively and vice versa. Here are the eight different dyadic proxies of military burden utilising data on

military expenditures as well as military personnel constructed from Correlates of Wars.

Military expenditures can either reflect aggression or deterrence, as we have posited above. We need to examine country specific dynamics of military spending to find out how each country's military expenditure/ military burden affects the dispute. We already know that Pakistan's spending on military expenditure as a proportion of GDP is higher than India's (figure 3). Additionally, since military expenditures may also capture the capability of a country to deal with civil unrest or intra-state conflict, Indian military expenditure can also be explained in terms of the high prevalence of continuing intra-state conflicts in various regions of India. Pakistan has had fewer civil wars. This may mean that Pakistan's military burden captures its security concerns principally vis-à-vis India. Thus to go beyond average dyadic investigation of the effect of military burden on conflict, we utilize 2 dynamic proxies of military burden which take military expenditure of Pakistan as a ratio of Indian military expenditure (*Lmilbrd2*) and the inverse (*Lmilbrd3)* in addition to taking average of India and Pakistan's military expenditures (*Lmilbrd1*). If, as we speculate, Pakistan's military burden is more closely related to conflict than India's, *Lmilbrd2* will have a positive sign and the inverse (*Lmilbrd3*) should have a negative sign, thus showing denominator effects of the inverse. (See Notes at the end of the chapter for details)

1. Log of Pakistan's defence expenditure over GDP as a ratio of India's defence expenditure over GDP (L*milbrd 1*).
2. Log of India's defence expenditure over GDP as a ratio of Pakistan's defence expenditure over GDP (L*milbrd 2*).
3. Log of Pakistan's defence expenditure over GDP as a ratio of Pakistan's defence expenditure over GDP plus India's defence expenditure over GDP (L*milbrd 3*).
4. Log of India's defence expenditure over GDP as a ratio of Pakistan's defence expenditure over GDP plus India's defence expenditure over GDP (L*milbrd4*).

5. Log of India's defence expenditure average over GDP and Pakistan's defence expenditure over GDP (*Lmilbrd5*).
6. Log of Pakistan and India's GDP weighted average of defence expenditures (*Lmilbrd6*). The proportion of military personnel to the total population represents the extent of militarisation in a society.
7. Log of Pakistan military personnel over Pakistan's total population as a ratio of India's military personnel over India's total population (*LMilppi*).
8. Log of India's military personnel over India's total population as a ratio of Pakistan's military personnel over Pakistan's total population (*LMilppi*).

Note that the first two proxies are the inverse of each other and expected to reveal the relative sensitivity of each country's military expenditure to conflict. Proxies 3 and 4 are a robustness check with military expenditures of each country divided by the combined military expenditure score of both countries. If *Lmilbrd3* is positively associated with conflict, this hypothesis can substitute for *Lmilbrd1*. If Pakistan's military expenditure is more closely associated with their bilateral conflict and if Indian military expenditure captures the element of deterrence, as well as belligerence with other national and international rivals, then the combined military expenditures should have lower explanatory value than Pakistan's military expenditure alone but the sign for combined military score should remain positive. This paper strives to investigate the average effects of military expenditures by both countries on India-Pakistan rivalry by taking two more proxies of military burden. This is to investigate whether military burden has on average a conflict enhancing effect, irrespective of country of origin, after analysing its country specific application for deterrence or belligerence.

Measuring democracy, growth and other variables

To capture democracy levels for India and Pakistan required use of the Polity IV project hosted by The Center for International Development and Conflict Management (CIDCM). Polity IV computes a combined

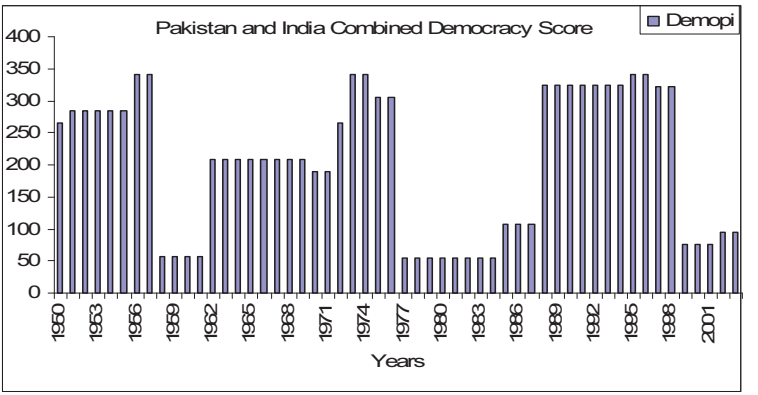
polity score by subtracting autocracy scores from democracy scores for the corresponding year. The value of this Polity score ranges from -10 to 10, where -10 denotes the highest autocracy level, and 10 denotes the maximum democracy score. Although India always takes a high positive value of seven or above, Pakistan frequently takes on negative values. The next step involved constructing a dyadic variable of democracy for both countries by multiplying their Polity scores, following Polachek and Seiglie (1969), adding 10 to each country's polity series to make the negative polity values positive so that the combined democracy score captures the variations in the democratisation process only on a positive scale. The dyadic democracy variable shows values as low as 50 on the scale of 0 to 400 when there are high levels of political dissimilarities between Pakistan (dictatorship) and India (democracy), and as high as 350 when both countries are governed by democracies (see figure 6.5).

The weighted average of India and Pakistan's real GDP per capita growth rates (Gpi) represents the dyadic proxy of economic progress for both countries. Constructing the series for both countries involved taking GDP at constant prices (taken from economic surveys) and dividing it by population levels. The researcher tallied the data using the GDP per capita series available in the World Development Indicators (2006) data set. The four different proxies of social development based on India and Pakistan's education data[8] are, GDP weighted average of per capita education expenditure; mean average of per-capita education expenditure; Pakistan and India's education expenditures as a ratio of Pakistan and Indian's GDP; and the average of Pakistan's education expenditure as a percentage of its GDP and India's education expenditure as a percentage of its GDP. Note that the first two proxies employ per-capita education expenditure and the last two proxies employ total education expenditure. The purpose of the four education proxies is to perform a robustness check on the role of education in conflict mitigation. India and Pakistan are two of the most densely populated countries in the world. Pakistan

[8] There is an insufficiently long time-series for public health spending data for India.

has 160 million inhabitants, and India has more than one billion. In line with earlier literature, this thesis also uses the mean average of both countries populations as a standardising variable in the analysis. (see Polachek 1997)

Figure 6.5
Dyadic democracy scores for Pakistan and India



Methodology

Any simple least square regression analysis may lead to spurious results because of endogeneity problems among the variables (from trade, military spending, social sector expenditure and growth to conflict and vice-versa). It seems necessary to utilise a simultaneous equation model to address potential endogeneity problems between various variables. Since the data is a time-series, it is appropriate to use Vector Autoregressive model (VAR), which is an extension of univariate Autoregressive (AR) models to capture the evolution and the interdependencies between multiple time-series. (Sims 1980) Treat all variables in a VAR symmetrically by including an equation for each variable explaining its evolution based on its own lags and the lags of other variables in the model. The number of equations in a VAR model depends upon the number of endogenous

variables; each endogenous variable is regressed on its lagged value, and the lagged values of all other endogenous variables as well as any number of exogenous variables. This solves the problem of endogeneity among variables. In this sense, VAR model is a seemingly unrelated regression (SUR) model with lagged variables and/or deterministic terms as common regressors so that one can interpret the regression results for each equation as ordinary least square estimators.

The basic $p-$lag vector autoregressive (VAR(p)) model has the form

$$Y_t = c + \Pi_1 y_{t-1} + \Pi_2 y_{t-2} + ... + \Pi_p y_{t-p} + \varepsilon_t \tag{6.12}$$

where c is a $(n\times 1)$ vector of constants (intercept), Π_i is a $(n\times n)$ matrix (for every $i = 1,...., p$) and ε_t is a $(n\times 1)$ vector of error terms.

A bivariate VAR(2) can be written as the following system of equations:

$$y_{1t} = c_1 + \Pi^1_{1,1} y_{1,t-1} + \Pi^1_{1,2} y_{2,t-1} + \Pi^2_{1,1} y_{1,t-2} + \Pi^2_{1,2} y_{2,t-2} + \varepsilon_{1t} \tag{6.13}$$

$$y_{2t} = c_2 + \Pi^1_{2,1} y_{1,t-1} + \Pi^1_{2,2} y_{2,t-1} + \Pi^2_{2,1} y_{1,t-2} + \Pi^2_{2,2} y_{2,t-2} + \varepsilon_{2t} \tag{6.14}$$

The lag length p has to be determined by model selection criterion (MSC) because too many lagged terms will consume more degrees of freedom and may introduce the problem of multicollinearity. Introducing too few lags will lead to specification errors. One way of deciding this question is to use Akaike (AIC), Schwarz-Bayesian (BIC) or Hannan Quinn (HQ) criteria and choose the model that gives the lowest values of these criteria. AIC criterion asymptotically overestimates the order with positive probability, whereas BIC and HQ criterion estimate the order consistently under general conditions if the true order p is less than or equal to p max .

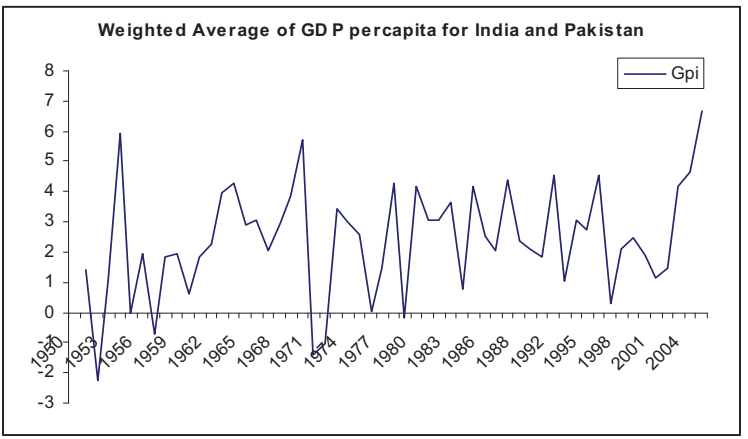
After fitting a VAR, it may be important to know which way causalities run. One way to do that is by running Granger causality tests after the VAR analysis. In a bivariate VAR model, a variable y_2 is said to Granger-cause a variable y_1 if, given the past values of y_1, past values of y_2 are useful for predicting y_1 (Granger 1969). Similarly it is feasible to

extend the current analysis to test Granger-causality for multivariate VAR (p), where $Y_t = (y_{1t}, y_{2t}, ..., y_{nt})'$.

Results with VAR models

This section reports the results of the multivariate VAR regression analysis. As we can see, the data set is purely time series, which may mean that most of the variables may simply only follow a random walk. Generally that is the case with most time series. (See detailed Notes at the end of the chapter) If a regression employs non-stationary or a mix of stationary and non-stationary variables, the error term would suffer from autocorrelation which would in turn mean that the error term obtained from such a regression would also be non-stationary. Generally, non-stationarity in variables may be solved by taking first difference of the series. However, it is not necessary to always take first differences, and stationary may be achieved at levels by taking time lags of variables where time trends or random walks would not be observed anymore.

Figure 6.6
Pakistan and India's Dyadic Growth Rates



As we have taken dyadic proxies, the problem of random walk may be minimised and we may obtain stationarity for our variables at levels rather than first differences. Table 6.2 undertakes unit root analysis to test for stationarity in the dyadic variables under the modified or augmented Dickey-Fuller t test (DF-GLS) proposed by Elliot, Rothenberg & Stock (1996), where each series is transformed via a generalised least squares (GLS) regression before performing the test. The results show that we could effectively solve for unit-roots (random walk) at levels, although for some variables we only obtain stationarity after quite a number of lags. For example, *Tpitp* (figure 6.2) clearly follows a random walk between 1950 and 1970, whereas in comparison to most other variables presence of random walk is only observed in a smaller part of the series and only for smaller time periods. In case of *Tpitp*, taking lags up to 15 periods solves for the random walk. By contrast, the economic development variable capturing the dyadic growth rates for India and Pakistan (*Gpi*) has been observed to be a perfectly stationary series (figure 6.6). Unit-root test confirms this observation; stationarity is achieved at levels with 0 lags.

Proxies treated as endogenous variables include those for conflict, bilateral and multilateral trade, economic progress, military burden and social development; whereas the concepts treated as purely exogenous are dyadic democracy and population. Since, these time-series variables are stationary at levels, although with some time lags, this allows the use of unrestricted VAR analysis instead of restricted VECM methodology. It is now possible to proceed to VAR analysis. The reduced form VAR model for conflict is as follows

$$\begin{aligned} Conf_t &= \alpha_1 + \alpha_{2,t-i} Conf_{t-i} + \alpha_{3,t-i} Tr_{t-i} + \alpha_{4,t-i} Mil_{t-i} \\ &+ \alpha_{5,t-i} E_{t-i} + \alpha_{6,t-i} G_{t-i} + \alpha_7 Demo_t + \alpha_8 P_t + \mathrm{E}_t \end{aligned} \tag{6.15}$$

Where $Conf_t$, Tr_{t-i}, Mil_{t-i}, E_{t-i}, G_{t-i}, $Demo_t$ and P_t depict interstate conflict, bilateral or multilateral trade, military burden, education expenditure, real growth rate of GDP per-capita, dyadic democracy score and population respectively; t ranges from 1950-2005 and $i = 1,\ldots,p$.

Table 6.2
DF-GLS unit root tests

Variables	Lag	With intercept	With intercept and trend
Fatal (annual fatality levels, 0-6)	1	-3.528*** (Ng-Perron)	-3.774*** (Ng-Perron)
Volfatal (precise numbers)	1	-4.789* **(Ng-Perron)	-4.844*** (Ng-Perron)
Dur (days of conflict)	1	-4.058* **(Ng-Perron)	-4.233***(Ng-Perron)
Hiact (highest action in disputes)	1	-2.382** (Ng-Perron)	-2.590 (Ng-Perron)
Hstlev (annual hostility levels, 1-5)	1	-2.371** (Ng-Perron)	-2.512 (Ng-Perron)
Cnf (conflict intensity ranges given by the PRIO-Uppsala data set)	1	-3.025* **(Ng-Perron)	-4.082*** (Ng-Perron)
Tpitp (Pakistan-India bilateral trade as a proportion of Pakistan's trade)	15	-1.112* (Ng-Perron)	-1.861 (Ng-Perron)
Tpiti (Above as a proportion of Indian trade)	15	-3.856*** (MAIC)	-3.319** (Ng-Perron)
Xmpi (Pakistan's total global trade as a ratio of India's global trade)	2	-2.710*** (Ng-Perron)	-2.860* (Ng-Perron)
Xmip (inverse of the above)	8	-4.951*** (MAIC)	-4.923*** (MAIC)
Lxpi1 (Log GDP weighted average of Pakistan and India's total exports)	0	2.951** (D-Fuller)	2.951** (D-Fuller)
Lxpi2 (Log mean of Pakistan's total exports over Pakistan's GDP and India's total exports over India's GDP)	0	-4.769*** (SIC)	-4.929*** (SIC)
Lmpi1 (Log GDP weighted average of Pakistan and India's total imports)	1	-4.049*** (SIC)	-3.961*** (SIC)
Lmpi2 (Log mean of Pakistan's total imports as a proportion of Pakistan's GDP and India's total imports as a ratio of India's GDP)	1	-4.511*** (SIC)	-4.382*** (SIC)
Lmilbrd1 (Log of Pakistan's defence expenditure over Pakistan's GDP as a ratio of India's defence expenditure over India's GDP)	5	-2.209** (Ng-Perron)	-2.795* (Ng-Perron)
Lmilbrd2 (Inverse of the above)	5	-2.209**(Ng-Perron)	-2.795*(Ng-Perron)
Lmilbrd3 (Log of Pakistan's defence expenditure over Pakistan's GDP as a ratio of Pakistan's defence expenditure over Pakistan's GDP plus India's defence expenditure over India's GDP)	5	-1.911*(Ng-Perron)	-2.686*(Ng-Perron)
Lmilbrd4 (Log of India's defence expenditure over India's GDP as a ratio of Pakistan's defence expenditure over Pakistan's GDP plus India's defence expenditure over India's GDP)	5	-2.128*(Ng-Perron)	-2.831*(Ng-Perron)
Lmilbrd5 (Log of Mean of India's defence expenditure over GDP and Pakistan's defence expenditure over GDP)	1	-4.735*** (SIC)	-4.748*** (SIC)
Lmilbrd6 (Log GDP weighted average of Pakistan and India's defence expenditures)	0	-	-4.308*** (SIC)
Lmilppi (Log of Pakistan's military personnel over Pakistan's total population as a ratio of India's military personnel over India's total population)	1	-4.082*** (SIC)	-4.098*** (SIC)
Lmilpip (inverse of the above)	1	-4.082*** (SIC)	-4.098*** (SIC)

Ledupi1 (log GDP weighted average of per capita education expenditure in India and Pakistan)	1	-	-5.374*** (SIC)
Ledupi2 (log mean of per capita education expenditure in India and Pakistan)	1	-	-5.478*** (SIC)
Ledupi3 (log of Pakistan and India's education expenditures as a ratio of both GDPs)	1	-5.918*** (SIC)	-5.907*** (SIC)
Ledupi4 (log of average of Pakistan's education expenditure over GDP plus India's education expenditure over GDP)	1	-	-5.642*** (SIC)
Gpi (weighted average of GDP per capita growth rates for both countries)	0	-4.256*** (Ng-Perron)	-4.276*** (Ng-Perron)
Demopi (combined democracy scores)	7	-2.790*** (Ng-Perron)	-2.997*** (Ng-Perron)
Poppi (average of total populations)	10	-	-7.392*** (MAIC)

- -***, ** and *shows significance at 1%, 5%and 10% level
- - The Lag structure is selected through (1) Ng-Perron sequential t (Ng-Perron), (2) the minimum Schwarz information criterion (SIC), (3) the Ng-Perron modified information criterion (MAIC) and (4) Dickey-Fuller test (D-Fuller).

Table 6.3 *VAR regression equations for fatal under multiple specifications of bilateral trade and military burden*

Right Hand Side Variables	Left Hand Side Variable : Fatal													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Bilateral Trade														
Tpitp (16)	-0.30***	-0.30***	-0.32***	-0..28***	-0.24**	-0.23**	-0.22**							
Tpiti (16)								-0.76*	-0.76*	-0.83**	-0.70*	-0.61*	-0.64*	0.55*
Military Burden̄														
lmilbrd1 (6)	2.33*							2.02						
lmilbrd2 (6)		-2.33*							-2.02					
lmilbrd3 (6)			6.53*							6.03				
lmilbrd4 (6)				-3.45							-2.84			
lmilbrd5 (2)					6.84**							6.54**		
lmilbrd6 (1)						3.26*							3.52*	
Lmilppi(2)							-1.80							
Lmilpip(2)														1.79
Social Development														
Ledupi1(2)	-4.98	-4.98	-4.83	-5.9*	-6.35**	-8.34***	-6.08**	-6.7*	-6.7*	-6.9*	-6.2*	-5.9**	-8.35***	-6.10**
Economic Growth														
Gpi (1)	-0.40***	-0.40***	-0.41***	-0.40***	-0.28***	-0.35***	-0.34***	-0.39***	-0.39***	-0.39***	-0.39***	-0.31***	-0.38***	-0.37***
Exogenous Variables														
Demopi (7)	-0.003	-0.003	-0.003	-0.003	-0.003	-0.004*	-0.004*	-0.003	-0.003	-0.003	-0.004	-0.003	-0.003*	-0.004*
Poppi (10)	0.064***	0.064***	0.063***	0.066***	0.112***	0.094***	0.076***	0.063***	0.063***	0.062***	0.064***	0.101***	0.088***	0.07***
N	38	38	38	38	38	38	38	38	38	38	38	38	38	38
R2	0.61	0.61	0.62	0.61	0.63	0.61	0.59	0.57	0.57	0.58	0.57	0.61	0.59	0.57
VAR(p)	VAR(2)	VAR(2)	VAR(2)	VAR(2)	VAR(2)	VAR(2)	VAR(2)	VAR(2)	VAR(2)	VAR(2)	VAR(2)	VAR(2)	VAR(2)	VAR(2)

- -***, **, * shows significance at 1%, 5% and 10% level
- - VAR (p) reports lag-order for each VAR model based on final prediction error (FPE), Akaike's information criterion (AIC), Schwarz's Bayesian information criterion (SBIC) and the Hannan and Quinn information criterion (HQIC),

Here p is the optimal lag structure for the VAR model. $\alpha_{2,t-i}$ $\alpha_{3,t-i}$ $\alpha_{4,t-i}$ $\alpha_{5,t-i}$ and $\alpha_{6,t-i}$ are (6×6) metrics (for every $i=1,....,p$).

Running the above model for the number of fatalities (*Fatal*), best captures the severity of the militarised conflict between the two nations. Later analysis employs other conflict proxies.

Table 6.3 shows the results for bilateral trade with the eight proxies of military burden proposed in section 6.5.2. The evidence suggests that trade between Pakistan and India significantly decreases hostilities between both nations. However, the low values of $\alpha_{3,t-i}$ coefficients suggest that bilateral trade has a limited role to play in conflict mitigation. This is not surprising because Figure 6.2 shows that trade between Pakistan and India remained very low, and comprises only a small fraction of each country's total international trade. Although low trade levels between both countries may very well be the cause of the ongoing conflict, the current analysis does not need to be concerned with reverse causality because the VAR model takes care of potential endogeneity problems between F*atal* and *Tpitp* or *Tpiti.* On the other hand, *Lmilbrd1, Lmilbrd2, Lmilbrd3, Lmilbrd4, Lmilbrd5* and *Lmilbrd6* all relate significantly with conflict, especially in the case of *Tpitp*. *Lmilbrd1* and *Lmilbrd3* relate negatively with conflict, and *Lmilbrd2* and *Lmilbrd4* positively relate with conflict. This confirms the hypothesis that Pakistan's high military expenditure is a close determinant of the India-Pakistan conflict.

The high values of the $\alpha_{4,t-i}$ coefficients in this case indicate that any increase in military expenditure by Pakistan when compared to India correlates with higher conflict. However negative signs of *Lmilbrd2* and *Lmilbrd4* also suggest that India's military expenditure is weakly related to conflict whereas as Indian military expenditure is also directed at its domestic civil wars and security concerns with other states and thus in the case of *Lmilbrd1*, *Lmilbrd2*, *Lmilbrd3* and *Lmilbrd4* the explanatory power comes from Pakistan's military expenditure. Furthermore, combined military scores in *Lmilbrd5* and *Lmilbrd5* relate positively with conflict and the relationship is significant for both proxies of bilateral trade. This result suggests that irrespective of Indian security concerns national or international, or Pakistan's anxieties about Indian hegemony,

military expenditures on average do not have deterrent effect (in terms of fewer fatalities), but high military expenditures by both sides show some evidence of an arms race. The insignificance of *Lmilppi* and *Lmilpip* may also indicate the transformation of contemporary conventional war tactics, in which military size *per se* has a limited role in providing strategic depth. However the negative sign of *Lmilppi* and the positive sign of *Lmilpip* hints that higher militarisation in Pakistan may very well be an outcome of the ongoing hostilities between the two nations, as higher Pakistani military personnel has a deterrent effect, and the converse is true for India. Education expenditures *Ledupi1* and growth rates *Gpi* relate significantly to conflict mitigation, and the size of coefficients suggests that the potential for spending on education in decreasing hostilities is quite substantial. Democracy also decreases the severity of conflict, but the low values of coefficients show the relationship is quite weak.

Tables 6.4 and 6.5 present results for multilateral trade with various proxies of military burden. In combination with various proxies of multilateral trade, the explanatory power of *Lmilbrd1, Lmilbrd2, Lmilbrd3* and *Lmilbrd4* reduced, as they are generally insignificant, but the coefficients also reduce, especially for *Xmpi* and *Xmip*. The only military burden proxy that is consistently significant and comes out with the right sign is *Lmilbrd6*. This means that the present conclusion about the average conflict-enhancing role of military expenditures remains unaltered. Results in Table 6.4 show that *Xmpi* is generally insignificant, whereas *Xmip* is significant in nearly all specifications. This is an interesting result, which suggests that higher Indian levels of trade integration mitigate conflict more than when Pakistani openness rises. However, the negative signs for both proxies confirm that greater openness in either country would significantly decrease conflict. Furthermore, it is reasonable to conclude that there is no rivalry between India and Pakistan in terms of their trade with the rest of the world, and any competition to capture international market share is healthy. Table 6.3C shows results for average trade scores for both countries differentiated by exports and imports. Exports by both countries to the rest of the world relate negatively with conflict and the relationship is significant at the one per cent level. Also, note that the values of $\alpha_{3,t-i}$ increased further for combined exports when compared

with the results in Table 6.3, indicating that the more these two countries are able to export to the rest of the world, the lower the levels of bilateral conflict. The high coefficients of *Xmpi* can lead the inference that the explanatory power for *Xpi* comes more from the Indian side. Both countries are at similar rungs on the technological ladder and share the potential to export to the rest of the world, along with countries like China. In contrast to exports, results on *Lmpi1* and *Lmpi2* show that rising imports do not increase hostilities, as the signs are always negative but the overall insignificance of combined import scores mean imports may not exert any negative pressure on hostilities either. The results for education expenditure, economic performance and democracy remain unchanged.

This research investigates potential for development expenditure in conflict mitigation in detail by employing four proxies of education expenditure, with three different combinations of multilateral trade, while using *Lmilbrd6* as a common proxy for military burden. The results, presented in Table 6.6, show a contrast to defence expenditure, which relates positively to conflict. Efforts to improve human capital by allocating more funds to education are a strong determinant of conflict mitigation as the results in table 6.6 demonstrate. All four proxies of education expenditure always enter the conflict regression equation with a negative sign, and are significant in all specifications. The high values of $\alpha_{5,t-i}$ indicate that channelling resources to the development sector in general, and investment in education in particular, may go a long way in building peace. The weighted average of Pakistan and Indian per-capita growth rates (*Gpi*) relate negatively and significantly with *Fatal* in all specifications confirming the hypothesis that countries are more peaceful when they are moving forward economically. The combined democracy score (*Demopi*) always relates negatively to conflict, and is significant. However, the low values of democracy coefficients suggest that political orientation played a limited role in the India-Pakistan conflict. The present results also show that the high levels of population in both countries, where a significant proportion are uneducated and poor on both sides, contribute positively to the conflict, although the effect is small. The results on *Xmip*, *Lxpi1* and *Lxpi2* confirm yet again that India and Pakistan

should open up further, as conflict mitigation is highly responsive to multilateral trade. In other words, it is possible to conclude that a lower military burden would mean both countries could invest more on education and that higher multilateral trade combined with increased education levels will seriously contribute to peace between Pakistan and India on a sustainable basis. Although democracy is also good for peace, economics clearly trumps democracy as a conflict-mitigating factor.

Next, the researcher performs further robustness checks, under additional specifications of the conflict dependent variable, with different proxies of conflict (*Volfatal*, *Cnfpi, Dur*, *Hstlvl* and *Hiact*). Each definition of conflict is regressed on *Lmilbrd3, Lmilbrd4* and *Lmilbrd6,* whereas *Lxpi2, Ledupi1, Gpi, Demopi* and *Poppi* make up the common set of regressors in 15 specifications. The results, given in Table 6.7 confirm the validity of all five of the hypotheses proposed at the start of the empirical section, and the theoretical model offered in this paper. More trade, increased education expenditure, higher GDP per-capita growth rates, a greater democratic orientation, all exert downward pressure on conflict, as all of these variables are significant in most cases and always carry the right signs. A comparison of coefficients suggests that integration with the world has by far the most dominant effect on conflict mitigation of all variables. Note that Table 6.7 only considers multilateral trade and not bilateral India-Pakistan trade. Education spending comes second in its effectiveness in enhancing peace. The results in Table 6.7 also show that annual battle deaths, severity of conflict, duration of escalation, hostility levels and highest hostility level decrease when both countries score high on democracy. Again, persistently low values taken by democracy $\alpha_{7,t}$ means that political orientation plays a less prominent role in explaining the severity of dispute or levels of escalation. There is some evidence that these countries have entered into outright war even when both were democracies. The Kargil war of 1999 is a case in point. By contrast, the long military standoff between India and Pakistan in 2002, occurred at a time when Pakistan was highly autocratic. The results in Table 6.7 also indicate that *Lmilbrd3* always enters (15) with a positive sign and is significant in four out of five cases. The coefficients

of *LMilbrd3, Lmilbrd4 and Lmilbrd6 are* highest for *Volfatal and Dur* suggesting that military expenditures significantly increase the severity of conflict as there are more days of the year spent in hostility and higher fatalities are borne by both sides.

It would be interesting to run multivariate Granger causality tests to see if causality runs from the determinants of conflict-to-conflict, and whether there are cases of reverse causality. This research included Granger causality tests for each VAR specification, presented in Tables 6.3, 6.4, 6.5, 6.6 and 6.7. Table 6.8 provides a summary of Granger causality tests for all endogenous regressors of conflict, and where there is an instance of reverse causality, it is noted. The results in Table 6.8 show that all regressors except *Lmilppi, Lmilpip*, *Lmpi1* and *Lmpi2* Granger cause conflict. There were also observations of some instances of reverse causality, especially for *Tpitp, Tpiti, Lmilbrd5, Lmilbrd6, Ledpi1, Ledupi2* and *Ledupi4* in case of *Fatal, Lmilbrd6* in case of *Volfatal, lmilbrd6* and *Ledupi1* in case of *Cnfpi, Lmilbrd6* and *Ledupi1* in case of *Dur*, *Lxpi2*, *Lmilbrd6* and *Ledupi1* in case of *Hstlvl* and *Lxpi2*, *Lmilbrd6* and *Ledupi1* in case of *Hiact*.

The reverse causality in the India-Pakistan bilateral trade measures show that low levels of trade are also an outcome of the India-Pakistan conflict, which has spanned more than 50 years. Any decrease in hostility levels would also exert a positive and favourable effect on bilateral trade, which would create fertile ground for dispute resolution. Thus, more bilateral trade through reduction of tariffs is a noteworthy confidence building measure. The presence of reverse causality in average military spending is also not a surprise. This means that the India-Pakistan conflict is a significant cause of historically high military expenditures between both countries. Especially if high levels of conflict between India and Pakistan lower India's military expenditure as a proportion of Pakistan's military expenditure, then *Lmilbrd1* and *Lmilbrd3* would relate positively with conflict, which is the case in Tables 6.3, 6.4, 6.5 and 6.7. In light of the results, one interpretation may be that a military build-up by Pakistan increases as a response to conflict. This may be true because the dominant role of the army and high military expenditures in Pakistan

are justified due to continuous high levels of hostility with its neighbour. Otherwise, Pakistan does not have any major dispute with any other nation, or frequent instances of intra-state disputes to justify the high budget allocation for defence. Reduction of hostilities would thus favourably affect the military burden in both countries, and both India and Pakistan could have more resources to channel towards its development and poverty reduction strategies. The reverse causality from conflict to education expenditure could explain this process.

Reverse causality between conflict measures and proxies of education expenditure highlight the resource constraints faced by both sides due to their rivalry where funds allocated to defence seem to crowd out public investment in the development sector. Also found is reverse causality between *Lxpi2, Hstslvl* and *Hiact*. This result highlights the economic implication of conflict. If hostility levels rise and conflict moves closer to outright war, it will strangle export capability with the rest of the world for both countries. This will have negative effects on growth potential as well. For example, one can observe from Figure (6.2), section 1 that right after the 1971 and 1999 wars between Pakistan and India, total trade shares for both countries witnessed a deep decline. Economic growth Granger causes conflict and the relationship is negative. The growth patterns of both countries are independent of conflict, as far as reverse causality is concerned. The relationship is highly significant at a one per cent level in all the observed instances of Table 6.8. These results substantiate the graphical analysis presented, where hostilities between both countries seem to go down when both countries are performing well on the macroeconomic front. Any slowdown in growth rates in either of the two nations seems to correlate positively with conflict and this trend has been present since 1950.

Table 6.4 *VAR regression equations for fatal under multiple specifications of multilateral trade and military burden*

Right Hand Side Variables	Left Hand Side Variable : Fatal													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Mutilateral Trade														
Xmpi(3)	-0.71	-0.71	-0.75	-0.74	-0.62	-0.77*	-0.75*							
Xmip(9)								-3.74***	-3.74***	-3.77***	-3.74***	-3.89***	-2.68***	-3.83***
Military Burden														
lmilbrd1 (6)	0.08							-0.18						
lmilbrd2 (6)		-0.08							0.18					
lmilbrd3 (6)			0.91							0.27				
lmilbrd4 (6)				-0.58							0.50			
lmilbrd5 (2)					0.04							-0.49		
lmilbrd6 (1)						3.38**							2.26*	
Lmilppi(2)							-1.02							
Lmilpip(2)														0.92
Social Development														
Ledupi1(2)	-3.64***	-3.64***	-3.59***	-3.69***	-3.60***	-8.07***	-2.85***	-4.73***	-4.73***	-4.67***	-4.79***	-4.44**	-7.70***	-4.22***
Economic Growth														
Gpi (1)	-0.37***	-0.37***	-0.37***	-0.38***	-0.37***	-0.34***	-0.37***	-0.40***	-0.40***	-0.39***	-0.40***	-0.40***	-0.36***	-0.39***
Exogenous Variables														
Demopi (7)	-0.006***	-0.006***	-0.006***	-0.006***	-0.006***	-0.006***	-0.005***	-0.006***	-0.006***	-0.006***	-0.005***	-0.006***	-0.006***	-0.005***
Poppi (10)	0.067***	0.067***	0.066***	0.067***	0.066***	0.094***	0.062***	0.083***	0.083***	0.082***	0.084***	0.078***	0.101***	0.075***
N	45	45	45	45	45	45	45	45	45	45	45	45	45	45
R2	0.42	0.42	0.42	0.42	0.42	0.46	0.42	0.45	0.45	0.45	0.45	0.45	0.47	0.46
VAR(p)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)

- -***, **, * shows significance at 1%, 5% and 10% level
- - VAR (p) reports lag-order for each VAR model based on final prediction error (FPE), Akaike's information criterion (AIC), Schwarz's Bayesian information criterion (SBIC)and the Hannan and Quinn information criterion (HQIC),

Table 6.5 *VAR regression equations for fatal under multiple specifications of exports, imports and military burden*

Right Hand Side Variables	Left Hand Side Variable : Fatal											
	1	2	3	4	5	6	7	8	9	10	11	12
Multilateral Trade												
Lxpi1(1)	-4.24***	-4.03***	-3.96***									
Lxpi2(1)				-7.89***	-7.15***	-4.78***						
Lmpi1(2)							-0.36	-0.17	0.03			
Lmpi2(2)										-0.71	-0.59	-0.33
Military Burden[a]												
Lmilbrd3 (6)	2.19			5.84**			0.39			0.30		
Lmilbrd4(6)		-0.66			-2.34*			0.44			0.37	
lmilbrd6 (1)			3.51***			2.42*			3.19**			3.09**
Social Development												
Ledupi1(2)	-1.96	-2.08*	-7.13***	-2.87***	-2.89***	-7.02***	-3.97***	-4.19***	-8.66***	-4.01***	-4.13***	-8.43***
Economic Growth												
Gpi (1)	-0.36***	-0.36***	-0.35***	-0.39***	-0.39***	-0.39***	-0.34***	-0.36***	-0.33***	-0.34***	-0.35***	-0.33***
Exogenous Variables												
Demopi (7)	-0.004***	-0.004***	-0.003*	-0.002	-0.002	-0.002	-0.006***	-0.006***	-0.006***	-0.006***	-0.005***	-0.005***
Poppi (10)	0.122***	0.120***	0.154***	0.077***	0.075***	0.103***	0.077***	0.078***	0.104***	0.074***	0.075***	0.103***
N	45	45	45	45	45	45	45	45	45	45	45	45
R2	0.50	0.49	0.55	0.58	0.55	0.55	0.40	0.40	0.45	0.40	0.40	0.44
VAR(p)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)

- -***, **, * shows significance at 1%, 5% and 10% level
- - VAR (p) reports lag-order for each VAR model based on final prediction error (FPE), Akaike's information criterion (AIC), Schwarz's Bayesian information criterion (SBIC) and the Hannan and Quinn information criterion (HQIC),

Table 6.6 *VAR regression equations for fatal under multiple specifications of education and multilateral trade*

Right Hand Side Variables	**Left Hand Side Variable : Fatal**											
	1	2	3	4	5	6	7	8	9	10	11	12
Social Development												
Ledupi1(2)	-7.70***	-7.13***	-7.01***									
Ledupi2(2)				-8.17***	-7.52***	-7.44***						
Ledupi3(2)							-4.06***	-6.29***	-5.79***			
Ledupi4(2)										-7.96***	-8.93***	-8.91***
Multilateral Trade												
Xmip(8)	-2.68			-2.68			-3.92*			-3.14		
Lxpi1(1)		-3.96***			-3.92***			-5.46***			-4.74***	
Lxpi2(1)			-4.78***			-4.75***			-6.35***			-5.76***
Military Burden[a]												
Lmilbrd6 (1)	2.26	3.50**	2.42*	2.44	3.62***	2.58***	-0.96	2.02***	0.45	0.51	2.73**	1.52
Economic Growth												
Gpi (1)	-0.36***	-0.35***	-0.39***	-0.37***	-0.36***	-0.39***	-0.42***	-0.41***	-0.45***	-0.39***	-0.38***	-0.42***
Exogenous Variables												
Demopi (7)	-0.006***	-0.003***	-0.003	-0.006***	-0.004***	-0.003	-0.005***	-0.001	-0.001	-0.006***	-0.003***	-0.002
Poppi (10)	0.101***	0.154***	0.103	0.107***	0.158***	0.109***	0.031***	0.107***	0.038***	0.021	0.087***	0.028**
N	45	45	45	45	45	45	45	45	45	45	45	45
R2	0.47	0.54	0.55	0.47	0.55	0.55	0.39	0.53	0.53	0.44	0.55	0.56
VAR(p)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)

- -***, **, * shows significance at 1%, 5% and 10% level
- - VAR (p) reports lag-order for each VAR model based on final prediction error (FPE), Akaike's information criterion (AIC), Schwarz's Bayesian information criterion (SBIC) and the Hannan and Quinn information criterion (HQIC),
- - [a] Results for Lmilbrd1, Lmilbrd2, Lmilbrd3, Lmilbrd4, Lmilbrd5, Lmilppi and Lmilpip are also utilised and the results do not change. (See tables 3a and 3b for details)

Table 6.7 *VAR regression equations under multiple specifications for conflict and military burden*

Right Hand Side Variables	**Left Hand Side Variable : Fatal**														
	Volfatal			Cnfpi			Dur			Hstlvl			Hiact		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Multilateral Trade															
Lxpi2 (1)	-10996***	-9971***	-6662***	-2.60***	-2.48***	-1.22*	-451.6**	-413.4**	-182.81	-6.81***	-6.60***	-4.07**	-25.5**	-25.32***	-16.8*
Military Burden[a]															
Lmilbrd3 (6)	8276***			2.91***			604.72***			5.33**			19.09		
Lmilbrd4(6)		-3352**			-1.46***			-283.8**			-2.8*			-9.98	
Lmilbrd6 (10)			3255*			0.31			-55.94			0.97			4.47
Social Development															
Ledupi (2)	-397.02	-435.58	-6011.6**	-0.7*	-0.69	-1.48	-146.53	-130.7	-180.69	-1.56	-1.47	-3.34	-9.9*	-8.75*	-17.08
Gpi (1)	-517.7***	-524.8***	-554.6***	-0.8**	-0.8*	-0.09**	4.89	4.97	3.63	-0.5*	-0.5*	-0.6*	-1.28**	-1.26**	-1.8*
Exogenous Variables															
Demopi (8)	1.36	1.06	0.06	-0.001*	-0.001*	-0.002*	-0.3*	-0.4*	-0.7*	-0.001	-0.001	-0.001	-0.011	-0.012	-0.012
Poppi (11)	36.3*	34.6*	71.54***	0.023***	0.021***	0.027***	3.53*	3.29*	4.28*	0.05**	0.048**	0.058**	0.253***	0.247***	0.295***
N	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45
R2	0.45	0.44	0.42	0.53	0.51	0.42	0.40	0.37	0.31	0.42	0.42	0.38	0.39	0.40	0.37
VAR(p)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)	VAR(1)

- -***, **, * shows significance at 1%, 5% and 10% level
- - VAR (p) reports lag-order for each VAR model based on final prediction error (FPE), Akaike's information criterion (AIC), Schwarz's Bayesian information criterion (SBIC)
- and the Hannan and Quinn information criterion (HQIC),
- - [a] Results for Lmilbrd1, Lmilbrd2, Lmilbrd3, Lmilbrd4, Lmilbrd5, Lmilppi and Lmilpip are also utilised and the results do not change. (See tables 3a and 3b for details)

Table 6.8
Granger causality Wald tests

Direction of Causality	Causes	RC	Direction of Causality	Causes	RC
Tpitp → *Fatal*	(√)***	(√)*	*Gpi* → *Volfatal*	(√)***	×
Tpiti → *Fatal*	(√)*	(√)**	*Lxpi*2 → *Cnfpi*	(√)***	×
Xmpi → *Fatal*	(√)**	×	*Lmilbrd*3 → *Cnfpi*	(√)***	×
Xmip → *Fatal*	(√)***	×	*Lmilbrd*4 → *Cnfpi*	(√)***	×
*Lxpi*1 → *Fatal*	(√)***	×	*Lmilbrd*6 → *Cnfpi*	×	(√)*
*Lxpi*2 → *Fatal*	(√)***	×	*Ledupi*1 → *Cnfpi*	(√)*	(√)*
*Lmpi*1 → *Fatal*	×	×	*Gpi* → *Cnfpi*	(√)***	×
*Lmpi*2 → *Fatal*	×	×	*Lxpi*2 → *Dur*	(√)***	×
*Lmilbrd*1 → *Fatal*	(√)**	×	*Lmilbrd*3 → *Dur*	(√)***	×
*Lmilbrd*2 → *Fatal*	(√)**	×	*Lmilbrd*4 → *Dur*	(√)**	×
*Lmilbrd*3 → *Fatal*	(√)***	×	*Lmilbrd*6 → *Dur*	×	(√)*
*Lmilbrd*4 → *Fatal*	(√)***	×	*Ledupi*1 → *Dur*	(√)***	(√)***
*Lmilbrd*5 → *Fatal*	(√)***	(√)**	*Gpi* → *Dur*	(√)***	×
*Lmilbrd*6 → *Fatal*	(√)***	(√)***	*Lxpi*2 → *Hstlvl*	(√)***	(√)*
Lmilpip → *Fatal*	×	×	*Lmilbrd*3 → *Hstlvl*	(√)**	×
Lmilppi → *Fatal*	×	×	*Lmilbrd*4 → *Hstlvl*	(√)*	×
*Ledupi*1 → *Fatal*	(√)***	(√)***	*Lmilbrd*6 → *Hstlvl*	×	(√)***
*Ledupi*2 → *Fatal*	(√)***	(√)***	*Ledupi*1 → *Hstlvl*	×	(√)***
*Ledupi*3 → *Fatal*	(√)***	×	*Gpi* → *Hstlvl*	(√)*	×
*Ledupi*4 → *Fatal*	(√)***	(√)*	*Lxpi*2 → *Hiact*	(√)**	(√)*
Gpi → *Fatal*	(√)***	×	*Lmilbrd*3 → *Hiact*	×	×
*Lxpi*2 → *Volfatal*	(√)***	×	*Lmilbrd*4 → *Hiact*	×	×
*Lmilbrd*3 → *Volfatal*	(√)***	×	*Lmilbrd*6 → *Hiact*	×	(√)***
*Lmilbrd*4 → *Volfatal*	(√)***	×	*Ledupi*1 → *Hiact*	(√)*	(√)**
*Lmilbrd*6 → *Volfatal*	(√)***	(√)*	*Gpi* → *Hiact*	(√)*	×
*Ledupi*1 → *Volfatal*	(√)***	×			

***, **, * shows significance at 1%, 5% and 10% level, RC stands for reverse causation, √ means causes and × means not causes

Results with VECM models

The analysis offered above establishes an average relationship between conflict and some of its identified determinants in a purely dyadic setting. It is now imperative to analyse country specific effects in order to investigate in detail the potential of each country's trade levels, military

burden, development expenditure and economic performance in enhancing peace and mitigating conflict. For Pakistan, trade share with the rest of the world (*Popen*), total exports to GDP ratio (*Pexpg*) and imports to GDP ratio (*Pimpg*) stand as proxies of Pakistan's multilateral trade. Pakistan's exports to India (*Pxi*) are a proxy for bilateral trade. Pakistan's defence expenditure as a percentage of its GDP (*Pdg*) is a proxy for the military burden, and *Pedug* is Pakistan's education expenditure as a percentage of its GDP. For India, there are three proxies of multilateral trade namely *Iopen, Iexpg* and *Iimpg*, one proxy of bilateral trade (*Ixp*), one proxy of military burden (*Idg*) and one proxy for education expenditure (*Iedug*). There are no separate Polity scores employed for India and Pakistan, as any changes in combined democracy scores are due to Pakistan. Before performing econometric analysis, it was necessary to conduct a stationary test. Here note that the new variables are not a complex combination of weighted proxies of a dyadic nature and thus may show higher levels of autocorrelation because they are simple percentages of time-series variables, which are mostly capturing single country time dynamics. Achieving stationarity in such a series at their level may be difficult.

For time-series variables, it is quite possible for random walks to relate to each other so that a regression of one random walk on the other has a stationary error term. As a simple example, consider a two variable system:

$\Delta y_{1,t} = \varepsilon$ and $\Delta y_{2,t} = u$ let $y_{1,t} + y_{2,t}$ be stationary.
The simplest example is that $y_{2,t} = -y_{1,t} + v$.

Table 6.9
Augmented Dickey Fuller test

Variables	Lag length	With intercept	With intercept and trend
Δ Fatal	1	-0.875***	-0.929***
Δ Popen	1	-0.977***	-0.984***
Δ lopen	1	-1.192***	-1.495***
Δ Pexpg	1	-0.937***	-0.965***
Δ lexpg	1	-0.940***	-1.257***
Δ Pimpg	1	-1.125***	-1.121***
Δ limpg	1	-1.321***	-1.449
Δ Pxi	1	-1.692***	-1.702***
Δ lxp	1	-1.971***	-2.328***
Δ Pedu	1	-0.946	-1.025***
Δ ledu	1	-0.841***	-0.879***
Δ Pgpc	1	-1.992***	-1.995***
Δ lgpc	1	-2.292***	-2.293***
Δ Pdg	1	-1.421***	-1.441***
Δ ldg	1	-0.899***	-0.877***
Δ Pmilpop	1	-1.289***	-1.292***
Δ lmilpop	1	-0.756***	-0.766***
Δ Demopi	1	-0.982***	-0.982***

-***, ** and * shows significance at 1%, 5% and 10% level

That is, let one random walk be the negative of the other, allowing for some error. Then the sum is simply a random error with no unit root or autocorrelation. If the combination of unit root variables is not a unit root, then there must be some relationship between them. If there is cointegration, then a relationship exists, if not it does not. Therefore establishing that a relationship exists between unit root variables is equivalent to establishing cointegration. That relationship is called the cointegrating vector, which for the current example is (1, 1) since the sum is stationary. There is a way to write a system that captures all the relationships and avoids unit roots. Consider

$$\Delta y_{1,t} = \alpha_1(\beta_1 y_{2,t-1} + \beta_2 y_{1,t-1}) + \varepsilon_t + v_t,$$
$$\Delta y_{2,t} = \alpha_2(\beta_1 y_{2,t-1} + \beta_2 y_{1,t-1}) + u_t + v_t.$$

This is called a vector error correction model. The error correction comes from the cointegrating relationship. The betas contain the cointegrating equation and the alphas the speeds of adjustment. If $y_{1,t}$ and $y_{2,t}$ are far from their equilibrium relationship, either $y_{1,t}$ or $y_{2,t}$ or both must change, the alphas let the data choose. The vector part of the name does not apply to the model above, but it will if the error terms are autocorrelated.

Unit root tests run on the above variables found that the unit root is solved only at first differences, as shown by Table 6.9. Since at levels, nearly all variables have unit roots, there should be at least one cointegrating relationship for this analysis to move forward. In other words, using unrestricted VAR analysis is no longer useful. What appears indicated now is to run Vector Error Correction Methodology (VECM), which is simply a restricted VAR, where the first presence of the number of cointegration equations is in each VECM specification and then run the regression analysis. As mentioned above, VECM also allows for a rich set of information among variables including their short and long-term adjustment dynamics and thus provides more comprehensive insights into the relationship among variables than an unrestricted VAR would do.

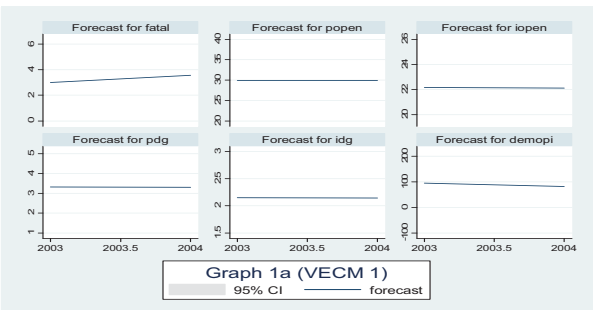
The three reduced form VECM equations for conflict would then be as follows:

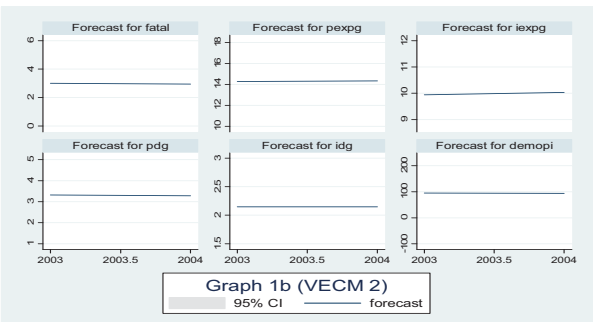
$$Conf_{1t} = \alpha_1(\beta_{1,t-i} Conf_{t-i} + \beta_{2,t-i} Ptr_{t-i} + \beta_{3,t-i} Itr_{t-i} + \beta_{4,t-i} Pdg_{t-i} + \beta_{5,t-i} Idg_{t-i} + \beta_{6,t-i} Demo_{t-i}) + \sum_{y=1}^{6} C_{ya,t-i} + E_{1t} \quad (6.16)$$

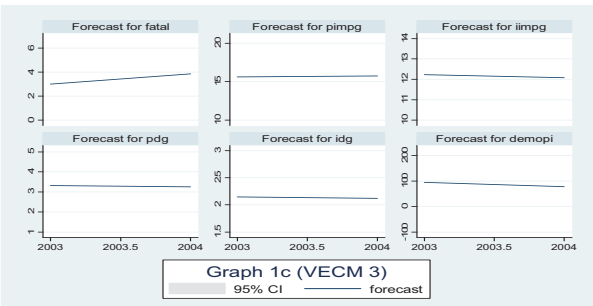
$$Conf_{2t} = \alpha_2(\beta_{7,t-i} Conf_{t-i} + \beta_{8,t-i} Pedu_{t-i} + \beta_{9,t-i} Iedu_{t-i} + \beta_{10,t-i} Pdg_{t-i} + \beta_{11,t-i} Idg_{t-i} + \beta_{12,t-i} Demo_{t-i}) + \sum_{y=1}^{6} C_{yb,t-i} + E_{2t} \quad (6.17)$$

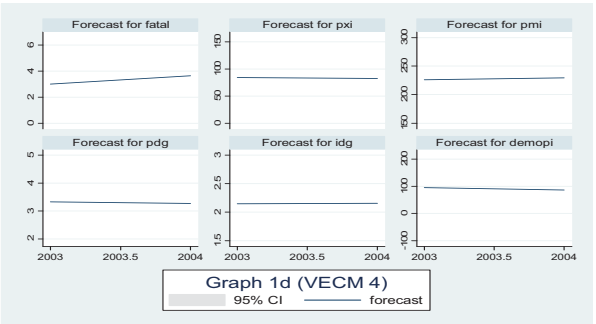
$$Conf_{3t} = \alpha_3(\beta_{13,t-i} Conf_{t-i} + \beta_{14,t-i} Pgpc_{t-i} + \beta_{15,t-i} Igpc_{t-i} + \beta_{16,t-i} Pdg_{t-i} + \beta_{17,t-i} Idg_{t-i} + \beta_{18,t-i} Demo_{t-i}) + \sum_{y=1}^{6} C_{yc,t-i} + E_{3t} \quad (6.18)$$

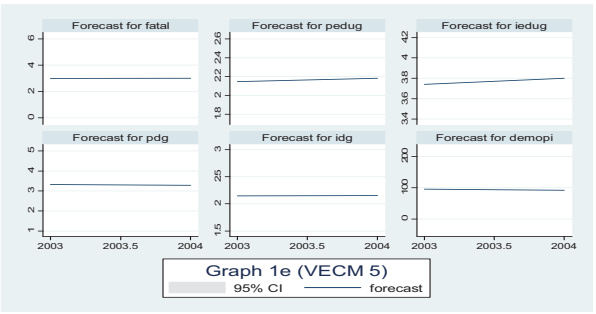
Figure 6.7 *Forecasting simulations based on VECMs for Fatal*

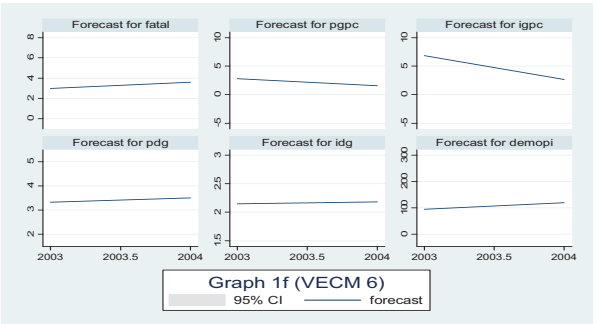












Here, β'*s* show the cointegration relationship for each variable under investigation for each equation, and the α'*s* show the adjustment parameters. *C*'*s* {you have a " instead of a ' after the C, need to change}are the constant terms for each six variables on the right hand side of each VECM equation, and E'*s* are the respective error terms. As mentioned, the general openness indicator, total export shares, total import shares and exports to the other country of conflict for both India and Pakistan

are utilised as four separate single country proxies of trade. Thus, there are four separate specifications for Eq. (6.16). This makes the total number of VECM specifications rise to six.

The results for each VECM equation appear in Table 6.10. The lag length for each VEC equation is (1), based on final prediction error (FPE), Akaike's information criterion (AIC), Schwarz's Bayesian information criterion (SBIC) and the Hannan and Quinn information criterion (HQIC). There is one cointegrating equation in each VECM, confirming the robustness of the model specification. Note that optimal value of conflict is zero in the long-term, meaning that the current conflict measure, *Fatal* takes the value of 0. The results for VECM 1 show that *Fatal* takes a negative value, and *Popen* and *Iopen* positive values. This means that in the short-term both Pakistani and Indian trade shares negatively relate to *Fatal*. However, only Indian-trade is sufficiently significant to exert negative pressure on hostilities, in the short-term adjustment period. In the end, both Pakistan and India's trade shares with the rest of the world will adjust by moving in opposite directions. Further, Pakistan will witness a rise in its trade with the outside world and Indian trade will decline to its optimal level.

The expected long-term net result on the trade share of both countries is positive, as trade will be at higher levels with peace than without peace. The long-term rise in Pakistan's trade shares in order to adjust to a fall in hostility levels also mean that the negative effects of India-Pakistan conflict have thwarted Pakistan's capacity to trade in international markets more than in India's case. Results on VECM 2 suggest that in the short-term, exports by both India and Pakistan will rise to adjust to any fall in conflict. However, in the end, Pakistani exports will remain unchanged, whereas Indian exports will adjust downward. There are similar short-term adjustment dynamics for imports for India shown in VECM 3. However, in the long-term, Pakistan's imports will rise as conflict moves to its optimal value of 0, whereas Indian imports will adjust downward. The above discussion suggests that Pakistan's trading capability has been seriously hampered by the conflict between these nations despite the fact Pakistan has been historically a more open economy compared to India.

As far as Indian trade with the outside world is concerned, in the short-term it is destined to rise further especially if hostilities with Pakistan abate. However, the long-term trade share will adjust downward unless India follows a more open trade policy and further reduces its tariffs to levels similar to its neighbour.

Bilateral trade would also respond to increased peace as shown by the results of VECM 4. In the short-term, there are signs of increases in bilateral trade between India and Pakistan, but the increase is not significant. Meaning, trade between India and Pakistan will remain low. However, in the long-term, Indian exports to Pakistan will decline to an optimal level. This is an important finding. Some in Pakistan fear that peace initiatives like reducing tariffs for Indian goods would mean greater dependency on Indian produce. Taking into account the historically high hostility levels between the two countries, Pakistan views any peace initiative or confidence building measure that leads to more market access to India with scepticism. Many Pakistani's have fears that dependence on India may expose Pakistan to unnecessary pressures from India, and leave it vulnerable to one-sided solutions to the Kashmir dispute. The current results show that in the end, the dependency on Indian cheap goods would actually decline, and both countries would end up as equal trading partners. Thus, more bilateral trade, far from creating any power imbalance between India and Pakistan, would equally distribute the gains. However, Pakistan may fulfil its import needs more from other developing countries such as China. The results for VECM 5 suggest that education expenditure would increase in the short-term to reduce conflict, and as conflict falls to its optimal level, Pakistan would be able simultaneously to put more resources into the education sector. High growth rates also adjust positively to decrease hostility levels and in the long-term as hostilities decrease. In addition, both countries witness a strong positive effect on their growth rates. This means that peace would put India and especially Pakistan on higher growth paths on a sustainable basis.

Table 6.10 *VECM regression equations for fatal under multiple specifications of trade, education and growth*

Right Hand Side Variables	**Left Hand Side Variable : Fatal**											
	VECM 1		VECM 2		VECM 3		VECM 4		VECM 5		VECM 6	
	α	β	α	β	α	β	α	β	α	β	α	β
Fatal	-0.92***	1	-0.80***	1	-0.87***	1	-0.96***	1	0.70***	1	0.05	1
Popen	0.27	0.15***										
lopen	0.39***	-0.38***										
Pexpg			0.28*	0.15								
lexpg			0.11**	-0.36***								
Pimpg					-0.02	0.30***						
limpg					0.29***	-0.85***						
Pxi							4.51	-0.007				
lxp							2.20	-0.015***				
Pedu									-0.02	2.27***		
ledu									-0.002	-1.53***		
Pgpc											-0.11**	2.18***
lgpc											-0.37***	2.57***
Pdg	-0.027	0.034	-0.081	0.52***	0.031	-0.25	0.048	-0.024	-0.082	0.84***	0.02	2.62***
ldg	0.009	-0.866***	-0.017	-0.32	0.030	-1.35***	0.002	-0.031	-0.006	-0.84**	0.002	-2.04
Demopi	17.83***	-0.003*	17.8***	-0.004**	14.73**	-0.002	14.76**	-0.0004	19.11	-0.008*	2.42***	-0.017*
(Max.VEC rank)º	*(1) º*		*(1) º*		*(1) º*		*(1) º*		*(1)º*		*(4) º*	
N	53		53		53		45		53		52	
R2	0.53		0.57		0.48		0.52		0.42		0.04	
VEC(p)	VEC(1)		VEC(1)		VEC(1)		VEC(1)		VEC(1)		VEC(1)	

- --***, **, * shows significance at 1%, 5% and 10% level, Δ denotes values first difference
- -Here α captures adjustment coefficients for a cointegration equation and β are parameters for each variable in a cointegration equation. ºVEC Rank shows the maximum number of cointegration equations for each VECM model significant at 5%. - VEC(p) reports lag-order for each VECM model based on final prediction error (FPE), Akaike's information criterion (AIC), Schwarz's Bayesian information criterion (SBIC) and the Hannan and Quinn information criterion (HQIC),

The results for the military burden show that in the short-term, military expenditure continue to remain at high levels. However in the long-term, as hostilities decline, Indian military expenditure would fall. Pakistan's military spending would adjust upward with declining trends in hostility.[9] In the short-term, there is also evidence of higher democracy scores as hostilities fall, but low values of the $\beta's$ show that conflict mitigation relates weakly to conflict.

In order to check the conclusions drawn from the VECM results in Table 6.10, six different forecast schedules from six cointegrating VECMs generated as a simulation exercise to predict how changes in its determinants affects conflict. Note that the data on *Fatal* are only up to 2002. Thus, this researcher generated one-year forecasts for *Fatal* for the 2003 period. Figure (6.6) shows the forecast graphs; Graphs 1a, 1b and 1c suggest that if military expenditures by both countries remain at current high levels, along with trade with the outside world at their 2002 levels, a slight deterioration in democracy scores will have a significant effect on the rise in hostility. However if India is able to export or import more, this would at least put a check on any rise in the severity of conflict and hostilities would adjust to some average level. Any decline in Indian trade will enhance hostilities. Current low levels of bilateral trade between Pakistan and India is conflict enhancing so more trade by both sides, with increased exports to each other, should be encouraged. More access to Pakistani markets on the Indian side may not lead to conflict mitigation if Pakistan is not also able to export more to India. A rise in education expenditure puts a check on hostilities as seen in Graph 1e.

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[9] In addition, VECM regressions run on military personnel of each country as a proxy of military burden show that in the short to long-term, there is a significant decline in military personnel by the Pakistani side, indicating lower levels of militarisation in the country. Thus high military spending by Pakistan, despite decreasing hostility may indicate procurement of high-end technology military imports. Growth rates would rise as hostilities fall, Pakistan may have more resources to channel to not only its development sector but also spend more to increase the efficiency of its armed forces.

Graph 1f is the standard representation of India-Pakistan conflict, and best fits historical trends. The forecasts suggest that conflict will rise, even if there is a significant increase in combined democracy scores, if growth rates plummet.

Both Pakistan and India have seen many years, when hostilities between them rose significantly when at least one of the countries was performing poorly, but were channelling more resources to the military as a proportion of their GDPs. The forecasts favour the liberal peace over democratic peace. Thus, one may look at current peace talks between both countries with optimism as both are performing well on the economic front and channelling fewer resources on military as a proportion of national income, while at the same time having a divergent set of political institutions.

6.4 Conclusions

Conflict between India and Pakistan, which spans most of the last 60 years, since their independence from British rule, significantly hampered bilateral trade between the two nations. However, the current analysis finds that the converse is also true; more trade between India and Pakistan decreases conflict and any measures to improve the bilateral trade share is a considerable confidence building measure. In the short-term, greater Indian access to Pakistani markets will help decrease hostilities between the two countries; whereas in the long-term as the peace is achieved, both countries could export more to each other. Lately there has been a high demand for cheaper Indian raw materials in Pakistani industries. A regional trade agreement along the lines of a South Asian Free Trade Agreement (SAFTA) could enable freer access to the markets of member countries, and has a high potential for the improvement of relations between India and Pakistan on a long-term basis. Pakistan and India's degree of openness to world trade is the *dominant* economic factor in conflict resolution. One would imagine that in the counterfactual case of significant mutual inward investment, that too would also decrease mutual belligerent tendencies.

Some of the results offered here may appear to suggest that Pakistan's relative military expenditure is conflict enhancing, whereas Indian relative military expenditure has a deterrent effect on conflict. This result, however, requires caution in interpretation. It does not necessarily mean that Pakistan is the principal actor initiating inter-state conflict with India. Rather it means that India, the regional hegemon, has other domestic and international concerns to which it targets its defence spending, besides its disputes with Pakistan. India, for example, has unilaterally massed troops on Pakistan's borders in 1951 and 2002. Indeed, there is some reverse causality between some of the military proxies and conflict suggesting that Pakistan's military build-ups may be more reactive. Overall, military expenditures are still high and both countries are diverting scarce resources away from social development spending, such as education and poverty reduction. Education spending has proven good for both peace and economic progress.

In an ideal world, increased dyadic democracy between pairs of nations should reduce inter-state hostility according to the democratic peace hypothesis; this relationship in the current case is present but weak. Peace initiatives are not the sole prerogative of democracies; they are also conceivable in less than democratic countries out of economic self-interest. Pakistan, at present, is making unilateral concessions on many disputed issues with India. However, the above findings point towards the liberal peace hypothesis. Economic progress and poverty reduction, combined with greater openness to international trade in general are more-significant drivers of peace between nations like India and Pakistan, rather than the *independent* contribution of a common democratic polity. Hence, more economic interdependence rather than politics is likely to contribute towards peaceful relations between India and Pakistan in the near future. In many ways, these results, for an individual dyad, echo Polachek's (1997) work across several dyads, where he argues that democracies cooperate not because they have common political systems, but because their economies are intricately and intensively interdependent. As pointed to by Hegre (2000), it is at these higher stages of economic development that the contribution of common democratic

values to peace becomes more salient. Meaningful democracy cannot truly function where poverty is acute and endemic, even in ostensible democracies such as India. In the final analysis, it may be that democracy itself is an endogenous by-product of increased general prosperity, as suggested nearly half a century ago by Lipset (1960). Then and only then, will nations be able to comprehend fully Angell-Lanes' (1910) arguments regarding the futility of inter-state conflict.

Notes

1. **Granger Causality and Military Burden**

Table 6.8 high-lights the country specific dynamics of military burden in India and Pakistan and nature of conflict. For example, if conflict lasts for more days, or hostilities rise or severity of action (i.e., in extreme case of out right war) rise between both parties, all would have a significant and positive shock on military expenditures in India and Pakistan as there is a presence of reverse causality between Lmilbrd6 and these measure of conflict but no presence of causality. No presence of causality means that arms race between India and Pakistan (Lmilbrd6) would not lead to rise in hostilities, neither increase the yearly duration of the conflict or lead to highest action (out-right war). This is an important result suggesting that higher military expenditures by both sides also have a deterrent effect on conflict, but if fatalities in the conflict rise, it will put a positive pressure on other measures of conflict, which in turn have positive shock on the arms race because we also find in table 6.8 that *Lmilbrd6*, in presence of reverse causation, appears to also positively and significantly cause *Fatal* or *Volfatal.* In contrast, *Lmildbrd1, Lmildbrd2, Lmildbrd3*and *Lmilbrd4*, which are dynamic interactions of Indian and Pakistani military expenditures, significantly cause conflict while there is no reverse causation. This points out towards the prevalent mistrust between both parties and the reason behind the arms race, where Pakistan's military expenditure is more sensitively related with conflict than the Indian military expenditure. Though, Pakistan may see its rise in military expenditure as deterrence to match Indian military expenditure, it would in effect has a positive effect on conflict as it would sustain hostilities between both parties at not only higher levels of severity but also the duration of the conflict on average would rise. Furthermore, Hiact (highest action in conflict) is not affected by military expenditures as all measures of military burden do not cause Hiact, though in case of Milbrd1, highest action in conflict

positively influence the former suggesting that outright wars or increase in the severity of action would put upward pressure on the military expenditures of Pakistan and India much equally. In case of war, one may explain this relationship by simply suggesting that Pakistan and India spend more resources on military procurement to cover such depleted military assets which have been increasingly utilized in the conflict.

2. Taking Inverse Ratios: "What They Really Show for Military Burden and Trade?"

The nature of variables is dyadic, corresponding to the analysis which is so common in conflict studies which investigate conflict in dyadic settings. However, defence or trade or democracy would provide results which may only capture dyadic effects while may not reveal some very important country specific information. For example, high military expenditure is conflict enhancing and higher bilateral or multilateral trade is conflict reducing. Such assertions may be substantiated by theory or empirics but it may suffer from one limitation: if the dyadic variables are constructed in a fashion that they only capture average effects of the two parties involved, (e.g. *Lmilbrd6*) results may be misleading as in reality, one party may be more relevant than other or the two parties may work in opposite directions.

For example, in our case, Pakistan's military expenditure is seen as conflict enhancing especially by Indian side. However, Pakistan sees military expenditure as a deterrence from outside (i.e., Indian) aggression suggesting that actually Indian military expenditure is fuelling the conflict. Indian, in contrast, traditionally see its high military expenditure as a deterrence to not only outside aggression but also inside civil unrest, whereby India has a high concentration of its military resources in the region of Kashmir. In the conflict literature, military expenditures are assets, which represent national capabilities to not only deter international conflict but also curtail any such civil unrest which may be a risk for economic development at national level. Thus relationship between military expenditures and conflict is not a linear one but a very dynamic one. Even if our dyadic proxy of military expenditure, which may take an average of India and Pakistan's military expenditure, has a positive relationship with Conflict between two nations, we cannot say with certainty whether such empirical finding may lead to the conclusion that Military expenditures are conflict enhancing. It may be that Pakistani military spending is conflict enhancing and Indian military spending show an effect of deterrence (which means conflict

reducing). Or it may be the opposite case. Another scenario may be that high military expenditure in India may show rivalry with a third party (China, a case in point) and thus may not be relevant at all in our analysis, while Pakistan may indeed be addressing its concerns viz-a-viz Indian hegemony and spend high on military build-up as a matter of deterrence.

Please note that it is to our discretion to put Pakistan or India as a numerator or denominator. Changing the position may have implications due to case sensitivities (as we would find in case of *Lmilbrd1* and *Lmilbrd2*). For example *Lmilbrd 1*, where India is in the denominator, has a positive sign suggesting *Lmilbrd1* is conflict enhancing. However, *Lmilbrd 2*, where Pakistan is in the denominator, has a negative relationship with conflict, suggesting on its face value that *Lmilbrd2* is conflict reducing. Both results are conflicting. According to our hypothesis, military burden for India and Pakistan, both should be conflict enhancing. That we do find for *Lmilbrd6*, which is just average of both. Hence, in the light of *Lmilbrd6* and its relationship with conflict, the signs of *Lmilbrd1* and *Lmilbrd2* actually give away important information, which is about relative importance of India and Pakistan's military expenditure in the conflict. If conflict is more related with Pakistani military expenditure then in case Pakistan military expenditure goes into the denominator, the sign should change and it does change in our regression models quite consistently satisfying maximum number of robustness checks. In the light of these results, a positive sign of *Lmilbrd6* suggests that Indian military expenditure also enhance conflict, but it is less relevant than the Pakistani one to explain severity of conflict between both nations.

In multilateral trade, inverse specifications serve this very analysis to investigate dyadic as well as country specific relationship to understand the dynamics of India-Pakistan conflict not only with its evolutionary settings but also with country specific perspective as to how trade may be related with conflict and thus suggest a peace strategy in rather comprehensive manner. For example, a higher coefficient of *Xmip* when compared to *Xmpi* shows that any rise in Indian trade with rest of the world has a proportionally greater effect on conflict mitigation than a rise in Pakistan's trade with rest of the world. Economic integration by Indian side would decrease costs of peace for India at a much greater pace than if Pakistan integrates with rest of the world. Our theoretical model has covered such dynamic trade-offs for India and Pakistan. In undertaking such empirical methodology (not to mention the utilization of VAR), chapter 6

confirms or rejects many assertions which are put forward in academic as well as popular literature to explain India-Pakistan conflict.

3. Why Granger Causality through a VAR?

Since there is endogeniety problem between variables of interest, VAR can analyze the nature of relationship without assuming dependency of one variable over the other. Only granger causality tests, which follow VAR analysis, inform us about the direction of relationship and it may be the case, as we found in our analysis, the direction of relationship between a pair of variables is two way. This again is important information. Thus the purpose is to investigate nature (+ or -) of relationship between conflict variables and other endogenous independent variables (military burden, bilateral or multilateral trade, economic development etc), while also examining the direction of relationship. VAR provides one of the best time series methodologies. However, first we have to solve for random walk or trends in our time series variables. Since our variables of choice are dyadic in nature, we could solve for random walk at level instead of first difference.

As we can see, the data set is purely time series which may mean that most of the variables may suffer from random walk. Generally that is the case with most time series. If a regression employs non stationary or a mix of stationary and non-stationary variables, the error term would suffer from autocorrelation which would in turn mean that the error term obtained from such a regression would also be non stationary. Generally, non-stationarity in variables may be solved by taking first difference of the series. It is not necessary to always take first difference and stationary may be achieved at level by taking time lags of variables where time trends or random walk would not be observed anymore:

1. Stationary Time Series (Basic Characteristics):
   (a) Mean reverting around a constant long-run mean
   (b) Constant variance which time-invariant
2. Non Stationary Time Series (Basic Characteristics)
   (a) Has no long-run into which the series returns
   (b) The variance depends on time and approached infinity as time goes to infinity

(A) Types of Non Stationarity

1. The random walk model with drift:

$$yt = \mu + yt\text{-}1 + ut \tag{6.19}$$

2. The deterministic trend process:

$$yt = \alpha + \beta t + ut \quad (6.20)$$

3. The explosive process:

$$yt = \mu + \phi yt\text{-}1 + ut \quad (6.21)$$

where $\phi > 1$. Typically, the explosive case is ignored and we use $\phi = 1$ to characterise the non-stationarity because:

(a) $\phi > 1$ does not describe many data series in economics and finance.

(b) $\phi > 1$ has an intuitively unappealing property: shocks to the system are not only persistent through time, they are propagated so that a given shock will have an increasingly large influence.

(B) The Augmented Dickey Fuller (ADF) Test

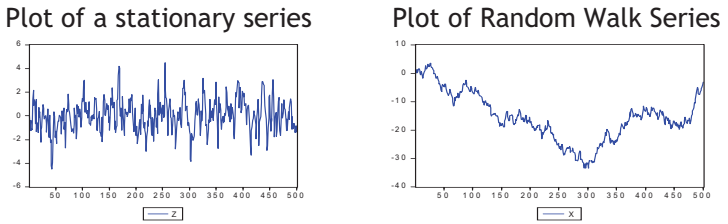
Dickey and Fuller (1979) and Fuller (1976) developed the basic test for unit roots and order of integration. The basic objective of the test is to test the null hypothesis that $\phi = 1$ in: $yt = \phi yt\text{-}1 + ut$ against the one-sided alternative $\phi < 1$.

So we have

H0: series contains a unit root

Vs. H1: series is stationary.

Figure 6.8
Properties of Times Series



We usually use the more convenient regression:

$$\Delta yt = \gamma yt\text{-}1 + ut$$

so that a test of ϕ=1 is equivalent to a test of γ=0 (since ϕ-1=γ).

$$yt = \phi yt\text{-}1 + ut\ ,\ yt - yt\text{-}1 = \phi yt\text{-}1 - yt\text{-}1 + ut,\ \Delta yt = (\phi\text{-}1)yt\text{-}1 + ut$$

Dickey and Fuller proposed three tests. The null (H0) and alternative (H1) models in each case are

i) H0: $yt = yt\text{-}1 + ut$ H1: $yt = \phi yt\text{-}1 + ut,\ \phi < 1$

This is a test for a random walk against a stationary autoregressive process of order one (AR(1))

ii) H0: $yt = yt\text{-}1 + ut$ H1: $yt = \phi yt\text{-}1 + \mu + ut,\ \phi < 1$

This is a test for a random walk against a stationary AR (1) with drift.

iii) H0: $yt = yt\text{-}1 + ut$ H1: $yt = \phi yt\text{-}1 + \mu + \lambda t + ut,\ \phi < 1$

This is a test for a random walk against a stationary AR (1) with drift and a time trend.

The three models can be described as cases with:

i) No intercept, no trend
ii) Intercept, no trend
iii) Intercept and trend

As the error term is unlikely to be white noise Dickey and Fuller extended their procedure suggesting an "augmented" version that uses p lags of the dependent variable. The alternative model in case (i) is now written:

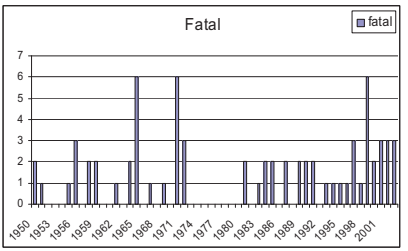
A problem now arises in determining the optimal number of lags of the dependent variable.

There are 2 ways

- use the frequency of the data to decide
- use information criteria

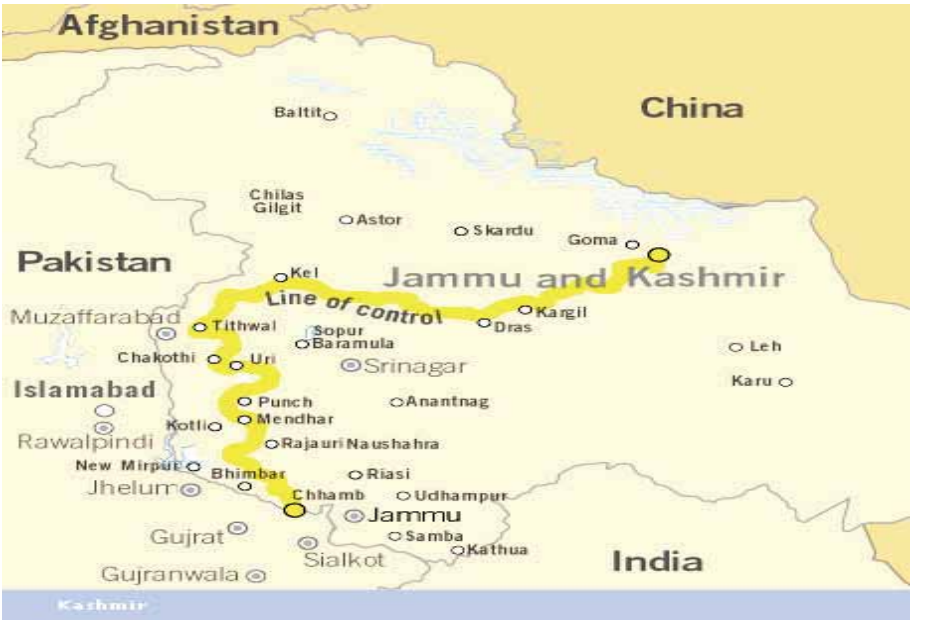
In our case, we have taken dyadic proxies, and thus the problem of random walk may have been minimised and we may obtain stationarity for our variables at level rather than first differences.

4. Fatalities and Trade Relationship

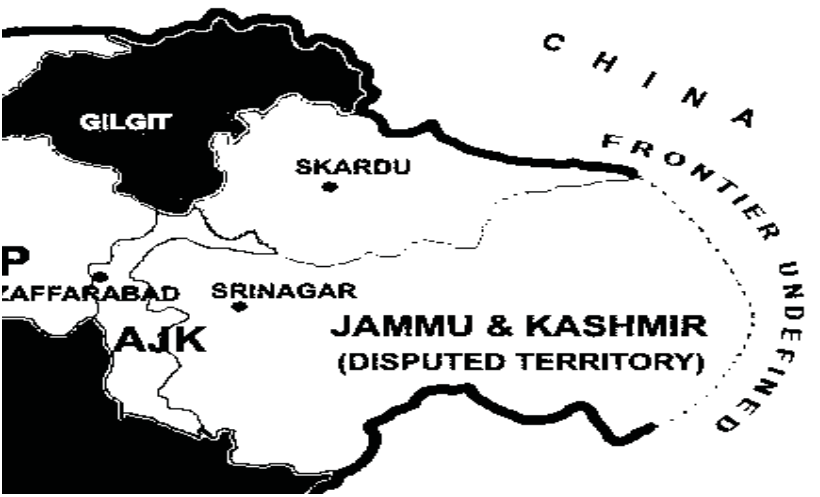


What would be the impact of a 100 percent increase in bilateral trade or multilateral trade on Conflict (fatalities)? For example, the coefficients in table 2 and 3 suggest if bilateral trade or multilateral trade doubles, fatalities (*Fatal*) would witness a decrease of at least 2 points or 200 percent in case of multilateral trade and only 20 percent (less than a half point) in case of bilateral trade. This means if *Fatal* have scored 5, and trade with rest of the world doubles, Fatal will go down to score 3. Generally, *Fatal* has taken up score of 3 or 2, which means usually battle deaths have been either 26-100 deaths in case of score 2 or 101-250 deaths in case of score 3. With high coefficients of multilateral trade in reducing fatal, one may confer that multilateral trade (relationship with outside world) traditionally have been playing a key role to contain fatalities and also possibility of out right war between India and Pakistan. In contrast, bilateral trade has much smaller effect in containing fatalities and thus plays a very limited role in conflict mitigation between India and Pakistan.

High Conflict Zone between India and Pakistan
(Source: International Crises Group)



How Pakistan sees the high Conflict Zone
(Source: Govt of Pakistan)



India Pakistan Peace Negotiations

Musharraf's Peace Proposals

- Pakistan gives up its claim to Indian-administered Kashmir if people from both regions have freedom of movement
- Neither part of Kashmir can become independent, but both can have a measure of self-governance
- Troops from both sides to be withdrawn in a staggered manner
- A joint mechanism to supervise both regions, in which people from India, Pakistan and Kashmir are represented

(BBC News: 7 Dec 2006)
http://news.bbc.co.uk/2/hi/south_asia/6217734.stm

Indian Response

- "The destinies of our two nations are interlinked. We need to put the past behind us"

  (Indian Prime Minister Man Mohan Singh: *Pakistani Newspaper 'the Nation', December 21, 2006)*

OUTCOME: *Kashmir rivals re-open trade route*

An old trade route has reopened after 60 years across the Line of Control (LoC) that divides disputed Kashmir.

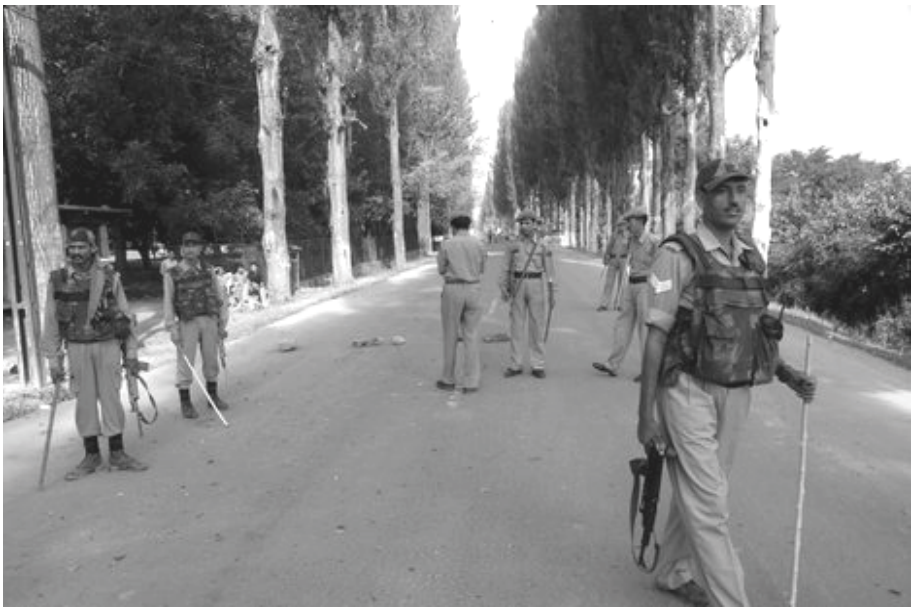
"Trucks carrying fruit, nuts and honey were flagged off by Indian officials from Salamabad in Indian-administered Kashmir under tight security. Lorries are expected to arrive later on Tuesday from the Pakistani side, bringing rice, rock salt and furniture. The opening of the trade route is part of a 2004 peace agreement between India and Pakistan, which both claim Kashmir. The trade link follows other confidence-building measures introduced in Kashmir in recent years, including the opening of rail and bus links."

Drum Beating: The BBC's Altaf Hussain says the atmosphere in Salamabad, on the Indian side of the LoC, on Tuesday morning was festive. (Tuesday, 21 October 2008 12:15 UK) http://news.bbc.co.uk/2/low/south_asia/7681320.stm

"I have always dreamed of going to the other side (of LoC), but I never thought I would be driving a lorry there so soon"
Truck driver Mohammad Arif

ON THE SIDELINES of Peace:
Kashmir under indefinite curfew
BBC NEWS: 24 August 2008

- *The strikers want a referendum which they hope will lead to self-determination for the region.*
- *Thousands of troops are enforcing the curfew in Srinagar*



7 Conclusions: From Economics to Economics of Regionalism: Development Recipe

For any country, a growth strategy is clearly different from a development policy and if not, there need not be an emphasis on pro-poor economic growth. Although poverty reduction strategies accept that economic development happens only when growth dividends trickle-down to alleviate poverty, as development policy supplements pro-growth strategies. They generally associate poverty with incidence of income impoverishment where a widely explained standard definition of poverty is an individual income threshold level of two dollars a day, to achieve a bare minimum, sustenance lifestyle. The end of the last century saw an unprecedented rise in the incidence of poverty as millions could barely earn enough to feed themselves. Even though many were resource rich countries, they suffered from Dutch disease, as resources became a curse while foreign intervention through aid and financial assistance (conditional aid by international financial institutions) failed to improve the situation.

Foreign intervention by means of intellectual and capital assistance was brought to developing countries under the tag of Structural Adjustment Programmes (SAP) and thus became the new world order for developing countries. In most places, SAP failed because as we know now, undue emphasis on market forces and fiscal discipline, without any consideration to prevalent institutions or social circumstances under which these developing countries functioned proved untenable. Under SAP, many developing countries opened up to international finance and trade but most could witness neither economic growth nor social development.

Rather things turned from bad to worse for many. It is not that policy advice under SAP was wrong, rather it was mistimed as well as conceived of only to cater to fast macroeconomic dividends while ignoring the institutional side of development discourse.

The experience of the last century shows how elusive the concept of pro-poor growth can be. It seems that emphasis on pro-poor growth may not lead to a comprehensive development strategy, as poverty itself becomes a concept relative to many definitions and may capture economic as well as social deprivations in society. Basic societies, which are abundant in developing peripheries, where livelihoods depend on basic modes of production, may earn less than USD two dollars a day as a household income, but the social capital they experience may have a higher value. Nevertheless considering scientific innovation and technology as a significant measure of development, social as well as economic, through means of learning by doing, the global culture is increasingly changing in favour of technology. Where even relatively isolated societies may be direct beneficiaries of it and thus can associate with global integration.

For all such societies with a significant portion of under-developed or rural peripheries working with basic modes of production, yet have easy access to technology, the more important determinants may be relative to the local or regional surroundings of developing nations and their underdeveloped peripheries. Developing countries need to prepare for globalization while local efficiency is harnessed and brought to global standards through a slow and steady progression from local to regional economic and institutional exposure and finally to a global one.

This thesis concentrates on concepts of universal well-being like education or institutions, while addressing the larger issue of poverty indirectly. This thesis made good effort to analyze these welfare-enhancing measures against each other for relative importance while checking their influence on the two important channels through which impoverishment may be most visibly affected. The literature suggests a country's per-capita growth or income dispersion influences poverty. The thesis has examined how different determinants of economic development fare with these endogenous concepts of welfare and may point to other wel-

fare improvement strategies in developing countries, which may supplement the more detailed ones published and promoted by IFIs.

This thesis started out with a detailed institutional analysis on the modes of national income generation. Rodrik et al. (2004) already undertook a similar study whereby they show that institutions have a most robust growth enhancing effect on income, while market forces may not matter in the long-term. Countries that follow the rule of law eventually achieve sustainable growth rates. Among developing countries, a good example is India, because rule of law is comparatively better in India than other developing countries and India is a well-practicing democracy. These institutional factors may relate more closely to the Indian growth phenomenon triggered in the last decade. India opened up to global markets in the early 1990s and, within little more than a decade, has become one of the most important stakeholders in global prosperity. Here the suggestion is clearly that strong institutions helped India provide the basis for an economic miracle while growing incomes have also benefited the people at the bottom of the pyramid resulting in a significant decrease in poverty levels. There is another lesson: the trade dimension to the Indian success story. Had it not been for increased efforts by India towards integration with the global economy in the 1990s, the country may have presented a different picture today as India also had a long history of growth failures. Here the clear suggestion is that India embraced globalization at a right time, when a significant portion of the population was educated. Before the 1990s, India was a socialist democracy, initiated by Nehru's first government in 1947, to protect local industry. However, during the 1947-90 period most of the population remained uneducated.

Nevertheless, in the comity of nations, India is just an isolated example. For example, its neighbour Pakistan has been a more open country traditionally, and overall for the last 60 years or so, Pakistan's growth performance has been better than India's on average. However, growth occurred intermittently in Pakistan, while it was highly correlated with national and international political economic circumstances where the country received special attention from international stakeholders, while conditional aid worth billions fed the macro economy well and growth

figures showed a visible rise for all such peculiar periods. Overall, the social sector is underdeveloped, where Pakistan scores low in human development indicators in South Asia as well as on global levels. Not only is there lack of democratic precedence in the country, rule of law is poor and the incidence of corruption relatively higher compared to India. All this coincides with a history of unsustainable economic growth while poverty measures show volatility and income inequalities are constantly on the rise. It seems markets may fail without the presence of robust institutions as well as a developed social sector in developing countries.

This thesis finds that institutions are a key factor behind rising incomes. Not only that, the analysis shows that income would be more equitable in the presence of good quality institutions, which then ensures pro-poor effects of economic growth. The comparative analysis of different types of institutions is a useful exercise as it provides a detailed policy guideline to policymakers on the relative importance of institutions. Incomes are highly correlated with a country's regulatory quality. Growth in per-capita income levels are more sensitive to market-friendly regulation that promote privatization under prudential regulation measures. Many developing countries have grown well, due to promotion of pro-market, pro-growth policies that encourage competition. Therefore, it seems, unlike Rodrik et al. (2004) and in line with Glaeser et al. (2004), regulatory quality is a more important determinant of incomes than rule of law. Nevertheless analysis on the distribution of income shows that rule of law and control for corruption are more important institutional factors while regulatory quality is less relevant. Furthermore political stability, which captures civil unrest in a country strongly influences distribution of income and has been found to be no less an important determinant of inequality than rule of law or control for corruption.

Rising levels of inequality are not good for economic growth, because of their correlation with poor institutional outcomes. While a country may very well show spurts of economic growth, it is visibly not sustainable under poorly performing legal or political institutions. In this context, an undue focus on economic institutions for their close relationship with growth rates becomes a trap for the country. This has recently hap-

pened in Pakistan, where the regime of General Pervez Musharraf became highly unpopular despite Pakistan having witnessed growth rates on par with China and India. Although the country was growing under good regulation policies, while the law and order situation worsened as well as the country becoming more politically unstable.

Unlike Rodrik et al. (2004), this study finds that integration is good for economic development only when certain negative externalities of integration are addressed in addition to ensuring a precedence of sound institutions. Although sound institutions link closely with economic development, for short-term policymaking there is a clear handicap. Institutional concepts like rule of law, control for corruption, voice and accountability can only develop over longer periods of time; sometimes it may take a few decades. However, it is possible to sow the seeds for good institutional set-ups by focusing on social development, especially by empowering people through formal and informal means of education. A well-educated population receives market information better. Investment in human capital may also improve the growth potential of the country when it moves to high technology-oriented production and consumption patterns which are then supplemented by an efficient utilization of economic opportunities of integration with global markets.

Countries that are better educated to start with make the best out of trade with equitable models of income generation. However, developing countries, including many high growth ones like India and China, have been investing in higher levels of education while a significant portion of the populations in both countries remain illiterate, especially in rural areas. This has resulted in a rise in education inequalities in line with many Latin American countries. While India and China benefited greatly from international trade, especially recently, the growth dividends of trade are unequally distributed. Many studies reviewed in the thesis suggest that trade oriented growth in many developing countries is seen to benefit the rich and the educated more while largely excluding those living in rural peripheries. Although the current analysis finds that, on average, the effect of trade on income inequalities is weak and mostly insignificant; due to trade liberalization there is a significant rise in wage inequality in the

manufacturing sector, which is usually a high growth-oriented sector of the economy.

The immediate solution to offset the negative effect of trade in developing countries is quite straight forward. They need to trade with each other more. Developing countries work under different technological regimes within a region. For example, China is at a higher rung of the technological ladder than say Taiwan. The same analogy is true for India and Pakistan. Similarly, there are regional categories where countries in one particular region are underdeveloped compared to other regions while international trade happens in the form of clusters.

Negative distributional effects of skill-biased trade with developed countries can be offset by increasing regional trade where more exchange can happen in low-skill goods and thus trade can directly target the incomes of the socially and economically excluded segments of the population.

Regional trade has seen increased attention recently but it has yet to become efficient for most developing countries because within regions there are conflicts of interest that prevent regional arrangements effectiveness. In many African countries, neighbours accuse each other of funding civil unrest. Many countries have historic grievances, especially land disputes. Yet most still trade and should do more.

Pakistan and India, despite dividends of regionalism, largely failed to benefit from regional economic arrangements. Rather, the rivalry between both nations made at least one regional arrangement namely SAARC (South Asian Association of Regional Cooperation) ineffective and redundant. In order to make an economic case for regionalism and trade as means to greater economic efficiency between rival parties, the thesis carries out detailed investigation on the larger determinants of India Pakistan conflict.

Both countries have a history of conflict going back to their independence from the British and today, 60 years later, the possible explanations for the conflict have increased in number. By controlling for many possible causes of prevalent hostilities between both nations, the thesis makes a strong case for their integration with global markets. Increased bilateral trade is also recommended as a significant means of conflict

mitigation, which may help both countries to focus more on shared economic well-being. Peace between both countries can also bring more focus to social development where a given country improves its growth potential with greater welfare impact.

After lengthy consideration of the institutional side of economic development as well as taking the empowerment of society into account through increased social development, in this thesis the author has made strong case for trade by examining its growth dividends as well as distributional effects to provide some guidelines as to how integration may best serve the interest of developing nations.

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Zhu, S.C. and D. Trefler (2003) 'Trade and Inequality in Developing Countries: A General Equilibrium Analysis', Canadian Institute of Advanced Research, www.chass.utoronto.ca/~trefler/Zhu_Inequality_Final.pdf.

Appendices

Data and Sources for Chapter 2, Chapter 4 and Chapter 5

	Variables	Sources
Dependent Variables:		
	chapter2	
LnY	Difference in Per-capita GDP, 2000, LnY	Natural Logarithm of percapita GDP in Purchasing Power Parity US dollars (PPP GDP). Source: World Development Indicators http://www.worldbank.org/
	Chapter4	
Gini	GINI Coefficient in Percentage Points as calculated by WIDER, 1995, Gini	Consult WIDER User Guide (WIID2) Range= 0-1 http://62.237.131.23/wiid/wiid-documentation1.php
Theil99	UTIP-UNIDO Wage Inequality THEIL Measure, 1999, Theil99	Between group Wage Inequality (Skilled and Unskilled wage gap) for manufacturing sector Range = 0-0.36 http://utip.gov.utexas.edu/data.html
Low10	Lowest income decile, 1995, Low10	Consult WIDER User Guide (WIID2) http://62.237.131.23/wiid/wiid-documentation1.php
High20/Low20	Fifth income percentile/ First income percentile , 1995, High20/Low20	Consult WIDER User Guide (WIID2) http://62.237.131.23/wiid/wiid-documentation1.php
Thrd20	Third income percentile, 1995, Thrd20	Consult WIDER User Guide (WIID2) http://62.237.131.23/wiid/wiid-documentation1.php
High10	Highest income decile, 1995, High10	Consult WIDER User Guide (WIID2) http://62.237.131.23/wiid/wiid-documentation1.php
	Chapter5	
Theil99developing	UTIP-UNIDO Wage Inequality THEIL Measure for developing countries only, 1999,	Between group Wage Inequality (Skilled and Unskilled wage gap) for manufacturing sector in Developing Countries only Range = 0-0.36 http://utip.gov.utexas.edu/data.html

Institutions

Kaufman et al (2003) Governance Indicators

(Comprised of aggregate governance indicators for six dimensions of governance covering 175 countries. Kaufman et al. (2003) relied on 194 different measures of governance drawn from 17 different sources of subjective governance data constructed by 15 different sources including international organisations, political and business risk rating agencies, think tanks and nongovernmental organisations. Governance indicators oriented so that higher values correspond to better outcomes on a scale from -2.5 to 2.5.)
http://www.worldbank.org/

Va	Voice and Accountability:	(i) Does State legitimately represent its citizens. (ii) Legal system/ transparency and fairness (iii) Political rights (iv) Freedom of speech (v) Business have voice to express and they are informed, Year: 1997/98. Source: Kaufman et al. (2002)
Ge	Government Effectiveness:	(i) Operation Risk Index : Bureaucratic delays (ii) State's ability to formulate and implement national policy initiatives (iii) Effectiveness at collecting taxes or other forms of government revenue (iv) State's ability to create, deliver and maintain vital national infrastructure (v) State's ability to respond effectively to domestic economic problems (vi) Institutional failure: A deterioration of government capacity to cope with national problems as a result of institutional rigidity or gridlock (vii) Government policy/ Pro business orientation (viii) Government decentralisation, independent and responsibilities or local and regional governments, and legislative and executive transparency (ix) Wasteful government expenditutre (x) Public service vulnerability to political pressure (xi) Government economic policies independent of pressure from special interest groups (xii) Quality of public health (xiii) quality of public education (xiv) quality of central bank, Year: 1997/98. Source: Kaufman et al. (2002)
Rq	Regulatory Quality:	(i) Restrictions on ownership of Business by non-residents (ii) Restriction on ownership of equities (iii) Price liberalisation (iv) Trade and Foreign exchange system (v) Competition Policy (vi) Commercial law effectiveness (vii) Commercial law extensiveness (viii) Financial regulations: extensiveness (ix) Financial Regulations: effectiveness (x) Large scale privatisation (xi) small scale Privatisation (xii) Governance and enterprise restructuring (xiii) Banking reform and interest rate liberalisation (xiv) Securities market and non-bank financial institutions (xv) Bankruptcy law (xvi) Minimal administrative regulations that constrain businesses (xvii) Wage/ Price Controls, Year: 1997/98. Source: Kaufman et al. (2002)
Rl	Rule of Law :	(i) Enforceability of contracts (ii) Losses and costs of crime (iii) Kidnapping of foreigners (iv) crime (v) Corruption of bank officials (vi) Extent of tax evasion (vii) Costs of organised crime for business (viii) Police effectiveness in safeguarding personal security (ix) independence of the judiciary from interference by the government and/or parties to the dispute (x) Private business has recourse to independent and impartial courts for challenging the legality of government (xi) Financial assets and wealth are well protected (xii) Private business are more likely to

		settle disputes outside court (xiii) Concern with level of income (xiv) Black market (xv) Property rights (xvi) Feeling of personal safety (xvii) Equal opportunities to access justice (xviii) Equality before the law (xix) Courts—fair and impartial (xx) Courts—affordable (xxi) Courts—consistent (xxii) Court's enforceability (xxiii) Confidence in judicial system today in insuring property rights (xxiv) General constraint—functioning of judiciary (xxv) Obstacles to competition-violation of patents (xxvi) Quality of courts (xxvii) Parallel economy as obstacle to business development Year: 1997/98. Source: Kaufman et al. (2002)
Ctc	Control for Corruption:	Improper practices in the public sphere (ii) Frequency of additional payments (iii) Dishonest courts (iv) Corruption as obstacle to business (v) Bribery (% of Gross Revenues) (vi) State Capture (BPS) (vii) Percent of public officials viewed to be corrupt (viii) Percent who believe the government is corrupt (ix) Additional Payments: bureaucracy (x) Additional payments: judiciary (xi) Severity of corruption within the state (xii) Political risk index: Internal causes of political risk: Mentality, including xenophobia, nationalism, corruption, nepotism, willingness to compromise, etc Year: 1997/98. Source: Kaufman et al. (2002)

Polity IV Dataset

(The Polity conceptual scheme is unique in that it examines concomitant qualities of democratic and autocratic authority in governing institutions, rather than discreet and mutually exclusive forms of governance. This perspective envisions a spectrum of governing authority that spans from fully institutionalized autocracies through mixed, or incoherent, authority regimes (termed "anocracies") to fully institutionalized democracies. The "Polity Score" captures this regime authority spectrum on a 21-point scale ranging from -10 (hereditary monarchy) to +10 (consolidated democracy). The Polity scores can also be converted to regime categories: we recommend a three-part categorization of "autocracies" (-10 to -6), "anocracies" (-5 to +5 and the three special values: -66, -77, and -88), and "democracies" (+6 to +10); see "Global Regimes by Type, 1946-2006" above. The Polity scheme consists of six component measures that record key qualities of executive recruitment, constraints on executive authority, and political competition. It also records changes in the institutionalized qualities of governing authority. The Polity data include information only on the institutions of the central government and on political groups acting, or reacting, within the scope of that authority. It does not include consideration of groups and territories that are actively removed from that authority (i.e., separatists or "fragments"; these are considered separate, though not independent, polities) or segments of the population that are not yet effectively politicized in relation to central state politics.)
http://www.systemicpeace.org/polity/polity4.htm

Demo	Democracy Score	Democracy, (numeric) Range = 0-10 (0 = low; 10 = high), Democracy Score: general openness of political institutions; the 11-point Democracy scale constructed additively, Year: 1999
Auto	Autocracy Score	Autocracy, (numeric) Range = 10-0 (0 = low; -10 = high), Autocracy Score: general closeness of political institutions; the 11-point Autocracy scale constructed additively, Year: 1999
	Integration	
	Outcome Based Measures	
Lcopen	(Exports	Natural logarithm of nominal openness. Nominal openness is

	+Imports)/GDP, 1985	given by the ratio of nominal imports plus exports relative to GDP (in exchange rate US dollars). Source; Penn World tables (PWT) http://pwt.econ.upenn.edu/

Leamer's measures of openness

Trade intensity and import penetration ratios were calculated using data on imports in U.S. dollars for 1982 and 1985 (the latest year with generally available data) from HNSO trade data base, accessed using the World Bank's TARS system. The aggregates were overall, manufacturing (SITC 5 to 8 less 68), agriculture (SITC 0+1+2+4, less 27, 28) and resources (SITC 27+28+3+68). The ratios of trade to GDP were calculated using dolaar GDP data from the National accounts (NA) data base maintained by the World Bank, accessed through BESD. (Pritchett, 1994; 330)

Impnov85	Import Penetration: overall, 1985	Data Available at http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)
Impnov85m	Import Penetration: manufacturing, 1985	Data Available at http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)
Impnov85a	Import Penetration: agriculture, 1985	Data Available at http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)
Impnov85r	Import Penetration: resources, 1985	Data Available at http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)
Impnov82	Import Penetration: overall, 1982	Data Available at http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)
Impnov82m	Import Penetration: manufacturing, 1982	Data Available at http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)
Impnov82a	Import Penetration: agriculture, 1982	Data Available at http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)
Impnov82r	Import Penetration: resources, 1982	Data Available at http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)
Tars85	TARS trade penetration: overall, 1985	Data Available at http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)
Tars85m	TARS trade penetration: manufacturing , 1985	Data Available at http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)
Tars85a	TARS trade penetration: agriculture, 1985	Data Available at http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)
Tars85r	TARS trade penetration: resources, 1985	Data Available at http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)
Tars82	TARS trade penetration,: overall, 1982	Data Available at http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)
Tars82m	TARS trade penetration: manufacturing , 1982	Data Available at http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)
Tars82a	TARS trade penetra-	Data Available at

	tion: agriculture, 1982	http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)
Tars82r	TARS trade penetration: resources, 1982	Data Available at http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)
Policy Based Measures		
Tariffs	Import duties as % imports,1985	World Development Indicators http://www.worldbank.org/
Owti	Tariffs on international inputs and capital goods, 1985	Sachs and Warner (1995) http://ideas.repec.org/p/fth/harver/1715.html
Owqi	Non trade barriers frequency on intermediate inputs, 1985	Sachs and Warner (1995) http://ideas.repec.org/p/fth/harver/1715.html
Txtrdg	Trade taxes/ trade, 1982	Data Available at http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)
Open80s	Sachs and Warner 1980s	Data Available at http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)
Leamer82	Leamers Measure, 1982	Data Available at http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)

Pritchett's Tariffs and Nontariff Barriers

The information for each country on the tariffs and nontariff barriers to trade was taken from country pages in UNCTAD. For each country the trade weighted averages of total charges and frequency of non tariff measures for food (SITC 0+1+22+4), agricultural raw materials (SITC 2 less 22, 27, 28), crude fertilizers (SITC 27 +28), mineral fuels (SITC 3), nonferrous metals (SITC 68) and manufactures (SITC 5 through 8 less 68) were entered. Weighted averages for Agriculture and Resources categories were formed from the subaggregates reported using the 1985 world trade weights. (Pritchett, 1996; 330)

Totimpv85	Weighted average of total import charges: overall, 1985	Data Available at http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)
Totimpv85m	Weighted average of total import charges: manufacturing, 1985	Data Available at http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)
Totimpv85a	Weighted average of total import charges: agriculture, 1985	Data Available at http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)
Totimpv85r	Weighted average of total import charges: agriculture, 1985	Data Available at http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)
Nontar85	Non-tariff barriers Coverage: overall, 1985	Data Available at http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)
Nontar85m	Non-tariff barriers Coverage: manufacturing, 1985	Data Available at http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)
Nontar85a	Non-tariff barriers Coverage: agriculture, 1985	Data Available at http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)
Nontar85r	Non-tariff barriers Coverage: resources, 1985	Data Available at http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)
Grmb	Gravity-residuals,	Data Available at

	basic model, 1982	http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)
Grma	Gravity-residuals, augmented model, 1982	Data Available at http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)
Black	Black market premium, 1985	Data Available at http://faculty.haas.berkeley.edu/arose/RecRes.htm Rose (2002)

Human Capital (Skills):
Average Years of Schooling calculated from school attainment rates at Primary, secondary and higher levels and no schooling
Barro and Lee (2001)

Skills99 (Sch99)	Average years of schooling, 1999	Data Available at http://www.cid.harvard.edu/ciddata/ciddata.html
Skills85	Average years of schooling, 1985	Data Available at http://www.cid.harvard.edu/ciddata/ciddata.html
Skills80	Average years of schooling, 1980	Data Available at http://www.cid.harvard.edu/ciddata/ciddata.html
Skills75	Average years of schooling, 1975	Data Available at http://www.cid.harvard.edu/ciddata/ciddata.html
Skills70	Average years of schooling, 1970	Data Available at http://www.cid.harvard.edu/ciddata/ciddata.html
Skills65	Average years of schooling, 1965	Data Available at http://www.cid.harvard.edu/ciddata/ciddata.html
Skills60	Average years of schooling, 1960	Data Available at http://www.cid.harvard.edu/ciddata/ciddata.html
Hyr99	School Attainment at Higher levels of Schooling, 1999	Data Available at http://www.cid.harvard.edu/ciddata/ciddata.html

Physical Capital

Pk	Gross capital formation as a percentage of GDP, 2000 Instruments	Source: World Development Indicators http://www.worldbank.org/
Lfrkrom	Natural logarithm of predicted trade shares computed from a bilateral trade equation with 'pure geography' variables, 1999	Data Available at http://elsa.berkeley.edu/~dromer/papers/AER_June99.pdf Frankel and Romer (1999)
Engfrac	Fraction of the population speaking English	Hall and Jones (1999) Data Shared by Arvind Subramanian (IMF), Washington D.C.
Eurfrac	Fraction of the population speaking one of the major languages of Western Europe: French, German,	Hall and Jones (1999) Data Shared by Arvind Subramanian (IMF), Washington D.C.

	Portugese or Spanish	
Drop90	Drop out rate, 1990	Data Available at http://www.cid.harvard.edu/ciddata/ciddata.html Barro and Lee (1996)
Schday	Number of school days	Data Available at http://www.cid.harvard.edu/ciddata/ciddata.html Barro and Lee (1996)
Disteq	Distance from the equator of capital city measured as abs (Latitude)/90	Acemoglu, Johnson and Robinson (AJR) (2001) Data Shared by Arvind Subramanian (IMF), Washington D.C.

Country List for Each Endogenous Dependent, Endogenous Independent and Instrumental Variable under Analysis in Chapter2, Chapter 4, and Chapter 5

Dependent Variables

Country List for Log of GDP Per Capita (LnY)

Angola
Albania
Argentina
Armenia
Antigua and Barbuda
Australia
Austria
Azerbaijan
Burundi
Belgium
Benin
Burkina Faso
Bangladesh
Bulgaria
Bahamas, The
Belarus
Belize
Bolivia
Brazil
Barbados
Bhutan
Botswana
Central African Republic
Canada
Switzerland
Chile
China
Cote d'Ivoire
Cameroon
Congo, Rep.
Colombia
Comoros
Cape Verde
Costa Rica
Cyprus
Czech Republic
Germany
Denmark
Dominican Republic
Algeria
Ecuador
Egypt, Arab Rep.
Eritrea
Spain
Estonia
Ethiopia
Finland
Fiji
France
Gabon
United Kingdom
Georgia
Ghana
Guinea
Gambia, The
Guinea-Bissau
Equatorial Guinea
Greece
Grenada
Guatemala
Guyana
Hong Kong, China
Honduras
Croatia
Haiti
Hungary
Indonesia
India
Ireland
Iran, Islamic Rep.
Iceland
Israel
Italy
Jamaica
Jordan
Japan
Kazakhstan
Kenya
Kyrgyz Republic
Cambodia
St. Kitts and Nevis
Korea, Rep.
Kuwait
Lao PDR
Lebanon
St. Lucia
Sri Lanka
Lesotho
Lithuania
Luxembourg
Latvia
Macao, China
Morocco
oldova
Madagascar
Maldives
Mexico
Marshall Islands
Macedonia, FYR
Mali
Malta
Mongolia
Northern Mariana Islands
Mozambique
Mauritania
Mauritius
Malawi
Malaysia
Namibia
New Caledonia
Niger
Nigeria
Nicaragua
Netherlands
Norway
Nepal
New Zealand
Pakistan
Panama
Peru
Philippines
Papua New Guinea

Poland
Portugal
Paraguay
French Polynesia
Romania
Russian Federation
Rwanda
Saudi Arabia
Sudan
Senegal
Singapore
Solomon Islands
Sierra Leone
El Salvador
Suriname
Slovak Republic
Slovenia
Sweden
Swaziland
Syrian Arab Republic
Chad
Togo
Thailand
Tajikistan
Turkmenistan
Trinidad and Tobago
Tunisia
Turkey
Tanzania
Uganda
Ukraine
Uruguay
United States
Uzbekistan
St. Vincent and the Grenadines
Venezuela, RB
Vietnam
Vanuatu
West Bank and Gaza
Samoa
Yemen, Rep.
South Africa
Zambia
Zimbabwe

Country List for Gini, Income Deciles and Percentiles

Aruba
Armenia
Australia
Austria
Azerbaijan
Burundi
Belgium
Burkina Faso
Bangladesh
Bulgaria
Belarus
Bolivia
Brazil
Central African Republic
Canada
Chile
China
Cote d'Ivoire
Cameroon
Colombia
Costa Rica
Czech Republic
Germany
Denmark
Dominican Republic
Algeria
Ecuador
Egypt, Arab Rep.
Spain
Estonia
Ethiopia
Finland
France
United Kingdom
Georgia
Ghana
Guinea
Gambia, The
Guinea-Bissau
Equatorial Guinea
Greece
Guatemala
Guyana
Hong Kong, China
Honduras
Croatia
Hungary
Indonesia
India
Ireland
Israel
Italy
Jamaica
Jordan
Japan
Kazakhstan
Kenya
Kyrgyz Republic
Cambodia
Korea, Rep.
Lao PDR
St. Lucia
Sri Lanka
Lesotho
Lithuania
Luxembourg
Latvia
Morocco
Moldova
Madagascar
Mexico
Malta
Mongolia
Mozambique
Mauritania
Malaysia
Niger
Nigeria
Nicaragua
Netherlands
Norway
Nepal
Pakistan
Panama
Peru
Philippines
Papua New Guinea
Poland
Portugal
Paraguay
Romania
Russian Federation
Rwanda
Senegal
Sierra Leone
El Salvador
Slovak Republic
Slovenia
Sweden
Swaziland
Thailand
Tajikistan
Turkmenistan
Trinidad and Tobago
Tunisia
Turkey
Tanzania
Uganda
Ukraine
Uruguay
United States
Uzbekistan
Venezuela, RB
Vietnam
Yemen, Rep.
Zambia
Zimbabwe

Country List for Theil99

Afghanistan
Angola
Albania
Netherlands Antilles
United Arab Emirates
Argentina
Armenia
Australia
Austria
Azerbaijan
Burundi
Belgium
Benin
Burkina Faso
Bangladesh
Bulgaria
Bahrain
Bahamas, The
Bosnia and Herzegovina
Belize
Bolivia
Brazil
Barbados
Bhutan
Botswana
Central African Republic
Canada
Chile
China
Cote d'Ivoire
Cameroon
Congo, Rep.
Colombia
Cape Verde
Costa Rica
Cuba
Cyprus
Czech Republic
Germany
Denmark
Dominican Republic
Algeria
Ecuador
Egypt, Arab Rep.
Eritrea
Spain
Ethiopia
Finland
Fiji
France
Gabon
United Kingdom
Georgia
Ghana
Guinea
Gambia, The
Guinea-Bissau
Equatorial Guinea
Greece
Guatemala
Hong Kong, China
Honduras
Croatia
Haiti
Hungary
Indonesia
India
Ireland
Iran, Islamic Rep.
Iraq
Iceland
Israel
Italy
Jamaica
Jordan
Japan
Kenya
Kyrgyz Republic
St. Kitts and Nevis
Korea, Rep.
Kuwait
Liberia
Libya
Sri Lanka
Lesotho
Lithuania
Luxembourg
Latvia
Macao, China
Morocco
Moldova
Madagascar
Mexico
Marshall Islands
Macedonia, FYR
Malta
Myanmar
Mongolia
Northern Mariana Islands
Mozambique
Mauritania
Mauritius
Malawi
Malaysia
Namibia
Nigeria
Nicaragua
Netherlands
Norway
Nepal
New Zealand
Oman
Pakistan
Panama
Peru
Philippines
Papua New Guinea
Poland
Puerto Rico
Korea, Dem. Rep.
Portugal
Paraguay
French Polynesia
Qatar
Romania
Russian Federation
Rwanda
Saudi Arabia
Sudan
Senegal
Singapore
Solomon Islands
El Salvador
Somalia
Sao Tome and Principe
Suriname
Slovak Republic
Slovenia
Sweden
Swaziland
Seychelles
Syrian Arab Republic
Togo
Thailand
Tonga
Trinidad and Tobago
Tunisia
Turkey
Tanzania
Uganda
Ukraine
Uruguay
United States
St. Vincent and the Grenadines
Venezuela, RB
West Bank and Gaza
Samoa
Yemen, Rep.
Yugoslavia, Fed. Rep.
South Africa
Congo, Dem. Rep.
Zambia
Zimbabwe

Independent Variables

(Openness)

List of Countries for Openness (Exports +Imports)/GDP, 1985: Lcopen

Angola
Albania
Argentina
Armenia
Antigua and Barbuda
Australia
Austria
Azerbaijan
Burundi
Belgium
Benin
Burkina Faso
Bangladesh
Bulgaria
Bahrain
Bahamas, The
Belarus
Belize
Bermuda
Bolivia
Brazil
Barbados
Bhutan
Botswana
Central African Republic
Canada
Switzerland
Chile
China
Cote d'Ivoire
Cameroon
Congo, Rep.
Colombia
Comoros
Cape Verde
Costa Rica
Cuba
Cyprus
Czech Republic
Germany
Djibouti
Dominica
Denmark
Dominican Republic
Algeria
Ecuador
Egypt, Arab Rep.
Eritrea
Spain
Estonia
Ethiopia
Finland
Fiji
France
Micronesia, Fed. Sts.
Gabon
United Kingdom
Georgia
Ghana
Guinea
Gambia, The
Guinea-Bissau
Equatorial Guinea
Greece
Grenada
Guatemala
Guyana
Hong Kong, China
Honduras
Croatia
Haiti
Hungary
Indonesia
India
Ireland
Iran, Islamic Rep.
Iceland
Israel
Italy
Jamaica
Jordan
Japan
Kazakhstan
Kenya
Kyrgyz Republic
Cambodia
St. Kitts and Nevis
Korea, Rep.
Kuwait
Lao PDR
Lebanon
St. Lucia
Sri Lanka
Lesotho
Lithuania
Luxembourg
Latvia
Macao, China
Morocco
Moldova
Madagascar
Mexico
Macedonia, FYR
Mali
Malta
Myanmar
Mongolia
Northern Mariana Islands
Mozambique
Mauritania
Mauritius
Malawi
Malaysia
Namibia
Niger
Nigeria
Nicaragua
Netherlands
Norway
Nepal
New Zealand
Oman
Pakistan
Panama
Peru
Philippines
Papua New Guinea
Poland
Puerto Rico
Portugal
Paraguay
Qatar
Romania
Russian Federation
Rwanda
Saudi Arabia
Sudan
Senegal
Singapore
Sierra Leone
El Salvador
Sao Tome and Principe
Suriname
Slovak Republic
Slovenia
Sweden
Swaziland
Seychelles
Syrian Arab Republic
Chad
Togo
Thailand
Tajikistan
Turkmenistan
Trinidad and Tobago
Tunisia
Turkey
Taiwan
Tanzania
Uganda
Ukraine
Uruguay
United States
Uzbekistan
St. Vincent and the Grenadines
Venezuela, RB
Virgin Islands (U.S.)
Vietnam
Yemen, Rep.
Yugoslavia, Fed. Rep.
South Africa
Congo, Dem. Rep.
Zambia
Zimbabwe

Country List for Import Penetration and TARS trade penetration

Angola
Argentina
Australia
Burundi
Belgium
Benin
Burkina Faso
Bangladesh
Bahrain
Bahamas, The
Belize
Brazil
Barbados
Central African Republic
Canada
Switzerland
Chile
China
Cote d'Ivoire
Cameroon
Congo, Rep.
Colombia
Costa Rica
Cayman Islands
Denmark
Dominican Republic
Algeria
Ecuador
Egypt, Arab Rep.
Finland
Fiji
France
United Kingdom
Ghana
Gambia, The
Guatemala
Guyana

Hong Kong, China
Haiti
Indonesia
India
Ireland
Iran, Islamic Rep.
Italy
Jamaica
Jordan
Japan
Kenya
Korea, Rep.
Kuwait
Sri Lanka
Morocco
Madagascar
Mexico
Mali
Malta
Malawi
Malaysia
Niger
Nigeria
Nicaragua
Netherlands
Norway
Nepal
New Zealand
Oman
Pakistan
Peru
Philippines
Papua New Guinea
Paraguay
Qatar
Rwanda
Sudan

Senegal
Singapore
Sierra Leone
El Salvador
Sweden
Syrian Arab Republic
Togo
Thailand
Trinidad and Tobago
Tunisia
Turkey
Tanzania
Uganda
Uruguay
United States
St. Vincent and the Grenadines
Venezuela, RB
Yemen, Rep.
Congo, Dem. Rep.
Zambia
Zimbabwe

(Trade Policy)

Country List for Import Duties as % imports, 1985 (Tariffs)

Argentina
Australia
Austria
Burundi
Belgium
Burkina Faso
Bangladesh
Bahrain
Bahamas, The
Bosnia and Herzegovina
Belize
Bolivia
Brazil
Barbados
Brunei
Botswana
Central African Republic
Canada
Switzerland
Chile
Cote d'Ivoire
Cameroon
Congo, Rep.
Colombia
Comoros
Costa Rica
Cayman Islands
Czech Republic
Denmark
Dominican Republic
Ecuador
Egypt, Arab Rep.
Spain
Ethiopia
Finland
Fiji
France

Gabon
United Kingdom
Ghana
Gambia, The
Guinea-Bissau
Greece
Guyana
Hungary
Indonesia
India
Ireland
Iran, Islamic Rep.
Iceland
Israel
Italy
Jamaica
Jordan
Japan
Kenya
St. Kitts and Nevis
Korea, Rep.
Kuwait
St. Lucia
Sri Lanka
Lesotho
Morocco
Mexico
Mali
Malta
Malawi
Malaysia
Nigeria
Nicaragua
Netherlands
Norway
Nepal

New Zealand
Oman

Pakistan
Panama
Peru
Philippines
Papua New Guinea
Poland
Paraguay
Senegal
Singapore
Sierra Leone
Sweden
Swaziland
Togo
Thailand
Tunisia
Turkey
Tanzania
Uganda
Uruguay
United States
St. Vincent and the Grenadines
Venezuela, RB
South Africa
Congo, Dem. Rep.
Zambia
Zimbabwe

List of Countries for Trade Taxes/ Trade, 1982: Txtrdg

Australia
Austria
Belgium
Bolivia
Brazil
Canada
Chile
Cote d'Ivoire
Cameroon
Congo, Rep.
Colombia
Denmark
Dominican Republic
Spain
Ethiopia
Finland
France
Gabon
United Kingdom
Greece
Honduras
Indonesia
India
Ireland
Iran, Islamic Rep.
Italy
Jamaica
Kuwait
Sri Lanka
Lesotho
Morocco
Mexico
Macedonia, FYR
Mauritania
Malaysia
Niger
Nicaragua
Netherlands
Norway
Oman
Pakistan
Paraguay
Rwanda
Singapore
Sweden
Thailand
Trinidad and Tobago
Tunisia
Turkey
Tanzania
United States
Venezuela, RB
Yugoslavia, Fed. Rep.
South Africa
Congo, Dem. Rep.
Zimbabwe

Country List for Tariffs on International Inputs and Capital Goods (Owti)

Angola
Argentina
Austria
Burundi
Belgium
Benin
Burkina Faso
Bangladesh
Bahrain
Bahamas, The
Bolivia
Brazil
Barbados
Central African Republic
Canada
Switzerland
Chile
China
Cameroon
Congo, Rep.
Colombia
Costa Rica
Cayman Islands
Dominica
Denmark
Algeria
Ecuador
Egypt, Arab Rep.
Spain
Ethiopia
Finland
France
Gabon
United Kingdom
Ghana
Guinea
Greece
Grenada
Guatemala
Guyana
Hong Kong, China
Haiti
Indonesia
India
Ireland
Iran, Islamic Rep.
Italy
Jamaica
Jordan
Japan
Kenya
Korea, Rep.
Kuwait
St. Lucia
Sri Lanka
Morocco
Madagascar
Mexico
Mozambique
Malawi
Malaysia
Nigeria
Nicaragua
Netherlands
Norway
Nepal
New Zealand
Oman
Pakistan
Peru
Philippines
Papua New Guinea
Paraguay
Rwanda
Saudi Arabia

Sudan
Senegal
Singapore
Sierra Leone
El Salvador
Sweden
Syrian Arab Republic
Togo
Thailand
Trinidad and Tobago
Tunisia
Turkey
Tanzania
Uganda
Uruguay
United States
St. Vincent and the Grenadines
Venezuela, RB
Virgin Islands (U.S.)
Yemen, Rep.
Congo, Dem. Rep.
Zambia
Zimbabwe

Country List for Weighted Average of total Import Charges, 1985(Totimpov85) (Available for Developing Countries Only)

Angola
Argentina
Antigua and Barbuda
Burundi
Benin
Burkina Faso
Bangladesh
Bahrain
Bahamas, The
Belize
Bolivia
Brazil
Barbados
Central African Republic
Chile
China
Cote d'Ivoire
Cameroon
Congo, Rep.
Colombia
Costa Rica
Cuba
Cayman Islands
Algeria
Ecuador
Egypt, Arab Rep.
Ghana
Guinea
Grenada
Guatemala
Guyana
Hong Kong, China
Haiti
Indonesia
India
Iran, Islamic Rep.
Jamaica
Jordan
Kenya
Korea, Rep.
Kuwait
Sri Lanka
Morocco
Madagascar
Mexico
Malawi
Malaysia
Nigeria
Nicaragua
Nepal
Oman
Pakistan
Peru
Philippines
Papua New Guinea
Paraguay
Qatar
Sudan
Senegal
Singapore
Sierra Leone
El Salvador
Syrian Arab Republic
Thailand
Trinidad and Tobago
Tunisia
Turkey
Tanzania
Uganda
Uruguay
St. Vincent and the Grenadines
Venezuela, RB
Yemen, Rep.
Congo, Dem. Rep.
Zambia
Zimbabwe

Country List for Non Trade Barriers Frequency on Intermediate Inputs, 1985 (Owqi)

Angola
Argentina
Austria
Burundi
Belgium
Benin
Burkina Faso
Bangladesh
Bahrain
Bahamas, The
Bolivia
Brazil
Barbados
Central African Republic
Canada
Switzerland
Chile
China
Cameroon
Congo, Rep.
Colombia
Costa Rica
Cayman Islands
Dominica
Denmark
Algeria
Ecuador
Egypt, Arab Rep.
Spain
Ethiopia
Finland
France
Micronesia, Fed. Sts.
United Kingdom
Ghana
Guinea
Greece
Grenada
Guatemala
Guyana
Hong Kong, China
Haiti
Indonesia
India
Ireland
Iran, Islamic Rep.
Italy

Jamaica
Jordan
Japan
Kenya
Korea, Rep.
Kuwait
St. Lucia
Sri Lanka
Morocco
Madagascar
Mexico
Mozambique
Malawi
Malaysia
Nigeria
Nicaragua
Netherlands
Norway
Nepal
Oman
Pakistan
Peru
Philippines
Papua New
Guinea
Paraguay
Rwanda
Saudi Arabia
Sudan
Senegal
Singapore
Sierra Leone
El Salvador
Sweden
Syrian Arab
Republic
Thailand
Trinidad and
Tobago
Tunisia
Turkey
Tanzania
Uganda
Uruguay
United States
St. Vincent and
the Grenadines
Venezuela, RB
Yemen, Rep.
Congo, Dem.
Rep.
Zambia
Zimbabwe

Country List for Non Tariff Barrier Coverage, 1987 (Nontarr87) (Available for Developing Countries Only)

Angola
Argentina
Antigua and
Barbuda
Burundi
Benin
Burkina Faso
Bangladesh
Bahrain
Bahamas, The
Belize
Bolivia
Brazil
Barbados
Central African
Republic
Chile
China
Cote d'Ivoire
Cameroon
Congo, Rep.
Colombia
Costa Rica
Cuba
Cayman Islands
Algeria
Ecuador
Egypt, Arab
Rep.
Ghana
Guinea
Grenada
Guatemala
Guyana
Hong Kong,
China
Haiti
Indonesia
India
Iran, Islamic
Rep.
Jamaica
Jordan
Kenya
Korea, Rep.
Kuwait
Sri Lanka
Morocco
Madagascar
Mexico
Malawi
Malaysia
Nigeria
Nicaragua
Nepal
Oman
Pakistan
Peru
Philippines
Papua New
Guinea
Paraguay
Qatar
Sudan
Senegal
Singapore
Sierra Leone
El Salvador
Syrian Arab
Republic
Thailand
Trinidad and
Tobago
Tunisia
Turkey
Tanzania
Uganda
Uruguay
St. Vincent and
the Grenadines
Venezuela, RB
Yemen, Rep.
Congo, Dem.
Rep.
Zambia
Zimbabwe

Country List for Sachs and Warner's Composite Openness Index (Open 80s)

Angola
Bangladesh
Canada
Switzerland
China
Cote d'Ivoire
Cameroon
Colombia
Cayman Islands
Czech Republic
Germany
Denmark
Algeria
Ecuador
Spain
Ethiopia
Finland
France
United Kingdom
Ghana
Guyana
Honduras
Haiti
Indonesia
Ireland
Iceland
Israel
Jordan
Japan
Kenya
Korea, Rep.
Kuwait
Luxembourg
Morocco
Mexico
Mali

Mozambique
Malawi
Malaysia
Nicaragua
Netherlands
Norway
New Zealand
Pakistan
Panama
Peru
Paraguay
Rwanda
Sudan
Senegal
Singapore
Sierra Leone
El Salvador
Sweden
Trinidad and Tobago
Tanzania
Uganda
Uruguay
Venezuela, RB
Congo, Dem. Rep.
Zambia
Zimbabwe

Country List for Leamers Measure of Openness (Leamer 82)

Argentina
Australia
Austria
Belgium
Bangladesh
Brazil
Canada
Switzerland
Cote d'Ivoire
Cameroon
Colombia
Costa Rica
Cayman Islands
Denmark
Dominican Republic
Ecuador
Egypt, Arab Rep.
Spain
Ethiopia
Finland
France
United Kingdom
Greece
Indonesia
Ireland
Israel
Italy
Japan
Sri Lanka
Morocco
Malaysia
Nicaragua
Netherlands
Norway
New Zealand
Pakistan
Panama
Peru
Philippines
Singapore
El Salvador
Sweden
Thailand
Trinidad and Tobago
Turkey
United States

Country List for Gravity –Residuals, Basic model (Grmb) and Augmented Model (Grma)

Argentina
Australia
Austria
Belgium
Benin
Burkina Faso
Bolivia
Brazil
Central African Republic
Canada
Switzerland
Chile
China
Cote d'Ivoire
Cameroon
Congo, Rep.
Colombia
Costa Rica
Denmark
Dominican Republic
Ecuador
Egypt, Arab Rep.
Spain
Ethiopia
Finland
France
Gabon
United Kingdom
Ghana
Guinea
Greece
Guatemala
Honduras
Haiti
Indonesia
India
Ireland
Iran, Islamic Rep.
Iceland
Israel
Italy
Jordan
Japan
Korea, Rep.
Sri Lanka
Morocco
Madagascar
Mexico
Mali
Mauritania
Malaysia
Niger
Nigeria
Nicaragua
Netherlands
Norway
New Zealand
Pakistan
Panama
Peru
Philippines
Paraguay
Saudi Arabia
Senegal
El Salvador
Sweden
Chad
Togo
Thailand
Tunisia
Turkey
Uruguay
United States
Venezuela, RB
South Africa
Congo, Dem. Rep.

Country List for Black Market Premium (Black), 1985

Argentina
Burundi
Benin
Burkina Faso
Bangladesh
Bolivia
Brazil
Central African Republic
Chile
China
Cote d'Ivoire
Cameroon
Colombia
Costa Rica
Algeria
Egypt, Arab Rep.
Spain
Ethiopia
Gabon
Ghana
Greece
Guatemala
Hong Kong, China
Haiti
Hungary
Indonesia
India
Israel
Jamaica
Kenya
Korea, Rep.
Sri Lanka
Morocco
Madagascar
Mexico
Mali
Malta
Mauritania
Malawi
Malaysia
Nigeria
Nicaragua
Pakistan
Panama
Peru
Philippines
Rwanda
Sudan
Senegal
Singapore
El Salvador
Syrian Arab Republic
Togo
Thailand
Turkey
Tanzania
Uganda
Venezuela, RB
Congo, Dem. Rep.
Zambia
Zimbabwe

(Institutions)

Country List for Governance Indicators :Voice and Accountability (Va), Political Stability (Ps), Government Effectiveness (Ge), Regulatory Quality (Rq), Rule of Law (Rl), and Control for Corruption (Ctc), 1999

Aruba
Andorra
Afghanistan
Angola
Albania
Netherlands Antilles
United Arab Emirates
Argentina
Armenia
American Samoa
Antigua and Barbuda
Australia
Austria
Azerbaijan
Burundi
Belgium
Benin
Burkina Faso
Bangladesh
Bulgaria
Bahrain
Bahamas, The
Bosnia and Herzegovina
Belarus
Belize
Bermuda
Bolivia
Brazil
Barbados
Brunei
Bhutan
Botswana
Central African Republic
Canada
Switzerland
Channel Islands
Chile
China
Cote d'Ivoire
Cameroon
Congo, Rep.
Colombia
Comoros
Cape Verde
Costa Rica
Cuba
Cayman Islands
Cyprus
Czech Republic
Germany
Djibouti
Dominica
Denmark
Dominican Republic
Algeria
Ecuador
Egypt, Arab Rep.
Eritrea
Spain
Estonia
Ethiopia
Finland
Fiji
France
Faeroe Islands
Micronesia, Fed. Sts.
Gabon
United Kingdom
Georgia
Ghana
Guinea
Gambia, The
Guinea-Bissau
Equatorial Guinea
Greece
Grenada
Greenland
Guatemala
Guam
Guyana
Hong Kong, China
Honduras
Croatia
Haiti
Hungary
Indonesia
Isle of Man
India
Ireland
Iran, Islamic Rep.
Iraq
Iceland
Israel
Italy
Jamaica

Jordan
Japan
Kazakhstan
Kenya
Kyrgyz Republic
Cambodia
Kiribati
St. Kitts and Nevis
Korea, Rep.
Kuwait
Lao PDR
Lebanon
Liberia
Libya
St. Lucia
Liechtenstein
Sri Lanka
Lesotho
Lithuania
Luxembourg
Latvia
Macao, China
Morocco
Monaco
Moldova
Madagascar
Maldives
Mexico
Marshall Islands
Macedonia, FYR
Mali
Malta
Myanmar
Mongolia
Northern Mariana Islands
Mozambique
Mauritania
Mauritius
Malawi
Malaysia
Mayotte
Namibia
New Caledonia
Niger
Nigeria
Nicaragua
Netherlands
Norway
Nepal
New Zealand
Oman
Pakistan
Panama
Peru
Philippines
Palau
Papua New Guinea
Poland
Puerto Rico
Korea, Dem. Rep.
Portugal
Paraguay
French Polynesia
Qatar
Romania
Russian Federation
Rwanda
Saudi Arabia
Sudan
Senegal
Singapore
Solomon Islands
Sierra Leone
El Salvador
Somalia
Sao Tome and Principe
Suriname
Slovak Republic
Slovenia
Sweden
Swaziland
Seychelles
Syrian Arab Republic
Chad
Togo
Thailand
Tajikistan
Turkmenistan
Tonga
Trinidad and Tobago
Tunisia
Turkey
Tanzania
Uganda
Ukraine
Uruguay
United States
Uzbekistan
St. Vincent and the Grenadines
Venezuela, RB
Virgin Islands (U.S.)
Vietnam
Vanuatu
West Bank and Gaza
Samoa
Yemen, Rep.
Yugoslavia, Fed. Rep.
South Africa
Congo, Dem. Rep.
Zambia
Zimbabwe

Country List for Democracy (Demo) and Autocracy (Auto) from Polity IV Data Set, 1999

Angola
Albania
Argentina
Australia
Austria
Burundi
Belgium
Benin
Burkina Faso
Bangladesh
Bulgaria
Bahrain
Bolivia
Brazil
Brunei
Botswana
Central African Republic
Canada
Switzerland
Chile
China
Cote d'Ivoire
Cameroon
Congo, Rep.
Colombia
Comoros
Costa Rica
Cuba
Cayman Islands
Czech Republic
Germany
Djibouti
Denmark
Dominican Republic
Algeria
Ecuador
Egypt, Arab Rep.
Spain
Ethiopia
Finland
Fiji
France
Gabon
United Kingdom
Ghana
Guinea
Gambia, The
Guinea-Bissau
Equatorial Guinea
Greece
Guyana
Honduras
Haiti
Hungary
Indonesia
India
Ireland
Iran, Islamic Rep.
Iceland
Israel
Italy
Jamaica
Jordan
Japan
Kenya
Korea, Rep.
Kuwait

Lao PDR
Sri Lanka
Lesotho
Luxembourg
Morocco
Madagascar
Mexico
Mali
Mongolia
Mozambique
Mauritania
Malawi
Malaysia
Niger
Nigeria
Nicaragua
Netherlands
Norway
Nepal
New Zealand
Oman
Pakistan
Panama
Peru
Philippines
Palau
Papua New Guinea
Poland
Paraguay
Qatar
Russian Federation
Rwanda
Saudi Arabia
Senegal
Singapore
Sierra Leone
El Salvador
Sweden
Swaziland
Syrian Arab Republic
Chad
Togo
Thailand
Trinidad and Tobago
Tunisia
Turkey
Tanzania
Uruguay
United States
Venezuela, RB
Vietnam
Yemen, Rep.
South Africa
Congo, Dem. Rep.
Zambia
Zimbabwe

(Capital Formation)

Country List for Capital Formation (Pk)

Angola
Albania
Argentina
Armenia
Antigua and Barbuda
Australia
Austria
Azerbaijan
Burundi
Belgium
Benin
Burkina Faso
Bangladesh
Bulgaria
Bahrain
Bosnia and Herzegovina
Belarus
Belize
Bolivia
Brazil
Barbados
Bhutan
Central African Republic
Canada
Switzerland
Chile
China
Cote d'Ivoire
Cameroon
Congo, Rep.
Colombia
Comoros
Cape Verde
Costa Rica
Cuba
Cyprus
Czech Republic
Germany
Djibouti
Dominica
Denmark
Dominican Republic
Algeria
Ecuador
Egypt, Arab Rep.
Eritrea
Spain
Estonia
Ethiopia
Finland
Fiji
France
Micronesia, Fed. Sts.
Gabon
United Kingdom
Georgia
Ghana
Guinea
Gambia, The
Guinea-Bissau
Equatorial Guinea
Greece
Grenada
Greenland
Guatemala
Guyana
Hong Kong, China
Honduras
Croatia
Haiti
Hungary
Indonesia
India
Ireland
Iran, Islamic Rep.
Iceland
Israel
Italy
Jamaica
Jordan
Japan
Kazakhstan
Kenya
Kyrgyz Republic
Cambodia
St. Kitts and Nevis
Korea, Rep.
Kuwait
Lao PDR
Lebanon
St. Lucia
Sri Lanka
Lesotho
Lithuania
Luxembourg
Latvia
Macao, China
Morocco
Moldova
Madagascar
Maldives
Mexico
Macedonia, FYR
Mali
Malta
Myanmar
Mongolia
Mozambique
Mauritania
Mauritius
Malawi
Malaysia
Namibia
Niger

Nigeria
Nicaragua
Netherlands
Norway
Nepal
New Zealand
Pakistan
Panama
Peru
Philippines
Papua New Guinea
Poland
Portugal
Paraguay
Romania
Russian Federation
Rwanda
Saudi Arabia
Sudan
Senegal
Singapore
Sierra Leone
El Salvador
Sao Tome and Principe
Suriname
Slovak Republic
Slovenia
Sweden
Swaziland
Seychelles
Syrian Arab Republic
Chad
Togo
Thailand
Tajikistan
Turkmenistan
Trinidad and Tobago
Tunisia
Turkey
Tanzania
Uganda
Ukraine
Uruguay
United States
Uzbekistan
St. Vincent and the Grenadines
Venezuela, RB
Vietnam
West Bank and Gaza
Yemen, Rep.
Yugoslavia, Fed. Rep.
South Africa
Zambia
Zimbabwe

(Human Capital: Initial Skills)

Country List for Average Years of Schooling, 1960 (Sch60), 1965 (Sch65), 1970 (Sch70), 1975 (Sch75), 1980 (Sch80), 1985 (Sch85), 1999 (Sch99)

Afghanistan
United Arab Emirates
Argentina
Australia
Austria
Burundi
Belgium
Benin
Bangladesh
Bahrain
Bolivia
Brazil
Barbados
Botswana
Central African Republic
Canada
Switzerland
Chile
China
Cameroon
Congo, Rep.
Colombia
Costa Rica
Cyprus
Germany
Denmark
Dominican Republic
Algeria
Ecuador
Egypt, Arab Rep.
Spain
Finland
Fiji
France
United Kingdom
Ghana
Gambia, The
Greece
Guatemala
Guyana
Hong Kong, China
Honduras
Haiti
Hungary

Indonesia
India
Ireland
Iran, Islamic Rep.
Iraq
Iceland
Israel
Italy
Jamaica
Jordan
Japan
Kenya
St. Kitts and Nevis
Korea, Rep.
Kuwait
Liberia
Sri Lanka
Lesotho
Mexico
Mali
Malta
Myanmar
Mozambique
Mauritania
Mauritius
Malawi
Malaysia
Niger
Nicaragua
Netherlands
Norway
Nepal
New Zealand
Pakistan
Panama
Peru
Philippines
Papua New Guinea
Poland
Portugal
Paraguay
Rwanda
Sudan
Senegal

Singapore
Sierra Leone
El Salvador
Sweden
Swaziland
Syrian Arab Republic
Togo
Thailand
Trinidad and Tobago
Tunisia
Turkey
Uganda
Uruguay
United States
Venezuela, RB
Yugoslavia, Fed. Rep.
South Africa
Congo, Dem. Rep.
Zambia
Zimbabwe

(Higher Skills)

Country List for Years of Higher Schooling (Hyr99), 1999

Afghanistan
Argentina
Australia
Austria
Belgium
Benin
Bangladesh
Bahrain
Bolivia
Brazil
Barbados
Botswana
Central African Republic
Canada
Switzerland
Chile
China
Cameroon
Congo, Rep.
Colombia
Costa Rica
Cyprus
Germany
Denmark
Dominican Republic
Algeria
Ecuador
Egypt, Arab Rep.
Spain
Finland
Fiji
France
United Kingdom
Ghana
Gambia, The
Greece
Guatemala
Guyana
Hong Kong, China
Honduras
Haiti
Hungary
Indonesia
India
Ireland
Iran, Islamic Rep.
Iraq
Iceland
Israel
Italy
Jamaica
Jordan
Japan
Kenya
Korea, Rep.
Kuwait
Liberia
Sri Lanka
Lesotho
Mexico
Mali
Malta
Myanmar
Mozambique
Mauritius
Malawi
Malaysia
Niger
Nicaragua
Netherlands
Norway
Nepal
New Zealand
Pakistan
Panama
Peru
Philippines
Papua New Guinea
Poland
Portugal
Paraguay
Rwanda
Sudan
Senegal
Singapore
Sierra Leone
El Salvador
Sweden
Swaziland
Syrian Arab Republic
Togo
Thailand
Trinidad and Tobago
Tunisia
Turkey
Uganda
Uruguay
United States
Venezuela, RB
South Africa
Zambia
Zimbabwe

(Instruments)

Country List for Schooling Days in a Year (Schday)

Afghanistan
Angola
United Arab Emirates
Argentina
Armenia
Australia
Austria
Burundi
Belgium
Benin
Burkina Faso
Bangladesh
Bulgaria
Bahrain
Bahamas, The
Bolivia
Brazil
Barbados
Central African Republic
Canada
Switzerland
Chile
China
Cote d'Ivoire
Cameroon
Congo, Rep.
Colombia
Comoros
Cape Verde
Costa Rica
Cyprus
Dominica
Denmark
Dominican Republic
Algeria
Ecuador
Egypt, Arab Rep.
Spain
Ethiopia
Finland
Fiji
France
Gabon
United Kingdom
Ghana
Guinea
Gambia, The
Guinea-Bissau
Greece
Grenada
Guatemala
Guyana
Hong Kong, China
Honduras
Haiti

Hungary
Indonesia
India
Ireland
Iran, Islamic Rep.
Iraq
Iceland
Israel
Italy
Jamaica
Jordan
Japan
Kenya
Korea, Rep.
Kuwait
Liberia
St. Lucia
Sri Lanka
Lesotho
Luxembourg
Morocco
Madagascar
Maldives
Mexico
Mali
Malta
Mozambique
Mauritania
Mauritius
Malaysia
Niger
Nigeria
Nicaragua
Netherlands
Norway
Nepal
New Zealand
Oman
Pakistan
Panama
Peru
Philippines
Papua New Guinea
Poland
Portugal
Paraguay
Romania
Rwanda
Saudi Arabia
Sudan
Senegal
Singapore
Solomon Islands
Sierra Leone
El Salvador
Somalia
Suriname
Sweden
Swaziland
Seychelles
Syrian Arab Republic
Chad
Togo
Thailand
Tonga
Trinidad and Tobago
Tunisia
Turkey
Tanzania
Uganda
Uruguay
United States
St. Vincent and the Grenadines
Venezuela, RB
Vanuatu
Samoa
Yemen, Rep.
Yugoslavia, Fed. Rep.
South Africa
Congo, Dem. Rep.
Zambia
Zimbabwe

Country List for Drop Out Rate from School , 1990 (Drop90)

Afghanistan
Angola
Albania
United Arab Emirates
Argentina
Armenia
Australia
Austria
Burundi
Belgium
Benin
Burkina Faso
Bangladesh
Bulgaria
Bahrain
Bahamas, The
Bolivia
Brazil
Barbados
Central African Republic
Canada
Switzerland
Chile
China
Cote d'Ivoire
Cameroon
Congo, Rep.
Colombia
Comoros
Cape Verde
Costa Rica
Cyprus
Dominica
Denmark
Dominican Republic
Algeria
Ecuador
Egypt, Arab Rep.
Spain
Ethiopia
Finland
France
Gabon
Ghana
Guinea
Gambia, The
Guinea-Bissau
Greece
Guatemala
Guyana
Hong Kong, China
Honduras
Haiti
Hungary
Indonesia
India
Ireland
Iran, Islamic Rep.
Iraq
Israel
Italy
Jamaica
Jordan
Japan
Korea, Rep.
Kuwait
Libya
St. Lucia
Sri Lanka
Lesotho
Luxembourg
Morocco
Madagascar
Maldives
Mexico
Mali
Malta
Mozambique
Mauritania
Mauritius
Malaysia
Niger
Nigeria
Nicaragua
Netherlands
Norway
New Zealand
Oman
Pakistan
Panama
Peru
Philippines
Papua New Guinea
Poland
Paraguay
Romania
Rwanda
Saudi Arabia
Sudan
Senegal
Singapore

Sierra Leone
El Salvador
Suriname
Sweden
Swaziland
Seychelles
Syrian Arab Republic
Chad
Togo
Thailand
Tonga
Trinidad and Tobago
Tunisia
Turkey
Tanzania
Uganda
Uruguay
United States
Venezuela, RB
Yemen, Rep.
Yugoslavia, Fed. Rep.
Congo, Dem. Rep.
Zambia
Zimbabwe

Country List for Distance from Equator (Disteq)

Aruba
Andorra
Afghanistan
Angola
Albania
Netherlands Antilles
United Arab Emirates
Argentina
Armenia
Antigua and Barbuda
Australia
Austria
Azerbaijan
Burundi
Belgium
Benin
Burkina Faso
Bangladesh
Bulgaria
Bahrain
Bahamas, The
Bosnia and Herzegovina
Belarus
Belize
Bermuda
Bolivia
Brazil
Barbados
Brunei
Bhutan
Botswana
Central African Republic
Canada
Switzerland
Chile
China
Cote d'Ivoire
Cameroon
Congo, Rep.
Colombia
Comoros
Cape Verde
Costa Rica
Cuba
Cayman Islands
Cyprus
Czech Republic
Germany
Djibouti
Dominica
Denmark
Dominican Republic
Algeria
Ecuador
Egypt, Arab Rep.
Eritrea
Spain
Estonia
Ethiopia
Finland
Fiji
France
Faeroe Islands
Micronesia, Fed. Sts.
Gabon
United Kingdom
Georgia
Ghana
Guinea
Gambia, The
Guinea-Bissau
Equatorial Guinea
Greece
Grenada
Greenland
Guatemala
Guam
Guyana
Hong Kong, China
Honduras
Croatia
Haiti
Hungary
Indonesia
India
Ireland
Iran, Islamic Rep.
Iraq
Iceland
Israel
Italy
Jamaica
Jordan
Japan
Kazakhstan
Kenya
Kyrgyz Republic
Cambodia
Kiribati
St. Kitts and Nevis
Korea, Rep.
Kuwait
Lao PDR
Lebanon
Liberia
Libya
St. Lucia
Liechtenstein
Sri Lanka
Lesotho
Lithuania
Luxembourg
Latvia
Macao, China
Morocco
Monaco
Moldova
Madagascar
Maldives
Mexico
Marshall Islands
Macedonia, FYR
Mali
Malta
Myanmar
Mongolia
Northern Mariana Islands
Mozambique
Mauritania
Mauritius
Malawi
Malaysia
Mayotte
Namibia
New Caledonia
Niger
Nigeria
Nicaragua
Netherlands
Norway
Nepal
New Zealand
Oman
Pakistan
Panama
Peru
Philippines
Palau
Papua New Guinea
Poland
Puerto Rico
Korea, Dem. Rep.
Portugal

Paraguay
French Polynesia
Qatar
Romania
Russian Federation
Rwanda
Saudi Arabia
Sudan
Senegal
Singapore
Solomon Islands
Sierra Leone
El Salvador
Somalia
Sao Tome and Principe
Suriname
Slovak Republic
Slovenia
Sweden
Swaziland
Seychelles
Syrian Arab Republic
Chad
Togo
Thailand
Tajikistan
Turkmenistan
Tonga
Trinidad and Tobago
Tunisia
Turkey
Tanzania
Uganda
Ukraine
Uruguay
United States
Uzbekistan
St. Vincent and the Grenadines
Venezuela, RB
Virgin Islands (U.S.)
Vietnam
Vanuatu
West Bank and Gaza
Samoa
Yemen, Rep.
Yugoslavia, Fed. Rep.
South Africa
Congo, Dem. Rep.
Zambia
Zimbabwe

Country List for Fraction of Population Speaking English (Engfrac) and major Languages in Western Europe (Eurfrac)

Afghanistan
Angola
Albania
United Arab Emirates
Argentina
Armenia
Australia
Austria
Azerbaijan
Burundi
Belgium
Benin
Burkina Faso
Bangladesh
Bulgaria
Bahrain
Bahamas, The
Bosnia and Herzegovina
Belarus
Belize
Bolivia
Brazil
Barbados
Brunei
Bhutan
Botswana
Central African Republic
Canada
Switzerland
Channel Islands
Chile
China
Cote d'Ivoire
Cameroon
Congo, Rep.
Colombia
Comoros
Cape Verde
Costa Rica
Cuba
Cayman Islands
Cyprus
Czech Republic
Djibouti
Dominica
Denmark
Dominican Republic
Algeria
Ecuador
Egypt, Arab Rep.
Eritrea
Spain
Estonia
Ethiopia
Finland
Fiji
France
Gabon
United Kingdom
Georgia
Ghana
Guinea
Gambia, The
Guinea-Bissau
Equatorial Guinea
Greece
Grenada
Guatemala
Guyana
Hong Kong, China
Honduras
Croatia
Haiti
Hungary
Indonesia
India
Ireland
Iran, Islamic Rep.
Iraq
Iceland
Israel
Italy
Jamaica
Jordan
Japan
Kazakhstan
Kenya
Kyrgyz Republic
Cambodia
Kiribati
St. Kitts and Nevis
Korea, Rep.
Kuwait
Lao PDR
Lebanon
Liberia
Libya
St. Lucia
Liechtenstein
Sri Lanka
Lesotho
Lithuania
Luxembourg
Latvia
Macao, China
Morocco
Monaco
Moldova
Madagascar
Maldives
Mexico
Marshall Islands
Macedonia, FYR
Mali
Malta
Myanmar
Mongolia
Northern Mariana Islands
Mozambique
Mauritania
Mauritius
Malawi
Malaysia
Mayotte
Namibia
New Caledonia
Niger
Nigeria
Nicaragua

Netherlands
Norway
Nepal
New Zealand
Oman
Pakistan
Panama
Peru
Philippines
Palau
Papua New Guinea
Poland
Puerto Rico
Korea, Dem. Rep.
Portugal
Paraguay
French Polynesia
Qatar
Romania
Russian Federation
Rwanda
Saudi Arabia
Sudan
Senegal
Singapore
Solomon Islands
Sierra Leone
El Salvador
Somalia
Sao Tome and Principe
Suriname
Slovak Republic
Slovenia
Sweden
Swaziland
Seychelles
Syrian Arab Republic
Chad
Togo
Thailand
Tajikistan
Turkmenistan
Tonga
Trinidad and Tobago
Tunisia
Turkey
Tanzania
Uganda
Ukraine
Uruguay
United States
Uzbekistan
St. Vincent and the Grenadines
Venezuela, RB
Virgin Islands (U.S.)
Vietnam
Vanuatu
West Bank and Gaza
Samoa
Yemen, Rep.
Yugoslavia, Fed. Rep.
South Africa
Congo, Dem. Rep.
Zambia
Zimbabwe

Country List for Log of Predicted Shares of FR Bilateral Trade, 1999 (Lfrkerom)

Afghanistan
Angola
Albania
Netherlands Antilles
United Arab Emirates
Argentina
Australia
Austria
Burundi
Belgium
Benin
Burkina Faso
Bangladesh
Bulgaria
Bahrain
Bahamas, The
Belize
Bolivia
Brazil
Barbados
Brunei
Bhutan
Botswana
Central African Republic
Canada
Switzerland
Chile
China
Cote d'Ivoire
Cameroon
Congo, Rep.
Colombia
Comoros
Cape Verde
Costa Rica
Cuba
Cyprus
Czech Republic
Germany
Djibouti
Dominica
Denmark
Dominican Republic
Algeria
Ecuador
Egypt, Arab Rep.

Spain
Ethiopia
Finland
Fiji
France
Micronesia, Fed. Sts.
Gabon
United Kingdom
Ghana
Guinea
Gambia, The
Guinea-Bissau
Equatorial Guinea
Greece
Grenada
Guatemala
Guyana
Hong Kong, China
Honduras
Haiti
Hungary
Indonesia
India
Ireland
Iran, Islamic Rep.
Iraq
Iceland
Israel
Italy
Jamaica
Jordan
Japan
Kenya
Cambodia
Korea, Rep.
Kuwait
Lao PDR
Lebanon
Liberia
Libya
St. Lucia
Sri Lanka
Lesotho
Luxembourg
Morocco
Madagascar

Maldives
Mexico
Mali
Malta
Myanmar
Mongolia
Mozambique
Mauritania
Mauritius
Malawi
Malaysia
Namibia
Niger
Nigeria
Nicaragua
Netherlands
Norway

Nepal
New Zealand
Oman
Pakistan
Panama
Peru
Philippines
Papua New Guinea
Poland
Puerto Rico
Korea, Dem. Rep.
Portugal
Paraguay
Qatar
Romania
Russian Federation
Rwanda
Saudi Arabia
Sudan
Senegal
Singapore
Solomon Islands
Sierra Leone
El Salvador
Somalia
Sao Tome and Principe
Suriname
Sweden
Swaziland
Seychelles
Syrian Arab Republic
Chad
Togo
Thailand
Tonga
Trinidad and Tobago
Tunisia
Turkey
Tanzania
Uganda
Uruguay
United States
St. Vincent and the Grenadines
Venezuela, RB
Virgin Islands (U.S.)
Vietnam
Vanuatu
Samoa
Yemen, Rep.
Yugoslavia, Fed. Rep.
South Africa
Congo, Dem. Rep.
Zambia
Zimbabwe

Data and Sources for Chapter 6

	Variables	Sources
Single Country varaibles		
ldg	India's Defence Expenditure as a percentage India's GDP at current market prices,	Years: 1950-2005, Sources: Correlates of war data set version 3.02, World Development Indicators 2006 (World Bank), Government Finance Statistics Year Book 2006 (IMF) and Economic Survey of Pakistan
ledug	India's education expenditure as a percentage of India's GDP at current market prices,	Years: 1950-2005, Sources: Indian Economic Survey, Education Statistics (Department of Education, India) and Education Statistics 2006 (World Bank)
lexpg	India's total exports as a percentage of India's GDP,	Years: 1950-2005, Source: Indian Economic Survey, International Financial Statistics 2006 (IMF)
lg	Annual growth rate of India's per capita gross domestic product (GDP) at constant prices,	Years: 1950-2005, Source: Indian Economic Survey
lgpc	India's real per capita growth rate,	Years: 1950-2005, Source: Indian Economic Survey, International Financial Statistics 2006 (IMF), World Development Indicators 2006 (World Bank)
limpg	India's total imports as a percentage of India's GDP	Years: 1950-2005, Source: Indian Economic Survey, International Financial Statistics 2006 (IMF)
lmilopop	India's number of military personnel as a percentage of India's total population.	Years: 1950-2003, Source: COW Inter-State War Data, Version 3.02, Faten et al. (2004), International Financial Statistics 2006 (IMF)
lopen	India's exports plus imports as a percentage India's GDP at current market prices,	Years: 1950-2005, Source: International Financial Statistics 2006 (IMF)
lxp	Indian exports to Pakistan,	Years: 1960-2005, Source: Direction of Trade Statistics yearbook, IMF

P2i	Polity 2 Score for India, numeric range from -10 (high autocracy) to 10 (high democracy),	Years: 1950-2003, Source: Polity IV Project (Centre for International Development and Conflict Management)
P2p	Polity 2 Score for Pakistan, numeric range from -10 (high autocracy) to 10 (high democracy),	Years: 1950-2003, Source: Polity IV Project (Centre for International Development and Conflict Management)
Pedug	Pakistan's education expenditure as a percentage of Pakistan's GDP at current market prices,	Years: 1950-2005, Sources: Pakistan Economic Survey and Education Statistics 2006 (World Bank)
Pexpg:	Pakistan's exports as a percentage of Pakistan's GDP,	Years: 1950-2005, Source: International Financial Statistics 2006 (IMF)
Pdg	Pakistan's Defence Expenditure as a percentage of Pakistan's GDP at current market prices,	Years: 1950-2005, Sources: Correlates of war data set version 3.02, World Development Indicators (2006), Government Finance Statistics Year Book 2006 (IMF) and Economic Survey of Pakistan
Pg:	Annual growth rate of Pakistan's GDP per capita at constant prices,	Years: 1950-2005, Source: Pakistan Economic Survey
Pgpc:	Pakistan's real GDP per capita growth rates,	Years: 1950-2005, Source: International Financial Statistics 2006 (IMF), Pakistan Economic Survey
Pimpg	Pakistan's imports as a percentage of Pakistan's GDP,	Years: 1950-2005, Source: International Financial Statistics 2006 (IMF)
Pmilpop	Pakistan's number of military personnel as a percentage of Pakistan's total population,	Years: 1950-2003, Sources: COW Inter-State War Data, Version 3.02, Faten et al. (2004), International Financial Statistics 2006 (IMF)
Popen	Pakistan's exports plus imports as a percentage of Pakistan's gross domestic product at current prices,	Years: 1950-2005, Source: International Financial Statistics 2006 (IMF)
Pxi:	Pakistan's exports to India,	Years: 1960-2005, Source: Direction of Trade Statistics yearbook, IMF

Dyadic Variables

Conflict

Cnfpi	Intensity of Conflict between Pakistan and India, Scores 1 (minor) when 25 to 999 battle-related deaths and 2 (war) when at least 1000 battle-related deaths in a given year,	Years: 1950-2003, Sources: UCDP/PRIO Armed Conflict Data set Version IV, Harbom et al. (2006)
Dur	Number of days a conflict lasts in a year between Pakistan and India,	Years: 1950-2003, Source: COW Inter-State War Data, Version 3.02, Faten et al. (2004)
Fatal	Annual fatality level of conflict between Pakistan and India, scores from 0 to 6 0 None 1-25 Deaths 26-100 Deaths 101-250 Deaths 251-500 Deaths	Years: 1950-2003, Sources: COW Inter-State War Data, Version 3.02, Faten et al. (2004)

	501-999 Deaths 6 >999 Deaths	
Hiact	Highest action by Pakistan and India in annual corresponding dispute [bracketed numbers refer to corresponding hostility level] 0 No militarised action [1] 1 Threat to use force [2] 2 Threat to blockade [2] 3 Threat to occupy territory [2] 4 Threat to declare war [2] 5 Threat to use CBR weapons [2] 6 Threat to join war [2] 7 Show of force [3] 8 Alert [3] 9 Nuclear alert [3] 10 Mobilisation [3] 11 Fortify border [3] 12 Border violation [3] 13 Blockade [4] 14 Occupation of territory [4] 15 Seizure [4] 16 Attack [4] 17 Clash [4] 18 Declaration of war [4] 19 Use of CBR weapons [5] 20 Begin inter-state war [5] 21 Join inter-state war [5]	Years: 1950-2003, Source: COW Inter-State War Data, Version 3.02, Faten et al. (2004)
Hstlev	Annual hostility levels reached by India and Pakistan in each annual corresponding dispute No militarised action Threat to use force Display of force Use of force War	Years: 1950-2003, Source: Faten et al. (2004)
VolFatal	Precise volume of fatality in each annual corresponding dispute,	Years: 1950-2003, Sources: COW Inter-State War Data, Version 3.02 (Faten et al. 2004), CSCW/PRIO Battle Deaths data (Lacina 2005), CSP Data set on Major Episodes of Political Violence 1946-2006 http://members.aol.com/cspmgm/warlist.htm
	Bi Lateral Trade	
Tpitp	Bilateral trade between Pakistan and India as a ratio of Pakistan's total trade,	Years: 1950-2001, Source: Direction of Trade Statistics yearbook, IMF International Financial Statistics 2006 (IMF)
Tpit	Bilateral trade between Pakistan and India as a ratio of India's total trade,	Years: 1950-2001, Source: Direction of Trade Statistics yearbook, IMF International Financial Statistics 2006 (IMF)
	Multilateral Trade	
Xmpi	Pakistan's total trade (exports + imports) as a ratio of India's total	Years: 1950-2001, Source: International Financial Statistics 2006 (IMF)

	trade (exports + imports),	
Xmip	India's total trade (exports + imports) as a ratio of Pakistan's total trade (exports + imports),	Years: 1950-2001, Source: International Financial Statistics 2006 (IMF)
Lmpi1	Log GDP weighted average of Pakistan and India's total imports,	Years: 1950-2005, Source: International Financial Statistics 2006 (IMF)
Lmpi2	Log mean average of Pakistan's total imports as a proportion of Pakistan's GDP and India's total imports as a ratio of India's GDP,	Years: 1950-2005, Source: International Financial Statistics 2006 (IMF)
Lxpi1	Log GDP weighted average of Pakistan and India's total exports,	Years: 1950-2001, Source: International Financial Statistics 2006 (IMF)
Lxpi2	Log mean average of Pakistan's total exports over Pakistan's GDP and India's total exports over India's GDP,	Years: 1950-2001, Source: International Financial Statistics 2006 (IMF)
	Military Burden	
Lmilbrd1	Log of Pakistan's defence expenditure over Pakistan's GDP as a ratio of India's defence expenditure over India's GDP,	Years: 1950-2005, Sources: Correlates to war data set version 3.02, World Development Indicators 2006 (World Bank), Government Finance Statistics Year Book (IMF) and Economic Survey of Pakistan
Lmilbrd2	Log of India's defence expenditure over India's GDP as a ratio of Pakistan's defence expenditure over Pakistan's GDP,	Years: 1950-2005, Sources: Correlates to war data set version 3.02, World Development Indicators 2006 (World Bank), Government Finance Statistics Year Book (IMF) and Economic Survey of Pakistan
Lmilbrd 3	Log of Pakistan's defence expenditure over Pakistan's GDP as a ratio of Pakistan's defence expenditure over Pakistan's GDP plus India's defence expenditure over India's GDP,	Years: 1950-2005, Sources: Correlates to war data set version 3.02, World Development Indicators 2006 (World Bank), Government Finance Statistics Year Book (IMF) and Economic Survey of Pakistan
Lmilbrd 4	Log of India's defence expenditure over India's GDP as a ratio of Pakistan's defence expenditure over Pakistan's GDP plus India's defence expenditure over India's GDP,	Years: 1950-2005, Sources: Correlates to war data set version 3.02, World Development Indicators 2006 (World Bank), Government Finance Statistics Year Book (IMF) and Economic Survey of Pakistan
Lmilbrd5	Log of Mean average of India's defence expenditure over GDP and Pakistan's defence expenditure over GDP,	Years: 1950-2005, Sources: Correlates to war data set version 3.02, World Development Indicators 2006 (World Bank), Government Finance Statistics Year Book (IMF) and Economic Survey of Pakistan
Lmilbrd6	Log GDP weighted average of Pakistan and India's defence expenditures,	Years: 1950-2005, Sources: Correlates to war data set version 3.02, World Development Indicators 2006 (World Bank), Government Finance Statistics Year Book (IMF), Economic Survey of Pakistan, Economic Survey of India
Lmilppi	Log of Pakistan's military personnel over Pakistan's total population as a ratio of India's military personnel over India's total population,	Years: 1950-2001, Sources: Correlates to war data set version 3.02 and International Financial Statistics 2006 (IMF)
Lmilpip	Log of India's military personnel over India's total population as a ratio of Pakistan's military personnel over Pakistan's total population,	Years: 1950-2001, Sources: Correlates to war data set version 3.02 and International Financial Statistics 2006 (IMF)

	Economic Growth	
Gpi	Weighted average of real GDP per capita growth rates for Pakistan and India,	Years: 1950 to 2005. Sources: Pakistan Economic Survey, Indian Economic Survey, International Financial Statistics 2006 (IMF)
	Democracy	
Demopi	Pakistan and India's combined democracy score (by adding 10 to India and Pakistan's Polity2 values for each year and then taking the product of these values in order to convert the variable in dyadic form),	Years: 1950-2003, Source: Polity IV Project (Centre for International Development and Conflict Management)
	Population	
Poppi	Average of Pakistan's total population and India's total population	Years: 1950-2001, Source: International Financial Statistics 2006 (IMF)

Dawood Mamoon

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This thesis has not been submitted to any university for a degree or any other award.