PRO-POOR GROWTH AND LIBERALISATION: CGE POLICY MODELLING FOR NEPAL

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ARMOEDE VERLICHTENDE GROEI EN LIBERALISERING: CGE BELEIDSMODEL VOOR NEPAL

Thesis

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by

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born in Tanahun, Nepal

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For my elder brother Dr. Bijnan Acharya

Preface

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Sanjaya Acharya
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1. Background and objectives

1.1. Introduction

Economic growth and poverty reduction are undisputed development objectives. Among the undisputed facts is also the recent increase in liberalisation measures, trade openness, and accelerated integration of national economies in the world economy, generally termed as globalisation. The two sets of facts raise important issues for the economist and the politician. What is the relationship between the growth and poverty objectives on the one hand and liberalisation and globalisation on the other hand? Do they help each other or are they in conflict with each other? Under which country conditions are such relations generated? What structural reforms would reinforce positive results in both directions? Last, and very relevant for the present study, there is the concern of developing and analysing analytical and policy modelling frameworks that can address these questions.

There are also very pressing policy questions unanswered in the development context, especially in the cases of small developing countries with least resources and that are just entering an international arena that is much more competitive in practically than all production and trade activities in that of the small country. As will be shown, the empirical evidences are all mixed in nature on these questions. Even if liberalisation, trade and globalisation can be shown in the context of such small and less fortunate countries to have minor or no effect on growth and/or have detrimental or no effects on poverty reduction, the expectation is that more liberalisation, trade and globalisation are tendencies that cannot be turned around. As a result, the pressing policy questions take the following form: How to restructure the developing economy in question in ways that can bring about benefits from globalisation.

In the light of the above statements, the objectives of the current study are twofold. In the first place, we want to develop a viable and easily accessible analytical framework for the case of a small developing country with least resources that can analyse the relationship between liberalisation policies and pro-poor growth. In the second place, we like to develop analytical tools and apply them to investigate alternative restructuring strategies of such economy that can lead to a win-win situation with regards to liberal reforms and pro-poor growth. It will be realised that external liberal reforms and internal liberal reforms have to go hand in hand.

The analytical approach we follow can be described as a general system approach. In particular, we work with a static CGE model that is subsequently made dynamic to allow an incorporation and assessment of alternative restructuring strategies. The country selected for the application, Nepal, conforms to the group of small and less fortunate economies described above.

1.2. Questions on the relation between liberalisation and distribution

Four introductory questions need to be reviewed before encroaching on the modelling and its application to Nepal. (a) What do theoretical studies tell on the relationship between liberalisation and pro-poor growth? (b) What is the empirical evidence on this relationship between liberalisation and distribution? (c) How did international assistance agencies, like the World Bank, WB, and International Monetary Fund, and recipient governments in developing countries formulate their development policy in the context of knowledge on the relationship between liberalisation and distribution? (d) In the case of Nepal, what are the specifics of the problem and how were these treated? These questions will be examined at some length in the next chapter. It suffices here in the way of introducing the problem to give some general answers to these questions.

First, what do theoretical studies tell on the relationship between liberalisation and pro-poor growth?

Theoretical works tend to conclude that economic liberalisation can bring both pro-poor and anti-poor growth effects as well as economic expansionary and contractionary forces in motion. The effects in the long and short run periods may differ. The relative strengths of these forces determine the change in economic welfare of different income groups.

Second, what is the empirical evidence on this relationship between liberalisation and distribution?

Review of the substantial empirical research during the past two decades does not lead us easily to robust conclusions regarding the relationship between globalisation and inequality. As will be apparent from the literature review of cross-country regression analysis, the combination of complex but partial phenomena, choice of variables, and data inadequacies have rendered the empirical works both hazardous and partial. In-depth specific country studies of the phenomenon are more helpful in giving an insight on the particular conditions that generate positive or negative redistribution effects of more trade. In this respect, the general system approach is more useful than a partial approach. A general system approach allows a study of more facets of the trade-distribution phenomena in a constrained framework of the whole economy and makes it possible to appraise alternative policy paths towards achieving pro-poor

growth under trade openness. The necessity of combining internal liberalisation with external liberalisation is an additional argument for developing a general system approach in heating the topic of interest in this study.

With the above knowledge, a general system approach is a more reliable and comprehensive tool of analysis for tackling the intricate relations between liberalisation and distribution. CGE models that trace the relationship between liberalisation, trade, growth and distribution are increasingly being used. A CGE model, backed by an allied Social Accounting Matrix (SAM), is thus the analytical tools we use in this study. The modelling framework will include both external and internal liberalisation measures that can be manipulated in policy simulations.

Third, how did international and national policy makers formulate their development policy in the context of knowledge on the relationship between liberalisation and distribution?
In the last four or five decades the direction of development policy, especially for the small and medium-size developing countries, has been remarkably dominated by policy views and development initiatives of the IMF and World Bank. These two agencies started in 1986 with the Structural Adjustment Programme (SAP) consisting of two phases. Since then their development policy has undergone basic changes over time, culminating more than one decade later in the Poverty Reduction and Growth Facilities (PRGF).

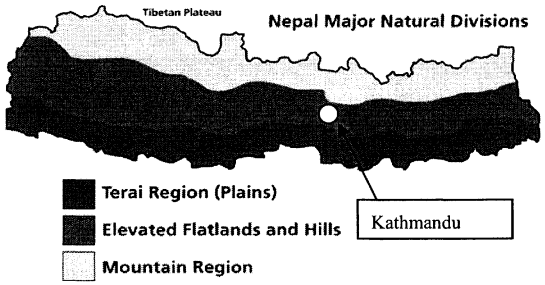
The first phase focused on macroeconomic adjustment and economic growth. Controlling money supply by cutting down the public expenditure remained the major strategy of the Fund while the World Bank involved itself to the identification and funding for major growth potential areas in the economy. The liberalization strategies at the time were based on the belief that free markets are the most growth inducing, and that this has trickle down effects that will reduce poverty. Therefore, there was no question of inequalities to be addressed so long as higher rates of economic growth are attained.

In time, there was increasing realisation that IMF and World Bank policies were anti-poor and they should be modified in favour of the poor. Devaluation of the local currencies of many developing countries led to the decline in the income of poor labours working in exporting sectors, while withdrawal of subsidies from development expenditure were detrimental for the poor. Subsequently, the second phase of the extended SAP, after 1992, emphasised the generation of more government revenue rather than expenditure cutting for balancing the state budget.

Various studies revealed that the liberalisation policies recommended by the IMF and World Bank marginalized many poor people in developing countries. This realization motivated the Fund and the Bank to initiate and implement a newly formulated Poverty Reduction and Growth Facilities. The programme aimed at making poverty reduction efforts among low income members a key and more explicit element of a renewed growth-oriented economic strategy, while maintaining liberalisation. This view is also the underlying view for the modelling formulations and policy simulations envisaged in chapters 4, 5, 6 and 7 of this book.

Fourth, how has the relationship liberalisation-poverty worked in Nepal?

Nepal is a South Asian country surrounded by India on the east, west, and south and bordering the Tibetan plateau of China is on the north. Nepal's difficult topography can be divided into three ecological regions: the upland mountain in the north that ranges from heights of 4.8 km to more than 8.8 km, including the top of the world, the Mount Everest; the middle hills, a rugged region with trails and with river valleys, heights ranging from 1.5 km to 4.8 km; and the southern *Terai*, a plain with sub-tropical climate, very fertile and densely populated. These three regions have 8%, 44%, and 48% of the total population of the country, respectively, CBS (2002). The expansion of transportation service and subsequent integration of poor people in the market is the main problem facing mountain and hill areas.



The sparse development infrastructure and difficult livelihood in upland mountains and hills have caused a high rate of migration of people to the low land (*Terai*) annually. This region constitutes the northern part of the Gangetic Plain of south Asia and has more than one million hectares of paddy fields.

A small landlocked country in South Asia, Nepal remains as one of the 48 least developed countries in the world with per capita income 240 US dollars in 2003, World Bank (2004). So far, the country has not been quoted as an example of any economic miracle nor of any debacle. Low economic growth rate (slightly over 2% in real term over the last 10 years), growing

unemployment and disguised unemployment, and intensifying poverty have culminated into the vicious cycle of low income, low saving, low investment; all together leading the country to a low level development equilibrium. The macro economic stability observed in the recent years is the virtual outcome of such a low level of economic activities, NSSD (2000). Furthermore, inefficiency in resource management resulting in high incremental capital-output ratio, estimated to an average of 4.1:1 during the last five years, has led it to a high cost economy, and has retarded the country's relative market competitiveness. A very weak development administration in charge of development programmes initiated in the Development Plans has resulted in undershooting of most of the plan targets. Moreover, structural and institutional barriers, such as a fragile industrial base, weak financial sector although flourishing in terms of the number of financial institutions[1], and inefficient public expenditures and state enterprises also explain the low economic growth.

Nepal's external sector is historically weak with a perpetually rising trade deficit. Exports continued to surge, while there was a rebound in imports as well and at a higher rate, resulting in a widening of the trade deficit. From basically a primary goods exporting country till the mid 1980s, Nepal is now turning into a manufacturing goods exporting country. Notwithstanding the satisfactory performance in the recent years, the vulnerability of Nepal's export trade can be gauged from its continued concentration in a few commodities and countries. Readymade garments, woollen carpets, and *Pashminas* (soft woollen blankets) account for more than 60% of the country's total manufacturing exports and more than four-fifths of the overseas exports. The current account situation deteriorated due to higher trade deficit and lower income receipts from the services sector. The structure of imports is continuously switching towards industrial raw materials and capital goods, which should help exports to increase. The exchange rate of the Nepalese Rupee has remained volatile with a long-term trend of depreciation.

Nepal entered the structural adjustment programme of the IMF/World Bank in 1986. The economic reforms in this programme were basically the domestic and the external market liberalisation. The domestic economic reform comprised the deregulation in both product and factor markets, whereas external sector liberalisation included trade and foreign exchange liberalisation.

[1] During the economic reform period, the number of financial institutions increased substantially in Nepal. The number of commercial banks reached 13 in 2004 as compared to two in 1984. Likewise the number of non-bank financial institutions reached 43 as compared to a very handful during 1980s. There are five rural development banks in the country as compared none by mid eighties (Ministry of Finance, 2004).

The factor market reform started from the financial sector. The major policy reforms launched in this connection were: promoting the establishment of many commercial banks and non-bank finance companies for increasing the financial intermediations. Moreover, monetary policy was also made liberal by adopting many indirect controlling measures like deregulation of investment criteria, and removal of direct credit control along with interest rate deregulation, Joshi (2000), p. 35.

The product market liberalisation proceeded with the promotion of the private sector for investment in many state owned enterprises, health and education services, import and distribution of chemical fertilisers, infrastructure development like hydro power plantation. Moreover, tax reform was also an integral part of the economic reform. Tax rates were scaled-down with the extension of the base, IIDS (1995), p. 4.

Nepalese external sector reform ended the quantitative restrictions and license system in foreign trade in addition to the adoption of floating exchange rate systems and full convertibility of Nepalese currency in current account.

These economic reforms brought some distributional changes in Nepalese economy. A survey conducted in 1995/96, CBS (1997), revealed the worsening income distribution pattern as compared to 1984 survey conducted by the Nepalese central bank, NRB (1888). The first available survey on income and employment in Nepal was in 1977 by the National Planning Commission, NPC (1983). During the first half of 1980s, the basic needs programme of the government might have contributed to the pro-poor income distributional changes. However, after mid-1980 the liberal economic reform might have caused anti-poor changes in the income. Moreover, various studies have concluded that increasing number and share of population are under the poverty line during the last two and half decades, UNDP (2000) and Prennushi (1999).

It is fully realised by the general and economically influential groups in Nepal that the accelerated integration of Nepal in the world economy is inevitable but rewards in the form of growth and progressive income distribution are not yet forthcoming. The development challenge that the country is facing is how to secure higher growth with a pro-poor distribution in an increasingly competitive world economy in which Nepal is now actively participating.

Nepal has adopted economic liberalisation policies since the last 18 years without any possibility of getting back towards state control of the economy. It seems a timely need to make an assessment of the impact of this liberalisation on the overall objectives of economic growth

and poverty reduction, which has become the foremost objective of the last three national development plans. The Head-count Poverty Index is about 40 percent (government record) now; and the current tenth five-year plan (2002-2007) has targeted to reduce this index by ten percentage points during the plan period, making poverty alleviation the foremost objective at the turn of the century. Furthermore, many studies from the private sector show the higher incidence of poverty than the government record, and suggest the presence of a trade-off between liberalisation and marginalisation. Therefore, the study of economic liberalisation and its impact on economic growth, and distribution in Nepalese economy is a burning issue in the country's development endeavours. Consequently, the intricate relationship between liberalisation and poverty, and how an eventual trade-off can be turned into a win-win situation could be the major concern among the Nepalese policy makers. The insights gained from this study would, therefore, be helpful in recommending the degree, nature, and process of economic liberalisation in Nepal that could be conducive with the pro-poor economic growth.

After this brief introduction on the four questions, this chapter will display the main features of the analytical framework that is followed in the study, and will give an overview of the forthcoming chapters.

1.3. Liberalisation with pro-poor growth: a general equilibrium restructuring approach

1.3.1. The Nepal CGE model and its SAM database

There are several studies on CGE that have examined the impact of trade reform on income distribution and poverty for specific countries. In the crux of these models, redistribution of income takes place basically due to price changes, first in product and later in factor markets. This is characteristic of the Nepal CGE model, as well.

Our study tries to present a slightly different analysis in several aspects as compared to other CGE country studies devoted in this area so far. First, its framework of reference is a CGE model of the Nepalese economy: a small country with poor resources and a competitive disadvantage when compared to many other countries in the world economy. Second, it allows tracing growth and distribution effects of reforms in both factor and product markets in the context of policies relating to external and internal reform. Under external liberalisation reforms, we shall mean a combination of reducing import duties and the opening up of export possibilities through reduction of import restrictions by the rest of the world, particularly by the rich countries. Under internal liberalisation reforms, we shall assess a budgetary policy that aims at reducing the budget deficit, known as stabilisation. Third, while we start with a standard static CGE model, incorporation of a pro-poor growth restructured development strategy is

made subsequently in a dynamic version of the CGE model. Fourth, it incorporates some non-economic policy factors along with the broad range of economic factors. Some of the policy parameters that we introduce in our model are slightly socio-political in nature; they relate to the skill-upgrade of the low-skilled labours, higher returns to their education and labour earnings determined in pace with their marginal productivity of labour, and changes in the distribution parameters in favour of the poor households as a result of shifts in public investments in physical infrastructures.

In this study, we understand income inequality from two perspectives: one between the high skilled and low skilled labour types, and the other with respect to income differences between four household categories. In the Nepal Social Accounting Matrix (SAM), which forms the framework for establishing the CGE model, we categorised the four household groups as Land-less (or almost landless) Rural Households (LLRHH), Small Rural Households (SRHH), Large Rural Households (LRHH), and Urban Households (UHH). The LLRHH group are all poor. Next to this, SRHH is also poor to a large extent. There are also poor households in LRHH and UHH also but little as compared to the former two. In defining a poverty group, we understand a combination of all LLRHH, large part of SRHH, relatively less that of the LRHH and least belonging to UHH in consistency with the reported poverty incidence in the country, which is estimated at about 42% of the total households in Nepal; this is consistent with the Prennushi (1999) study based on 1995/96 survey of CBS (1997). The Nepal SAM 1996 is also based on the same survey. The LLRHH, SRHH, and LRHH are specially spread throughout the country in all three ecological belts as shown in the Nepal map in page 5.

1.3.2. Research questions

In this study, we will first establish the intricate relationship between economic liberalisation and marginalisation in case of a small, developing and liberal Nepalese economy. If there is a trade-off between them, how an eventual trade-off can be turned into a win-win situation is the major research question raised in this study. The insights gained from this study will help recommending the degree, nature, and process of economic liberalisation that could be conducive with the higher and pro-poor growth of the developing economy like that of Nepal.

In a more lucid form, this research tries to answer the following:

i. What are the facts, relationships and mechanisms behind the liberalisation and the prerequisites appropriately competing institutional settings on the one hand, and growth and poverty performance on the other hand,

ii. Which avenues are available for circumventing the trade-off between growth and poverty,

iii. What are the relative degrees of effectiveness of these avenues, and

iv. What about their relative degrees of receptivity/acceptability within the broad framework of macroeconomic constraints.

1.3.3. The hypotheses

This study has the following hypotheses:

i. conventional liberalisation drives may not be supportive to higher and pro-poor growth,

ii. efficiency parameters in the production function require to be scaled up in order to boost the growth rate of the economy,

iii. the higher economic growth also becomes pro-poor growth if there is change in the distribution pattern of the factor income where poor households can draw more factor income from faster growing economic activities

iv. skill upgrade of factors, especially that of low-skilled labour, is necessary for their gradual transfer to high-skilled category to foster the competitive and faster growth of the economy in the long run, and

v. macro-economic aggregates require stability or improvement in the long run to sustain the changes from ii to iv.

1.3.4. Methodology

This study uses the social accounting matrix (SAM) as a data base for formulating a computable general equilibrium (CGE) model that allows examining the above hypotheses. In addition to this SAM, we also make use of the income distribution pattern in Nepal for the last four decades (from 1970s to 2000s) as represented by the four national representative surveys. The overall CGE simulation analysis has been based on a static version and a dynamic version of the model. The static version uses the benchmark SAM 1996 applied with traditional liberalisation discourses like reduction/elimination of the custom duties compensated by increased value added tax, and the liberalised exchange. The results obtained give an assessment of the impact of conventional liberalisation on economic growth and household welfare. These analyses test the first and part of the last hypotheses.

For the dynamic analysis, we simulate the liberalisation policies along with restructuring of the Nepalese economy to observe whether it is conducive to the pro-poor growth in the long-run. It starts with making adjustments in efficiency and distribution parameters to be reflected in the projection of a prospective SAM for a future period, i.e. 2006. Such a baseline is a prerequisite for the dynamic analysis in this study. We construct Nepal SAM 2006 based on the SAM 1996 updating the macroeconomic aggregates available in national statistics. The SAM reconstruction is based on the growth pattern of the years between 1996 and 2006. Moreover, the restructuring of some accounts relating to efficiency and distribution parameters was considered necessary for

examining the other hypotheses in the new restructured economic setting that aims and implements a win-win strategy with respect to pro-poor growth and liberalisation. To underline the common properties of the actual SAM 1996 and the prospective SAM 2006, we conduct a comparative multiplier analysis to that end.

We then introduce some equations in the dynamic Nepal CGE model on top of the set of static CGE model. First, we make the capital stock endogenous by linking it to the investment at the end of the period. Second, we make the distribution of the labour supply endogenous in terms of low and high skill categories. In this extended framework, labour distributes itself between the low and high skill categories on the basis of the relative returns to education of the two skill types. The rates of return involve the cost of education to produce these two types of labour, shares in it the households have to bear, and the wage rates to these labour categories. The dynamic policy simulations will allow the upgrading of the labour force, which can lead to higher growth but also a pro-poor growth. These extensions relate to hypothesis iv.

We then solve the dynamic CGE and follow the projected results for the main variables. Next, we simulate all the liberalisation policies implemented for the static analysis of chapter 6 to the restructured and dynamic economy in chapter 7. We compare the effects of these simulations in the light of pro-poor growth tendencies.

1.3.5. Expectations and results

This study aims to develop policy combinations in which economic liberalism could go together with poverty reduction in a more fiscally balanced, competitively driven, and globalising economy. In the extension of the model, this study is alert to the contention that fundamental, innovative and effective instruments would require giving more attention to politico-economic relationships and to a collective redistribution of human and physical assets on household groups that would allow generating pro-poor growth.

We expect the impact of the liberalisation measures implemented in the static version of the CGE model not to be strong and progressive enough to generate higher and pro-poor growth of the economy. However, the static analysis with different policy simulations will provide us clues for the restructuring of the economy in the dynamic version along ways that would allow liberalisations measures to result in pro-poor growth.

The improvement in efficiency parameters is expected to generate higher economic growth; whereas the change in the distribution parameters is expected to translate higher growth into pro-poor growth. The high economic growth would require more foreign capital inflow.

Moreover, it is expected to narrow down the fiscal deficit because of the more tax collection by the government. The export performance should improve as well due to the higher growth of GDP.

The improvement of the efficiency parameters via a reduction in the share of domestic and imported intermediate deliveries in the production of activities paves the way for the higher share of the factor inputs in activities. The higher growth accrued in this way is channelled more to poorer household categories through the new redistribution pattern of factor income. In the restructured economy, poorer households get more factor income from the high growing sectors while the richer households are more attached to the slow growing/contracting sectors. The policy implication of the above is the upgrading of skills and redirection of factors of production provided by poorer household categories to the high growth sectors of the economy. We expect that the income of richer households need not decline in the dynamic model policy simulations even if they draw large shares of their income from slow growing/contracting sectors because of the higher rate of wage to high skilled labour and higher rate of profit to capital. The results confirm that.

The higher growth of GDP requires higher investment, specifically in the faster growing sectors, i.e. higher growth in investment is in agriculture followed by industry, because these are two faster growing activities following liberalisation reforms. Interestingly, faster growth of agricultural and industrial activities in the dynamic model is able to make some other activities also grow, which were found to be contracting in static model policy simulations. This applies to the public services sector as this sector is more connected to those high growing sectors in terms of input-output linkages. Another necessary condition to this higher and broad-based growth in dynamic version of the model as compared to the static one is the higher labour participation rate that goes along with the liberalisation reforms. The capital being endogenous in the dynamic model adjusts accordingly to accommodate this higher participation rate of labour. The influx of new labours is basically in the form of low-skilled workers. This situation creates higher demand of high-skilled workers and capital; therefore, their rates of remuneration move upwards. The growing need for high-skilled worker and the wider wage differential between the labours with skill differences push some of the low-skilled labours to more education and transformation into the high-skilled category over time. The long-term ratio of labours in terms of skill categories depends on cost of education incurred by households as well as wage rate differential. Thus, the high growth of investment, more labour participation rate, transformation of some low-skilled labours to high skilled category all create higher growth spiral effects in the economy and with better redistribution schemes as mentioned above this higher growth translates into a pro-poor growth.

For both static and dynamic models, we expected and found that gradual, or staged, liberalisation provides absolute advantages in terms of higher overall growth of the economy over the situation when several liberalisation measures are implemented together. The reason behind this is in the lack of time to internalise all the benefits of the separate simulations so that there remain possibilities of the cross-cancellation of some of the benefits to satisfy several conditions created by different simulations at once. To put it in a different way, doubling the mode of liberalisation increases the benefit by less than the double because some of the expansionary effects would be diluted by some other contracting forces.

1.4. Overview

The second chapter of this thesis reviews the theoretical and empirical literature on the relationship between liberal reforms and trade expansion on the one hand and growth with distribution on the other hand. It makes also a brief review of the economic liberalisation in Nepal, which basically started as a structural adjustment programme of IMF/World bank since 1986. We make a description how Nepalese liberalisation schemes proceeded into consecutive phases starting from SAF (Structural Adjustment Facilities in 1986) to Poverty Reduction and Growth Facilities (PRGF) in 1999. The chapter also reviews the growth and poverty situation in Nepal for the last three decades.

Chapter three presents the major database of this study, i.e. the Nepal SAM 1996. The major assumptions and principles behind this SAM construction are presented in this chapter. In this connection, we make use of a related SAM developed for 1996 by Sapkota (2001). However, we introduced our own classification of economic sectors, factor categories, and household groups. Furthermore, the links between sectors, factors, and household groups were made more explicit so that the intention of tracing pro-poor growth can be taken up more explicitly in construction of the CGE model in chapter 6 and its extension in chapter 7 towards a dynamic model.

Chapter four is on the specification of the Nepal CGE model. We have formulated a CGE model that is close to the CGE model developed by the International Food Policy Research Institute (IFPRI). But some important modifications to the IFPRI model have been made so as to incorporate wider perspectives on household income structure, and investment functions, among others. The chapter also includes a short comparison of the model with similar other models which are particularly used for Nepal CGE by the previous researchers. Moreover, the

discussion on the closure rules and the typical closure followed in the Nepal CGE model is also an integral part of this chapter.
We use the computer software Generalised Algebraic Modelling System (GAMS) to implement this model both in its static and dynamic forms. Most researchers applying CGE models use this software to calibrate the mathematical modelling system to the data base and to analyse different policy simulations. The beauty of this software is that it detects and expresses the inconsistencies, compilations and execution errors in the model so that the modeller himself can continue the exercise with the response provided by the software itself.

Chapter five is a brief account of the calibration of Nepal CGE model for 1996 based on Nepal SAM 1996 and some other exogenous variables/parameters.

Chapter six is all about policy simulations under the static CGE analysis. We simulate the effects of unilateral trade liberalisations by Nepal, export trade liberalisation by Nepal or import liberalisation by the rest of the world (ROW) on Nepalese products, combined import and export trade liberalisations under fixed and flexible exchange rate systems, effects of the devaluation of domestic currency, and the internal reform to reduce the fiscal deficit. We measure the changes from the baseline and study them with reference to the macroeconomic constraints/aggregates. Estimation of the welfare change of households with due consideration of the price changes in every simulation is also an integral part of this chapter.

Chapter seven treats the dynamic model. It projects the baseline for a restructured economy for a future period, i.e. 2006. A prospective SAM for 2006 is constructed accordingly. We have restructured the economy, by applying consistent adjustments of efficiency and distributional parameters in ways that *can* lead to a pro-poor growth. This is only a potential, since its actualisation depends on the right movement of prices and factors in a dynamic solution of the model. To assure that the SAMs for 1996 and 2006 share equivalent properties, a comparative multiplier analysis is added. The conversion of the static Nepal CGE model into a dynamic one relate to making endogenous both capital and labour skills. The endogenous investment at the end of the period is linked to the determination of the capital stock during the period, so that the capital stock becomes endogenous. Also with regard to the labour factors of production, the distribution between low and high skills is made endogenous and is guided by the relative returns to education of both skills. Along with this dynamic model formulation, the restructuring development strategy behind these adjustments is explored in the chapter. We implement the same simulations of chapter 6 in the dynamic and the restructured dynamic model of chapter 7. Afterwards, we make a brief comparison of the policy simulation results between the static and the dynamic models. As the restructuring of the economy is proposed in such a way that it

would be in favour of the poorer household categories, the comparisons between the two types of simulations would throw light on the policy prescriptions for achieving a win-win strategy of pro-poor growth.

Chapter eight summarises the research done and its findings.

2. Liberalisation reforms and poverty: theory, evidence, policy, and the case of Nepal

2.1. Introduction

In this chapter we review four questions pertaining to the issues of liberalisation and distribution. The orientation of the current study is determined for a good deal by the answers to these questions. After the review of each question we draw some implications for the orientation of the study, which are then later elaborated in the chapters that follow on economic policy modelling and application to Nepal.

The four questions are:
(a) What do theoretical studies tell on the relationship between liberalisation and pro-poor growth?
(b) What is the empirical evidence on this relationship between liberalisation and distribution?
(c) How did international assistance agencies, like the World Bank, WB, and International Monetary Fund, and recipient governments in developing countries formulate their development policy in the context of knowledge on the relationship between liberalisation and distribution?
(d) In the case of Nepal, what are the specifics of the problem? What is the extent of the implementation of liberalisation reforms, and related development policies in Nepal? What is the extent and nature of pro-poor growth trends, and more specifically the poverty situation, in Nepal?

2.2. Theoretical studies on liberalisation and distribution

The theorem of Stolper-Samuelson (1941) is the first basic theoretical tool to deal with the distribution impacts of trade. Many theoretical and empirical studies on trade reform and its distributional impacts have relied on the theoretical foundation of this theorem, which itself is based on Heckscher-Ohlin-Samuelson (HOS) Model. In this section we review relevant theoretical literature on the relationship between trade liberalisation and income distribution.

The Stolper-Samuelson theorem is an essential tool for thinking about the relationship between international trade and the distribution of income. The Stolper-Samuelson theorem states that under the assumptions of the Heckscher-Ohlin-Samuelson (HOS) model, an increase in the relative price of a good raises the return to the factor used intensively in the production of that good relative to all other prices and lowers the return to the other factors. The 2-good × 2-factor general equilibrium model provides the minimally complex micro-foundations for a well-specified macroeconomic model with international trade that can generate income distribution effects. The Stolper-Samuelson theorem takes over various assumptions of the HOS model. They are: rational behaviour by households and firms, complete and perfectly competitive markets, trading countries possess *identical tastes* that can be represented by identical systems of (homothetic) community indifference curves. Moreover, each country is endowed with fixed quantities of two factors of production: (L) for labour and (H) for human capital, or simply skills and capital. Further assumptions are factors are assumed to be of uniform quality, perfectly mobile between sectors and perfectly immobile between countries. Other assumptions of the model are countries share the same technological opportunities, each good requires strictly positive inputs of both L and H to be produced in positive quantities and production functions are linear homogeneous, twice differentiable, and strictly concave.

Regarding the factor intensity, the model assumes that, at all relevant factor prices, one of the goods in trade is always human capital intensive relative to the other. One of the two countries is taken to be relatively more richly endowed with human capital than the other. The last but very strong assumption is that international trade in goods is costless.

Applied to a poor and a rich trading countries, with more relative endowments in labour and capital, respectively, the theorem predicts that more trade will benefit labour in the poor country and, hence, progressive in its distribution effect. The opposite would apply for the rich country.

Many theoretical works related to trade liberalisation and distribution issues have their foundations in Stolper-Samuelson theorem. We give a brief account of some relevant ones. Bourguignon and Morrison (1989) have dropped the assumption of flexible factor prices and full employment to obtain a Keynesian approach rather than neo-classical one. In this model, demand plays a key role and has an interdependent relation with income distribution. According to this approach, trade affects income distribution via exogenously determined foreign demand. Though not directly related to the Stolper-Samuelson theorem, Alsenia and Rodrik (1994) studied the relationship between politics and economic growth in a simple model of endogenous growth with distributive conflict among agents endowed with varying capital/labour shares. This study is not particularly devoted to trade and distribution issues; however, the politics of

tax has well captured the direction of international trade in the model. They established several results regarding the factor ownership of the median individual and the level of taxation, redistribution, and growth. Policies that maximize growth are optimal only for a government that cares solely about pure 'capitalists.' The greater the inequality of wealth and income, the higher is the rate of taxation and the lower growth.

Wood (1994) and Cline (1997) have made a comprehensive extension of the Stolper-Samuelson theorem with the viewpoint of making it practical to deal with concrete trade policy. Francois and Nelson (1998) introduced the inter-industry linkages and considered the mechanism that transmits the effect of goods prices to factor prices. According to this version, the change in goods prices are transmitted first to value added prices and then to relative factor prices. In this case the theorem will hold so long as the goods are homogenous; however, in case of the intermediate product differentiation, the theorem no longer holds. Navia, Douglas and Wedding (1999) argues that an appropriate test of the Stolper-Samuelson theorem must take account of the fact that the theorem refers to a long-run relationship between relative commodity-prices and relative factor-prices. They used a unit root co-integration methodology developed by Johansen (1988) to evaluate the Stolper-Samuelson relationship.

According to Aghion, Caroli and Garcia-Penalosa (1999), 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 earnings 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.

The impact of economic liberalisation on poverty is mostly analysed through its adjustment in labour market, Vos (1999), pp. 2–3. The financial liberalisation could enhance financial intermediation and subsequent investment. In the wake of trade liberalisation whether this increasing investment induces labour-intensive or capital-intensive mode of production including the price movements makes all the difference regarding the distributional changes. Since the relative price shifts in favour of traded over non-traded goods in free trade, the distributional impact of it does depend on the factor intensity in both sectors. The changes in demand of the final products in domestic and international markets make all the factor reallocations and changes in their relative returns. The wage earners will benefit more than

profit earners from the trade liberalisation if labour-intensive goods are traded more than capital-intensive goods.

2.3. Empirical studies on the relationship between liberalisation and distribution

On the empirical front, the global economy has undergone increasing factor and product market liberalisation during the last couple of decades. Developing economies are becoming more open, while factor shares and the patterns of income distribution and income inequalities are also changing over time.

The liberalisation drive in the developing world was basically led by the IMF/World Bank's Structural Adjustment Programme since the mid-1980s. The external sector liberalisation is considered to integrate the domestic economy to the rest of the world; therefore, it is sometimes synonymously understood as the globalisation process. To be more specific, many empirical papers have regarded trade liberalisation as globalisation; whereas some others like Milanovic (2005b) and Behrmann et al. (2003) have regarded capital account liberalisation as globalisation. However, in this study globalisation will refer to both of them.

As a background to this study, there are three groups of empirical studies on trade liberalisation and its distributional impact mainly in developing countries. These are (a) cross-sectional regression analysis for groups of countries (b) partial analysis of trade and its distributional impact for specific countries, and (c) general equilibrium analysis for specific countries.

First, we review main studies with cross-country analysis. Deininger and Squire (1996) prepared a first consistent database to make this type of studies. This opened the way for a series of influential econometric studies. Edwards (1997) analysis of trade policy and income distribution, using new income comparative data sets, shows no relationship between the two ends. The regression of the change in the Gini index between the 1970s and the 1980s on a dummy indicating whether or not a country had engaged in trade liberalisation as measured by the average black-market premium or the average collected tariff ratio helped Edwards reach this conclusion.

Spilimbergo, Londono, and Szekely (1999) studied the empirical links among factor endowments, trade and personal income distribution. By using panel data, they showed that land and capital intensive countries have a less equal income distribution while skill intensive countries have a more equal income distribution. They showed that the effects of trade openness on inequality depend on factor endowments in a way consistent with several recent case studies

but not with the Hecksher–Ohlin framework. The results are robust to the division of the sample according to level of income, the inclusion of different regressors, the use of different measures of trade openness and of relative factor abundance, and tests for possible problems of endogeneity.

Atkinson (2003) was able to represent a decrease in inequality in the wake of globalisation, more specifically after Second World War, and a turning point around 1980s when inequality began to increase again, which confirmed the "U-turn" hypothesis. Other studies reaching similar results though using different specifications, time periods and data include Londono (2002), Green and Dickerson (2001), and Dollar and Kraay (2002). Berman, Birdsall, and Szekely (2003) concluded that more liberal trade regimes did not have an impact on wage differentials between different education categories in Latin American countries. But, financial liberalisation and high-technology exports in the context of a liberal trade regime contributed to the rising inequality. Rajas-Romagosa (2005), analyzing cross-country regressions, showed that trade openness does not influence negatively income inequality in low-income countries though the effects are marginal and, for most indicators of trade openness, the effect is not significant.

Mainstream economists and international financial organisations claim that trade liberalisation and factor mobility have increased economic growth in those countries that have successively integrated into the world economy and that these improved economic conditions have allowed these developing countries to reduce poverty (World Bank, 2002). Another representative study leading to this conclusion is by Dollar and Kraay (2002). They find that inequality between the population-weighted mean incomes of the globalising countries declined substantially between 1975 and 1995. In global context, Milanovic (2005a) finds a sharp increase in the global inequality between 1988 and 1993 and then moderate decline during the next five years. Sala-i-Martin (2002) and Bhalla (2002) also argue that the global inequality has gone down. On the other side, Lundberg and Squire (2003); and Barro (2000) find that their preferred measure of openness has measured increasing inequality in low-income countries. Milanovic and Squire (2005) also conclude that trade openness is associated with higher inter-occupational and inter-industry inequality in poorer countries (those below the world medium income) and the reverse in richer countries. But these studies are suffering from the lots of criticisms. First, their approach that combines household survey and national accounts (GDP data) is questionable. Second, the results drawn have been based on many strong assumptions. Third, neither of these studies explores the issues of causality between increased globalisation and global inequality (Ibid, p. 8).

The general impression from a review of cross-country regressions is that the results of distributional effects of more trade are very mixed. The pooling of observations of developed and developing countries in one equation regression analysis is also not helpful in throwing light on mechanisms that couple trade to distribution.

The second group of empirical studies that we briefly review consists of country studies with partial analysis of a liberalisation phenomenon on selected aspects of growth and distribution. Hansen and Harrison (1999) concluded that trade reform along with foreign direct investment, export orientation, and technological change had increased wage-inequality in Mexico. Robertson (2000) has also reached the same conclusion. Bayer, Rajas and Vergara (1999) also find a similar effect of trade reform on wage inequality in Chile because skill-intensive, resource-based industries expanded following the liberalisation. In this connection, Robbins and Gindling (1999) put a prominent argument regarding the effects of trade liberalisation on the dispersion of wages in LDCs that trade liberalisation should lower the relative demand for more-skilled workers by inducing them shift towards sectors intensive in unskilled labour. Based on a nonparametric approach, the paper presented evidence that trade liberalisation in Costa Rica led to an increase in relative demand of skilled workers. Other findings are consistent with the "skill-enhancing-trade hypothesis," whereby trade liberalisation induces an acceleration of physical capital imports, which raises relative demand through capital–skill complimentarity.

Vos and Jong (2000) applied a methodology of "micro-simulations" to Ecuador and analysed in detail which labour market factors are associated with most of the changes in income distribution (and poverty, for that matter). The "counterfactual" scenario created in the micro-simulations was one of what poverty and income distribution would have looked like if the observed labour market shifts would not have taken place. The results suggested that the observed rise in income inequality seemed to be closely associated with the effects of trade liberalisation, which has led to greater demand for skilled workers and pushed unskilled workers into unemployment or (informal) self-employed activities. This appears to have been counteracted somewhat by rising participation rates, falling unemployment and real wage increases during the period of stabilization and growth (1990-95), facilitated by greater capital inflows. The macroeconomic downturn intensified the inequalities and the steep rise in poverty.

Wei and Wu (2001) provide a case study of the impact of globalisation on income inequality using data across Chinese regions. The literature on cross-country studies has been criticized in this paper because differences in legal systems and other institutions across countries were difficult to control for, and the data on inequality across countries are not compatible. Authors

claim that an in-depth case study of a particular country's experience can provide a more useful alternative to cross-country regressions. The study of Wei and Wu constructed a measure of urban-rural income ratio for 100 or so Chinese cities (urban areas and adjacent rural counties) over the period 1988-1993. The central finding is that cities that experienced a greater degree of openness in trade also tended to demonstrate a greater decline in urban-rural income inequality. Thus, globalization has helped to reduce, rather than increase, the urban-rural income inequality. This pattern in the data suggested that inferences based solely on China's national aggregate figures (overall openness and overall inequality) can be misleading. The negative association between openness and inequality holds up when authors apply a geography-based instrumental variable approach to correct for possible endogeneity of a region's trade openness.

Harrison, Rutherford and Tarr (2002) illustrated two approaches to design trade liberalisation in Turkey which could ensure that the poor will not lose. This approach was followed with the assumption that trade liberalisation results in aggregate welfare gain over all households but with the high possibility that the poorest households would lose. The first of the two approaches proposed was the direct compensation to losers. The second approach used limited policy reform, where exceptions to the across-the-board reform were chosen to meet the equity goal. In each case, the authors mapped out some of the efficiency costs of attaining these equity goals so as to inform policy makers about the least-cost way of attaining them.

The impact of opening trade is found also to vary in different regions of the came country. Hanson (2004) finds that labour income in low-exposure states in Mexico fell relative to high-exposure states by 10% and the wage poverty[2] in low exposure states increased relative to high-exposure states by 7% after the trade liberalisation. Ravallion and Loskin (2004) have also reached a similar conclusion. They find that there are both gainers and losers (contrary to past claims) and that the rural poor are worse off on average after trade policy reforms.

Some writers like Bruno, Hanshom and Ashipala (2004) considered factors like poor human development, lack of competitiveness and the less efficient traditional technology in domestic production as unfavourable conditions that have allowed the external forces that go with trade liberalisation to ruin the domestic economy of the developing world basically that of the rural sector.

[2] The fraction of wage earners whose labour income would not sustain a family of four at above poverty consumption levels.

The above review of country studies, though incomplete, is helpful in illustrating the bind of conditions, much among that exist in specific countries and in specific regions within a country, which can lead to positive or negative redistribution effects of trade. An in-depth country specific approach is more relevant than a cross-country regression analysis in gauging the relationship between trade and distribution.

The third group of empirical studies consists of country studies with general system analysis. These are mostly based on CGE models. This group of studies is especially relevant for the current study as it falls also in this category. We shall come back in chapter 4 to some of the references reviewed here. Decaluwe, Patry and Savard (1998) study the impact of a trade shock and a tariff reform on household poverty for an archetype developing country. Following a change in the mean income, the income distribution shifted proportionally by the same variation. The poverty line changed following a variation in relative prices. With the new distributions and poverty line, the poverty levels of the base year were compared with the ex-post values. The Foster, Greer and Thorbecke's (1984) poverty index measures were used to quantify the households' poverty levels. The fall in the world price of the country's export crops indicated a drop in all household incomes and also a decrease in the poverty line. A unilateral trade liberalisation also had negative consequences on all household incomes.

The dynamically recursive general equilibrium model of Morocco by Löfgren, El-Said and Robinson (1999) examined alternative trade and domestic policy scenarios involving the implementation of the EU Association Agreement for the period 1998-2012. The model has a detailed treatment of the agricultural and rural economy in Morocco. The results for the trade liberalisation scenarios indicated that tariff unification had small aggregate effects whereas the removal of non-tariff barriers had strong positive aggregate effects: factor incomes and household welfare could expand considerably and more rapidly than for the base. However, trade liberalisation appears to disfavour the rural poor, especially in rain-fed areas. The simulation of the introduction of complementary domestic policies with a non-distorting transfer programme, which fully compensates the owners of rain-fed resources and skill upgrading for the rural labour force, indicated that, if combined with at least one of these complementary domestic policies, trade liberalisation could increase the welfare of all household groups significantly and rapidly than if status-quo policies were followed.

Devarajan and Mensbrugghe (2000); Hertel, Preckel and Cranfield (2000); Ianchovichina, Nicita and Soloaga (2001) used a two-step computationally simple procedure to analyse the effects of Mexico's potential unilateral tariff liberalisation. Simulation with price changes was applied to the household data in order to assess the effects of the policy simulation on poverty

and income distribution. Mexico had already widely liberalised most of its imports by the mid 90's, a salient feature of its membership in the North American Free Trade Agreement (NAFTA) with Canada and United States. Using the Global Trade Analysis Project (GTAP) as the price generator, the authors were able to model the differential tariff structure quite appropriately (almost zero for NAFTA members and higher tariffs for non-members). Starting with a low level of tariff protection, simulation results showed that the impact of tariff reform on welfare would be positive in general for all expenditure deciles. Moreover, when non-homothetic individual preferences were modelled, trade liberalisation had a good prospect of benefiting people in the poorer deciles more than those in the richer ones.

In a general equilibrium analysis of Jordan's trade liberalisation, Hosoe (2001) simulated the effects of Uruguay Round (UR) negotiations and Free Trade Agreement (FTA) with the European Union on Jordan's economic growth. He concluded that UR would bring about trade expansion effects whereas FTA would make trade diversion effects favourably for imports from the EU. Under these circumstances, the chemical and the agricultural sectors would expand while the non-metal mineral sector would contract. In total, the overall effect of the trade liberalisation was confirmed expansionary.

Similar is the conclusion reached by Harrison et al. (2002) in case of Brazil. The study shows that the MERCOSUR (regional trade agreement among Brazil, Paraguay, Uruguay and Argentina), FTAA (Free Trade Agreements of the Americas), and free trade with EU could be expected to result in gains in Brazil. The agreement with the EU seemed 1.5 times valuable to that of FTAA due to access to highly protected agricultural markets in the EU. The combined gain from both agreements was estimated greater than the gains than the gains obtained from the sum of the agreements separately due to a reduction of trade diversion. In most of the trade policy options the authors evaluated, either regional or multilateral or unilateral, could result in a progressive distribution of the gains to different households. More specifically, the poor households could experience the greatest percentage increase in their incomes because the change in trade policy tended to shift resources from capital intensive manufacturing toward labour intensive agriculture, thereby inducing an increase in the wage of unskilled labour relative to the other prices of factors of production. This, in turn, could result in a percentage increase in the incomes of the poorest households, three to four times, relative to the richest. Authors concluded that Brazil could optimise its choice of trade policies by combining regional arrangements with both the Americas and the EU with multilateral trade liberalisation and if tariff uniformity is added to the regional and multilateral liberalisation, further gains would be realised.

In CGE analysis of Egypt, Lofgren (2001) disclosed that there was no contradiction between more rapid growth, largely a function of more rapid productivity growth, and improved welfare for the poor. The results indicated that pro-poor redistribution of land and human capital assets could have been a particularly effective tool if Egypt had prioritised more strongly to improve the welfare of the poor and reduce inequalities. Such policies could have been implemented without any noticeable negative impact on growth or aggregate welfare. The results confirmed the finding of earlier analyses that, compared to pro-manufacturing policies, pro-agricultural policies have a more positive impact on household welfare in general and the poor in particular. There is a significant synergy between a pro-agricultural shift in productivity growth, improved market access for agricultural exports, and reduced transactions costs in foreign trade to reduce the inequality.

El-said, Lofgren and Robinson (2001) addressed the longer-term issues of economic development in Egypt using a dynamically CGE model to assess the outcomes associated with two types of development approaches over the period 1998-2012. One was a targeted sector development approach, and the second more broad-based development approach. Under the first development approach technological advancement was separately targeted to three sectors: agriculture, food processing, and textiles. The results indicated that, when agricultural exports remained relatively low, promoting the Egyptian textile sector was a win-win scenario in terms of rapid growth and equity. A crucial policy objective for achieving rapid and egalitarian growth for the Egyptian economy was considered the ability to secure improved access to international textile markets and the successful expansion of agricultural exports.

Thurlow and Seventer (2002) tested a standard International Food Policy Research Institute (IFPRI) CGE model for South Africa. This model used to simulate the economy-wide impact of a range of hypothetical policy levers including increased government spending, the elimination of tariff barriers, and an improvement in total factor productivity. Results indicated that assumptions made regarding the mechanisms of macroeconomic adjustment are important in determining the expected impacts of these policies. Firstly, despite mixed results concerning changes in household income distribution, the impact of expansionary fiscal policy appeared to be growth enhancing, with the Keynesian style adjustment mechanism producing the most positive results. Secondly, a complete abolition of import tariffs also appeared to generate higher GDP growth, with negative and positive consequences for aggregate manufacturing and services, respectively. Finally, an increase in total factor productivity was growth enhancing, with the most positive results derived under neoclassical assumptions of the macroeconomic adjustment mechanisms. These simulations were meant to demonstrate the usefulness for

economy-wide policy modelling and the paper concluded by highlighting areas of policy analysis that might benefit from more detailed applications with this framework.

IFPRI (2003) measured the impact of various macro policy reforms on household welfare along with many macroeconomic indicators in case of Zimbabwe. The counterfactual simulations included trade liberalisation, changes in government expenditure and tax policies, maize marketing reform, and land redistribution. Simultaneously implementing trade liberalisation, maize price decontrol, and income tax adjustment, there were substantial increase in GDP, foreign trade, and household income distribution relative to the scenario of zero fiscal deficits only. Thus, the real effect of a contractionary fiscal policy could be effectively swamped by the economy-wide impact of the trade liberalisation package. This scenario when compared with the results of involving only the trade liberalisation package, showed identical GDP effects but a more favourable equity impact. These comparative results from counterfactual simulations based on the Zimbabwe CGE model has illuminated the greater effectiveness of trade policy reform in promoting overall growth of the Zimbabwean economy, and of fiscal policy and sectoral reforms in improving income equity among the five household groups. The significant improvements in aggregate household income and its distribution, accompanied by large increases in agricultural GDP are indicative of the central role of agriculture in achieving equitable growth in Zimbabwe. These results are consistent with the strong linkages observed in the SAM analysis, which suggested that the distribution of income would benefit from agricultural growth and overall GDP growth from stimulating smallholder production.

Going beyond trade liberalisation and dealing with internal liberalisation reforms, some earlier and related studies revealed the anti-poor effects of structural reforms, at least for the short-run, Thiele (2001), Psacharopoulos et al. (1992), and continuing poverty to a large chunk of the population in developing countries, Musinguzi and Smith (1993). Downsizing the government's regular expenditure and devaluation of the domestic currency are known to make the lives of poor even poorer in many developing countries. Despite these anti-poor effects of the earlier structural reforms, the developing countries had little policy autonomy due to huge foreign debt and assistance not only from the developed world but also from the global financial institutions that basically work with liberal economic policies. Moreover, a non-globalising country not only fails to participate in the benefits of an expanding world volume of trade but actually sees a deterioration in its position compared with the pre-globalising era, Milanovic and Squire (2005), p. 4.

In addition to the trade reform, fiscal and labour market reforms are also emphasised as some of the major policy agenda in many developing countries, and assessing their effects on

unemployment and poverty is a key issue in the design and sequencing of adjustment programmes. In turn, assessing these effects requires understanding not only how the labour market operates, but also how fiscal variables (taxes and expenditure) interact with the labour market. Because most taxes have an effect on the functioning of the economy, they also affect the labour market, both directly and indirectly, through changes in the level and distribution of wages, labour supply decisions, and the level and composition of employment. For instance, taxing the profits of small firms (which tend to be more labour intensive) may affect their ability to create jobs, whereas income taxation and the existence of an unemployment benefit system may affect the propensity of the unemployed to seek employment, Agénor (2003), p. 1. In case of the trade liberalisation, these issues also become important because reduction of the custom duties is mostly compensated by the increase in the value added tax not to allow government revenue to decline. The necessity of combining internal liberalisation with external liberalisation is an additional argument for developing a general system approach in treating the topic of interest in this study.

Recently, the debate on trade liberalisation and its impact on growth and inequality at the household level, and making use of household surveys, are getting more attention. Reimer (2002) has made a comprehensive literature survey of the evidence on the impact of trade liberalization on poverty. He could not find a simple generalization about the relationship between trade liberalization and poverty. However, Cororaton (2003), using data from 24,797 households from the Philippines, carried out a comprehensive poverty and income distribution analysis and could conclude that poverty falls in the Philippines after a complete tariff reduction but that income distribution worsens.

According to Hertel et al. (2003), the short run impact of trade liberalisation on different household groups varies and not always positive. However, the overall impact on poverty depends on the structure of poverty in each country. Combining the detailed household survey data with a global economic model in order to measure the poverty impacts of trade liberalisation on the five different household strata in each country, they concluded that as countries become wealthier and the labour market becomes more developed, it is mostly common to observe households specialising in wage labour. Accordingly, these households also become a larger part of the data base in the overall poverty picture. Since the poorest households tend to be heavily reliant on unskilled labour, the key earnings variable for reducing poverty is the wage paid to unskilled labour. In most cases, this wage falls, relative to average earnings, but it rises relative to skilled wages. Therefore the impact of trade liberalisation on this group of households is mixed, with the poverty increases more frequent than the decreases.

The findings in their paper have emphasized the differential short run impacts of multilateral trade liberalisation on poverty across countries, across strata, and within strata, thereby highlighting the links between the structure of poverty and the national impacts of trade liberalisation. In the long run, when self-employed workers, land and capital investments are able to fully adjust to the trade policy shock, the results can be significantly altered.

The popular saying "a rising tide lifts all boats" does not apply sometimes. While it is generally true that the countries that experience a per capita gain also experience a reduction in poverty, Thailand offers an important exception (Ibid, p. 10). Here, the very sharp rise in staple grains prices following global trade liberalisation pushes more non-agricultural households into poverty and this effect dominates the reduction in poverty among agriculture-specialized households. On the other hand, in the case of Mexico, poverty falls despite the decline in per capita welfare following global trade liberalisation. This is due to the decline in food prices that results from lower cost imports.

Francois and Rojas-Romagosa (2005) analyzed general equilibrium relationships between trade policy and the household distribution of income, decomposing social welfare into real income level and variance components and emphasizing Gini and Atkinson indexes. Embedding these inequality adjusted social welfare functions in a general equilibrium structure and mapping from tariff protection to household inequality, this study could yield predictions regarding the linkages between trade protection, country characteristics and inequality within a broad general equilibrium framework. In addition, the efficiency and equity effects of tariffs on welfare are also separated. They examined endogenous tariff formation when policy makers care about both equity and special interests.

In representative democratic systems, their study could find that positive optimum tariffs can be sustained in capital-abundant countries even when the policy-maker assigns a low or zero weight to the contributions of special interests groups. In this case, the positive distributional effect of import protection can offset or compensate the efficiency losses of reduced trade. In poor countries, characterized by the relative abundance of labour, positive tariffs are explained by the influence of special interest groups (i.e. capitalists) that heavily lobby for higher tariffs. Most importantly, the study concludes that import protection in developing countries not only diminishes social welfare through efficiency and equity considerations, but also signals the economic and political weight of the capital-owners (p. 17).

Chitiga, Kandiero, and Mabugu (2005) used micro-simulations with a computable general equilibrium model to study the impact of trade liberalization on poverty in Zimbabwe. They

worked with data from 14006 households derived from 1995 Poverty Assessment Study Survey (PASS). They conclude that complete removal of tariffs favours export-oriented sectors and that total imports increase. The unskilled labour used intensively in agriculture, mining and services benefit from this policy. Most manufacturing sectors shrink leading to a fall in demand for skilled labour and capital. Returns to land increase as agricultural export expand. Overall consumer prices fall and consumption expenditure also falls in the economy. Simulations show the reduction of poverty in the economy, more in urban than in rural areas. However, the income distribution pattern could reveal insignificant changes (pp. 20-21).

Boccanfuso and Savard (2005) used a micro-simulated multiple household computable general equilibrium method, such as proposed by Decaluwé et al. (1999), for analyzing the impacts of the trade liberalization of groundnut production in Senegal. Tariff reforms and external shocks were simulated, and the impacts were measured at the macroeconomic, sectoral and household levels to establish a link between these economic reforms, poverty and income distribution. In the model they focused on the price effects linked to recent and ongoing tariff affecting the groundnut industry directly or indirectly. In conclusion, they state that the removal of specific import taxes would be positive for the households since the price effect dominated the income effect.

Some primarily focus on the agricultural productivity growth and labour market to assess the impact of trade liberalisation on distribution. Zhai and Hertel (2004) used a household-disaggregated, recursively dynamic CGE model of the Chinese economy to evaluate the impact of several key labour market distortions in China on rural-urban inequality and income distribution. The simulation results showed that the reforms in rural land rental market as well as increasing off-farm labour mobility would reduce the urban-rural income ratio dramatically. The reform associated with the land rental market had a significant impact on rural-urban inequality. Introduction of a fully functioning market for agricultural land permitted agricultural households to focus solely on the differential between farm and non-farm returns to labour in determining whether to work on- or off-farm and it increased the off-farm labour mobility on China's economy, boosted the GDP growth, and caused more labour moving out of agriculture and reduced rural-urban inequality. Furthermore, the combined impact of WTO accession and labour market reforms reduced rural-urban income inequality quite significantly.

Hertel et al. (2004) made another assessment of the impact of trade liberalisation on poverty on a case-by-case basis and also developed a tractable methodology for the estimates of the global impact on poverty in a range of different countries. They considered three tools of analysis: (1) detailed earnings data from household surveys, (2) an econometrically estimated demand system

that reflects the changes in consumption patterns across the income spectrum and provides a natural vehicle for analysis of household welfare and poverty, and (3) a micro-macro consistent framework for projecting the price impacts of global trade liberalisation.

Focussing on the case of Indonesia, the study concluded that the aggregate reduction in Indonesia's national poverty headcount had masked a more complex set of impacts among different groups. In the short run, the poverty headcount rose slightly for the self-employed and agricultural households, as the rise in farm profits was outpaced by consumer prices. However, in the long run, the poverty headcount fell for all strata in Indonesia, since the increased demand for unskilled workers raised incomes for the formerly self-employed, some of whom moved into the wage labour market.

Valenzuela et al. (2005), with good data on the predictions in agricultural productivity growth, price changes, and household income composition, could confirm that historically observed annual growth in agricultural productivity had a positive effect on poverty reduction for all of the eleven developing countries used in their study. Nonetheless, this growth could be redirected into different production sectors in agriculture for additional poverty reduction in the range from 4% in Bangladesh to 59% in Indonesia. Changing the momentum of the historical trend in the growth of productivity in agriculture could be a viable instrument in the fight against poverty.

Valenzuela and Hertel (2006) proposes the application of a stochastic simulation framework to put the poverty impacts of trade policy reform in context by comparing them to the impacts of price variability in agricultural markets on the poor. According to this study, for developing countries experiencing a decrease in poverty, international trade and openness are valuable means of economic improvement for the lowest income households. In countries exhibiting an increase in poverty in the short-run, but expected to face a reduction in the medium-term, the policy implication would be to devise some sort of safety net mechanism oriented to help the lowest income households following adjustment to trade reform. For countries showing a discernable increase in poverty in the short-run, and for which there are predictions of increasing poverty in the medium-term, trade liberalisation may not be the best alternative. In these instances, the policy implication is to allow for longer phases of reform implementation, in combination with specifically targeted support of low-income households.

The above studies suggest that trade reforms are most likely to have a pro-poor when the developing country concerned has an economic structure that predicts stable or declining poverty in the foreseeable future. Our own study in this book will give attention to the modelling of this hypothesis and examination of its results.

To summarise, economic liberalisation brings both pro-poor and anti-poor growth effects as well as economic expansionary and contractionary forces in motion. The effects in the long and short run periods may differ. The relative strengths of these forces determine the change in economic welfare of different income groups. Review of the substantial empirical research during the past two decades does not lead us easily to robust conclusions regarding the relationship between globalisation and inequality. As was apparent from the literature review of cross-country regression analysis, the combination of complex but partial phenomena, choice of variables, and data inadequacies have rendered the empirical works both hazardous and partial. In-depth specific country studies of the phenomenon are more helpful in giving an insight on the particular conditions that generate positive or negative redistribution effects of more trade. In this respect, the general system approach is more useful than a partial approach. A general system approach allows a study of more facets of the trade-distribution phenomena in a constrained framework of the whole economy and makes it possible to appraise alternative policy paths towards achieving pro-poor growth under trade openness.

Under these circumstances a general system approach should be considered a more reliable and comprehensive tool of analysis. More recent literature is also increasingly working with CGE models to trace the relationship between trade openness, liberalisation, growth and distribution. The general equilibrium modelling framework that we pursue in this study will include both external and internal liberalisation measures in both the product and factor markets. The model will allow throwing more light on major questions raised on the prospects of a pro-poor growth path following external trade reforms and internal budgetary reforms.

2.4. Recent trends in international and national development policy relating to liberalisation and poverty

2.4.1. From SAP to PRGF

In the last four or five decades the direction of development policy, especially for the small and medium-size developing countries, has been remarkably dominated by policy views and development initiatives of the IMF and World Bank. The two agencies started in 1986 with the Structural Adjustment Programme (SAP). Since then their development policy has undergone basic changes over time, culminating more than two decades later in the Poverty Reduction and Growth Facilities (PRGF).

The first phase of the SAP 1986–1989 mainly focused on macroeconomic adjustment and economic growth. This phase consisted of Structural Adjustment Fund facilities of the IMF and Structural Adjustment Loan facilities of the World Bank. Controlling money supply by cutting

down the public expenditure remained the major strategy of the Fund while the World Bank involved itself to the identification and funding for major growth potential areas in the economy. Controlling the money supply and price, maintenance of competitive exchange rates, withdrawal of subsidies, privatisation of state owned enterprises, simplification of custom duties and internal taxes were the major policy instruments of IMF/World Bank's SAP. This programme believed that these measures could help the integration of domestic economy with the world economy so that there will be the creation of immense opportunities to the factors of production in developing world to get employed in most productive areas and get higher return. Subsequently, the real wages of labours in developing countries would get increased which could help reduce poverty in these countries.

In time, there was increasing realisation that IMF and World Bank policies on stabilisation and structural adjustment were anti-poor and they should be modified in favour of the poor. There were two basic ways in which the initial SAP made the lives of the poor people miserable. Firstly, the devaluation of the local currencies of many developing countries deteriorated their international terms of trade; consequently, there was the decline in the level of income of the labour working in exportable sectors. Secondly, the liberalisation of markets and withdrawal of subsidies again made the lives of poor people more difficult, especially of those industrial and agricultural sector labour whose products could not compete at the international market. Furthermore, reductions in development expenditure made many poor people destitute. In this way the earnings and the living conditions of the poor declined faster than ever expected. With due realization of these facts, the IMF slightly modified its stabilization programme.

Subsequently, the second phase of the extended SAP - named ESAP - started in 1992. This emphasised the generation of more government revenue rather than expenditure cutting for balancing the state budget. Therefore, the development expenditure started increasing in many developing countries, which mitigated the adverse effects of the first phase programme to some extent. As will be seen in chapters 6 and 7, the policy simulations that we study with regard to internal reforms will also emphasise the generation of more public revenue rather than cutting public expenditure in keeping the budget deficit under control.

Both the first and second phases of the SAP have their deep-rooted affiliation with the neo-liberal development thinking. The thrust of the IMF policies was that the increase in the money supply should be seen as the major destabilising factor in the economy, both internally and externally. The channel of reactions is through the higher rate of inflation (internally) and decline of the exports given fixed exchange rates (externally). Both of these notions originate from the neo-classical quantity theory of money. Furthermore, the liberalisation strategies

followed by the World Bank also believed that free and unfettered markets are the most growth inducing, and this has trickle down effects will reduce poverty. Therefore, there was no question of inequalities to be addressed so long as higher rates of economic growth are attained.

Ended in 1994, the second phase SAP has raised some important issues. Most prominently, poverty has multi-dimensional facets and economic aspect is one of them. Therefore, mere economic policies are not sufficient to address this problem. The other aspects that should also be equally addressed in this connection are good governance; participatory approach in development planning, project implementation and evaluation; empowerment of women and socially deprived classes of the societies; political commitment and stability of the government. Not withstanding the importance of these issues, the core question remains: which development policies and which economic structures would enhance the income level of poor groups? These are also the type of questions that the current study addresses.

Various studies revealed that the liberalisation policies recommended by the IMF and World Bank marginalized many poor people in developing countries. With due realization of the facts enumerated above, the Fund and the Bank initiated and implemented a newly formulated Poverty Reduction and Growth Facilities (PRGF) programme.

The Key features of PRGF-supported programmes are:

•Broad participation and greater ownership. Basing the PRGF program on the country's PRSP should ensure that civil society is involved and that the country authorities are in the driver's seat.

•Embedding the PRGF programme in the overall strategy for growth and poverty reduction. PRGF staff reports will show how IMF programs derive from the poverty reduction strategy and are complementary to World Bank activities and conditionality.

•Budgets those are more pro-poor and pro-growth. Government spending should shift toward activities that demonstrably benefit the poor, while tax reforms should improve both equity and efficiency.

•Social impact analysis of major reforms. Where there are expected to be major reforms, analysis of the impact on the poor-normally by the World Bank-will need to be conducted and countervailing measures incorporated in the PRGF programme.

•Ensuring appropriate flexibility in fiscal targets. There should be scope to react to commonly experienced shocks, such as deteriorating terms-of-trade or poor harvests, or to spend newly-available aid when it is clear that it could be used productively.

•Emphasis on measures to improve accountability for public resource management. Strengthening fiscal governance to improve public services and ensure proper use of debt relief and other government resources is to be a key objective of PRGF programmes.

•More selective conditionality. With greater ownership expected, PRGF conditionality can and should be more selective, focusing on measures central to the success of the country's strategy.

Source: (*http://www.imf.org/external/np/prgf/2000/eng/key.htm*

The Interim Committee of the Policy Development and Review Department of IMF endorsed, on September 26, 1999, the replacement of the ESAP by the PRGF programme, which aimed at making poverty reduction efforts among low income members a key and more explicit element of a renewed growth-oriented economic strategy.[3] The Bank and Fund, consequently, started adopting more pro-poor policies while supporting liberalisation policies.

The participatory process in the implementation of the programme starts from the very beginning of the preparation of Poverty Reduction Strategy Paper with joint efforts of the country and the World Bank. This paper should incorporate the programmes and strategies on enhancing economic growth, civil service reform, privatization, women empowerment, infrastructure development, provision of the safety nets, and the conservation of environment. Henceforth, poverty alleviation efforts were meant to deserve much more microeconomic colour and attention than was usual in the past.

The implementation of PRGF accommodates the following major steps

-Discussion on macroeconomic framework has become more open and iterative between members and the Fund. Key macroeconomic policies in this regard are on growth and inflation, and the thrust of fiscal, monetary and external policies, as well as structural policies to accelerate growth.

-There is more exercise in the reallocation of government spending in support of the poverty reduction strategy. In the process of PRGF, the feasibility of mobilising additional domestic fiscal revenues should be considered early on. Likewise, a judgment is needed at this stage on the scope of additional domestic financing taking into account the need to maintain macroeconomic stability and avoid unduly crowding out of the private sector.

-Donors are presented, during the formulation of a PRSP, with macroeconomic scenarios that give clearer indications what financing would be needed to meet programme goals agreed with the country, particularly with respect to poverty reduction, in the context of the longer term international development goals.

-The emphasis on improvements in governance as a fundamental underpinning for macroeconomic stability, sustainable growth and poverty reduction is through the management of public resources, achievement of greater transparency, more active public scrutiny and generally increasing government accountability in fiscal management.

Source: IMF (1999), pp. 4-5.

2.4.2. Is there something new in PRGF?

Getting PRGF facilities requires the preparation of Poverty Reduction Strategy Paper (PRSP) by the country in consultation with the World Bank. PRSP is a professedly comprehensive approach to address poverty. It combines powerful econometric and ethnographic approaches to

[3] The purpose of this new facility is "to support programmes to strengthen substantially and in a sustainable manner balance of payment position and to foster durable growth, leading to higher living standards and a reduction in poverty. PRGF-supported programmes, like those of IDA, will stem from and be consistent with Poverty Reduction Strategy Papers (PRSPs) prepared by the borrowing country and endorsed in their respective areas of responsibility by the Boards of IMF and World Bank.

poverty policy with a battery of 'participatory' technique to a sharp neo-liberal economics and preparedness to innovate, ultimately linked to reproduce a four-pronged approach to poverty reduction. The approaches it uses are, Craig (2001), p.1:

(1) Broad-based growth: It is most recently understood as 'pro-poor' growth focussing on employment creating growth.

(2) Investment in human capital: typically on health and education sectors.

(3) Good governance: This issue has grown from anti-corruption and public accountability measures to embrace macro-economic fiscal management and decentralised governance, and

(4) Social safety nets: It is special purpose financing arrangements for those who are adversely affected by the adjustment process or are unable to participate in the growth.

A quick look on SAP/ESAP and PRGF shows that the former facilities of the IMF and World Bank were completely based on the adoption of neo-liberal development approach. The sole ideology of the programmes was that competition raises economic efficiency, which is conducive to economic growth, and the benefit of latter automatically trickles down in the free market economy. These programmes believed that integration of the poor people into the world market provides them immense opportunities for more employment, which is the ultimate solution to alleviate poverty in developing countries. However, direct anti-poverty measures were not incorporated in SAP; it was weakly addressed within the periphery of broad-based growth objective of ESAP, but has now become the sole objective of PRGF.

PRGF seems trying to integrate macroeconomic policies with social and sectoral objectives to ensure that plans are mutually supportive and consistent with a common set of objectives to spur growth and reduce poverty. Key sectoral and social policies, infrastructure projects, institutional reforms, and other measures are costed, prioritised, and incorporated within the macroeconomic framework. This is a new feature in PRGF. However, the issue of good governance has been vaguely incorporated in PRGF and it is very hard to relate good governance directly with poverty reduction/income equality. The operational aspect of the PRGF seems quite silent while relating these two aspects.

In PRGF, the issues on good governance and social safety nets have come focussed equally to that of broad-based growth and investment in human capital. In fact, the latter two were the sole concern of ESAP for poverty reduction. In this sense, PRGF seems more comprehensive and trying to accommodate different facets of poverty dimension. Consequently, the convergence of broad-based growth and investment on human capital has got equal attention in PRGF phase similar to that of ESAP. Moreover, this new programme has embedded in practice a plural, wide ranging set of techniques for identifying, mapping, measuring and reporting poverty as

popularised by the publications like 'Voices of the Poor'. Likewise, non-government sector's role has become more important now because they are promoting the partnership with third sector organisations to secure participation of the community which are the primary sites for decentralised approach of governance. And, in confidently projecting values and ideals well ahead of their demonstrated capacity to deliver, they seem to have a special facility for re-spinning new progressive outfits for old conservative policy, or building what Perry Anderson described as "the best ideological shell of neo-liberalism today". However, critics say that the link between the liberalisation/openness and the poverty reduction still needs to be clarified with clear transmission mechanism. According to them, promotion of the faster growth and poverty reduction by improving the climate for the private sector, thereby, generating more jobs at higher wages, reforming state enterprises to improve efficiency and free up the fiscal resources for poverty reduction programme, restructuring the banking system to reduce the risk of financial crisis, and integrating their labour-intensive exports with the world economy are more rhetoric than in practice, Craig (2001), p. 4.

2.4.3. Appraisal/evaluation methods of PRGF

PRGF tries to work as a macroeconomic framework to sustained poverty reduction in developing countries. By virtue of its nature, it should review economic management (inflation, financial sector stability, fiscal management, exchange rate and trade regimes, and income and employment trends) and assess whether these policies are coherent with the anti-poverty policy. If the government does not have any anti-poverty policy, do these policies produce pro or anti-poverty biases? What is the impact of fiscal policy on domestic prices and financial stability and how are the poor affected? Do monetary, foreign exchange, investment, and/or trade policies erode the domestic goods and industries, particularly those which affect the poor? Who are the main beneficiaries of policy prescriptions? Are policies silent or explicit on issues of discrimination and/or access of the poor to resources and services? And if they are explicit, what roles they can play? Are policies, which are particularly pro-poor aspects, actually implemented? These are some of the basic issues that PRGF should address to make the programme really instrumental.

As we can see, the constant emphasis of IMF and World Bank programmes is on economic growth. Here we should be clear about the efficacy of the programmes on the ground of the composition and distribution of growth. It is because, though economic growth is the engine of poverty reduction, it works more effectively in some situations than in others. In this connection, it is necessary to highlight two important aspects of growth: nature of economic growth and its distribution.

If the benefits of growth are translated into poverty reduction through the existing distribution of income, then more equal societies will be the most efficient transformers of growth into poverty reduction. A number of empirical studies have found that the responsiveness of income poverty to growth increases significantly if inequality is lowered. This is also supported by a recent cross-country study which found that the more equal the distribution of income in a country, the greater is the impact of growth on the number of people in poverty. Others have suggested that greater equity comes at the expense of growth and there is a trade-off between growth and equity when it comes to poverty reduction. However, a large number of recent empirical studies have found that there is not necessarily such a trade-off and that equity in its various dimensions is growth enhancing, Ames et al. (2001), p. 5.

Regarding the sectoral economic growths, various country-specific and cross-country studies have shown that growth in the agricultural and tertiary sectors has had a major effect on reducing poverty while growth in the manufacturing has not. This reinforces the case for duty-free access for agricultural exports from low-income countries to markets of industrial countries. However, the links may be more complex over the long run. More importantly, faster growth in agriculture may address rural poverty in the short-term, reliance on agricultural activity may also intensify output variability, which, in turn, would contribute to increasing rather than decreasing poverty in the long-run. A more diversified economy with a vibrant manufacturing sector might offer the best chances for a sustainable improvement in living standards in the long-run, (Ibid, p. 6). Therefore, sustainable poverty alleviation requires the removal of two important trade-offs that are almost bound to occur in a free market economy.

These two possible trade-offs are (i) Economic growth rate does not automatically trickle down to the desired sector/group/income strata. There is always a trade-off between the income growth at the higher income group and at the lower income group. Anti-poverty measures should try to translate the economic growth more to the lower income group and less to the higher income group. This can be interpreted as constrained equality effects of poverty reduction policies due to circular flow mechanisms. (ii) There is also the other trade-off between more government expenditure and the macroeconomic stability. More government expenditure is always necessary in favour of pro-poor growth, but it may also destabilise the economy. This can be interpreted as constrained equality poverty policies due to required macroeconomic balancing conditions.

To be more specific, the possible avenues through which these conflicts can be addressed are two: circular flow mechanisms and macroeconomic balancing conditions. With regard to circular flow mechanisms there are (i) micro foundational restructuring and policies, and (ii)

income/employment/growth foundational restructuring and policies: growth of those sectors in which bulk of the poor are concentrated should be promoted. In Nepalese case, it is the agriculture sector in which almost three-fourths of the economically active population is engaged. In case of the industrial sector, labour-intensive mode of production deserves special attention. With regard to macroeconomic balancing conditions there are (i) fiscal policy of the government: tax policy with more dependence on direct tax revenues and less on indirect tax revenues is necessary. Likewise, restructuring of public expenditure in favour of development expenditure basically on social overhead capital, safety nets, health and education also deserves attention, and (ii) monetary policy: The major objective should be to control inflation and stabilise the exchange rate. It is because poor are more hit by higher rate of inflation and devaluation of the domestic currency.

Note that the macroeconomic balancing conditions are imposed on the circular flow but these conditions have to pass through the circular flow before their final results are realised, and they may deviate from the original intention.

2.5. The case of Nepal

2.5.1 General background

After emerging from isolation in 1950, Nepal pursued inward-looking economic policies reflecting the intellectual influences of time and the approach of development followed by India. The government initiated widespread involvement in most aspects of the economy. There was the establishment of varied range of enterprises, and government employment was multiplied. The financial system was based on credit allocation via two large government banks, and access to the foreign exchange was controlled.

Stagnating per capita income and declining agricultural productivity in the early 1980s led to increased development spending largely financed by foreign aid. Moreover, Nepal experienced a rapid decumulation in foreign exchange reserves in the early 1980s because of the foreign financing below expected level, adverse supply shocks in agriculture, and resort to domestic financing of the budget. The extensive role of the state resulted in heavily regulated markets, inefficient centralised public management of foreign exchange, agriculture inputs, and industrial investment. Moreover, the budget deficit of the government increased steadily, IMF (1993).

2.5.2. The path to structural reform

Slow and fluctuating economic growth rate, and wide spread poverty are the two major development problems in Nepalese economy now. In the second half of the 1980s, government took important steps to stabilise the increasing macroeconomic imbalances in the economy and the beginning was made towards economic liberalisation. However, the role of the government was pervasive and the reforms were incremental. With the immediate objectives of reducing macroeconomic imbalances especially the trade and budget imbalances and attaining higher economic growth rate, the country entered SAP in 1987. More specifically, the objectives of Nepalese SAP[4] were: to reduce government budget deficit, to raise government revenue, and to reduce internal credit for controlling monetary expansion.

The goal of these objectives was to downsize the role of government in economic activities and promote private sector in this regard. With due efficiency gain in economic activities, it was expected to provide higher economic growth rate.

Nepal received loans named as SAL and SAF from the World Bank and IMF, respectively, to proceed in line of structural reform towards economic liberalisation. During the period of 1987

[4] Budget Speech 1987/88, Ministry of Finance, p.3.

– 89, there were some steps taken by the government to reduce its budget deficit, promote the private sector in economic front, and reduce trade imbalance. There were various revisions on tax structure and government expenditure patterns. Government promoted for the establishment of a number of joint venture commercial banks and other financial institutions at the private sector which are now providing modern banking facilities to fulfill the needs of industrial sector. Likewise, Nepalese currency was devaluated by about 14 percent with the currencies of major trading partners.

Despite its entry in SAP, the budget deficit did not get reduced as it was expected. But, there was some progress in this regard that increasing trend of budget deficit was controlled to about 7 percent of GDP, in an average, after the implementation of SAP. In other respects, there were some progresses. These included tariff reform, expansion of the open general license system (OGL) for imports, simplifications of export procedure, etc. The buoyancy of the tax system was enhanced but the public expenditure management remained weak. Significant progress was made with financial reforms in strengthening the banking system and improving the environment for indirect monetary control. Likewise, the co-ordination between monetary programming and domestic debt management remained inadequate. However, the overall growth of the economy remained satisfactory, approximately 4 per cent per annum.

Nepal has now entered the PRGF facilities of the Fund. It has also prepared PRSP in close co-ordination with the World Bank. The major work done in this background is that the government has formed a Poverty Alleviation Fund (PAF) at the National Planning Commission. The major task of the PAF is to bring all the poverty alleviation programmes in the country under a common umbrella so that there will be a better co-ordination of the donors and there will be no duplication of the programmes.

2.5.3 Strategic issues under reform

When SAP started in 1986 (first phase) it had more stabilisation and adjustment objectives rather than equity and distributional objectives. The Bank's loan SAL and that Fund's loan SAF was for three years (1987-89). The strategic issues in this phase were as follows: expenditure ceilings to control budget deficit, devaluation of the Nepalese currency, liberalisation of both factor and commodity markets, and control the higher rate of inflation. Following these policies of Bank and Fund, Nepalese government started reviewing the tariff structure, tried to reduce the growing budget deficit, devaluated the Nepalese currency in 1987 by about 14 percent with respect to the currencies of major trading partners, etc.

The major achievement during this period was in the financial sector. More indirect measures for monetary control came in operation. There was flexibility of the rate of interest in the money market. The second major strand of the financial reform was the establishment of a sound and viable commercial banking structure, which was an essential requirement for supporting private sector development. Because of the liberal financial policy of the government, about half a dozen of joint venture banks were established in Nepal. There was also an effort on capital restructuring and provisioning of bad debt of the two government-owned commercial banks, which counted about 90 percent of the commercial banks assets. The restructuring of these two banks was to make them competitive in the more liberal economic environment. The programme concentrated on the management reforms aimed at enhancing the operational freedom and accountability of the bank management, improving the management information system, reducing the banks' overhead costs including the retrenchment of surplus staff and consolidation of the branch structure, improving their portfolio quality and loan recoveries, and ensuring a fully commercial orientation.

Reducing fiscal deficit is possible either by reducing the public expenditure or by increasing the revenue or by adopting these two strategies at once. During the period of SAF (1887-1989), the IMF strategy to reduce the budget deficit was by expenditure-cut. But, under ESAF (second phase from 1992 onward), IMF wanted to make overall budgetary management rather than mere emphasis on expenditure cutting, with the realization that increasing government expenditure in developing countries was also by external factors, i.e. deterioration of the terms of trade. In world market, the prices of capital goods were increasing and that of primary commodities were declining. But governments in underdeveloped countries could not stop importing capital goods because of the development needs. Therefore, it was a common phenomenon in many developing countries that higher budget deficit was mostly associated with declining terms of trade. Consequently, there was a growing consensus that the developing economy should channel their resources into more productive areas, i.e. rationalise development expenditure rather than mere expenditure cutting because the cutting down of capital expenditure may hinder the growth potential of them. In the context of the public sector, developing world should make investments in social overhead capitals and reduce consumption expenditure. IMF recommended this strategy in the ESAF period.

Since the mid-80s, there have been several tax reforms in Nepal as a part of SAP to increase government revenue. Rates and slabs for both direct and indirect taxes have been reduced, a system of self-assessment of income tax has been introduced, and urban-land-house tax has been rationalised. Besides collection, some taxes such as land tax has been transferred to local government, while *octroi* has been abolished and replaced by adjustments in other forms of tax

such as urban property tax", UNDP (1998), p. 234. Likewise, Value Added Tax (VAT) has just been implemented to replace many domestic consumption taxes like sales tax, hotel tax, entertainment tax, contract tax, etc.

In this way, the following three strategies were prominent in the ESAF period: overall budgetary management for reducing the budget deficit rather than mere emphasis on expenditure cuts; tax reform to increase tax base and elasticity for meeting increasing government expenditure; and reduction of transfer payments to public enterprises.

Similar to SAF objectives, ESAF objectives were also of fiscal nature. Emphasis on sustained improvement in public savings over time was to help finance development spending; and a corresponding reduction in domestic financing of the budget deficit was to reduce the budget's expansionary effect on domestic liquidity and inflation as well as to ensure that an increasing share of domestic savings would be made available to the private sector. The government also recognised that the returns from most of its development projects in the past were less than the satisfactory; therefore, it intended to undertake wide-ranging efforts to improve the overall efficiency of public expenditure.

Monetary controls during this period were through indirect measures. Financial institutions were free to allocate credit in accordance with market forces except for the priority sector-lending scheme. There was the consideration to keep positive interest rate differentials vis-à-vis the neighbouring countries through the use of indirect monetary instruments so as to sustain confidence and discourage capital outflows. The government wanted to maintain a broad maturity range of government securities and thereby foster the development of active capital market. A system of the auction of treasury bills started which has now become an integral part of the monetary programme and open market operation has become the principal instrument of monetary control. In addition to these measures, open and liberal exchange and trade system, efforts to expand bilateral trade and economic cooperation, current account convertibility, simplification of the tariff structure, and public administration reform to downsize it, were also implemented.

During the ESAF period, government implemented various acts and regulations to promote more liberal economy. New Industrial Act, Commercial Bank Act, Foreign Investment and Technology Transfer Act, Privatisation Act, etc., came in operation. In early March 1992, a substantial liberalisation of industrial licensing was announced together with revamped import and foreign exchange policies. These policies were to further improve and extend the access of domestic producers to imported inputs, technology, markets and foster their competitiveness.

Government prepared a negative list of industries, which were still regulated for security, health, and environment reasons, and started the process of privatisation. Moreover, the criteria for licensing activities on the negative list were made transparent and capital goods were made freely importable at the market exchange rate. The government also eliminated controls over output pricing of industrial products. With regard to new investment, the government did not undertake any significant new investments through public industrial enterprises. Private sector investment or joint venture investment got emphasis in this respect, IMF (1992), p. 13.

In addition to those macroeconomic, mainly fiscal and financial policies/strategies, there were implementations of different sectoral policies on agriculture, population, education, health, and energy. More emphasis on these sectors was because of the more growth prospects embedded in them. The government's role in agriculture was to create a more competitive market-oriented agricultural sector relying increasingly on private initiatives. There were efforts to liberalise the markets for agricultural inputs and outputs by relaxing price regulations and quantitative regulations. Role of the private sector in the import and retail distribution of fertiliser and other inputs increased over the course of arrangement and the fertiliser subsidies substantially reduced over time.

The above-mentioned strategic issues expected to help attain higher rate of economic growth because of more efficient resource allocation. Moreover, ESAF aid disbursements were also expected to provide a realistic resource framework together with the targets for current expenditure for the development budget. IMF also emphasised for the reduction of the number of development projects to increase the funding for selected projects and channel the resources in more productive areas. World Bank mission helped select the development projects having more prospective yields.

Though economic growth was the major objective of SAF, it did not address the issue of poverty reduction in the context of the programme. The programme either did not feel the necessity of addressing this issue in the programme or it believed on the popular notion of trickle down effect of the economic growth in the market economy. However, the studies during the early 1990s showed the high prevalence of poverty in Nepal, therefore, the formulation of ESAF during 1992 got emphasis on the poverty reduction in the country. The programme tried to address poverty reduction through two basic strategies: (i) attain broad-based economic growth, and (ii) increase spending on rural infrastructure, education, health and family planning services for the improvement in living standard of the people mainly who were living below the poverty line.

The structural adjustment programme was likely to have a positive overall impact on the poorest segment of the society by raising the overall rate of economic growth and improving its access to basic services such as education and health care. The population of the urban and rural market economy would be likely to benefit significantly from the removal of trade restrictions and the reduction in the inflation tax. However, a large section of the population primarily engaged in subsistence agriculture could be affected very little by these changes. However, they would have been affected negatively by the removal of subsistence in agriculture. Therefore, the government's effort to improve their welfare focussed on improving rural infrastructure, facilitating them to integrate into the market economy, and on a more efficient delivery of basic services. In this respect, the poverty alleviation efforts look like having microeconomic in nature.

2.6. Leading issues in the Nepalese trade-off between growth and poverty

Nepal is a landlocked country of 147,000 square kilometres in the central Himalayas and the adjoining Ganges plain. She has no access to the sea except through transit arrangements with India. The nearest port facility (Calcutta) is some 500 miles away from the main point of entry into Nepal. While the hills and mountains at the north of the Ganges plain have less than 10 percent arable land, however, the area contains huge hydroelectric potentials and provides substantial opportunities for tourism. In contrast, the southern part of the country adjoining with India, which comprises about 30 percent of the country's total area (known as *Terai*), is flat with about half of the land area under cultivation. Most parts of the country, except the mountainous extreme north, are densely populated. Currently, Nepal's population is about 24 millions.

Nepal's economy is heavily dependent on agriculture, which employs approximately three-fourths of the economically active labour force in the country and draws about 40 percent of GDP. Because agriculture in Nepal is largely rain fed, its performance is highly sensitive to Nepal's erratic weather patterns. Small manufacturing sector is trying to groom basically to produce carpets and garments; however, the manufacturing growth has been constrained by power. The industrial base of the country is very weak, and its contribution in GDP, though marginally increasing, is about 20 percent during these years. During the last decade of nineties, Nepal's annual overall economic growth remained around 5 percent, approximately 4 percent in agriculture sector and 6.5 percent in non-agriculture sector.

A significant feature of Nepalese economy is its close relationship with neighbouring countries. Particularly, there are large movements of goods, labour and capital across its open border with India. During these years, approximately one third of its trade is with India. Moreover, Nepal's

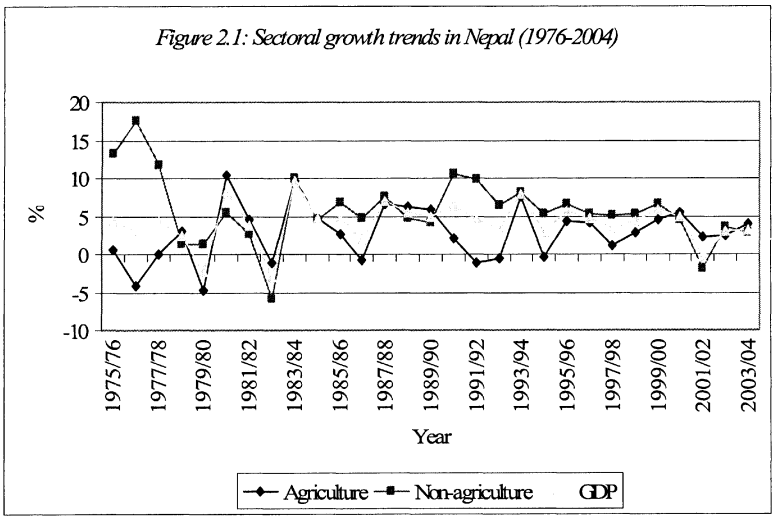
trade with third countries is also expanding these years providing her immense opportunity for both exports and imports.

The withdrawal of subsidies in agriculture and devaluation of domestic currency as initial steps towards structural adjustment in 1987 resulted in a sharp increase of poverty in the country (see Table 2.1 and 2.2). At the beginning of the 1990s, Nepal remained one of the poorest countries in the world.

No doubt, higher economic growth is the basic requirement of poverty alleviation, but it is the nature of growth that is really important in reducing poverty. Two important things should be born in mind in this connection. Firstly, the sectoral economic growth should be higher in that sector from where the majority of the poor are drawing their livelihood, and secondly, the distribution of growth should be reasonably distributed to the factors of the production. In Nepalese case, agriculture is the prominent sector upon which majority of the poor are dependent. Therefore, the growth of this sector deserves special attention.

The Figure 2.1 depicts that agricultural, non-agricultural, and overall GDP growths in Nepal are widely fluctuating over the period 1975/76 – 2003/04. However, non-agricultural GDP growth seems less fluctuating after 1991/92. Moreover, the overall growth rate of the economy is likely to be more dependent on agricultural growth. The agricultural sector is traditional in Nepal, and the land productivity is mostly dependent on monsoon. Therefore, the agricultural shocks are out of control of the majority of farmers, and the shocks are easily translated to the livelihoods of many poor people because majority of poor are small-scale farmers.

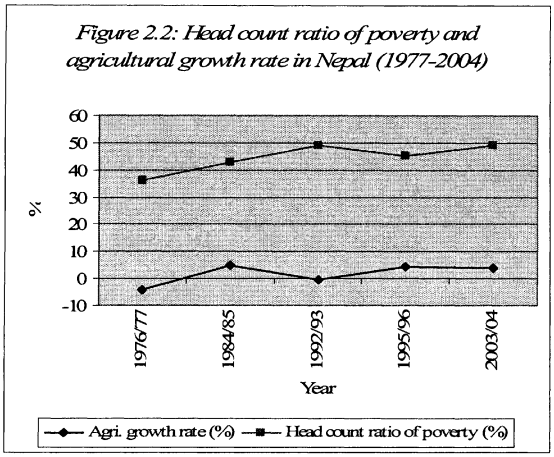
Figure 2.1: Sectoral growth trends in Nepal (1976-2004)



Data source: Economic Survey 2005, Ministry of Finance, Kathmandu.

Except 1976/77, a brief glance on trend of agricultural growth rate and Head Count Ratio (HCR) of poverty over the available data (Figure 2.2) shows that there is a clear negative relationship between HCR and agricultural growth rate in Nepal.

Figure 2.2: Head count ratio of poverty and agricultural growth rate in Nepal (1977-2004)



Now, the question arises about distribution. The income distribution patterns in Nepal during 1976/77 - 2003/04 are given in the following table.

Table 2.1: Income distribution pattern in Nepal

Share in population (quintiles)	% share of income during			
	1976/77	1984/85	1995/96	2003/04
Lowest 20 %	8.23	10.12	5.3	5.3
Next 20 %	5.86	14.93	10.0	8.9
Next 20 %	9.05	18.25	14.0	12.8
Next 20 %	22.38	22.09	20.4	26.9
Top 20 %	59.88	34.61	50.3	46.6

Sources: NPC/N (1983), *A Survey of Employment, Income Distribution and Consumption Patterns in Nepal 1976/77*, Kathmandu.
NRB (1988), *Multi-purpose Household Budget Survey 1984/85*, Kathmandu.
CBS (1997), *Nepal Living Standard Survey 1995/96*, Kathmandu.
CBS(2004), *Nepal Living Standard Survey 2003/04,* Kathmandu

The above table shows that though there is some progress in reducing the inequality in income distribution during 1976/77 – 1995/96 (the Gini coefficient has declined from 0.52 to 0.39); the inequality has, in fact, risen during the economic reform (Structural Adjustment) period. During 1984/85 – 1995/96, the Gini coefficient has increased from 0.22 to 0.39 and reached to 0.47 in 2003/04. It has given us the message that there is increasing marginalisation in the process of

economic liberalisation in Nepal and how to reduce this trade-off is an important development problem in Nepalese case. Are the inequalities bound to occur or they can be removed should be answered.

Nepal is one of the lowest per capita income countries in the world (US$210) though the economic growth rate has remained at 3.9 percent per year from 1970 to 2000. Given the widespread poverty in Nepal, nearly half of the population is below the poverty line and recent economic performance is not good enough to make tangible progress in reducing poverty. In this connection, adequate income-earning and employment opportunities are essential for maintaining social and political stability. Higher economic growth is also necessary to provide better services and infrastructure to the poor.

The first attempt to estimate poverty in Nepal was in 1976/77. During that year, National Planning Commission of Nepal (NPC/N) carried out a national level survey on Employment, Income Distribution, and Consumption Pattern. Poverty level was specified in terms of basic minimum calorie intake. This level was 2250 calorie per head per day in an average. Per capita minimum income level of Rs. 720 per annum was estimated to fulfill this requirement. This poverty level estimated about 36.2 percent of the total population living below the poverty line.

Later surveys also estimated the incidence of poverty on the basis of the same poverty line, i.e. 2250 calorie intake per capita daily. A household budget survey was carried out by the Nepal Rastra Bank (NRB), the Nepalese Central Bank, in 1984/85, which also tried to measure the incidence of poverty. NPC/N also estimated poverty in 1992 and 1996. Another Nepal Living Standard Survey was also conducted in 2003/04 but studies have not yet been made based on this new survey. The trend of poverty in Nepal as envisaged by different studies was as follows:

Table 2.2: Poverty situation and trend in Nepal (1976/77 – 2003/04)

Survey	Population below the poverty line	Population below poverty line (% of total population)	Per capita poverty line income (Rs.)	Per capita poverty line income (US$)
NPC, 1976/77	4,730,468	36.2	720	57.6
NRB Household Survey 1984/85	7,100,048	42.6	1,971	110.7
NPC Estimate, 1992	9,250,971	49.0	4,145	97.1
NLSS, 1995/96	9,426,048	45.0	4,560	80.3
NLSS, 2003/04	11,860,429	49.0	9,648	-

Note: i. Poverty line incomes are in current year prices. NPC (1992) figures are all estimates.
ii. NLSS is for Nepal Living Standard Survey. Figures to 2003/04 are authors own estimations.
Source: Suman Sharma, *Nepal Country Report - Summary Report (in preparation of South Asia Poverty Monitor)*, ACTIONAID/Nepal, 1998.

The survey by Central Bureau of Statistics (CBS), NLSS 1996, deserves special attention in this connection because World Bank has estimated poverty gap and severity of poverty in addition to the head-count index using this data. It shows that regional variation of the poverty incidence is quite alarming in Nepal. Approximately 56 percent of the households in the mountain region were living below the poverty line, whereas the percentages were 42 and 41 in case of *Terai* and hills, respectively. Similarly, poverty in the remote regions of the western Nepal was more severe than elsewhere. In these regions, nearly three-fourths of the households were living below poverty line. The World Bank Estimates of poverty indices based on CBS 1996 survey data were as follows:

Table 2.3: Poverty measures for Nepal (poverty line per capita income = Rs. 4,404)

Region/Sector	Head-Count index (%)	Poverty Gap index (%)	Squared Poverty Gap index (%)
Ecological Belt			
Mountain	56 (0.059)	18.5 ((0.027)	8.2 (0.015)
Hills	41 (0.031)	13.6 (0.014)	6.1 (0.008)
Terai	42 (0.025)	9.9 (0.009)	3.4 (0.004)
Sector			
Urban	23 (0.058)	7.0 (0.025)	2.8 (0.012)
Rural	44 (0.020)	12.5 (0.008)	5.1 (0.004)
National Average	42 (0.019)	12.1 (0.008)	5.0 (0.004)

Note: Figures in parentheses represent standard errors adjusted for stratification and sample clustering.
Source: Nepal: Poverty at the Turn of the Twenty-First Century, World Bank, 1999.

Depicted by Table 2.3, poverty in Nepal is predominantly a rural phenomenon. It is pervasive and severe there as compared to urban centres. Among the urban centres, it is least at Kathmandu valley. Income distribution among the poor is also more uneven in rural as compared to the urban areas. The shortfall of income from the poverty line is less in *Terai* as compared to Mountain and Hills. Income distribution among the poor is also relatively less skewed in *Terai* than in other ecological belts. Though the table does not incorporate indices by development regions, the World Bank study also reveals that poverty incidence also varies widely across the development regions. Highest poverty incidence (Head-count ratio 0.57) is in rural-western Hills followed by rural-western *Terai* (0.46). It is least in rural-eastern Hills.

Characteristics of Nepalese Poor, *Source: Nepal Country Assistance Strategy, World Bank, 1999, p.2*

- The gender gap, although declining, is still very large. The gap in literacy rates between men and women is 35% (with 54% of men literate as against 19% of women). Fortunately, there are signs that this gap is narrowing (with a gender gap of only 15% in the 10-14 age group).
- Access to infrastructure is limited for all Nepalis, but especially for the very poor. The rural poor live on average more than five hours away from the nearest dirt road, as compared to three hours for others. Only 3% of the very poor have access to electricity, as against a country-wide average of 15%. This reduces their productivity and employment opportunities.
- The lack of transport infrastructure—rural roads in particular—constrains the potential for agriculture, as it increases the cost of inputs and reduces the value of marketable output. Whether or not the road was a paved all-weather road made no significant difference.
- The very poor have much worse educational outcomes than others. Only 22% of the very poor are literate, as compared to 40% for the others. A very poor child of primary school age has only 2/3 probability of attending school compared to other children. A year of public schooling costs, on average, more than three months' per capita consumption for the very poor. Lack of parental education, the need to work, cost, and remoteness all reduce the probability that a child will be in school. Lack of education compounded with the lack of access to infrastructure has limited the employment opportunities for the very poor.
- When sick, the very poor seek health treatment less frequently (only half times, as against 70% for the rest of the population) partly because of remoteness and partly because of cost. The average cost of treatment for an episode of illness is equal to one-and-a-half month of per capita consumption for the very poor. In addition, limited access to safe water and sanitation adds to the health risks faced by the poor. Only 40% of the very poor have access to (relatively) safe drinking water, as compared to 60% for others. Ill health further reduces the productivity of the very poor.
- There are no public safety nets in practice for the poor. Remittances are important, with one in five very poor households receiving remittances, accounting for 27% of their income. Similar is the case of seasonal migration, with again one in five households having a seasonal migrant.

2.7. IMF/World Bank policies for sustained growth and poverty reduction in Nepal

IMF and World Bank policies are operational in Nepal since the last four and half decades. Both of these institutions were working for their regular works in Nepal for the first three decades, IMF helping maintain stable exchange rate and helping balance short-term foreign exchange crisis and World Bank in providing loans to potential development infrastructures. However, their roles became more structural and developmental since the mid eighties.

The first phase of the SAP implemented in Nepal in 1987 regarded macroeconomic imbalances as the major obstacle to economic growth, consequently, it tried to address those macroeconomic problems mainly from money supply and exchange rate approaches. The second phase SAP implemented in 1992 also proceeded in the same line, however, it realised that economic growth objective should basically target the lower income group of the economy. It associated the concept of broad-based growth and restructuring of public budgeting. The process of privatisation, tax reform and financial sector reform took momentum in this phase. Though poverty reduction was one of the targets of the programme, economic growth policies

got more emphasis to address poverty. Moreover, the popular neo-liberal development ideology of the trickles down effect of growth to reduce poverty was at the core of poverty alleviation strategy.

The recently launched PRGF has associated some socio-political factors in addition to economic ones in connection with economic growth and distributional goals. It was because of the due realisation that macroeconomic stabilities alone are not sufficient to address the diverse nature of poverty in the country. In Nepalese case, the World Bank has opined that though the overall macroeconomic performance is satisfactory, the economic management needs improvement. Using the Bank's own words "Macroeconomic stability has been maintained so far (with tight monetary and fiscal policies), the domestic inflation rate remains relatively low, the balance of payments situation appears to have stabilized, preparations are under way for implementing a Value Added Tax, and the privatization process, though somewhat limited to date because of political constraints, seems to be moving forward again. Not withstanding these achievements, given the inadequate political support for a coherent reform agenda, the overall quality of economic management has suffered."

Currently, IMF and the World Bank are working in close co-operation to reduce global poverty. The IMF's role is mainly in analysing the macroeconomic framework of the countries and make them more conducive to pro-poor growth whereas that of the World Bank's role is in selecting micro-level development projects, which could be beneficial mostly to the poor. Similar to other aid receiving countries, the World Bank has developed a Country Assistance Strategy to Nepal aiming to help overcome the constraints to development. It was elaborated in a participatory process involving extensive consultations. It seems that the World Bank strategy has two new prongs: bringing resources closer to the beneficiaries, where they are most likely to be productively used; and collective donor action to foster the stronger governance needed to reduce waste and mismanagement. To these ends, it will support: (i) a greater reliance on local stakeholder and private sector participation in project preparation and implementation; and (ii) closer cooperation among donors linking donor assistance to improved governance. At the same time it will continue looking for major improvements in national economic and fiscal management, especially further privatization, a continued strengthening of the tax base, better allocation and management of public resources, and reform of the financial sector (Ibid).

In these backgrounds, the last two national development plans of Nepal have been based on major policy recommendations of the IMF and the World Bank's Country Assistance Strategy. Recognising the need and potential for higher growth, the government, since the Ninth Five Year Plan launched in 1997, has articulated a four-pronged development strategy focusing on:

(i) accelerating economic growth (more than 6 percent) per annum; (ii) pursuing liberal, market-oriented economic policies to promote private sector-led development; (iii) bringing rural areas into the mainstream of development through promotion of agriculture and community development programmes; and (iv) developing special programs for the most vulnerable and underprivileged groups. The budget also states that it gives priority on a sectoral basis to agriculture, tourism, power, human resource development and rural infrastructure.

IMF and World Bank's experience in Nepal is that within the more limited resources which are likely to be available, Nepal can still increase the economic growth rate and its impact on reducing poverty by improving economic management in three key areas: (i) utilizing public resources efficiently; (ii) providing a more conducive atmosphere to facilitate the vibrant growth of the private sector; and (iii) improving policies and programs in key sectors to exploit their potential for economic growth and poverty reduction. To bring about such improvements, a serious political commitment to maintain fiscal discipline and ensure better use of public resources is essential. If such actions were taken to improve the effectiveness of public spending, then additional revenue mobilization by the government would be warranted. To increase the elasticity of the tax system and enhance revenue generation over the medium term, Nepal needs to move away from its heavy dependence on import taxes to a more broad-based system mainly relying on domestic taxation of consumption, such as a Value Added Tax (VAT) and selective excise taxes, supplemented by low rates of customs duty and income tax.

To accelerate economic growth and development, Nepal's small but growing private sector will need to play an increasingly active and eventually leading role. Economic reforms in the early nineties have already led to significant improvements in the economic climate for the private sector. Nevertheless, further improvements are needed in a number of areas, notably through (i) financial sector reforms, (ii) privatisation and (iii) further liberalisation of trade and investment policies. Among these, financial sector reform and investment policies may reduce poverty so long as they are conducive to domestic investment and foreign direct investment (FDI), which may increase the level of employment. Furthermore, trade liberalisation reduces poverty since consumers get goods and services at competitive prices; consequently, there is the welfare gain of the poor people.

Regarding the reform towards economic liberalisation, the Fund and Bank are somewhat satisfied in Nepalese case. According to them, Nepal's trade and foreign exchange regime is already quite liberal. Nevertheless further improvements in trade and investment policies can help stimulate exports, private sector activity and economic growth. Specifically, the further reform would help to take advantage of emerging opportunities through its membership in

World Trade Organization (WTO) and South Asian Preferential Trade Arrangements (SAPTA). Moreover because of the economic liberalisation in India, Nepal needs to improve its competitiveness through technological upgrading, skill development, export and tourism promotion, as well as joint investments aimed at supplying to the neighbouring Indian market. Nepal also needs to work out appropriate administrative arrangements with India and undertake the necessary investments in transport improvements in order to take advantage of recent bilateral trade and transit agreements. Given its land-locked location and small domestic market, Nepal is unlikely to attract significant amounts of foreign investment except in areas where it has a comparative advantage - power development, tourism, and possibly some services. Moreover, the Bank has felt the necessity of the improvements of policies in key sectors to enhance the effectiveness of both public and private investments, encourage greater private sector involvement and facilitate faster project implementation. While such improvements are needed in almost all sectors, some important examples are agriculture, tourism, and social sectors (education, health and drinking water) to reduce widespread poverty. These are well documented in the Country Poverty Assessment Report also.

If overall economic management and governance can be improved and population pressures eased, sustained income growth especially among the rural poor, is possible. Nepal does have a number of assets: agricultural land that could support much higher output, particularly in the *Terai*; people, especially women, are accustomed to extremely hard work; access to quite generous donor aid of some $20 per capita per year; a large and growing market in neighbouring India that is now accessible on preferential terms; enormous, if seasonal, water resources giving it a massive hydropower export potential; and scenery and a cultural inheritance that make it a major tourist destination. The challenge facing Nepal is to harness these assets to sustain rapid and broadly based growth, while reducing the birth rate so that the growth is realised in higher per capita income rather than an ever-increasing population density. The Bank feels that key constraints to growth of Nepalese economy are low productivity of agricultural land, poor productivity of rural labour, low returns on public investments, and inadequate government services, World Bank (1999), p. 5.

The Nepalese experience shows that there are three important areas that the IMF and World Bank should focus regarding the poverty alleviation. Firstly, there is no sign of the reduction of inequalities in income distribution in the process of economic liberalisation, and it seems a clear trade-off between the growth of income between the higher and lower income groups. Secondly, the trade-offs between the macroeconomic stabilities and the pro-poor economic policies should be addressed in a proper way. Thirdly, the microeconomic and macroeconomic foundational

structures, mechanisms and policies feeding poverty alleviation schemes should be coherent and target oriented.

For SAP to succeed the three above areas of trade-offs, and their conflicts or overlapping need to be addressed through foundational changes and be supported by corresponding policies that fit with these foundational changes. To put in other words, the SAP should be redesigned to incorporate some fundamental changes and related policies which are conducive to higher economic growth, equality and poverty reduction, nationally stable balancing conditions, and coherent with globalising and competitive world.

3. The social accounting matrix of Nepal

3.1. Introduction

The genesis of the social accounting Matrix (SAM) goes back to Richard Stone's pioneering work on Social Accounts. Subsequently, Graham Pyatt and Erik Thorbecke further formalized the SAM and showed how it could be used as a conceptual and modular framework for policy and planning purposes.

The SAM approach to modelling is a very flexible one and it is a basic element in the tool kit of the general equilibrium economist. SAMs have been used to study four aspects: (i) growth strategies in developing economies by Pyatt and Round (1985), and Robinson (1988),(ii) income distribution by Pyatt and Round (1977), Adelman and Robinson (1978) and redistribution by Ronald-Holst and Sancho (1992), (iii) fiscal policy in national and regional settings by Whalley and St. Hillaire (1983, 1987), and (iv) decomposition of activity multipliers that shed light on the circuits comprising the circular flow of income by Stone (1981), Pyatt and Round (1979), Defourny and Thorbecke (1984), and Robinson and Holst (1988). Moreover SAMs have also been used to provide applied general equilibrium models with consistent calibration data, Ballard et al. (1985). In fact, as Pyatt (1988) convincingly argues, any disaggregate model has, knowingly or not, an associated Social Accounting Matrix, Ronald-Holst and Sancho (1995). Various applications to the above four aspects are found for developing and transition countries in Cohen (2002a).

The SAM provides a consistent accounting framework to depict the circular flow of incomes and expenditures in an economy for a benchmark year. The transactions in the economy are represented in a matrix form. By convention, entries in any row of the SAM represent revenue sources and the entries in any column represent payments. Thus each cell in a SAM reports a payment from a column account to a row account. Each account balances, with incomes exactly equalling expenditures such that the column sums in a SAM equal to the corresponding row sums.

This chapter gives an overview regarding income-expenditure flows in Nepalese economy through the construction of the SAM. Section 3.2 puts the underlining principles in the

construction of Nepal SAM. It displays the number of accounts and their sub-divisions. Section 3.3 distinguishes between commodity and activity accounts, and the Rest of the World account (ROW). In section 3.4 we present Nepal SAM in schematic and numerical terms. This is followed in section 3.5 by a review of the characteristics of the Nepalese economy as depicted by the SAM for 1996. Finally, section 3.6 summarises and gives concluding remarks.

3.2. SAM components

Several main accounts are distinguished in a SAM. These include factors, institutions, activities, commodities, and the rest of the world. Each account can be further disaggregated into many sub-accounts based on the socio-economic structure of the economy under consideration and the need of the particular policy modelling. In our case, the factor account has been divided into three main accounts namely, unskilled labour, skilled labour, and capital (including land). The current accounts of institutions have been categorized into three main sub-accounts: households, firms, and government. Moreover, the household account was further divided into four different types: small rural households, large rural households, land-less rural households, and urban households. This sub-division of households is based on various socio-economic characteristics, regional attributes and other endowment characteristics applicable to Nepal. There is an aggregate capital account (national accumulation) for all institutions taken together. The activity account comprises four major sub-accounts: agriculture, manufacturing, commercial services, and other services. A similar pattern is followed in case of the commodity account.

3.2.1 Factor account

The factor account receives the return to the factors of production. Generally land, labour, and capital are considered as the primary factors of production. In our case, we have sub-divided labour into skilled and unskilled labour. In order to make the SAM consistent with the features of the CGE model we merge land and capital accounts into a single factor called capital. Therefore, the three factors of production are low-skilled manpower, high-skilled manpower and capital.

The distinction between the skilled and unskilled labour is in terms of the possession of job-related training and school education received. The majority of the agricultural labour, production workers, clerical, sales and service workers are in low-skilled labour account. The factor high skilled labour mostly consists of professionals, managers and non-civilians account. Gross operating surplus is the remuneration to the capital (factor) account.

The intersection of the factor accounts in the rows and activity accounts in the columns gives the value added module. This value added module contains the returns to the primary factors of production. Similarly, different columns of the factor account represent expenditures of the factors accounts that become the incomes of different institutions like households and firms. These incomings and outgoings of the factor accounts can be expressed as follows:

$FI_q = \square QF_{qi}. RF_q$ .....(3.1)

In equation 3.1, q is the factor of production, i is the activity. Likewise, FI_q, QF_{qi}, and RF_q refer to factor income of type q, quantity of factor q involved in activity i, and the remuneration rate to the factor q, respectively. The economic activity in our case refers to agriculture, industry, commercial services, and public services. The total factor income from different activity accounts can be read from the corresponding row total in the SAM.

The factor outgoings can be disaggregated into different institutional incomes as follows:

$FE_q = \square HI_{hq} + FI_q + GI_{gq}$ .....(3.2)

In equation 3.2, FE_q, HI_{hq}, FI_q, GI represent for factor q's total payments, factor q's payments going to household group h, factor q's payments going to firms, and factor q's payments going to government, respectively.

3.2.2 Institutional accounts

These accounts comprise the current accounts of household groups h, firm and government, and an aggregate capital account for all institutions together. The Nepal SAM contains four household accounts, one corporate business, one government account, and an aggregate capital account. Households are classified according to the family size and rural urban difference. The four major types of household accounts are: Small Rural Households (SRHH), Large Rural Households (LRHH), Land-less Rural Households (LLRHH), and Urban Households (UHH). The rows of the institution accounts provide the incomes of the institutions from different sources, and the respective column account shows the institution's expenditure.

Household account. The intersection of the household account and the factor account shows the factor incomes of the households. These factor incomes are from skilled labours, unskilled labours, and capital. Moreover, the household accounts receive transfer incomes form other institutions, mainly from the government, and remittances from the rest of the world. The household incomes can be expressed as:

$HHI_h = \square QF_{hq}. RF_q + TRF_{hi} + R_{hr}$ .....(3.3)

In this equation HHI is for household income, the subscript h is for the different type of household, hq represents the income received by household h from factor type q. Likewise, TRF is for transfer earning, i for domestic institutions and r for the rest of the world. R represents the remittance earning.

The expenditure of households goes to the commodity account that provides composite goods to the households, and a part goes to the government as taxes. The rest of the household income is saved and it enters the national capital account. In fact, it is the balancing item of the receipts and expenditures of households.

$HHE_h = \square QC_{ch}. PC_c + TX_{gh} + S_h$ .....(3.4)

Here HHE represents household expenditure, QC the quantity of composite commodity, PC the price of commodity, TX the income tax, and S is the saving. Likewise, the subscript c is for the type of composite commodity and g for the government.

Firm account. Firm's income (FI) is from its capital investment (FIK), transfer from the government and from the rest of the world. Likewise, firm's expenditure (FE_f) goes as a tax to the government and as an import expenditure to the rest of the world. The balancing item is the firm's saving (S_f) which goes to the national capital account.

$FI = FIK + TRF_{fg} + TRF_{fr}$ .....(3.5)

$FE = FE_{gf} + FE_{rf} + S_f$ .....(3.6)

In equations 3.5 and 3.6, the suffix f refers to the firm.

Government account. Government's income (GI) includes direct tax revenues (DTX) from households, indirect tax revenues from the economic activities (ITX), indirect tax revenue from sales of commodities (ITX), export and import duties (EI), and transfers from the rest of the world. Likewise, government's expenditures are transfers to households, payment to composite goods, and the payment to the rest of the world. Government saving becomes the balancing item to equalize government income and expenditures.

$GI = DTX_{gh} + ITX_{ga} + ITX_{gc} + EI_{gc} + TRF_{gr}$ .....(3.7)

$GE = TRF_{hg} + GE_{cg} + GE_{rg} + S_g$ .....(3.8)

Saving investment account. This is the national capital account that balances total national saving and total investment expenditure. The total national saving (NS) is from households (S_h), firms (S_f), government (S_g), and the rest of the world (S_r). The total national capital investment (NCI) goes to the commodity account and depreciation (D_c). The balancing item between the national saving and national investment is the foreign capital inflow or outflow.

$NS = S_h + S_f + S_g + S_r$ .....(3.9)

$NCI = \square NCI_c + D_c$ .....(3.10)

In Nepal SAM we put a composite figure NCI_c and D_c that is total gross fixed investment.

3.2.3. Activity account

We have classified the Nepalese activity account into four major categories: agriculture and other land activities, industry, commercial services, and other public services. The major contribution in agriculture account is by paddy, wheat, maize, millet, barley, jute, tobacco, sugarcane, and other food crops. Other land activities include livestock and fisheries, and forestry. Likewise, the major activities in manufacturing sector is from mining and quarrying, dairy products, canning, other food products, grain mill products, tobacco manufacturing, beverages, tea, sugar and confectionary, carpets, textiles, garments, jute goods, footwear and leather goods, cements, mineral and fuel products, pharmaceuticals, chemicals, wood and furniture, paper and printing, plastic and rubber products, basic and fabricated metals, electric and electronic goods, etc. The commercial service sector includes activities in construction, gas/electricity and water, hotel and restaurant, wholesale and retail trade, transport and communication, banking, real estate and dwelling. Lastly, the other public services include activities in education, health, government services and other social services.

All activity accounts have two broad types of income sources (IA), one from the commodity account and another from the rest of the world. The supply of the activity account to the commodity account shows the final consumption of respective activity product. Likewise, the activity account consists of the expenditures to factors, tax to the government (excise duties), commodity accounts, and the rest of the worlds. The outlays of the production activities to the commodity accounts are payments for intermediate deliveries. Payment to the rest of the world is for the non-competitive imports. In equations 3.11 and 3.12 index a stand for the type of activity and c for the type of commodity.

$IA = IA_{ac} + IA_{ar}$ .....(3.11)

$EA = EA_{fa} + EA_{ga} + EA_{ca} + EA_{ra}$ .....(3.12)

However, Nepal SAM 1996 does not have income of the activity account from the rest of the world. Likewise, in order to avoid the possibility of double taxation on the same domestic product, we have put the domestic indirect tax only in the commodity account.

3.2.4. Commodity account

The commodity account closely resembles the activity account. In Nepal SAM, all activity accounts have their commodity accounts as well. However, the sources of income and the

expenditures of these two types of accounts are different. The incomes of the commodity accounts (IC) are from institutions, national capital (saving-investment) account, activity accounts, and the rest of the world accounts. Likewise, the expenditure of the commodity account (EC) goes to the government (as sales tax or value added tax), activity accounts, and the rest of the world account. More importantly, the expenditures of the activity accounts that go to the commodity accounts feed the input-output table (IOT).

$IC = IC_{ca} + IC_{ci} + IC_{cn} + IC_{cr}$ ..... .(3.13)

$EC = EC_{gc} + EC_{ac} + EC_{rc}$ .....(3.14)

In equation 3.13, the subscript i and n refer to the institutions and national capital, respectively.

3.2.5. Rest of the world (ROW) account

This account shows the demand for the goods and services of the country from the rest of the world and the supply of goods and services to the country. In the last row of the SAM there are payments to the ROW from different accounts that are receipts from the viewpoint of the ROW. The balance of current transactions with the ROW is calculated with the help of the figures at two different cells in the SAM, they are the cells at the intersection between National Capital (NC) account and the ROW account. The figure at the NC column and the ROW row shows the capital outflow from the country whereas the figure in the reverse cell shows the capital inflow from the foreign countries. As the capital account of the balance of payments mirrors the current account, the net balance in these two cells gives the net in(out) flow of foreign capital. The incomes of the rest of the world account (IR) are the transfer payments by the institutions to the rest of the world and the demand of imports (M_j) from the rest of the world. Likewise, the expenditures of this account (ER) are the transfer payments to the institutions by the rest of the world and the exports of the domestic product (E_j) to the rest of the world. Foreign saving is the balancing factor of this account, which shows the capital inflow or outflow to or from the country.

$IR = TRF_{rg} + TRF_{rf} + TRF_{rh} + \square M_j$ ..... (3.15)

$ER = TRF_{gr} + TRF_{fr} + TRF_{hr} + \square E_j + CAB$ .....(3.16)

In equations 3.15 and 3.16, j refers to the products under foreign trade and CAB is the current account balance. The CAB is, in fact, the foreign saving. This balance in the current account is made from the capital account. If it is negative, it shows the capital outflow from the country.

3.3. Additional clarifications

While the activity account corresponds to the producing sectors in the input-output module, the commodity account combines domestic supply with imports to yield total supply to the domestic and foreign markets. The separation of the activity and commodity account in the SAM construction is essential for the modelling framework because activities are assumed to consist of producers, who are behaviourally distinct in the models, Sapkota (2001). The commodity account corresponds to the domestic market for all products with supplies coming from domestic producers and imports as well. It is important to bear in mind that exports are not included in the commodity account but are sold directly to the rest of the world by producers (activities). Thus the treatment of exports and imports are different in this SAM. Likewise, the distinction between activities and commodities allows more than one commodity to produce a given activity.

The ROW account consists of many income and expenditure streams. An import and export accounts are the parts of the broad ROW account. The import of a country becomes a part of the income of the ROW account. Likewise, the export of the country becomes a part the expenditure of the ROW account. The import and exports remain in ROW account in conjunction with commodity account, which means that only final commodities are imported or exported not the activities.

The distinction between the national capital account and the factor account for capital remuneration also deserves attention. The national capital account is a separate account that plays the role of intermediation between national saving and national investment or more specifically between the domestic saving and the domestic investment. Therefore, national capital account collects savings from all the domestic institutions and from the ROW as well and makes an investment for the production of commodities. But, the factor account for capital remuneration is a different one. It receives profit from the activity accounts. The profits are disposed of to the institutions as a return to the capital that they possess.

3.4. Schematic and numerical Nepal SAM 1996

Table 3.1 summarises the scheme described in the above section. It is a schematic representation of Nepal SAM and the numerical version of this SAM has been presented in Table 3.2. In order to obtain the numerical SAM in Table 3.2 corresponding to the schematic form as given in Table 3.1, first we developed an aggregate SAM containing aggregated accounts of factors, households, firms, government, saving and investment (S-I), activities, commodities, and the rest of the world (ROW). The figures used to construct the aggregate SAM are partly based on Sapkota (2001), and partly on updated figures from more recent national account statistics. The two sources were scaled to each other resulting in a consistent macro SAM that corresponds with the national accounts statistics of 1995/96.

We can elaborate on the differences between the SAM of Sapkota and the SAM we developed as follows. Sapkota's SAM 1996 works with three household groups: rural hills households, rural *Terai* households, and urban households. However, we follow a different classification so as to highlight poverty issues, resulting in four household groups: urban households, large rural households, small rural households, and off-farm rural households. This classification is necessary in this study with focus on liberalisation and pro-poor growth because off-farm rural households are the poorest household category in Nepal. Per-capita income of this household category has become a target variable to different policy simulations in our study. Moreover, we have disaggregated the service sector into commercial services and public services which was lacking in Sapkota's SAM. Furthermore, we made the Nepal SAM 1996 fully consistent with the major macroeconomic statistics like GDP, imports, exports, savings and investment; whereas some statistical gaps existed in Sapkota SAM 1996. Finally, and as will be shown later on in this chapter, we go beyond the conventional links in social accounting matrices, inclusive Sapkota, and introduce the mapping of factor income distribution among different activities and household categories. We have prepared an extended factor-activity-households income distribution matrix accordingly. As this research is trying to develop a liberalisation discourse supportive to pro-poor growth for a developing economy like Nepal, this scenario could only be developed and studied if there is an actualised mapping of factor income distribution among different activities and household categories.

More details on our SAM follow. A slight adjustment was made in the case of indirect tax paid by the activities. As these taxes were to be borne by the final consumption goods in the commodity market, we shifted them in the commodity account and made subsequent adjustment in the activity account. Furthermore, three separate accounts were created for income tax, domestic indirect tax, and tariff, for the sake of convenience in implementing SAM in CGE. As

a result, the final disaggregated Nepal SAM 1996 is shown in the form given in Table 3.3. Finally, Table 3.3 differs in form from Table 3.2 by rearranging the accounts, starting with activities first, then commodities and so on. But the difference is only in form and not in substance. The rearrangement of the accounts allows a swift application of the GAMS programme to solving the CGE model. This table forms the benchmark for the calibration of the CGE model in the next chapter.

This macro-SAM has been disaggregated into different factors, institutions, activities, and commodities to get a disaggregated SAM. The disaggregated construction of Nepal SAM basically follows the Input-Output Table (IOT) prepared by National Planning Commission of Nepal (NPC, 1992). The value added account, factor account, imports and exports, domestic indirect taxes, direct taxes, inter-industry transaction were derived from the (IOT). The domestic demands for domestically produced goods were estimated deducting the export values from the total output. The estimation of household savings, firm saving and government savings were on the basis of the data from Nepal Rastra Bank, NRB (1994), Central Bureau of statistics (CBS), and balance of payment (BOP) statistics from the Trade Promotion Centre. The household disaggregation has been made on the basis of information obtained in the Nepal Living Standard Survey (NLSS) by CBS in 1996. The data from this survey became very much instrumental in deriving the sub- matrix of consumption by household groups and commodity types, Sapkota (2001). The full forms of the abbreviations used in Table 3.3 are as follows:

SRHH = Small Rural Household	S-I = Saving Investment
LRHH = Large Rural Household	AGR-A = Agricultural Activity
LLRHH = Land-less Rural Household	IND-A = Industrial Activity
UHH = Urban Household	CS-A = Commercial Service Activity
GOVT = Government	OS-A = Other Service Activity
FIRM = Business firm	AGR-C = Agricultural Commodity
ROW = Rest of the World	IND-C = Industrial Commodity
WLSL = Wage to Low-Skilled Labour	CS-C = Commercial Services
WHSL = Wage to High-Skilled Labour	OS-C = Other Services
PROFIT = profit to invested Capital	ERR/OMM = Error/Omission

Table 3.1: Schematic representation of the Nepal social accounting matrix

Receipts	Expenditures									
		Factors	Institutions				Activities	Commodities	ROW	Total
			Households	Firms	Government	Saving investment				
Factors							Value added			GNP at factor cost
Institutions	Households	Factor incomes received by households			Government transfer to households				Net Remittances and net factor income from abroad	Household income
	Firms	Factor income to firms			Government transfer to firms				Transfers from abroad	Firm income
	Government		Taxes	Taxes			Indirect taxes	Import tariffs	Foreign aid and other transfers to government	Govt. income
	Saving investment		Household savings	Firm savings	Government saving				Net foreign capital inflow	Total savings
Activities								Domestic sales		Total Production
Commodities			Private consumption		Government consumption	Private and public investments	Intermediate inputs		Exports	Total demand
ROW							Complimentary imports	Competitive imports		Foreign exchange Payments to abroad
Total		Factor outlay	Household expenditure	Firm expenditure	Government expenditure	Total investment	Total Production	Domestic supply	Foreign exchange earnings from abroad	

Table 3.2: Numeric representation of the Nepal SAM 1996 *(values in million Rupees)*

Receipts		Expenditures								
		Factors	Institutions				Activities	Commodities	ROW	Total
			Households	Firms	Government	Saving investment				
Factors							231901			231901
Institutions	Households	215127			2987				4466	222580
	Firms	16774			5688					22462
	Government		4921	5960			9685	17012	4825	32718
	Saving investment		26189	16503	1025				24300	68017
Activities								393304		393304
Commodities			191469		23018	68017	113354		55405	451263
ROW							38365	50631		88996
Total		231901	222579	22463	32718	68017	393304	451263	88996	

Table 3.3: Disaggregated social accounting matrix of Nepal 1996 *(values in million Rupees)*

	Activities				Commodities				Factors			Households					FIRMS	GOV	S-I	YTAX	STAX	TAR	ROW	Total
	AGR-A	IND-A	CS-A	OS-A	AGR-C	IND-C	CS-C	OS-C	WLSL	WHSL	PROFIT	U-HH	LR-HH	SR-HH	LLR-HH	FIRMS	GOV	S-I	YTAX	STAX	TAR	ROW	
AGR-A					124996																		124996
IND-A						120442																	120442
CS-A							100103																100103
OS-A								38079															38079
AGR-C	15035	21517	14	74								22948	11597	29165	19573			10344				5769	136035
IND-C	228	22704	4713	4460								9522	7526	15988	6626			38223				33708	143697
CS-C	8830	5009	15432	5416								24695	8403	10793	5399			16814				15928	116720
OS-C	792	2660	5252	1219								5443	3406	5067	5318		23018	2637				0	54811
WLSL	39905	10204	17482	12637																			80229
WHSL	7599	8809	5407	9565																			31380
PROFIT	43129	30493	45020	1651																			120293
U-HH									21139	12328	35609						284					510	69869
LR-HH									11277	8563	28821						250					456	49367
SR-HH									28038	6679	28384						1266					1120	65488
LLR-HH									19775	3809	10705						1187					2380	37856
FIRMS											16774						5688						22462
GOV																			10881	9685	7327	4825	32718
S-I												4692	16083	4475	940	16503	1025					24299	68017
YTAX												2569	2352	0	0	5960							10881
STAX					1870	5040	2060	715															9685
TAR					1069	1696	1853	2710															7327
ROW	9478	19046	6783	3057	8101	16520	12704	13307															88996
ERR/OMM																-1							
Total	124996	120441	100103	38079	136035	143697	116720	54811	80229	31380	120293	69869	49367	65488	37856	22462	32718	68017	10881	9685	7327	88996	

This research is trying to develop a liberalisation discourse supportive to pro-poor growth for a developing economy like Nepal. As this scenario could only be developed and studied after the proper understanding of factor income distribution among different activities and household categories, we have prepared an extended factor-activity-household income distribution matrix accordingly. There is recently more attention given to such an extended income distribution matrix and its integration in SAMs and CGE models; see the review of related literature, referring to T. Hertel among others, in section 2.3, chapter 2. The implementation of such extensions is usually restricted by the unavailability of household surveys that map the cross-sections of income receipts. This is also the case for Nepal. Nevertheless, there are some rudimentary data from various sources that can be used in the case of Nepal, and together with plausible assumptions that can be made; it has become feasible to extend the income distribution matrix in the SAM so as to be able to trace the flow of factor income types from activity sectors to household groups. These cross specifications are crucial for catching the full richness of the circular flow in the CGE model.

We have prepared the extended factor-activity-household income distribution matrix along the following lines. We calculated the disaggregated shares of the factor income by activities that go to household categories and firms. In this process, we have made some assumptions like that all the profit earning of the LLR-HH is from the agricultural sector, and none of the high skill earning from the service sectors. However, we have allowed the equal possibility of their earnings from the high-skilled agricultural labour category. In case of the SRHH, they have some profit earning from agricultural capital, industrial capital, and commercial services capital but none from other service capital. Their major source of earning is from the high skilled labour in service sectors and low skilled labour in agriculture sector. In case of the LRHH and UHH their major sources of earning is from the capital and high skilled labour, LRHH from agricultural capital and UHH from industrial and service capitals. More importantly, the profit earning from public services capital completely goes to the UHH. Firms have profit earnings from the capital invested in industrial and commercial service sectors.

The rationale behind these assumptions can be explained as follows. The LLRHH and SRHH constitute almost 90% of the rural households; therefore, they are the major drivers of the village economy almost dependent on agriculture. The agricultural labour income mostly goes to these two types of households according to their proportional share in the population. A lower share goes to the other two household categories. The UHH have more access to all non-

agricultural activities, consequently, they invest their capital in industrial and services sectors and derive factor income accordingly. As LRHH are mainly the landlord group; therefore, profit from the land capital mainly goes to this group. This group invests the rest of its capital in industrial and commercial services because these are the dynamic sectors in the economy and demand huge capital every year.

Based on the above assumptions and rationale behind them, we made the following factor income distribution shares to different households and firms from different activities. They are given in Table 3.4. The need for this sub- matrix is justified on the grounds that it allows analysis of alternative- growth patterns involving agriculture and industry that can be beneficial to the poorer households as compared to other growth patterns. Generally speaking, different economic activities will grow at different rate under different liberalisation drives. Therefore, developing these required growth strategies would fulfill our goal of evaluating the channelling of more factor endowments and remuneration to target households. In this way, construction of this distribution shares would play a vital role in analysing the mechanisms for pro-poor growth, and fulfilling the objectives of this research.

Based on these distribution shares, the absolute distribution of the household factor income distributions are given in Table 3.5. It is the fully extended version of the household income distribution by factor and activities and is fully consistent with the corresponding block in Nepal SAM 1996 (Table 3.3).

Table 3.4: Factor shares to households and firms

Households and firms	Activities and factors											
	AGR-A			IND-A			CS-A			OS-A		
	WLSL	WHSL	PROFIT	WLSL	WHSL	PROFIT	WLSL	WHSL	PROFIT	WLSL	WHSL	PROFIT
UHH	0.179	0.114	0.099	0.348	0.356	0.539	0.343	0.659	0.294	0.351	0.498	1.000
LRHH	0.127	0.372	0.403	0.165	0.258	0.128	0.148	0.164	0.167	0.153	0.270	0.000
SRHH	0.504	0.290	0.249	0.367	0.147	0.173	0.175	0.177	0.275	0.087	0.233	0.000
LLRHH	0.189	0.224	0.248	0.120	0.239	0.000	0.334	0.000	0.000	0.408	0.000	0.000
FIRM	0.000	0.000	0.000	0.000	0.000	0.160	0.000	0.000	0.264	0.000	0.000	0.000
Total	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Table 3.5: Factor income distribution of households

Households and firms	Activities and factors											
	AGR-A			IND-A			CS-A			OS-A		
	WLSL	WHSL	PROFIT	WLSL	WHSL	PROFIT	WLSL	WHSL	PROFIT	WLSL	WHSL	PROFIT
UHH	7155.84	866.28	4290.26	3549.21	3136.82	16422.78	5993.00	3565.30	13244.63	4440.62	4760.01	1650.85
LRHH	5070.34	2824.18	17389.56	1684.07	2273.78	3912.82	2583.21	886.68	7518.92	1938.98	2578.27	0.00
SRHH	20121.76	2207.08	10744.20	3748.30	1290.81	5275.08	3062.93	954.60	12364.26	1105.37	2226.98	0.00
LLRHH	7557.39	1701.44	10705.22	1222.04	2107.30	0.00	5843.34	0.00	0.00	5152.08	0.00	0.00
FIRM	0.00	0.00	0.00	0.00	0.00	4881.92	0.00	0.00	11892.46	0.00	0.00	0.00
Total	39905.34	7598.98	43129.24	10203.63	8808.71	30492.60	17482.49	5406.57	45020.28	12637.05	9565.26	1650.85

WLSL = wage to low-skilled labour, WHSL = wage to high-skilled labour, PROFIT = return to capital.

3.5. The Nepalese economy as characterised by SAM 1996

In this section a quick preview of the Nepalese economy is done on the basis of the SAM. The agriculture sector in this SAM incorporates livestock farming and forest related activities as well. The industrial sector primarily consists of manufacturing sector. Carpet and garment are the major manufacturing products of Nepal. They comprise more than two-thirds of the export trade. Agriculture is still the largest sector in terms of both value added and employment. It employs the majority of rapidly increasing low skilled labour force and contributes approximately 40 percent of the GDP. Nepalese agricultural farming is primarily traditional. The Nepalese manufacturing sector is more capital intensive as compared to the agriculture and service sectors, contributes about one-fifth of the GDP; but it is still underdeveloped in comparison with industrial technologies of other countries at a similar development level to Nepal. The industrial and service sectors, both private and public, employ majority of the high-skilled labour force. The commercial services sector, which is growing faster as compared to the other sectors, accounts for almost 29 percent of GDP whereas the public service sector 11 percent of the GDP (Table 3.6).

Table 3.6: Sectoral contribution in the economy (values in million Rupees)

Sectors	Value added	Domestic indirect tax	Import duties	Sectoral total (% share)
Agriculture	90633	1870	1069	93572 (37.6)
Industry	49506	5040	1696	56242 (22.6)
Commercial service	67909	2060	1852	71821 (28.8)
Public service	23853	715	2710	27278 (11.0)
Sub-total	231901	9685	7327	248913
% share	93.2	3.9	2.9	100.00

Source: Table 3.3.

The general trend of the Nepalese macroeconomic data show that the contribution of the agricultural sector in GDP is gradually declining and that of the commercial service sector is increasing. The increasing trend of the latter, if the recent years' slow down by Maoist movement is ignored, is mainly due to the expansionary banking, tourism, transportation, and hotel services. On the other hand, the Nepalese industrial sector has been growing very slowly recently. Its share is approximately 23 percent of GDP in SAM 1996, and is virtually not much different about a decade later as well.

The activities account use intermediate imports for approximately 10 percent of its total value; it is as high as 16 percent in industrial activities and as low as 7 percent in commercial services. A glance at the consumption expenditure pattern of institutions shows that government consumes

only public services, firms consume none of the commodity types, and household sector consumes all four types of commodities.

Distribution of the compensation to the factors of production shows that the profit wage ratio is approximately 1.08:1. The ratio of total compensation of low-skilled labour to high-skilled labour is 2.5:1 representing the abundance of low-skilled labours in the economy.

In terms of activities, commercial services appear to be the most capital intensive sector followed by industrial sector. These sectors' profit share in their value added account for 66 and 61 percentages, respectively. On the other hand, public services are the most labour intensive, followed by agriculture. The share of wages in the value added in these sectors account for 93 and 52 percent, respectively. As will be shown in Section 5.3.2, unskilled labours are more concentrated in agricultural sector whereas skilled labours in other sectors mainly in public services and industrial sector.

The distribution of factor incomes to different institutions shows that land-less rural household is the most vulnerable group, having the least labour as well as the capital income. Their per capita income is significantly below the national average. As only 15 percent of the total Nepalese population (National Census 2001) live in urban areas, the urban share of the total factor income as it appears in Table 3.4 and Table 3.5 show that it is the best-off group in terms of income as compared to all other households. Poverty in Nepal is mainly a rural phenomenon, as in most developing countries.

Among the rural households, though the LRHH constitute only about 11 percent of the total households in the survey, the LRHH has more labour as well as the capital income as compared to SRHH and it is also able to pay direct tax to the government. Therefore, this group is also better-off group. As a result, poverty is concentrated among LLRHH and SRHH. As will be shown later in chapter 5, these two poorer groups, SRHH and LLRHH, spend significantly high shares of their consumption expenditure on food (agricultural commodities). Their saving rates are also very low as compared to the rest of the household types. Moreover, these household types are unable to pay tax to the government with their income falling within the exemption limit.

3.6. Summary and conclusion

The social accounting matrix (SAM) has many implications for policy analysis. This chapter attempted to present a picture of Nepalese economy using Nepal SAM 1996. Moreover, it is also a background for the SAM based CGE modelling for Nepal. Starting from a macro SAM, we disaggregated it into different accounts. This disaggregated SAM consists of four activities, four commodities, four households, and three factor accounts in addition to an account to each of government, firms, national capital, domestic direct tax, domestic indirect tax, custom duties, and the rest of the world. Moreover, we elaborated a factor/activity/household income distribution sub-matrix that would be essential for analysing the effects of policy simulations on not only economic growth but also the income of poor households.

Land-less rural household is the most vulnerable group, which has the least labour as well as the capital income. They constitute approximately 38 percent of the total households in the country; however, they draw only 17 percent of the total household income. Next to this, small rural households are also mostly poor; approximately 41 percent of the households share about 30 percent of the total household income. The other urban and large rural households are relatively rich. They constituted about 10 and 11 percent of the total households in the country but had shares of 31 and 22 percent of the total household incomes in 1996.

4. The Nepal CGE model

4.1. Introduction

The empirical application of general equilibrium models can be traced back to 1960 when Johansen presented his multi-sectoral model for the Norwegian economy. Since the mid-seventies, the stream of Computable General Equilibrium (CGE) models has grown remarkably, which mainly can be attributed to the availability of faster and cheaper computers and to the renewed recognition of the importance of relative prices for the allocation of resources. CGE models proved to be very useful tools for the analysis of tax reforms, international trade, resource allocation and income distribution. The majority of CGE models are applied to developing countries; however, there are increasingly more applications to advanced countries as well, Cohen (2002a).

The CGE model described below follows the neoclassical modelling tradition that was originally presented in Dervis, de Melo and Robinson (1982). Several writers have extended this framework to allow for several new features such as the home consumption of non-marketed goods, the explicit treatment of transaction costs, and the ability of producers to produce more than a single commodity.

One model built with this background is by International Food Policy Research Institute (IFPRI) in Lofgren et al. (2001). This model is considered to be very useful in the study of the impacts of economic liberalisation in the developing economy. Although this study shares common features with the IFPRI model, there are differences as well. The IFPRI model explicitly used consumer's price index as the numeraire; but in this study the numeraire is different. We take the domestic price of industrial goods PDc (c = industrial goods) as a numeraire. The IFPRI model applies the domestic indirect tax to the whole composite goods uniformly; whereas our model removes the possibility of the double taxing to the same commodity with the viewpoint of measuring the impact of trade liberalisation correctly. Our model divides the total investment into gross fixed capital formation and the change in stock; which is not so in IFPRI model. Government investment is one of the possible policy variables in our model; whereas it is mentioned only in an implicit way in the IFPRI model.

Another model of special interest in the present context is by Cockburn (2001) conducted a CGE analysis on trade liberalisation and poverty in Nepal. His model also used Cobb-Douglas production function for the agricultural sector but used CES production function to the rest of the sectors. Moreover, he has used regionally disaggregated SAM as compared to the macro SAM in this paper. For the numeraire, Cockburn model used nominal exchange rate whereas the current study uses domestic price of domestic industrial commodities. Moreover, there are some differences in the macroeconomic closure rules followed by this study and the study by Cockburn, which will be clear in respective section in the following chapter.

Sapkota (2001) elaborated also a Nepal CGE model. There are important differences between the CGE models used by Sapkota (2001) and what we do in this study. Regarding production, Sapkota used CES production function for all the activities whereas we used Cobb-Douglas function. As regards income distribution, the issue had minimal concern in Sapkota, while in our model we apply cross links between factor income types, activity sectors and household groups, more disaggregated to reflect poverty incidence. There are also significant differences in the rule of closures, and other related specifications. Sapkota closed his model with fixed foreign saving; and real exchange rate worked as a numeraire. In our case, domestic supply price of industrial commodity is the numeraire and nominal exchange rate is endogenous in most of the simulations. Sapkota made marginal propensity to consume flexible but domestic saving exogenous. However, we work with an exactly opposite closure rule. Moreover, Sapkota worked with regional constraints of endowments; we relaxed this assumption and made the factors fully mobile across regions but only exogenous at the macro level. Government income was exogenous in Sapkota model but is endogenous in our model. The use made of the models is also different. While Sapkota studied unilateral import liberalisation and export liberalisations, we extended our model specification to allow for the analysis of a complete external reform, devaluation, budget reform, and combined import liberalisation and budget reform. Moreover, our study extends the static CGE to a dynamic CGE analysis on top of all the simulations under static analysis.

Section 4.2 of this chapter presents the key features of the model. It explains the role of prices and taxes, commodity markets, activity markets and the institutions in this standard CGE model. Section 4.3 reviews the principles behind the relationship among commodity markets, activity markets, institutions and price levels. Section 4.4 gives a description of the model and the specification of the endogenous and exogenous variables towards solving the model. We also include section 4.5 that reflects on closure rules in CGE models in general and on those applied in the Nepal CGE model. The material serves as background for the calibration of the model

and its use later for policy simulations. The acquainted reader may like to skip this last section that is basically a review of literature and the positioning of the study therein.

4.2. Key features

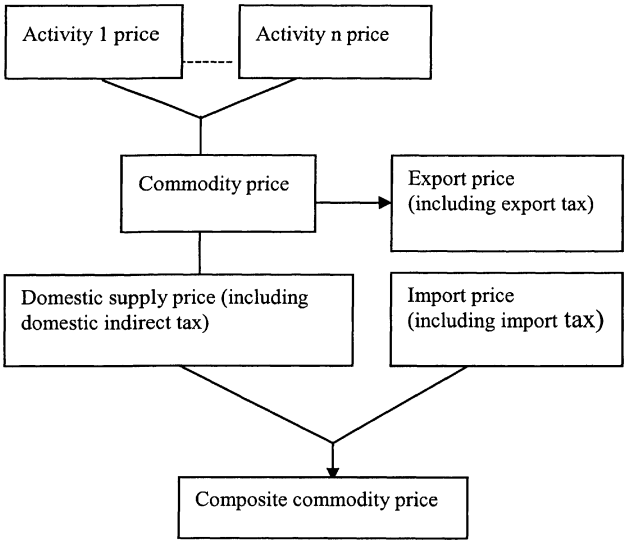
An important feature of this standard model is that it is a *static* and not a *dynamic* CGE model.[5] Accordingly, it does not take into account the second-period effects of changes in investment spending. Neither is the model specific about the time horizon of the adjustment or how the adjustment is sequenced. In other words, the model cannot determine whether adjustment from the base to a new equilibrium occurs over any particular length of time, or whether a large part of the adjustment takes place in a particular year.

4.2.1. Prices and taxes

One of the distinctive features of the CGE model is its detailed handling of prices. Given that many commodities can be combined in the production of the same activity that again goes in the commodity market, first it is necessary to combine the prices of the various commodities producing a particular activity into a single producer price for that commodity. In order to avoid double tax accounting, we apply the domestic consumption tax only at the final supply price but not at the factory level price. From the producer price of a commodity it is possible to arrive at a final export price by including any taxes that might be imposed on the export of commodities. Furthermore, the domestic supply price is converted into the domestic demand price by including the relevant domestic transaction costs. However, the model we are using does not associate the transaction cost with the assumption that the transaction costs of all the marketable commodities do not differ much, therefore, do not change the relative prices. The composite of domestic and export prices determines the final supply price for the domestic market. The price of imports is calculated by including any tariff that might be placed on foreign commodities entering the domestic market. The interaction of the import and domestic prices determines the price of the composite commodity. The price system in the standard CGE model can be summarized as follows:

[5] The model will be made dynamic in chapter 7.

Figure 4.1: Price system in the standard CGE model



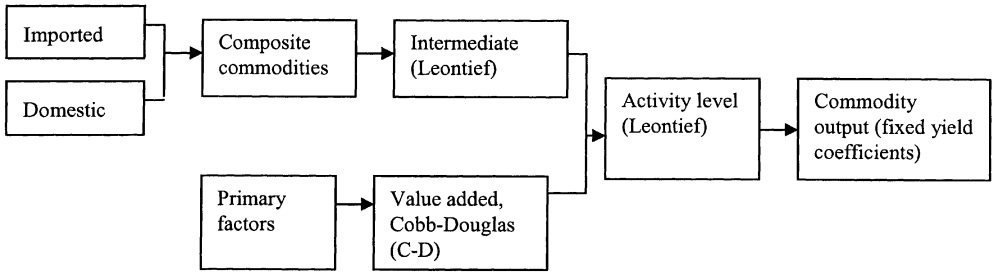
Source: Adapted from Thurlow (2002), p. 64.

4.2.2. Production activities

In this standard neo-classical model, all producers (each represented by an activity sector) are assumed to maximise profits subject to their existing production technology. This production technology is divisible into two levels. The first level involves decisions on combining intermediate inputs and the factors of production. Having decided on the proportions between value-added and intermediates, producers, then, at the second level, decide how to combine the various factors of production. While the choice in the first level between value-added and intermediates can be modelled along with Leontief specification, the choice among various intermediate inputs to arrive at a composite intermediate commodity is derived under Leontief fixed proportions. In the second level, the choice between factors is governed by a Cobb Douglas (C-D) production function.

As noted above, one of the distinctive features of this CGE model is that there need not be a one-to-one mapping between activities and commodities. Therefore, as a starting point, producers use the given technology to start with their activity. The output of this activity is then separated into commodities using the fixed coefficients found in the SAM. Thus, a distinction is made between activities and commodities in the model. The production technology in this standard model can be summarized as follows:

Figure 4.2: Production technology



Source: Ibid, p. 9.

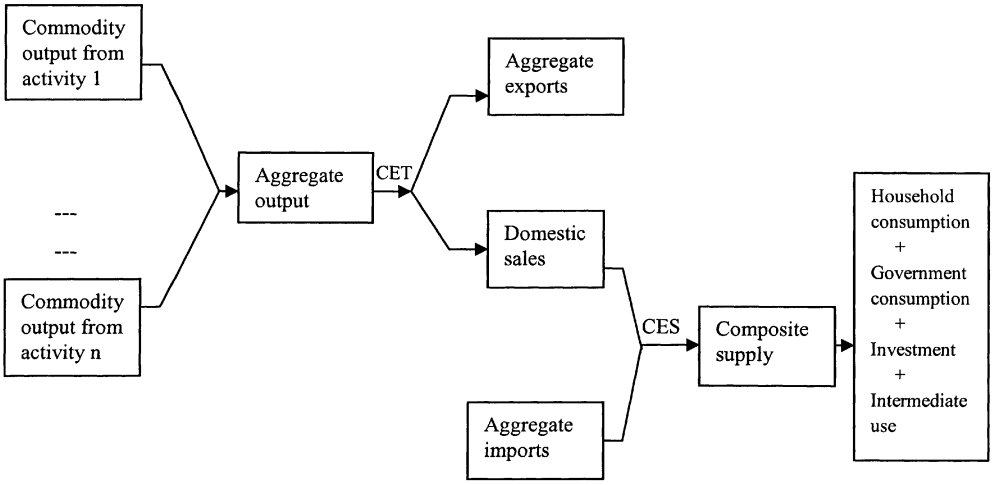
4.2.3. Commodity markets

With the exception of the unregistered home made commodities and their consumption, all commodities produced through the domestic activities enter markets. Figure 4.3 shows how both domestic and foreign goods move between producers and consumers.

As already mentioned, it is possible for a single activity to use a number of commodities to produce an activity. The first stage of the commodity flow diagram shows how commodities from different sectors are combined to arrive at the aggregate output of each activity. According to Lofgren (2001), the output of these activities could be imperfect substitutes of each other because of the differences in, for example, timing, quality and location. The demand for each activity is derived from the problem of minimising the cost of supplying a given commodity.

At the second stage of the commodity flow diagram, aggregate output is divided between exports and commodities available for sale on the domestic market. This decision is determined by a Constant Elasticity of Transformation (CET) function, which assumes that producers aim to maximise sales subject to the imperfect transformability between exports and domestic sales, Thurlow (2002), pp. 16-19. Under the small-country assumption, Nepalese export demand is assumed to be infinitely elastic at constant world prices, and the price of exports is fixed in terms of the foreign currency. The domestic price paid by demanders for each commodity is the sum of the price received by domestic suppliers plus the indirect tax. In the specific case where a commodity is not exported, the whole domestic production is sold in the domestic market.

Figure 4.3: Flows of marketed commodities



Source: Adapted from Lofgren et al. (2001), p. 13.

The level of domestic final demand is comprised of household and government consumption demand, investment demand, and the demand by domestic producers for intermediate inputs. This demand is met through the use of either domestically produced or imported commodities. The supply from these two sources is combined to form a composite commodity, which is then sold to domestic demanders. These demanders are assumed to minimise cost subject to the substitutability between imports and domestic commodities. This is the well-known Armington CES function, Armington (1969). Demand is directed towards domestic production for commodities that lack imports, and total demand is satisfied by imports for commodities, which have no domestic production. It is assumed that international supply is infinitely elastic at constant world prices. The final import price paid by domestic demanders is inclusive of import tariffs.

4.2.4. Institutions

The institutions represented in the model include households, firms, and government. Households receive income directly from producers for the latter's use of the factors of production. Alternatively, some models make a track of channelling the profit to households indirectly via enterprises. But, Nepal CGE does not follow this indirect way. Moreover, households also receive transfers from all other institutions included in the model except inter-household transfers.

Households, in turn, use their income to pay taxes, save, and consume commodities. As mentioned above, households not only consume marketed commodities, but they also consume their own production. However, the latter is currently not an active mechanism in our standard Nepalese CGE model. Household consumption is distributed across market and commodities according to Linear Expenditure System (LES) demand functions.

Firms receive income from the capital invested and receive transfers from other institutions. The expenditures of firms include direct taxes, and savings. It is assumed that they do not consume commodities, which is consistent with the Nepal SAM presented in the previous chapter.

Government receives income from indirect tax on domestically produced commodities, income tax on households and enterprises, and import and export duties. The import duties are treated as fixed *ad valorem* whereas export duties are absent in our model because this tax does not exist in Nepal. Furthermore, the government receives transfers from other institutions. The government, then, uses this income for the consumption of commodities, transfers to institutions, and saves the rest that becomes the part of domestic saving.

Finally, with reference to the rest of the world, imports and exports are the major sources of income and expenditure flows of the rest of the world in the CGE model. Moreover, the rest of the world has also transfers to and from the domestic institutions. Foreign savings are derived as the residual difference between foreign receipts and payments.

4.3. The basic model

This CGE model expresses the income and expenditure flows represented in the Nepal SAM as a set of simultaneous linear and non-linear equations. The model, therefore, follows the SAM divisions into different factors, activities, commodities and institutional accounts. The equations describe the behaviour and interactions of these actors using rules captured by both fixed coefficients and non-linear first-order optimality conditions. Furthermore, the equations ensure that a set of both micro and macroeconomic constraints are satisfied, such that factor and commodity markets, savings and investment, and government and current account balance requirements are met. The microeconomic constraints refer the optimization behaviours of institutions as well as the clearance of all markets. Likewise, the macroeconomic constraints refer to macroeconomic balances like saving-investment balances, current account balances and government's budgetary balances.

The model assumes that producers maximize profits subject to production functions, while households maximize utility subject to budget constraints. Cobb-Douglas functions are used for producer technology. Factors are mobile across activities, available in fixed supplies, and demanded by producers at market-clearing prices (rents). On the basis of fixed shares (derived from base-year data), factor incomes are passed on in their entirety to the domestic institutions. The outputs are demanded by the institutions at market-clearing prices.

Some modellers use distortion coefficients in the factor demand equations with the view point that competitive prices of factors hardly exit in the developing economies. This argument has some rationale also. However, in our case, as we are going to develop a liberal and competitive model economy, sooner or later we have to remove these distortion coefficients even if we apply them at the beginning. In order to make a consistency in the analytical framework, we have not used these distortion coefficients since the beginning.

The assumptions regarding saving-investment are the followings: (a) household income is allocated in fixed shares to savings and consumption; (b) investment is savings-driven and (c) investment spending is allocated to the four commodity accounts (see the Nepalese SAM in chapter 3) in such a manner that the ratio between the quantities is fixed. In fact, this gives a static model. Later the investment proportions will be changed based on other macroeconomic parameters and it will be one of the steps in converting the static model into a dynamic one. Together, assumptions (b) and (c) mean that when savings values and/or the prices of investment commodities change, there is a proportional adjustment in the quantities of investment demand for each commodity, generating an investment value equal to the savings value.

The model has been disaggregated into four household categories (urban households, large rural households, small rural households, and land-less rural households), three factors (low skilled labour, high skilled labour, and capital), and four activities and associated commodities (agricultural, industrial, commercial services, and other services). The distinction, however, is needed for models to make them fully applicable even if they deviate from a one-to-one mapping between activities and commodities, that is, for models where at least one activity produces more than one commodity and/or at least one commodity is produced by more than one activity.[6]

[6] Lofgren (1999), p. 4.

4.4. Specification of the model

The model is specified in 30 equational sets, divided into "blocks" for prices, production and commodities, institutions, poverty and system constraints. Notations used are displayed below.

Sets

$a \in A$ activities (agriculture, industry, commercial services, other services)

$c \in C$ commodities (agriculture, industry, commercial services, other services)

$c \in CM (\subset C)$ imported commodities

$c \in CNM (\subset C)$ non-imported commodities

$c \in CE (\subset C)$ exported commodities

$c \in CNE (\subset C)$ non-exported commodities

$f \in F$ factors (low skilled labour, high skilled labour, capital)

$h \in H (\subset I)$ households (UHH, LRHH, SRHH, LLRHH)

$i \in I$ institutions (households, government, firms)

r∈ rest of the world

Parameters

ad_a	production function calibration parameter
aq_c	shift parameter for composite supply (Armington) function
at_c	shift parameter for output transformation (CET) function
ica_{ca}	quantity of c as intermediate input per unit of activity a
aps_h	share of disposable household income to savings
$apsf$	share of disposable firms' income to savings
$qinsh_c$	share of investment goods in different commodity markets
$chsts_c$	share of the change in stock in different commodities
$shry_{h,fa}$	share of household h in the income of factor f in activity a
$shry_{fi}$	share of factor income going to firms
te_c	export tax rate
tm_c	import tariff rate
tq_c	sales tax rate
$tr_{ii'}$	transfer from institution i' to institution i
ty_h	rate of household income tax
α_{fa}	value-added share for factor f in activity a
β_{ch}	share of commodity c in the consumption of household h
δ_c^q	share parameter for composite supply (Armington) function

δ_c^t	share parameter for output transformation (CET) function
θ_{ac}	yield of commodity c per unit of activity a
ρ_c^q	exponent ($-1 < \rho_c^q < \infty$) for composite supply (Armington) function
ρ_c^t	exponent ($1 < \rho_c^t < \infty$) for output transformation (CET) function
ec_c	export calibration constant
eec_c	export elasticity constant
im_c	import calibration constant
ime_c	import elasticity coefficient
$ncir_{ra}$	non competitive import coefficient from ROW to activities
tyf	rate of income tax to firms
ε_0	private investment calibration constant
μ	public investment exponent parameter
φ	profit rate exponent parameter
nd_{llr}	number of dependents per land-less household worker

Variables	
GE	government expenditure
GS	government budget deficit/surplus
GI	public investment
GC_c	quantity of government demand for commodity c
GY	government revenue
EXR	foreign exchange rate (domestic currency per unit of foreign currency)
$FSAV$	foreign savings
$GFCF$	gross fixed capital formation in the economy
$CHST$	total change in the stock in the economy
PA_a	activity price
PD_c	domestic price of domestic output
PE_c	export price (domestic currency)
PM_c	import price (domestic currency)
PQ_c	composite commodity price
PVA_a	value-added price
PX_c	producer price
PWE_c	export price (foreign currency)
PWM_c	import price (foreign currency)
QA_a	activity level
QD_c	quantity of domestic output sold domestically

QE_c	quantity of exports
QF_{fa}	quantity demanded of factor f by activity a
QFS_f	supply of factor f
QH_{ch}	quantity of consumption of commodity c by household h
$QINT_{ca}$	quantity of intermediate use of commodity c by activity a
$QINV_c$	quantity of investment demand
QM_c	quantity of imports
QQ_c	quantity supplied to domestic commodity demanders (composite supply)
QX_c	quantity of domestic output
TR_{hg}	transfer to household from government
TR_{hr}	transfer to household from rest of the world
TR_{gr}	transfer to government from rest of the world
$TR_{fi,g}$	transfer to firms from the government
WF_f	average wage (rental rate) of factor f
YF_{fa}	remuneration of factor f in activity a
YH_h	income of household group h
YFF	income of firms from factors
$YFIR$	total income of firms
GDP	Gross Domestic Product of the economy
PCI_{llr}	per capita income of the land-less rural household
$PCIN$	per capita income in Nepal
TP	total population in Nepal

4.4.1. Price block

In a general equilibrium model, it is not possible to determine the absolute price level, only relative prices can be established. This proposition reflects the well-known fact that if all prices increase in the same proportion, the real relationship among different variables in the economy remains unchanged. The mathematical approach to this proposition is to say that all the demand and supply functions of the economy will be homogenous of degree zero.[7]

The price system of the model is rich, primarily as a result of the assumed quality differences between commodities of different origins and destinations (exports, imports, and domestic

[7] Dinwiddy and Teal (1988), p. 13.

outputs used domestically). The price block consists of equations in which endogenous model prices are linked to other prices (endogenous or exogenous) and non-price model variables.[8]

Import price

$PM_c = (1 + tm_c) \cdot EXR \cdot PWM_c \qquad c \in CM$.. ..(1)

Prices of the importable are world market prices times exchange rate of the domestic currency with foreign currency adjusted with the import tariffs. Therefore, the prices of the importable are expressed in domestic currency in this model.

Export price

$PE_c = (1 - te_c) \cdot EXR \cdot PWE_c \qquad c \in CE$.. ..(2)

Prices of the exportable are world prices times exchange rate of the domestic currency with the foreign currency adjusted with the export tariff. The tariff rates work in different directions in equation 1 and 2. In equation 1, it raises the domestic price level because of the tariff, whereas in equation 2, domestic prices of exportable are calculated by deducting the export tariff from the world market prices.

Domestic absorption

$PQ_c \cdot QQ_c = PD_c \,.\, QD_c \,.(1 + tq_c) + PM_c \cdot QM_c \qquad c \in C$...................... (3)

Total absorption in the domestic country is the total of the domestic supply of domestic production and the import. For each commodity, absorption — total domestic spending on the commodity at domestic demand prices — is expressed as the sum of spending on domestic output and imports, including an upward adjustment for the sales tax to the domestic production. The fact that this condition holds follows from the linear homogeneity of the composite supply Armington function. Domestic demanders (households, the government, producers, and investors) pay the composite price, PQ_c, which replaces P_c in all relevant equations. Prices of both domestically produced goods and imported goods are expressed in domestic currency, and they are both adjusted with their respective taxes. Therefore, PQ_c refers the domestic sales price of the composite product and QQ_c the total commodity supply. In this

[8] Lofgren (2001), p. 20.

equation both the domestically produced goods and the imported goods are treated in a similar way in the domestic market. Therefore, equation 3 refers the total absorption in the country.

Domestic output value

$$PX_c \cdot QX_c = PD_c \cdot QD_c + (PE_c \cdot QE_c) \qquad c \in C \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Equation 4 calculates domestic output value that is the total of the domestic consumption and the foreign consumption. For each commodity, domestic output value at producer prices is stated as the sum of the value of domestic output sold domestically and the export value (in domestic currency).[9]

Activity price

$$PA_a = \sum_{c \in C} PX_c . \theta_{ac} \qquad a \in A \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

Domestic activity price is the domestic commodity price times yield of commodity c per unit of activity a.

Value-added price

$$PVA_a = PA_a - \sum_{c \in C} PQ_c \cdot ica_{ca} - ncir_{ra} \cdot PA_a \qquad a \in A \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

Value added price of activity a is equal to the price of activity a less the values of the composite commodities c used in the production of activity a and value of intermediate imports per unit of activity a valued at the price of activity a. This equation is formulated per unit of activity a.

4.4.2. Production and commodity block

Activity production function

[9] This equation reflects the fact that the CET (constant-elasticity-of-transformation) function in Equation 13 is linearly homogeneous. The export part vanishes if the commodity has only domestic supply. Equations 13 and 14 explain further.

$$QA_a = ad_a \cdot \prod_{f \in F} QF_{fa}^{\alpha_{fa}} \qquad a \in A \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (7)$$

This study uses Cobb-Douglas production function for the activities. Equation 7 shows that production of activity *a* is equal to the product of the physical quantity of the factor inputs with power elasticity of substitution times the calibration constant.

Factor demand

$$WF_f = \frac{\alpha_{fa} . PVA_a . QA_a}{QF_{fa}} \qquad f \in F,\ a \in A \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (8)$$

Equation 8 represents the total demand of the factor *f* in the production activities. The price of the factor *f* is equal to the ratio of the total value of activity *a* produced and total quantity of factor *f* employed in activity *a* adjusted with the value added share of factor *f* in activity *a*.

Intermediate demand

$$QINT_{ca} = ica_{ca} \cdot QA_a \qquad c \in C,\ a \in A \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (9)$$

Level of the intermediate demand of the commodity *c* demanded by the activity *a* is the function of the quantity of *a* produced times quantity of *c* as intermediate input per unit of activity *a* (ica_{ca}).

Output function

$$QX_c = \sum_{a \in A} \theta_{ac} \cdot QA_a \qquad c \in C \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (10)$$

Quantity of the domestic output of the commodity *c* is the function of the corresponding activity product. Equation 10 shows that this functional relationship is maintained by using the coefficient on the yield of commodity *c* per unit of activity *a* (θ_{ac}).

Composite supply (Armington) function

$$QQ_c = aq_c.(\delta_c^q QM_c^{-\rho_c^q} + (1-\delta_c^q).QD_c^{-\rho_c^q})^{\frac{-1}{\rho_c^q}} \qquad c \in C \ldots\ldots\ldots\ldots\ldots\ldots .(11)$$

All domestic demanders use the composite commodities. Imperfect substitutability between imports and domestic output sold domestically is captured by a CES (constant elasticity of substitution) aggregation function in which the composite commodity that is supplied domestically is "produced" by domestic and imported commodities, and they enter in this function as "inputs". This means demander preferences over imports and domestic output are expressed as a CES function. This function, with a domain that is limited to elements in *CM,* is often called an Armington function after the originator of the idea in using a CES function for this purpose. The restriction on the value of ρ_c^q *(–1* $< \rho_c^q < \infty$*)* assures that the corresponding isoquant is convex to the origin, in terms of production economics equivalent to a diminishing technical rate of substitution.[10]

Import-domestic demand ratio

$$\frac{QM_c}{QD_c} = im_c\left[\left(\frac{PD_c}{PM_c}\right)^{ime_c}.\frac{\delta_c^q}{1-\delta_c^q}\right]^{\frac{1}{1+\rho_c^q}} \qquad c \in CM \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots .(12)$$

Equation 12 defines the optimal mix between import and domestic output. Its domain is also limited to imported commodities. It shows that the domestic price - import price ratio causes import - domestic demand ratio. This equation together with equations 3 and 11 constitute the first-order conditions for cost minimisation given the two prices, a fixed quantity of the composite commodity, and subject to the Armington function.[11]

Output transformation (CET) function

$$QX_c = at_c.(\delta_c^t.QE_c^{\rho_c^t} + (1-\delta_c^t).QD_c^{\rho_c^t})^{\frac{1}{\rho_c^t}} \qquad c \in CE \ldots\ldots\ldots\ldots\ldots .(13)$$

Imperfect substitutability between imports and domestic output sold domestically is paralleled by imperfect transformability between domestic output for exports and domestic sales. Equation 13 captures the latter phenomenon. In case of commodities without exports, δ_c^t equals 0 so that

[10] IFPRI (2002), p. 27.
[11] Ibid, p. 39.

$QX_c = QD_c$. The CET function, which applies to exported commodities, is identical to a CES function except for negative elasticities of substitution. The isoquant corresponding to the output transformation function will be concave to the origin given the restriction imposed on the value of ρ_c^t $(1 < \rho_c^t < \infty)$. In economic terms, the difference between the Armington and CET functions is that the arguments in the former are inputs, those in the latter are outputs. In case of the non-exported commodities, the domestic supply equals the domestic demand; consequently, equation 13 can be written as equation 13.1.

$$QX_c = QD_c \qquad c \in CNE \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (13.1)$$

Export-domestic supply ratio

$$\frac{QE_c}{QD_c} = ec_c \left[\left(\frac{PE_c}{PD_c} \right)^{eec_c} \cdot \frac{1-\delta_c^t}{\delta_c^t} \right]^{\frac{1}{\delta_c^t - 1}} \qquad c \in CE \ldots\ldots\ldots\ldots\ldots\ldots\ldots (14)$$

Equation 14 defines the optimal mix between exports and domestic sales. Equations 4, 13, and 14 constitute the first-order conditions for maximization of producer revenues given the two prices, a fixed quantity of domestic output (export and domestic supply), and subject to the CET function. One important difference between the equations for import demand (12) and export supply (14) is that the quantity demanded of the imported commodity *QMc* is inversely related to the import price, whereas the quantity supplied of the exported commodity *QEc* is directly related to the export price.

4.4.3. Institution block

Total factor income by activities

Factor income by activities is the product of wage rate of the factor and the quantity of that factor employed in the given activity. In other words, every factor income is the multiple of the total factor quantity available in the country to the rate of return to the factor (equation 15).

$$YF_{fa} = QF_{fa} . WF_f \qquad a \in A, f \in F \ldots\ldots\ldots\ldots\ldots\ldots (15)$$

Total household income

$$YH_h = \sum_{fa} shry_{h,fa} . YF_{fa} + TR_{hg} + EXR.TR_{hr} \qquad a \in A,\ h \in H, f \in F \ldots\ldots (16)$$

Equation 16 shows the total household income. We have taken three sources of household income following the Nepal SAM in Chapter 3; they are income from factors, transfer from the government and the transfer from the rest of the world.

Household consumption demand

$$QH_{ch} = \frac{\beta_{ch} . (1 - aps_h) . (1 - ty_h) . YH_h}{PQ_c} \qquad c \in C,\ h \in H \ldots\ldots\ldots\ldots\ldots\ldots (17)$$

Household consumption demand for a commodity depends upon total disposable household income, average propensity to consume, and composite price of the commodity.

Factor income of firms

$$YFF = shry_{fi} . \sum_{a \in A} QF_{fa} . WF_f \qquad f \in F,\ a \in A \ldots\ldots\ldots\ldots\ldots\ldots (18)$$

We have taken the factor earnings of a firm as the sum of constant shares of the total factor remunerations in respective activities (equation 18). However, in case of the firms, profit is the only factor income that comes as a return to the firms' invested capital.

Total income of firms

$$YFIR = YFF + TR_{fi,g} \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (19)$$

Firm's total income (equation 19) consists of factor earning plus transfers from the government. In our Nepal CGE, we do not have transfer earnings of firms from the households and the rest of the worlds.

Gross fixed capital formation

$$GFCF = GI + \varepsilon_0 (GI)^{\mu} (WF_{cap})^{\phi} \qquad WF_{cap} \in WF(F) \text{ ....(20)}$$

Total investment in the economy is the sum of the private and the public sectors' investments. The public investment (the first part of the right hand side of equation 20) has also its influence to private investment (second part of the equation) as a crowding out/in effect. Here, if the elasticity coefficient (μ) is more than unity, the private investment is complementarily related with the public investment. For example, the government investment in infrastructures will encourage the private sector to invest more[12]. In addition to the public investment, the rate of profit to the invested capital is another determinant of the private investment. The higher the profit rate, the higher is the private investment and conversely. Its scale is determined by the profit elasticity (φ).

$$QINV_c = \frac{qinsh_c . GFCF}{PQ_c} \qquad c \in C\text{...(21)}$$

Equation 21 says that total investment demand for the commodity c is a constant share of the Gross Fixed Capital Formation *(GFCF)*.

Government revenue

$$GY = \sum_{h \in H} ty_h \cdot YH_h + \text{tyf.YFIR} + \sum_{c \in C} tq_c \cdot (PD_c \cdot QD_c) + \sum_{c \in CM} tm_c \cdot EXR \cdot PWM_c \cdot QM_c + EXR \cdot TR_{gr}$$

$$c \in C,\ h \in H \text{ ....(22)}$$

Government revenue is composed of household and firm's direct tax contributions, sales (value added) taxes to the domestically produced commodities, total import duties, and net transfer earnings of the government from the rest of the world, (equation 22).[13]

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[12] Taylor (1991), p.166; Ibrahim (1995), p.54; Abdelgalil (2000), p.176.

[13] In the presence of tax on export, this equation becomes

$$YG = \sum_{h \in H} ty_h \cdot YH_h + EXR \cdot TR_{gr} + \sum_{c \in C} tq_c \cdot (PD_c \cdot QD_c) + \sum_{c \in CM} tm_c \cdot EXR \cdot PWM_c \cdot QM_c + \sum_{c \in CM} te_c$$

$\cdot EXR \cdot PWE_c \cdot QE_c$.

But, in our Nepal CGE model, we don't have export tax, therefore, the last part of this equation is not considered.

Government expenditures

$$GE = \sum_{c \in C} PQ_c \,.\, GC_c + \sum_{h \in H} TR_{hg} + TR_{fi,g} + GI \qquad c \in C,\ h \in H \ldots\ldots\ldots (23)$$

Equation 23 states that the total government expenditure can be disaggregated into three broad components: consumption expenditure that goes to the commodity account, the transfer expenditure that goes to the households and firms, and investment. This standard specification does not explicitly mention debt repayment and debt servicing expenditure of the government rather they are incorporated into transfer to households, firms and the rest of the world. Moreover, transfer to the rest of the world is also not explicitly mentioned in the government expenditure equation, rather government revenue equation uses net transfer earning of the government from ROW.

$$GS = GY - GE \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (24)$$

GS is the balancing element between the government income and expenditures (equation 24). It is the budget deficit (surplus) of the government.

4.4.4. Poor households and per capita income

In Nepal land-less rural households are all poor and they constitute more than one-third of the total households in the country. In our Nepal CGE model, per capita household income in general and that of land-less rural households in particular are the target variables; whereas various simulation parameters/variables, see section 6.3, work as policy parameters/variables. Therefore, it is essential to formulate an equation for the per capita income of the land-less rural households PCI_{llr}. In equation 25, YH_{llr} is the total household income of the land-less workers. The first part of the right side denominator shows the total number of land-less workers. nd_{llr} refers number of dependents per land-less rural households.

$$PCI_{llr} = \frac{YH_{llr}}{\dfrac{\sum_{fa} shry_{llr.fa} . YF_{fa}}{WF_f} . nd_{llr}} \qquad f \in F,\ a \in A \ldots\ldots\ldots\ldots (25)$$

The per capita household income in Nepal, *PCIN*, is calculated from the total household income divided by the total population (*TP*) (equation 26). The distance between the variables of PCI_{llr} and *PCIN* gives an indication of relative income inequality in the country.

$$PCIN = \frac{\sum_{h} YH_h}{TP} \qquad h \in H \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (26)$$

Gross Domestic Product

$$GDP = \sum_{a \in A} PVA_a . QA_a \qquad a \in A \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (27)$$

Finally, it is desirable to incorporate explicitly in the model the *GDP*, which is the total value added in all activity accounts (equation 27). While the division of total household income by *TP* gives the per capita income for Nepal, yet when reflecting on inequality issues it is more relevant to work with *PCIN* in relation to PCI_{llr}.

4.4.5. System constraints block

This block defines the constraints that are satisfied by the economy as a whole without being considered by its individual agents. The model's *micro* constraints apply to individual markets for factors and commodities. With the few exceptions like export and import markets, flexible prices clear the markets for all commodities and factors. The *macro* constraints apply to the commodity market, factor market, current account balance, and the saving-investment markets.

Balanced factor markets

$$\sum_{a \in A} QF_{fa} = QFS_f \qquad f \in F, a \in A \ldots\ldots\ldots\ldots\ldots\ldots (28)$$

This system constraint equation tells that total factor demand in the economy is equal to the total factor supply; the latter is the exogenous variable in the model. This equation shows the factor market equilibrium. As stated earlier, these factors are high skilled labour, low skilled labour, and the capital in our model.

Balanced composite commodity markets

$$QQ_c = \sum_{a \in A} QINT_{ca} + \sum_{h \in H} QH_{ch} + GC_c + QINV_c + chsts_c . CHST / PQ_c$$

$$a \in A, h \in H, c \in C \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (29)$$

The composite commodity market equilibrium condition, equation 29, shows that total quantity of the commodity demanded is the sum of the intermediate demand, household consumption demand, government consumption demand, investment demand, and the change in stock.

In the absence of export, the commodity market equilibrium condition is equated with the domestic demand. This new equilibrium condition imposes equality in the composite commodity market with the demand side represented by all types of domestic commodity use while the supply comes from the Armington function (or its substitute for non-imported commodities) that aggregates imports and domestic output. The variable *PQc* clears this market.

In addition to the composite commodity, the model includes quantity (and associated price) variables for the following commodities and activities: QM_c, QE_c, QX_c, QD_c, and QA_a. These variables represent both the quantities supplied and demanded (for the quantities supplied and demanded, the equilibrium quantity has been substituted throughout the model). For exports and imports, the quantities demanded and supplied clear the markets (infinitely elastic world market demands and supplies at fixed foreign-currency prices).For the remaining three quantities, the associated price variables (PX_c, PD_c, and PA_a) serve the market clearing role.

Current account balance for ROW

$$\text{FSAV} = \sum_{c \in C} PWM_c \cdot QM_c + \sum_{a \in A} (PA_a \cdot ncir_{ra} \cdot QA_a)/EXR - \sum_{c \in C} PWE_c \cdot QE_c - \sum_{i \in I} TR_{ir}$$

$$c \in C,\ i \in I \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (30)$$

Equation 30 shows the current account balance equation, which states that the total import of the economy is equal to the sum of export from the country, net transfers from the rest of the world to the home country and foreign saving. In fact, the foreign saving is the balancing factor to hold this equality.

The current-account equation imposes equality between the country's earning and spending of foreign exchange. Foreign savings is equal to the current-account deficit/surplus. This is related to the fact that the model includes two variables that may serve the role of clearing the current-account balance—the foreign exchange rate *EXR* and foreign savings *FSAV*. This model assumes that *EXR* is fixed. But, in some simulations we interchange them.

4.4.6. Solving the model

Completion of the specification of the model requires enumerating the exogenous variables. The proposed GAMS model counts 158 variables in 128 single equations. In order to make a unique solution of the model, 30 variables are required to be specified as exogenous variables. These are variables belonging to factor supplies QFS_f, and total population *TPN*; and variables under control of government and the rest of the world, which includes *EXR*, PWE_c, PWM_c, GC_c, $QE_{os\text{-}c}$, *GI*, TR_{hr}, TR_{hg}, TR_{gr}, and $TR_{fi,g}$. Finally, we select $PD_{ind\text{-}c}$ as a numeraire. As a result the number of endogenous variables and single equations are equal at 128.

Some clarifying remarks on these can be made. Total factor supplies QFS_f are exogenous whereas their sectoral allocations are endogenous. We consider the total population of Nepal *TPN* as given throughout the analysis. Government's consumption demand of commodities is considered exogenous GC_c. Moreover, government investment *GI* is also predetermined. Likewise, in case of external balance, real exchange rate *EXR* is fixed whereas foreign savings is flexible.[14] Moreover, we have built this model under small country assumption, which allows us to treat world market prices of importable PWM_c and exportable PWE_c as given. According to Nepal SAM 1996, Nepal has no export of public services; therefore, zero value of the public service export $QE_{os\text{-}c}$ is also fixed in the model. All the transfer earnings of the institutions TR_{hr}, TR_{hg}, TR_{gr}, *and* $TR_{fi,g}$ are exogenous. Finally, we have regarded domestic supply price of industrial commodities as numeraire; therefore, this variable $PD_{ind\text{-}c}$ is fixed. We shall elaborate on the selection of these exogenous variables with reference to the closure rules in chapter 5. Using these closures, the Nepal CGE model presented above is implemented in chapter 5. This is followed by the analysis of different policy simulations.

4.4.7. More on solution of the model

Two additional elaborations need to be mentioned on the solution of the model. First, in order to check the total investment equals total saving, we use one more equation in solving the model but this additional equation is not a part of the model. Here the total gross fixed capital formation equals to the total savings in the economy that is comprised of the household saving, firm's saving, government saving, and foreign saving. To confirm the equality holds, we have used WALRAS as a variable, which is expected to be zero in equilibrium.[15] The saving-investment balancing equation can be expressed as follows:

[14] Though real exchange rate and foreign savings are made respectively exogenous and endogenous variables at the base run of the model, in one of the policy simulation exercises in chapter 6, we reverse their status of exogenous and endogenous.

[15] Some modellers incorporate a variable WALRAS in the CGE equation whose equilibrium value must be zero. The important thing is that the equation is not displayed as a part of the model, but only used as a checking device for the overall consistency of the model. The GAMS file of Nepal CGE has used a

$$\sum_h YH_h \,.\, aps_h \,.\, (1\text{-}ty_h) + YFIR \,.\, apsf \,.\, (1\text{-}tyf) + (GY\text{-}GE) + FSAV.\, EXR = \sum_c PQ_c \,.\, QINV_c +$$

$$WALRAS \qquad\qquad h \in H,\, c \in C$$

Second, it is also implicit that prices are consistent with consumer's price index *CPI*. In simulation, it will be possible to trace the aggregate effect on the level of prices via *CPI*.

In order to assure that only one solution exists, some modellers use a price normalization equation, in this case adding the consumer price index *CPI* equation. Given this definition of the price normalization, all simulated price changes can be directly interpreted as changes vis-à-vis the *CPI*. But, in our case as the system of equations are already balanced in terms of the number of variables and equations, we regard this equation as only reference to know the scale up (down) of the general price level. The following equation, therefore, has been used beside the CGE equations.

$$\sum_{c \in C} PQc \cdot cwts_c = CPI \qquad\qquad c \in C$$

where $cwts_c$ are the weights assigned to different commodity prices.

4.5. Macroeconomic closures and system constraints

4.5.1. Closure rules

This section reflects on closure rules in CGE models in general and on those applied in the Nepal CGE model in particular. The material serves as background for the calibration of the model and its use later for policy simulations. The reader may like to skip this section that is basically a review of literature and the positioning of the study therein.

Establishing a mechanism for closing the model is an important step in CGE modelling. The selection of the closure serves to typify the entire model or the modules within it. This step becomes a cornerstone for the modeller as it helps to introduce consistently the definition of the model equations and facilitate the understanding how the model works. Many CGE models deal with four types of macro balances: government consumption, saving-investment, commodity, and the foreign exchange. The balances of these entities are expressed in the form of

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device to check the equality between the row total and the corresponding column total while calibrating the macro SAM. Therefore, there is no need of including separate WALRAS variable in this particular model.

macroeconomic constraints. These are constraints that have to be satisfied by the economic system, but are not considered in the optimizing decision of any micro agent.[16] In reviewing the macroeconomic system constraints or the macroeconomic closure rules, we focus mainly on four types of constraints corresponding closely with the above mentioned macro balances: factor market constraints, saving-investment constraints, government macroeconomic constraints and the external sector constraints. The closure rules of the model indicate the mechanisms on the basis of which the model satisfies these constraints.[17]

The appropriate choice between different macro closures depends on the context of analysis. In our case, as the static Nepal CGE is a single period model, macro closures combining fixed real exchange, fixed real government consumption, fixed transfer earning of institutions, fixed international market prices, seem convincing for simulations to explore the welfare changes of households under alternative policies. This type of closure avoids the misleading welfare effects that appear when foreign savings and real investment change in simulations with a single-period model that may lead the increase in the foreign savings and decrease in investment to raise household welfare and vice versa. This latter result can be misleading because the analysis does not capture the welfare losses in the later periods that may arise from larger foreign debt and smaller capital stock.[18]

Neo-classical closure assumes full utilization of factors of production, whereas output and income are determined mainly from the production side. Markets reach equilibrium via price changes. In most of the cases, one of the prices is used as a unitary numeraire and the prices of all other activities/commodities and factors are estimated as the relative prices to that numeraire. Moreover, total investment is endogenously defined and equals to total savings. To assure equilibrium the Walras law, whereby the sum of the nominal excess demands across all product and factor markets is zero, must be satisfied. Lastly, the assurance of foreign exchange equilibrium requires using a balance of payments constraint.[19]

A structualist closure, on the contrary, take into account the unlimited supplies of labour, supply rigidities, low domestic savings capacity and foreign savings constraints, among others, as institutional constraints. In most of the structuralist type of CGE modelling, it is customary to include structural rigidities by assuming a fixed nominal wage rate or government transfers and the existence of mark-up pricing data due to supply constraints. In comparison to the neo-

[16] Robinson (1989).
[17] Moataz (2001), p. 5.
[18] Channi (2002), p. 19.
[19] Robinson (1989), pp. 911-912.

classical closure, the structuralist closure assumes non-homogeneity of the commodities/activities and the factors; however, it incorporates a price index as a numeraire.

A typical Keynesian closure is composed of five rules, namely: income equals the value of output, prices are normalized (P=1), consumption is the fraction of real income, output adjusts to satisfy demand and supply balance, and there must be the injection of demand at least in one sector to permit a sensible solution because savings are present in the system.[20] The demand injection is explained by increased exogenous investment. Given the exogenous saving rates, income and real output increases through the multiplier process that makes the possibility of reaching in the equality between savings and investment. Because of the higher investment, firms hire more labour. In this situation, the real wage must fall which is the driving variable for the multiplier process. Here, the macro equilibrium variable is the aggregate price index as the nominal wage is considered fixed.

Keleckian closure is another frequently used closure rule in CGE modelling. Here too, changes in prices make the equality between demand and supply and this adjustment clears the market. Price adjustment is considered to occur in some commodity markets, whereas quantity adjustments prevail in other markets. Moreover, costs determine prices using the mark-ups over a variable production cost. Similar to the Keynesian closure, it assumes savings equal investment and the latter is the exogenous variable. Thus, sectoral capital stocks become exogenous while sectoral investment rates become endogenous so that the corresponding equations for factor market can be removed. Sectoral employment corresponds sectoral output via labour-output coefficients. Finally, the definition of sectoral wages may include labour productivity growth rates.

Some speak about neoclassical macro closure if the last equation to be introduced defines savings (for example, by fixing the balance of trade or foreign savings, which means that investments will have to adjust to savings).[21] In this view, a Keynesian macro closure variant can be designed, for example, by defining gross investments exogenously (either as constant or introducing some sort of functions to define its level), and letting savings to adjust. In an alternative Keynesian type closure, in addition to fixing investment exogenously, one could fix wages and free the labour utilisation index at the same time.

[20] Taylor (1990), p. 39.
[21] Taylor (1984 and 1990).

4.5.2. System constraints

The system constraints or the adjustment rules directly follow the macroeconomic closure rules. In order to achieve macroeconomic stability a number of constraints are imposed on the behavioural CGE equations to cover the factor and commodity markets, savings and investment, government, and current account balances. The choice of these constraints also determines the way macroeconomic variables adjust in the modelled economy and is governed by the user's perceptions and the functioning of the macro-economy. While there is often only one obvious choice for most of these constraints when looking at the economy at hand, others represent major macroeconomic policy levers or views on macroeconomic adjustment mechanisms.[22] Here, we discuss the most obvious ones as explained by the closure rules. The system constraints are sketched together in Table 4.1.

Factor market. Three options are available for the factor market. For the first option (FMC1), the quantity supplied of each factor is exogenous (i.e., the factor is assumed to be fully employed), whereas an economy-wide wage variable is free to adjust (endogenous) to ensure that the sum of factor demands from all activities equals the quantity supplied. Each activity pays an activity-specific wage that is equal to the economy-wide wage multiplied by wage distortion term. This latter term is exogenous in this option.

The second option (FMC2) reverses the above by allowing for unemployment. This would be preferable in situations where significant unemployment is present for a particular factor category. It is possible by allowing the adjustment of each factor quantity supply and holding the nominal wage exogenous. Each activity is free to hire any amount of each factor at the given wage, while the quantity supplied effectively reflects the quantity demanded.

Finally, in the third option (FMC3), it is assumed that the factor market is segmented and each activity has to hire the observed base year factor quantities. This implies that factors are activity-specific and are, therefore, immobile between various activities. In this situation, the activity-specific wage distortion and the factor supply terms are endogenous, while activity-specific factor demands and the economy-wide wage terms are exogenous. This would be preferable when it is suspected that there are significant quality differences between factors in different activities.

Government balance. The first constraint option (GB1) assumes that government savings (the difference between current revenues and expenditure) is a flexible residual while all tax rates are

[22] Thurlow (2002), p. 19.

fixed. Under the remaining two closure options the direct tax rates on households and enterprises are flexible to allow for an adjustment in revenue and thereby maintain government savings. In the first of these (GB2), the direct tax rate on non-government institutions is increased by a fixed number of percentage points, whereas for the second (GB3), the tax rates are multiplied by a fixed scalar. In each of the three options above it is assumed that government consumption expenditure is held exogenous either in real terms or as a share of total absorption. Another option, not mentioned here, would be to adjust the mix of expenditures in such a way that total expenditure remains exogenous. For example, in the case of an increase in government transfers to poor households, it is possible that government expenditure on goods and services is cut back by the same amount.

External balance. Two options are available with regard to the treatment of the external balance. The first (EB1) holds foreign savings (or borrowing) exogenous while allowing the real exchange rate to adjust (endogenous). The trade balance is effectively held constant, since the remaining components of the external balance (i.e. transfers between the rest of the world and other domestic institutions) are all fixed in the model. For example, a fall in the level of foreign savings would induce depreciation in the real exchange rate, and this would result in a fall in imports and a rise in exports until the trade balance is restored to its original level. Alternatively, EB2 holds the real exchange rate exogenous while the level of foreign savings (i.e. the trade balance) endogenous.

Savings and investment balance. Macro savings (domestic plus foreign) must equal investment *ex post* by definition. The critical difference between the various constraints available for the savings-investment balance lies in whether savings are assumed to be investment-driven or whether investment is considered to be savings-driven. The first option (SIB1) assumes an investment-driven economy in that the savings rate adjusts (endogenous) to maintain a fixed level of investment (exogenous). In order to generate sufficient savings equal to the cost of investment, the savings *rates* of selected non-government institutions are adjusted until a balance is reached. The second option (SIB2) is also investment-driven. It differs from the first option in that, instead of savings rates being increased by a fixed number of percentage points, the savings rates are multiplied by a flexible scalar across all institutions (firms, households).

The third option (SIB3) is savings-driven. The saving rates for all non-government institutions are held exogenous, while the quantity of each commodity in the investment bundle is a constant share of total investment that is eventually equal to the total savings.

The fourth (SIB4) and fifth (SIB5) options are variations on the first and second options in that the constraints are also set up as investment-driven economy, yet the adjustment in absorption is not confined to changes in investment alone, but rather adjustments are balanced evenly across household and government consumption, and investment spending as well. In order to ensure that these changes are spread evenly across all the components of absorption, the share of total absorption for each of these components is held exogenous. In the fourth option (SIB4) savings rates for selected institutions adjust by fixed percentage points, whereas for the final option (SIB5), savings rates are multiplied by a flexible scalar.

The adjustment rules imposed on the current account are again the same for all three options, i.e., a flexible exchange rate with fixed foreign savings is assumed (EB1). Similarly, for the government balance, the constraints are identical for each option in that it is assumed that direct tax rates on domestic non-government institutions are fixed, while government savings is free to adjust (GB1).

The three macroeconomic adjustment options differ in their treatment of savings and investment. In the neoclassical case, it is assumed that the economy is savings-driven (SIB3). This implies that the level of investment will adjust to ensure that it equals the level of savings as determined by fixed marginal propensities to save for each domestic non-government institution. Conversely, the Johansen option assumes that the economy is investment-driven and that savings-rates are scaled to ensure the level of savings and investment is balanced (SIB2). Finally, the Keynesian approach takes the position that both the level of investment and the savings rates are fixed. Savings will, however, still adjust to balance investment in this option in that higher income will generate more savings given a fixed savings rate. In that sense the final option is a variation to the Johansen option.

There is no explicit modelling of the financial market in the standard IFPRI model. Rather, the mechanism that ensures savings equals investment in equilibrium is assumed. For example, in the neoclassical case, the crowding-out of investment is assumed to be driven by implicit changes in the bond or money market. The government issues additional bonds and, in order to sell these to the private sector, it is necessary to raise interest rates. This increase in interest rates drives down the level of investment. Alternatively, in the Johansen closure, it is assumed that savings adjust through some forced savings mechanism imposed by the government. For example, the government may be able to manage inflation and thereby induce households to save, or alternatively the central bank can increase private banks' reserve requirements, thereby forcing up the interest rate and promoting savings.

*Table 4.1: Alternative closure rules for macro system constraints**

Constraints in CGE modelling		
Government Balance	External Balance	Savings-Investment Balance
GB-1: Flexible government savings; fixed tax rates	EB-1: Fixed foreign savings; flexible real exchange rate	SIB-1: Fixed capital formation; uniform MPS** point change for selected institutions
GB-2: Fixed government savings; uniform tax rate point change for selected institutions	EB-2: Flexible foreign savings; fixed real exchange rate	SIB-2: Fixed capital formation; scaled MPS for selected institutions
GB-3: Fixed government savings; scaled tax rates for selected institutions		SIB-3: Flexible capital formation; fixed MPS for all non-government institutions
		SIB-4: Fixed investment and government consumption absorption shares (flexible quantities); uniform MPS point change for selected institutions
		SIB-5: Fixed investment and government consumption absorption shares (flexible quantities); scaled MPS for selected institutions

Source: Adapted from Lofgren (2001), p. 16. Note: Instead of only direct tax rates used in the Lofgren model, this model considers all the tax rates as available options in the analysis of system constraints.
* For the specified closure rules, the choice for one of the three constraints does not constrain the choice for the other two constraints. ** MPS = marginal propensity to save.

In the Keynesian case, where the CPI is allowed to adjust and the nominal wage rate of semi-skilled & unskilled labour is assumed fixed, the government could be seen to intervene in the wage bargaining process so as to persuade trade unions to maintain the initial level of nominal wages. In this way, the government might be able to manipulate the level of real labour returns.

Finally, the neoclassical and Johansen adjustment rules use only the producer price index as a numeraire, while the Keynesian approach, due to the over-identification caused by fixing both savings-rates and investment, has both flexible producer and consumer price indices, while the wage rate of semi and unskilled labour is fixed.

4.5.3. Adjustment rules in Nepal CGE analysis

As the current Nepal CGE model belongs to the neo-classical group, we select the adjustment rules accordingly. Among all the available options explained in Section 4.5.2, we have selected GB-1, EB1 and EB-2, and SIB-3 from government balance, external balance, and saving-investment balance, respectively. Consequently, tax rates are fixed, whereas government saving is flexible in government balance. Likewise, in case of external balance, firstly, real exchange

rate is fixed whereas foreign savings is flexible. In the latter case, we reverse their exogeneity and endogeneity. Lastly, in case of saving-investment balance, MPS of all the non-government institutions are fixed and capital formation is flexible.

Table 4.2: Macro closures selected for CGE Nepal model

Government Balance	External Balance	Savings-Investment Balance
GB-1	EB-1, EB-2	SIB-3

Three types of factors of production are included in the standard Nepalese CGE model: capital, unskilled labour, and skilled labour. Returns to the factors are flexible to clear respective factor markets. Factors are assumed to face flexible returns in a market characterised by full employment (FMC1).

4.5.4. Clearance in the labour market

Regarding the clearance of labour market, there are two strands of thought. Many CGE modellers go straight for full clearance in the labour market and assume that there are no distortions, so the distortion variables are not incorporated in the model. Moreover, the solved optimal allocation of skills in different sectors is also by assumption the actual distribution of employment. There will be differences between the solved and the observed allocation of labour as reflected by some rudimentary available data, but then they argue that this data on labour use in the sectors is not homogeneous in terms of skills, and that if the labour skills in the various sectors were consistently measured there would not be any differences for wages of the same skill in different sectors. In fact, the labour variables in the model are defined as skill-equivalents. And most of these modellers hardly confront the optimally solved labour allocation on the sectors with observed figures, as these latter figures are not presented or do not exist in their correctly measured form. Although the approach is theoretical, it is fully consistent with general equilibrium theory.

There is another group of modellers who are more structuralists, and more empirically oriented. They see the difference between the solved optimal labour allocation and the available data as the result of distortions in wage clearance. Because these CGE models are more applied in nature, any position taken on the specific values of the distortions should be justified by the factual situation at hand.

In the Nepal CGE, we are working within the realm of the first approach. This requires explicit specification of the homogenous factors of production. We make an assumption here that the labour factor with high skill is supposed to be homogeneous over all the sectors. In other words,

the high skilled labourer in agriculture is of the same high skill quality in manufacturing or services. The same applies to low skills.

4.5.5. Concluding remarks

The neo-liberal closure rule states that markets are in equilibrium due to the flexibility of price changes. In the structualist closure, markets may not be cleared instantly because of the possibility of unlimited supplies of labour, supply rigidities, and saving constraints. The consideration of non-homogeneity of the commodities, activities and the factors is the major reason for the difference between these two closures. In contrast, the Keleckian closure considers the market clearance by price change in some markets and by quantity change in some others.

In the Nepal CGE model, we have selected macroeconomic closures that are more inclined to the neo-liberal closure. However, we have made the real exchange rate fixed. Therefore, the closure rule in this model is of hybrid type. In this model, the government investment and tax rates are fixed whereas government revenue and saving are flexible. Likewise, in case of external balance, firstly, real exchange rate is fixed whereas foreign savings is flexible. Later, we reverse their exogenous and endogenous status. Lastly, in case of saving-investment balance, the average propensity to save is fixed. Government investment is fixed and private investment is a complementary function of the government investment.

5. Calibration of the Nepal CGE model

5.1. Introduction

This chapter calibrates the Nepal CGE model specified in chapter 4 making use of the Nepal SAM 1996 described in chapter 3. The calibration of the CGE yields consistent estimates of the model parameters. On the basis of the data set for the base period, the parameters of the model are estimated in a manner that enables the model general equilibrium solution to precisely replicate the base year data set. In other words, behavioural parameters are calibrated as if the base year economy was indeed in equilibrium. The estimates of the parameters and the baseline solution of the model are presented below.

5.2. Parameter estimates

5.2.1. Activity parameters

Considering first the parameters of the production functions, Table 5.1 (derived from Nepal SAM 1996, Table 3.3) shows factor shares in the value added for the four activities. In equilibrium, these factor shares would represent the marginal returns to production of the respective factors. The factor content analysis reflects the fact that agriculture and commercial services are highly dominated by unskilled labour relative to skilled labour in Nepal. In contrast, in industry and public services, this gap is significantly small. As regards to the factor share of capital (profit), it is lowest for the public service sector (OS-A), 0.069, which is expected given the nature of this sector where labour is the main contributor to the value added. For the other activities, capital (profit) share is lowest, 0.476, in agriculture as compared to 0.616 and 0.663, respectively in case of industry and commercial services.

While some modellers consider the shift parameter in the Cobb-Douglas production function as an efficiency parameter; we are inclined to regard it as a calibration constant in our Nepal CGE model based on its inter-sectoral scale differences. As Table 5.1 suggests, they cannot be validated on efficiency grounds.

Table 5.1: Factor shares (α_{fa}) and calibration constant (ad_a) in production function

parameters	activities			
	AGR-A	IND-A	CS-A	OS-A
factor share (α_{fa})				
low skilled labour wage (WLSL)	0.440	0.206	0.257	0.530
high skilled labour wage (WHSL)	0.084	0.178	0.080	0.401
profit	0.476	0.616	0.663	0.069
calibration constant (ad_a)	193.231	83.078	25.830	19443.181

Intermediate inputs per unit activity are presented in Table 5.2. The agricultural sector uses more of the agricultural intermediate deliveries; whereas industrial sector uses industrial and agricultural intermediate deliveries to a significant extent as compared to other commodities. Both service categories, commercial and others, use more intermediate deliveries from commercial services.

Table 5.2: Quantities of c as intermediate inputs per unit of activity (ica_{ca})

commodities/services	activities			
	AGR-A	IND-A	CS-A	OS-A
AGR-C	0.119	0.176	0.0001	0.002
IND-C	0.002	0.181	0.045	0.112
CS-C	0.069	0.041	0.151	0.139
OS-C	0.006	0.022	0.051	0.031

The agricultural sector has very little inputs (0.2%) from the industrial sector. It shows the traditional nature of Nepalese agriculture. On the other hand, a glance on the outlay pattern of the Nepalese industrial sector shows that it is more agricultural and import based. Approximately, 18 percent of the expenditure of this sector goes to the agricultural raw materials and 16 percent to the rest of the world for the imported inputs (Table 3.3). Moreover, the agro-industrial and intra-industrial linkages are prominent in Nepalese industrial sector. It concludes that agriculture is the backbone of Nepalese economy and the slow and fluctuating growth of the agriculture sector badly affects the industrial sector as well.

5.2.2. Commodity parameters

There are market interaction parameters relating to commodities especially with regard to foreign trade, and there are other structural parameters relating to commodities. In this model, we have made an assumption for demanders that imports and domestic outputs sold domestically are imperfect substitutes to each other. Similarly, for producers, we consider the imperfect transformability between exports and domestic output sold domestically. Compared to the alternative of perfect substitutability (which, for any given commodity, only permits one-way trade), this treatment tends to generate more realistic responses by domestic prices,

production, and consumption in developing countries to changes in international prices.[23] Following this principle, regarding the specification of the structural parameters, we have assumed the elasticity of substitution between domestic *vs.* import goods equal to 1.6, 0.8, and 0.4 to agricultural, industrial and services sectors, respectively. But, the elasticity of transformation between domestic *vs.* export goods has been taken equal to 2 to all the sectors. These assumptions provide Armington function exponent to import commodity (ρ_c^q) (equations 4.11) equal to -0.375, 0.250, and 1.5 to agriculture, industry and services sectors, respectively. Likewise, the Armington function exponent for export commodity (ρ_c^t) (equation 4.13) equals to 1.5 to all the sectors.

Armington import shares in composite commodities are 0.06, 0.16, 0.13, and 0.25 in agriculture, industry, commercial services and public services, respectively. Likewise, in case of exportable, it is 0.05, 0.28, and 0.16, respectively. These figures determined the level of shift parameters in (aq_c and at_c) as given in Table 5.3. The high Armington import share in public services means huge expenditure on the services like health and education. Moreover, the Nepalese export is mainly dominated by industrial products. In terms of imports, more than half of the total imports in agriculture and industry belong to the non-competitive import (Table 3.2, chapter 3). The shares of intermediate import ($ncir_a$) are 0.08, 0.16, 0.07, and 0.08 in agriculture, industry, commercial services, and other services, respectively (Table 5.3).

We have assumed the values of import elasticity coefficient (ime_c) equal to 0.2, 0.6, 0.2, and 0.2 in agriculture, industry, commercial services, and other services, respectively. Likewise, the assumed export elasticity coefficients (eec_c) are respectively 0.4, 0.6, 0.2, and 0 (no export of public services) in these four sectors. These assumptions helped us fix the levels of import and export calibration constants (im_c and ec_c) as shown in Table 5.3.

[23] Lofgren (1999), p. 21.

Table 5.3: Market interaction relating to commodities

parameters	commodities			
	AGR-C	IND-C	CS-C	OS-C
elasticity of substitution between domestic vs. import goods (σ_c^q)	1.6	0.8	0.4	0.4
elasticity of transformation between domestic vs. export goods (σ_c^t)	2.0	2.0	2.0	2.0
armington function exponent to import commodity (ρ_c^q)	-0.375	0.250	1.5	1.5
armington function exponent for export commodity (ρ_c^t)	1.5	1.5	1.5	1.5
armington import share of composite commodity (δ_c^q)	0.063	0.156	0.129	0.247
armington export share of composite commodity (δ_c^t)	0.046	0.280	0.159	-
armington function shift parameter for supply of c (aq_c)	1.201	1.658	2.476	2.205
armington function shift parameter for demand of c (at_c)	1.082	1.628	1.321	-
non-competitive import coefficient from ROW ($ncir_a$)	0.076	0.158	0.068	0.080
import elasticity coefficient (ime_c)	0.2	0.6	0.2	0.2
export elasticity coefficient (eec_c)	0.4	0.6	0.2	0.0
import calibration constant (im_c)	5.294	0.768	0.328	0.554
export calibration constant (ec_c)	0.0001	0.059	0.007	0.0

As regards other structural parameters relating to commodities, Table 5.4 gives the rates of import duties (tm_c), fixed at moderate level. In terms of the tariff revenue collection, the rate is highest in public services (20%); and for the other commodities the rate ranges between 10% and 15%. Though nominal rates range from 5 to 30 percent in Nepal, these rates are not realised in terms of the revenue collection. It is noted that such issues in tariff evasion are common in many developing countries as also mentioned by Wobst (2001). Similar is the problem in case of domestic indirect tax rates (tq_c) as well. In terms of revenue collection, they are lowest at 1.5% in agriculture and are highest at 4.2% in industrial sector (Table 5.4).

Industrial sector has highest share in gross investment ($qinsh_c$) followed by commercial services and agriculture. However, in case of the change in stock, we have maintained the proportions ($chstsh_c$) only in between agricultural and industrial goods because it is not possible in case of services. A big share of the composite agriculture commodities goes for household consumption; therefore, the share of the price of agricultural composite goods is dominant in CPI index ($cwts_c$) (Table 5.4)

In Nepal CGE model, the coefficient (θ_{ac}) transforms the activity quantity into commodity quantity. There is, in fact, a one-to-one correspondence while an activity total merges into its respective commodity market. At this stage, one unit of activity has been considered as the equal unit of commodity in their respective accounts.

Table 5.4: Other structural parameters relating to commodities

parameters	commodities			
	AGR-C	IND-C	CS-C	OS-C
import tariff rates (tm_c)	0.132	0.103	0.146	0.204
rate of sales tax on commodities (tq_c)	0.015	0.042	0.021	0.019
weights in the cpi ($cwts_c$)	0.435	0.207	0.257	0.1
share in gross investment ($qinsh_c$)	0.152	0.562	0.247	0.039
share in change in stock ($chstsh_c$)	0.213	0.787	0.0	0.0
Conversion coefficients(θ_{ac})	1	1	1	1

5.2.3. Institutional parameters

The detailed distribution of the incomes by factors and activities on household groups has already been presented in Table 3.5. This distributional structure gives the coefficients $shry_{hf}$ in Nepal CGE model. Also in Table 5.5, it can be seen that the poorer households (LLR-HH and SR-HH) are getting more wage income, basically from low-skilled type; whereas richer households are deriving more factor income from high-skilled labour and capital. Large proportions of the wages to the high-skilled labour and profit to the capital in industrial sector go to the urban households, 36 and 54 percentages, respectively. Moreover, urban households are the sole earners of the profit income from the capital invested in public services. A significantly high proportion (40%) of the profit to agricultural capital goes to the large rural households. Likewise, high-skilled wage income in service sectors primarily goes to the urban households. Relatively bigger share of low-skilled wage income from agriculture and industry goes to small rural households whereas from services goes to land-less rural households. The latter also receives high-skilled labour income from the agriculture and industry but none from services. Corporate sector receives 16 and 26 percentages of total profit income in industrial sector and commercial services.

Table 5.5: Share of income by factor and activity going to households ($shry_{hf}$) and firms ($shryf$)

Household type	Factor incomes from											
	LSL in activities				HSL in activities				Capital in activities			
	AGR	IND	CS	OS	AGR	IND	CS	OS	AGR	IND	CS	OS
U-HH	0.18	0.35	0.34	0.35	0.11	0.36	0.66	0.50	0.10	0.54	0.29	1.00
LR-HH	0.13	0.16	0.15	0.15	0.37	0.26	0.16	0.27	0.40	0.13	0.17	0.00
SR-HH	0.50	0.37	0.18	0.09	0.29	0.15	0.18	0.23	0.25	0.17	0.28	0.00
LLR-HH	0.19	0.12	0.33	0.41	0.22	0.24	0.00	0.00	0.25	0.00	0.00	0.00
FIRM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.26	0.00

Table 5.6 shows tax rates and saving rates by household groups. Land-less households and the small rural households are the poorest among the four household categories. They pay no income tax to the government as their incomes are below the exemption limit. Even in case of urban households and large-rural households, the rates of income tax (ex post) are low,

approximately 4% and 5%, respectively. However, the rate of income tax to the corporate (firm) income is about 26%. Regarding the rate of savings, it is highest among large households and lowest among land-less rural households. In case of firms, all disposable income goes as saving.

Table 5.6: Rate of income tax and average propensity to save for households and firms

parameters	Households and firm				
	U-HH	LR-HH	SR-HH	LLR-HH	FIRM
rate of income tax to households (ty_h) and firm (tyf)	0.037	0.048	0.0	0.0	0.265
average propensity to save (aps_h & $apsf$)	0.070	0.342	0.068	0.025	1.0

Table 5.7 gives the average propensities to consume by household group and commodity type. The consumption patterns are different according to household type. Urban households have highest share on commercial services followed by food consumption expenditure; whereas among others, food consumption shares highest proportion followed by industrial commodities, commercial services and the other services.

Table 5.7: Share of household consumption spending on commodities and services (β_{ch})

commodities/services	households			
	U-HH	LR-HH	SR-HH	LLR-HH
AGR-C	0.367	0.375	0.478	0.530
IND-C	0.152	0.243	0.262	0.179
CS-C	0.394	0.272	0.177	0.146
OS-C	0.087	0.110	0.083	0.144

In addition to the above parameters, there are the public investment exponent coefficient (μ), profit rate exponent coefficient (φ), private investment calibration constant (ε_0), see equation 21, chapter 4. With the assumption of μ= 0.5 and φ= 1, ε_0 has been calculated at 1396.129.

5.3. Baseline values of model variables

The values of different incoming and outgoing flows characteristic of the SAM can be recalled from the Nepal SAM 1996 (Table 3.3). Therefore, in this section, we confine the presentation to splitting these flow variables into price and quantity variables for 1996.

As mentioned earlier, our CGE model assumes that markets clear; therefore, there is no distortion in the factor market. Labour of the same skill category gets the same competitive wage rate irrespective of the activity it is involved in. The same applies to capital. The allocation of total labour, with skill category, and capital into different activities are given in

Table 5.8. The low-skilled labours are more concentrated in agriculture followed by commercial services; whereas the high skilled labour concentrate more in public services followed by the industrial sector. In this model, land has been treated as capital similar to other forms of physical capital; therefore, agricultural sector is shown to contain a huge quantity of capital next to commercial services and followed by industrial sector and other services. The public service sector is basically skilled labour intensive. In total, low-skilled labours are almost five times more than high-skilled labours and receive almost half of the wage rate of the latter. The solution for the rate of profit to capital gives a value of almost 21%.

Table 5.8: Quantities (QF_{fa}) and remuneration rates of factors (WF_f)

factors	Quantities of factors allocated to activities				total quantity of factors	Remuneration rates of factors (wages in rupees, profit rate in %)
	AGR-A	IND-A	CS-A	OS-A		
LSL (mln)	4.946	1.265	2.167	1.566	9.943	8068.8
HSL (mln)	0.498	0.577	0.354	0.627	2.057	15255.2
CAP (mln rupees)	207860	146961	216974	7957	579752	0.207

Turning now to the activities, the value and quantity of the same activity in the baseline solution are equal to each other; therefore, the price for each activity is set at 1 (Table 5.9).

Table 5.9: Price indices and quantity levels of activities

price and quantity of activities	activities			
	AGR-A	IND-A	CS-A	OS-A
value-added price for activity a (*PVA*)	0.725	0.411	0.678	0.626
price index of activities (PA_a)	1.0	1.0	1.0	1.0
level of activity a (QA_a)	124996.0	120442.0	100103.0	38079.0

Table 5.10 presents quantities of different intermediate inputs in different activities. Since the price indices of composite commodities are close to unity for the baseline, the quantities of the intermediate deliveries are close to the money value of the corresponding element in Nepal SAM 1996 in Table 3.3.

Table 5.10: Quantity of commodities as intermediate inputs in activities ($QINT_{ca}$), mln. Rupees

commodities/services	activities			
	AGR-A	IND-A	CS-A	OS-A
AGR-C	14812.8	21199.0	13.7	72.9
IND-C	218.8	21793.0	4523.9	4281.0
CS-C	8651.7	4907.8	15120.5	5306.6
OS-C	777.3	2610.9	5155.0	1196.5

Similarly, in the case of commodities, the domestic production and the supply prices are also stabilised at unity in the baseline calibration (Table 5.11). Imports face custom duties whereas domestic productions face domestic indirect tax; therefore, their equilibrium prices are calculated accordingly, and they differ. The equilibrium quantities at these price levels are also presented in the table. It is noted from the table that the government sector consumes only the public services. Of the total gross fixed capital formation (*GFCF*), the sectoral allocation ($QINV_c$) goes significantly to industrial sector (56%) followed by commercial service sector (25%). The agricultural and other service sectors receive relatively lower shares of investments, 15% and 4%, respectively.

Table 5.11: Price indices and quantity variables relating to commodities, quantities in mln. Rupees

variables	commodities			
	AGR-C	IND-C	CS-C	OS-C
import price (foreign currency) (*PWMc*)	1.0	1.0	1.0	1.0
export price (foreign currency) (*PWEc*)	1.0	1.0	1.0	1.0
import price (domestic currency) (*PMc*)	1.132	1.103	1.146	1.204
export price (domestic currency) (*PEc*)	1.0	1.0	1.0	1.0
producer's price (*PXc*)	1.0	1.0	1.0	1.0
domestic price of domestic output (*PDc*)	1.0	1.0	1.0	1.0
composite commodity price (*PQc*)	1.015	1.042	1.021	1.019
quantity of imports (*QMc*)	8101.0	16520.0	12704.0	13307.0
quantity of exports (*QEc*)	5769.0	33708.0	15928.0	-
quantities of domestic output (*QXc*)	124996.0	120442.0	100103.0	38079.0
domestically sold domestic output (*QDc*)	119227.0	86734.0	84175.0	38079.0
quantities of domestic supply (*QQc*)	128341.9	105576.9	98757.6	53799.6
quantity of Investment demand ($QINV_c$)	8398.3	30253.0	13572.4	2146.8

Table 5.12 gives the model solutions for the quantities of consumption by household group and commodity type. Households consume various goods/services from all categories.

Table 5.12: Commodity consumption by household groups (QH_{ch}), mln. Rupees

commodities/services	households			
	U-HH	LR-HH	SR-HH	LLR-HH
AGR-C	22608.8	11425.6	28733.9	19283.7
IND-C	9139.9	7224.0	15346.5	6360.1
CS-C	24196.5	8233.3	10575.1	5290.0
OS-C	5342.5	3343.1	4973.5	5219.8

Government consumption expenditure is confined to the public services (*GCc*) only. Baseline calibration has calculated this figure to be 22593.2 units. The benchmark solution for the government revenue and expenditure are 32718 million Rupees (mln. Rs.) and 43629 mln. Rs., respectively, thus generates budget deficit of 10911 mln. Rs.

Total investment in the economy, 68017 mln. Rupees, includes gross fixed capital formation (*GFCF*) and change in stock (*CHST*) of 56081 and 11936 mln. Rs., respectively. The *GFCF* is divided into all four commodity accounts, whereas the change in stock is divided into agricultural and industrial goods according to their proportion in the *GFCF*.

The exchange rate has been initialised to 1 and the foreign saving has entered the model in terms of local currency (24299 mln. Rs.). The same applies to the transfer earnings from the rest of the world. We used only the prices of importable and exportable in world market in terms of foreign currency. All other monetary variables are in domestic currency. The consumer's price index (*CPI*), based on composite prices of commodities, initialised at 1.022.

Gross Domestic Product in 1996 was 231901.0 mln. Rs.. The model has calculated the per capita annual income of the land-less rural people equal to 4005 Rs. and per capita income of the whole Nepal at 10691 Rs..

6. Simulations of liberalisation and reform policies

6.1. Introduction

This chapter investigates how economic policy directed towards liberalisation and stabilisation affect the growth and distribution of the economy. The chapter assesses the impact of economic liberalisation and structural reforms in Nepal in light of the conflicting empirics provided by previous studies for several countries. This is done using Nepal SAM 1996 presented in chapter 3 and Nepal CGE model presented in chapter 4 with neo-classical closure rule and some macroeconomic constraints explained in chapter 5.

We have selected for the policy simulations those policy instruments that are more neo-classical in nature and pertinent to structural reforms in developing countries. In the analysis, we have grouped them broadly under external and internal reforms.

In external reforms, we work with unilateral import liberalisation by the host country, export liberalisation by the rest of the world (ROW), and a combined trade liberalisation by the host country and ROW under fixed and flexible exchange rate systems. We simulate the effects of currency devaluation as well. The simulation analysis with devaluation has two purposes. First, it is one of the major policies implemented under conventional structural adjustment programme of the IMF and World Bank which Nepal also followed. Second, foreign exchange liberalisation in developing economies is considered mostly resulting in devaluation of domestic currency in the short run; therefore, policy simulation with devaluation of the currency is an alternative approach to study the effects of foreign exchange liberalisation.

In the internal reform, we increase the domestic tax rates slightly in order to acquire more government revenue and reduce fiscal deficit. This adjustment seems one sided without any adjustment to reduce public expenditure in an effort to narrow fiscal deficit. It is because public expenditure cutting in developing economies is generally not feasible due to political unrest it may cause in one hand and high investment demand for social overhead capital on the other. The feasible strategy to narrow down the fiscal gap through internal reform is, therefore, by scaling-up the domestic tax rates but protecting the poor.

The organisation of this chapter is as follows: Section 6.2 reviews contemporary research on liberalisation policies and their effects in developing countries, as a background to the policy simulations that we apply. Section 6.3 defines the various policy simulations and positions them in the flow structure and working mechanism of the CGE model used in this study. Section 6.4 gives an analysis of the simulation results. Section 6.5 tests the sensitivity of the results to the choice of the numeraire, this section is also used to examine the robustness of the simulation results. Sections 6.6 and 6.7 deal with changes in macroeconomic constraints, and the further analysis of the impact on household welfare. Section 6.8 concludes the chapter.

6.2. Contemporary debates on liberalisation and reform policies

6.2.1. Unilateral trade liberalisation by the host country

In the last two decades, many developing countries have undergone an economic transformation involving a process of trade liberalization under the structural adjustment programme. In this respect, the traditional trade theory (which excludes, by assumption, uncertainty and unemployment) should have been reassuring, since its most celebrated theorem, the Stolper-Samuelson theorem, predicts that a skill-poor developing country after opening up to international competition will grow more and experience a reduction in wage income inequality.

During the last decade, a number of empirical works have resorted to see whether the predicted gains from trade liberalization have materialized. Most of these studies find that trade reform is accompanied by productivity growth, technology advancement, falling mark-ups and a reshuffling of resources toward more efficient firms; although in some cases the evidences fail to confirm these results. Traditional trade theory supports the allocation efficiency argument for freer trade in the context of perfectly competitive markets. Since the late 1970s, however, the emerging new trade theory has shown that the gains from trade originating from specialization according to the comparative advantage are only parts of the story; since even in the presence of imperfectly competitive markets, trade liberalization can also bring additional gains by reducing the deadweight losses created by domestic firms' protected market power. In particular, it forces firms to lower price-marginal cost, and mark-ups, thereby raise firm size and scale efficiency. These all ultimately help an economy grow faster, Efipani (2003), p.2. Recently, it was also shown that in the presence of within-industry firm heterogeneity, trade liberalization causes more productive firms to expand at the expense of less efficient firms (which either shrink or exit), thereby inducing additional efficiency gains. Moreover, trade and investment liberalization may foster technology advancement and productivity growth in developing countries through several channels.

In a different strand of thought, the main argument against trade reform in developing countries opts for an import substitution industrialization strategy to prevent exacerbation of income inequality and hence deterioration of the conditions of the poor in trade liberalisation. In particular, these concerns regard higher unemployment among workers displaced with the contraction of import competing sectors, greater uncertainty and precariousness of job conditions, and the creation of new job opportunities only for the most qualified segments of the workforce deem inevitable consequences of trade liberalisation. Moreover, some also argue dramatic increase in wage inequality. Recent theoretical and empirical literature can explain this puzzling effect. It shows that in the presence of imperfect competitive markets, increasing returns to scale, and heterogeneous firms, trade liberalization can indeed exacerbate wage inequality even in a skill-poor developing country. Matusz and Tarr (1999), and Bacchetta and Jansen (2001) show high adjustment costs and small benefits in trade liberalization of developing world.

Plant-level evidence reveals slightly different results that trade reforms in developing countries do not generally bring a sharp contraction of import competing skill-intensive sectors rather the trade exposure is associated with greater wage volatility and a greater investment in technology and human capital. Trade models based on increasing returns to scale and imperfect competitive markets, too, can generally explain this evidence. A few recent papers address related issues from different perspectives; for example, Harrison and Hanson (1999) focus on three empirical issues concerning the impact of trade reform in developing countries. First, they address the question of the weak econometric link between trade policy and long-run growth, and argue that it may be due to the lack of adequate data trade policy cannot yet be measured adequately. Second, trade reforms have small impact on employment. Third, it causes wide inequality in wages.

6.2.2. Trade liberalisation by the ROW

In the context of freer international trade, an agreement was eventually made in 1994 as a result of the Uruguay Round negotiations admitting the end of a long and hard road with many limitations in international trade. Since the conclusion of the Uruguay Round agreement, some progress has been made in giving effect to its provisions like further liberalisation within the World Trade Organization (WTO) member countries basically with multilateral agreements relating to information technology, telecommunications, and financial services. WTO has wider terms of reference, greater powers and a more assured status as compared to GATT; therefore, world trade may undergo brisk liberalization in coming years. Moreover, the member countries

can also strengthen the multilateral trade and investment system and the rules, understandings and procedures in regional basis in the course to freer international trade.

Trade liberalisation by the rest of the world means downsizing/removal of tax and non-tax barriers in international trade, basically in imports. Both developing and developed countries stand to gain welfare in multilateral trade liberalisation. Potential welfare results strongly depend on the assumed magnitude of trade barriers. Both regional and global multilateral trade liberalisations make export performance better for a country like Nepal, which has limited international export market so far. Regional trading negotiations like South Asian Free Trade Agreement (SAFTA); Bangladesh, India, Myanmar, Sri Lanka and Thailand Economic Co-operation (BIMSTEC) and Nepal's membership in WTO are expected to provide immense opportunities to Nepalese exports in global markets.

6.2.3. Combined trade liberalisation by host and ROW under fixed exchange rate

Some argue that under a fixed exchange rate regime, significant trade reform is possible by the devaluation of domestic currency. The required depreciation is larger, the greater the extent of trade liberalization. Without following any particular exchange rate regime, however, some developing countries are becoming participants in a currency zone, which limits their capacity to devalue their currency, an example is provided by the countries in West and Central Africa who are members of the CFA zone. Due primarily to currency overvaluation in the CFA zone between 1986 and 1994, there was no economic growth, when other Sub-Saharan African countries were growing at 2.5 percent annually, Clement (1994). In fact, for some of the CFA countries (e.g., Cameroon, Ivory Coast), the overvaluation induced an output contraction between 1986 and 1994 comparable to the Great Depression in the United States, Shatz and Tarr (2001). A number of CFA countries also suffered from increasing poverty, Devarajan and Hinkle (1994). After the devaluation of 1994 economic growth resumed strongly.

Some countries seek to maintain a fixed exchange rate through the establishment of a currency board or some other arrangements (e.g., Argentina and Estonia). In such countries, to constrain output losses, trade liberalization may have to proceed at a pace consistent with the feasible rate of real exchange rate depreciation.

According to Rodrik (1993), the theoretical base for the existence of a policy dilemma in exchange rate management when trade liberalization is implemented simultaneously with stabilization policies is weaker than is usually presupposed. A commitment to a pegged exchange rate can, if credible, actually solves rather than intensifies the potential conflict

between trade liberalization and exchange rate stability. A depreciation of the real exchange rate will help restore a balance between exports and imports since it makes imports dearer and exports more profitable in domestic currency.

6.2.4. Combined trade liberalisation by host and ROW under flexible exchange rate

Some strands of thought argue that to be self-sustainable and make contribution to an efficient allocation of resources, trade liberalization must be supported by a stable macroeconomic environment and a competitive real exchange rate. Trade reform works through the transmission of price signals in factor, commodity, and money markets. The transmission mechanism, particularly of the money market, is controlled in a regime of fixed exchange rate.

A competitive real exchange rate is also crucial to create conditions for continued support to the liberal trade policies. With an overvalued exchange rate, import competing industries are at a competitive disadvantage, and this generates political pressures for protection that are difficult to withstand in the face of rising trade deficits and declining foreign exchange reserves. Shatz and Tarr (2001) provide a more general treatment in this regard. Initially, trade liberalisation is likely to lead to a trade deficit because the rise in imports tends to occur faster than the export supply response. Under a flexible exchange rate regime, the real exchange rate will adjust through demand and supply forces and stabilises at a competitive level.

By the mid-1990s, the flexible exchange rate regime became dominant in the currency market. It works to equilibrate demand and supply of the foreign exchange in the same way as flexible price works in the commodity market. This system is mostly implemented while targeting the foreign saving.

The experience of the exchange rate regime in developing countries is diverse. Levy-Yeyati and Sturzenegger (2003) studied exchange rate regimes and economic growth for a sample of 183 countries over the post-Bretton Woods period, using a new *de facto* classification of regimes based on the actual behaviour of the relevant macroeconomic variables. In contrast with previous studies, they found that, for developing countries, less flexible exchange rate regimes are associated with slower growth, as well as with greater output volatility. In addition, as suggested by Calvo (1999) and others, the need to defend a peg in the event of a negative external shock implies a significant cost in terms of real interest rates, as well as increasing uncertainty to the sustainability of the regime, potentially harming investment prospects. While the implications of these channels in terms of long-run growth performance are not obvious, there is some evidence of a negative link between output volatility and growth.

Some argue that relatively poor countries with little access to international capital markets, pegged exchange rate regimes work surprisingly well, delivering both relatively low inflation and relatively high exchange rate durability. However, this finding is in contrast to the growing conventional policy wisdom that pegs are universally unstable and crisis prone.

Exposure to foreign capital flows makes it more difficult to sustain a peg if the domestic financial system is not sufficiently mature to efficiently intermediate those flows. Though pegs have been much more durable in developing countries (both in relation to emerging markets and compared to other regimes in developing countries), their longevity has declined quite sharply since 1975, perhaps suggesting that sustaining pegs has become more difficult even in developing countries with limited exposure to international capital markets.

In general, exchange rate regimes have steadily becoming less durable since the mid-1970s, with emerging markets experiencing the most instability. An important exception, however, is advanced economies, for which durability has increased, particularly for flexible rate systems. Cross-country comparison shows, indeed, for advanced economies, flexible exchange rate systems yield somewhat higher growth without higher inflation. For emerging markets, the exchange regime does not appear to have a systematic effect on inflation or growth, although—in line with conventional wisdom—pegs are distinctly more vulnerable to banking and exchange rate crises, Husain et al. (2004).

The early debate on exchange rate regimes largely focused on the benefits and costs associated with fixed versus flexible regimes. In their analysis, Baxter and Stockman (1989) essentially viewed regimes in industrial countries as either fixed or floating. Subsequent analysis, and indeed Baxter and Stockman's own comments on developing countries, increasingly recognized that countries' regimes are often neither completely fixed nor fully flexible. As Williamson (2000) has argued, such "intermediate" regimes could, in principle, allow countries to reap the benefits of fixed and flexible regimes without incurring some of their costs. Others, however, have been more sceptical. According to the "bipolar" view, intermediate regimes are unsustainable over the long run, forcing countries—at least those with open capital accounts—to choose between freely floating exchange rates or monetary union with another currency, Eichengreen (1994), Summers (2000), Fischer (2001).

The interaction of the exchange rate regime with the performance of the economy is likely to be shaped by the economy's institutional and financial maturity and its openness to capital flows. Among developing countries, those that are exposed to large capital flows may well perform

differently under certain regimes than countries that are relatively closed to flows of foreign capital.

By contrast, the Bretton Woods collapse became a watershed event for emerging markets and developing countries, at least as far as their exchange rate regimes were concerned. Both groups of countries saw a gradual decline in the share of pegs in all regimes during the 1970s and 1980s, but not an abrupt shift.

If historical regime transition rates persist, and major political shifts toward currency unions do not occur, the number of pegged regimes in emerging markets and developing countries is likely to decline further. Thus, although the literature seems to offer stronger arguments favouring the idea that fixed exchange rates may lead to higher/lower growth rates, in the end, the question of whether or not there exists a link between regimes and growth can only be resolved by empirical tests. In this context, we would like to examine in this study, among others, the growth and distribution impacts of liberalizing the exchange rate system in the wake of overall economic reform.

6.2.5. Devaluation

Exchange rate devaluation of the domestic currency is one of the major components in an orthodox stabilisation strategy. The existing literature has produced different explanations on the syndrome of exchange-rate-based stabilizations to date, Mendoza and Uribe (1999), p. 2. Dornbusch (1982) and Rodriguez (1982) argued that devaluation is a fixed expectation of inflation and it adjusts slowly. They reason that in this situation, real interest rate falls because interest parity forces the nominal interest rate to fall, while expectations of inflation remain high. Roldós (1995) and Uribe (1997) have put forward the supply-side hypothesis. According to them, even under perfect credibility and price flexibility, a permanent decline in the rate of depreciation of the currency can induce a gradual real appreciation, a boom in domestic absorption, and a deterioration of the current account because it reduces inflation-induced distortions on the relative price of capital and other durable goods.

These theories fit well some elements of country experiences of the 1970s and 1980s, but they appear to be otherwise with recent experiences. The syndrome of exchange-rate-based stabilizations affected Argentina and Mexico despite sharp declines in price inertia and large fiscal cuts in both countries. Moreover, even though the *qualitative* predictions of existing theories are consistent with some of the stylized facts, their *quantitative* performance has been very mixed. They cannot account for the magnitudes of observed macroeconomic fluctuations

and the high correlation between the real exchange rate and the public expenditures, Rebelo and Végh (1996).

Recent theoretical works shed light on the origins of some of these empirical shortcomings. First, Calvo (1986) showed in a partial-equilibrium setting that uncertainty about the duration of policy changes and incomplete contingent-claims markets, both issues generally abstracted from the existing literature, are required in order to account for the observed gradual consumption booms. If Calvo's (1986) model is altered so that the date of a policy reversal is uncertain, producing a gradual consumption boom requires wealth effects resulting from incomplete markets and the unproductive use of government revenue. Still, the Calvo-Drazen framework cannot account for the observed cyclical dynamics because consumption is always non-decreasing, regardless of the time path of the probability of reversal. Second, Uribe (1997) showed that most of the existing models that study exchange-rate-based stabilizations belong to a large class that features the "price-consumption puzzle." This puzzle implies that the observed high correlation between consumption and the real exchange rate cannot be a property of the equilibrium of models in that class. Along the equilibrium path of these models, the real exchange rate appreciates only if consumption declines.

In the context of stabilisation, the role of devaluation is understood in a slightly different way. According to the conventional notion, nominal devaluation results in expenditure switching, increased production of tradable, higher exports and improvement in the current account in the international trade. However, traditional stabilisation package, and especially devaluation component, is under heavy attack by a number of authors, Edwards (1986), p. 1. According to them, though nominal devaluation may achieve its goal of generating a relative price readjustment, this stabilisation process may be very long and painful. This high cost is mainly because of the decline in total output. It is sometime referred to as a contractionary devaluation problem.

Why devaluations are sometimes contractionary? The first reason is because of the immediate contraction in aggregate demand. The devaluation raises the general price level of the imports, consequently, the import-based economy moves towards demand compression. It ultimately results into negative real balance effects. The second effect of devaluation on aggregate demand is through the change in the income redistribution from groups with low marginal propensity to high marginal propensity to save resulting into decline in aggregate demand and output, Diaz-Alejandro (1965), Krugman and Tylor (1978). Moreover, in the situation of low export and import price elasticities, the trade balance worsens leading towards recession.

There are also some related supply-side analyses; Wijnbergen (1986) developed a model with intermediate goods and informal financial markets where, under certain conditions, the devaluation can result in an upward shift of aggregate supply. According to his model, once this supply side channel is introduced into the analysis, it is possible for devaluations to be contractionary even if the net effect on aggregate demand is expansionary. This is the situation where expenditure-switching effect dominates the expenditure-reducing effect.

The existing research findings on the effects of devaluation on real economic activities are mixed, some suggest expansionary effects and some others contractionary effects. Connolly (1983) analysed the effect of nominal exchange rate on the rate of economic growth. The coefficient obtained was positive and marginally significant providing some suport to the hypothesis of expansionary devaluation. The study by Gylfason and Risager (1984), using the imputed parameter data, suggested that devaluations are generally expansionary in developed countries and they are likely to be contractionary in developing countries. Likewise, the simulation model of Gylfason and Radetzki (1985) suggested that devaluation results in decline in output and the extent of contraction increases in the presence of indexed wages. Branson (1986) study of the Kenyan economy also supports this finding. On the other hand, Taylor and Rosensweig (1984), using a large CGE model for the Thai economy, simulated the effect of 10% devaluation of Bhat in real exchange to an increase in real output by 3.3%. A more comprehensive study in this regard is by Edward (1986). His study using the data of 12 developing countries for the period 1965-80 shows that immediate effect of devaluation is contractionary, after one year it is expansionary and in long run it is neutral. Ripoll (2004) demonstrates that in the long run real devaluation redistributes income towards unskilled labour, while real appreciation favours skilled labour.

Since the early days of structural adjustment policies devaluation of the domestic currency was one of the major policy instruments. The rationale behind this policy is that it may lead the export boom of the domestic product, control the imports and, thus, help reduce wide current account deficit of a developing economy. However, the idea of the contractionary devaluation as explained earlier also seems a very convincing one. In the light of these contrasting views, our study will examine a policy simulation with an exchange rate devaluation.

In general, the analysis of these effects are studied from two different perspectives: one is using "before after" approach for the estimation of some selected macroeconomic variables and another using general equilibrium analysis. In this chapter, we are following the second approach. The purpose of this policy simulation is to measure the impact of devaluation on

economic growth, household welfare, foreign trade and the government budget under well defined macroeconomic constraints.

6.2.6. Internal reform

The levels of government income, expenditure, and resource gap (or surplus) provide important information for studying the effects of government budget on capital formation, growth, and distribution. Much empirical work exists that examines the effect of government expenditure on economic growth. Kormendi and Meguire (1985), Grier and Tullock (1989), and Landau (1983) employ government consumption expenditure as a share of GDP from the Summers and Heston data base and find either a negative or no effect on the growth of real per capita GDP. Barro (1991) finds that government consumption expenditure has a negative and significant effect on the growth of real per capita GDP, but that government investment expenditure does not have a significant effect, although the sign is positive.

Several recent papers, e.g., Devarajan, Swaroop and Zou (1996), and Miller and Russek (1997), have examined the effects of the components of government expenditure on the growth of real per capita GDP without assigning the components into productive or unproductive categories. Devarajan, Swaroop and Zou (1996) considered a sample of developing countries from 1970 to 1990 and found that all candidates for unproductive government expenditure either have no or a negative effect on the growth of real per capita GDP; only current expenditure has a positive effect. Miller and Russek (1997) consider a sample of developed and developing countries from 1975 to 1984 and found that both the component of government expenditure and the method of financing do have different effects. Moreover, according to them the debt-financed public expenditure increases in defence, health, and social security and welfare have negative effects on the growth of real per capita GDP in developing countries while debt-financed increases in education expenditure has a positive effects. Easterly and Rebelo (1993) showed that public transportation and communication investment in developing countries leads to higher growth in real per capita GDP along with the crowding-in effect. The findings seem to support the work of Aschauer (1989) on the linkage between public and private investment.

Some empirical studies consider the effects of fiscal variables on investment, typically using aggregate fiscal measures. For example, Levine and Renelt (1992) concluded that none of the fiscal variables possesses a robust correlation with investment. Fischer (1993) performed cross-section and pooled cross-section time-series regressions and found that the budget surplus associates with greater capital formation.

On the other side, the closed-economy IS-LM model, Mankiw (2003) suggests that greater government spending will boost real interest rates and discourage private investment. Greater government spending raises planned aggregate expenditure, which stimulates output, increases the real demand for money, and reduces the demand for bonds, which depresses bond prices and elevates interest rates. The simple IS-LM model makes no distinction between government spending on consumption and investment.

The open economy Mundell-Fleming model typically assumes that countries are small relative to the world economy and that capital is perfectly mobile. Then each country's interest rate must equal the world interest rate because the fiscal policy in any one country is incapable of changing the world interest rate. Under floating exchange rates, as soon as greater government spending raises interest rates, foreign capital rushes in. This increases the demand for the domestic currency, causes the currency to appreciate, lowers net exports and aggregate demand, reduces output, and curtails real money demand, bringing interest rates back down to their original level, consequently, no virtual impact on the level of output in the long run.

Reducing public deficit is one of the important components in the orthodox model of stabilisation.[24] Not only in Nepal, but also in many developing countries, public budget cut has become one of the important fiscal variables under economic stabilisation. But, there is a growing evidence as discussed above that decline in public expenditure on health and education cause a severe slowing down of the economic activities in developing countries in the long-run. In our study, we approach the public deficit somewhat differently. We shall analyse the growth and distribution effects of reducing the public deficit , whereby reduction of public deficit is accomplished simulatanously by increasing the revenue rather than by soloely cutting the expenditure.

6.2.7. Unilateral trade liberalisation by the host country and revenue replacement from internal sources

Though the removal of quantitative restrictions, ratification of quotas or reduction of non-tariff barriers all have in the long run the advantage of preserving or even increasing government revenue without a major reform of the tax system, *e.g.* Ebrill *et al.* (1999), in current terms many developing countries may face a fiscal problem when reducing their tariffs. Furthermore,

[24] Since the inception of the first phase of structural adjustment in Nepal in 1987, there is strong emphasis on the government budget cut to reduce the fiscal deficit from 10 percent to less than one percent of GDP. Though there is no success to reach this limit so far, the budget deficit was stabilized around 7 percent of GDP within 10 years.

the high shares of import duties in government revenue of many low income countries imply that, should tariffs be completely abolished, many would have to extensively revamp their domestic tax systems. UNECA (2003) reports that revenue from import duties accounts for around 2% of their total tax revenue in developed countries whereas in Least Developed Countries (LDCs) it ranges in between 18 to over 50%. In Nepal, it ranged 25 - 30% during 1990s.

The importance of these differences between developed and developing countries is reinforced by the fact that countries at lower stages of development are often struggling to sustain their macroeconomic stability (of which fiscal sustainability is an important aspect) and face potential adverse effects of revenue reduction on poverty reduction, redistribution and development strategies. Potential revenue shortfalls can undermine economic programmes and may result in a reversal of the trade reform itself, Kowalski (2005). Failure to take fiscal constraints into consideration can be one of the principal causes for unsuccessful trade reforms. This highlights the need to accompany tariff reforms with policies designed to replace any potentially lost tariff revenue, ideally, in a less distortionary manner. The recent policy advice of IMF in the area of fiscal implications of trade liberalisation stresses the use of other taxes as a compensating measure. A shift away from trade taxes towards other forms of taxation such as income, sales or value added taxes has already been taking place for some time in many countries. In fact, the need to offset revenue losses from trade liberalisation by strengthening domestic taxation has in many cases been a key consideration in the adoption of the VAT, IMF (2003).

Shifting the emphasis away from trade taxes towards domestic consumption and income taxes reflects the view that trade taxes are a relatively inefficient way of raising revenue. Trade taxes distort both consumption and production decisions and apply to a relatively narrow base, Whalley (2002). Since at the aggregate level, net trade must close the gap between domestic production and consumption, taxes applied to either domestic production, consumption or both would have the advantage of being relatively broadly based as compared to trade taxes. According to Keen and Lighthart (2001), it is therefore theoretically possible to switch from trade taxes towards consumption or income taxes in such a way that domestic production, consumption and trade are less distorted, the allocation of resources and welfare are improved and revenue unchanged or even increased. These issues have formed the basis for the policy advice by the IMF and the World Bank that have, for some time now, been advocating and supporting a move towards more broadly-based tax systems in developing countries, see WTO (2003a).

Notwithstanding the theoretical argument for a simultaneous tariff and tax system reform, there exists a considerable controversy with respect to the feasibility of such a strategy in developing countries whose ability to replace tariffs with indirect taxes has been questioned on structural and political-economy grounds, see *e.g.* Tanzi and Zee (2000), Khattry and Rao (2002), and Moutos, (2001). The communication between the WTO and the IMF, WTO (2003a), argued that there is in principle no great difficulty in devising a policy mix that replaces tariffs by indirect taxes in such a way as to preserve the revenue without jeopardising other economic and social objectives. The same communication also points to the fact that many countries already have functioning VAT systems in place and these countries are best placed to replace import duties with VAT revenues. Nevertheless, even in these cases the existing systems may need strengthening to ensure effective collection at higher rates.

Khattry and Rao (2002) and Tanzi and Zee (2000) argue that reliance on tariff revenues will be higher in agricultural economies where the income bases are difficult to assess and tax enforcement is more difficult. Low urbanisation increases the need for indirect taxation but at the same time reduces the capacity to tax collection. Inefficient, under funded and corrupt tax administrations may not be able to assess and collect broad based tax liabilities while trade taxes are relatively easy to assess through monitoring of entry and exit of goods. Large informal sector activities and occupations, domination of small establishments, small share of wages in total national income, small shares of total consumer spending made in large modern establishments all reduce the possibility of relying on certain modern taxes such as personal income taxes or, to a much lesser extent, value added taxes, Tanzi and Zee (2000).

In addition to the strategic issues while replacing tariff revenue by domestic taxes, there are additional concerns as well. As far as a shift from trade to other forms of taxation is concerned, there are pros and cons to both indirect and direct taxes to rely on for the revenue replacement. Indirect taxes are preferred in some respects while direct taxes to some others. Indirect taxes, which shift the overall tax burden from factors of production (labour and capital) to consumption, are believed to be associated with superior employment, saving, and investment incentives thereby positively affecting the economic development prospects, Kowalski (2005). Moreover, they are also perceived as more effective in correcting market failures such as for controlling environmental degradation. In many countries, such taxes can be changed more easily than direct taxes and thus are considered as a more flexible way of raising revenue. Finally, indirect taxes, which are taxes on spending, are also less costly to collect and administer. An argument against indirect taxation is that it tends to be regressive: a uniform tax rate collected on consumption of a particular good discriminates against those with lower income

who spend a higher proportion of their income on their tax obligation. Direct taxes tend to be expressed as a percentage of income with progressive bands so that the proportion of the income paid on taxes increases with income.

In light of these conflicting policies on dependence to direct or indirect domestic taxes, in the Nepal CGE model for revenue replacement along with import liberalisation, we work with the approach of proportional increment to all domestic taxes in order to stabilize the level of government budget deficit at the benchmark level. This policy is supposed to lessen the socio-political upheavals in administering higher the tax rates as they apply to all types of domestic taxes.

6.3. Simulated policies

The policy simulations in the Nepal CGE model are based on the closure rules explained in chapter 5. In our simulations, the changes are created by policy variables and simulation parameters. We shall display in this section the policy instruments and their place in the model.

A major policy variable in our model is the exchange rate, EXR. Though in one simulation, we set foreign saving, FSAV, at a higher level and make endogenous EXR. FSAV cannot be regarded as a policy variable as it is not under the control of policy makers. It depends on many economic fundamentals which are difficult to control at once.

Likewise, we have five simulation parameters tm_c, eec_c, tq_c, ty_h *and* tyf; which play major roles in these simulation scenarios. The abbreviations have the same meaning as they were used in chapter 4. We conduct different simulations broadly classified into external and internal reforms as below: The results of the simulations will be later presented in absolute form so that they become directly comparable to the baseline figures.

External reforms

i. import liberalization by Nepal (ILN)
ii export liberalization by ROW (ELROW)
iii. (i) + (ii): ILN + ELROW under fixed exchange rate regime
iv. (i) + (ii): ILN + ELROW under flexible exchange rate regime, this is complete external reform (CER)
v. devaluation (DEV)

We implement the policy of import liberalisation through the reduction of the tariff rates in all the commodity markets. Though, principally, both tariff and quota restrictions are the import barriers, quota restrictions have little roles in Nepal for controlling imports; therefore, we confine ourselves in tariff rates only. The ex-post ad-valorem tariff rates to the imports (*tm*) of agricultural, industrial, commercial service, and public service commodities were 13.2, 10.3, 14.6, and 20.4 %, respectively at their benchmark level. We reduce these rates by 10% in our simulation with import liberalisation.

Changes in tariff rates change the price of importable goods, leading to changes in quantities and prices of domestic productions that result in reallocations of factors of production on activities, followed by changes in factor income by activities and institutional income by households. Many other variables in their backward and forward linkages are also affected. For details, see the schematic working of the model in Figure 6.1.

We simulate the effects of the export liberalisation by ROW by scaling up the export elasticity coefficient, eec_c, by 10%.

Import liberalisation by Nepal along with export liberalisation by the ROW, through the adjustments in import tariff rates, tm_c, and export elasticity coefficient, eec_c, make two different trends operational, starting from the change in the quantity of export commodities, QE, and change in the price of import commodities, PM, (Figure 6.1). Then the two sub systems of imports and exports work in similar way as shown by lines downwards. The increase in import might produce contractionary effect on domestic production whereas the promotion of export might produce the expansionary effects. The composite effects may be expansionary, contractionary, or both forces balancing each other, thus, equilibrating the system almost at the benchmark level. Our simulation, with 10% increase in eec_c and 10% reduction in *tm* will explore it.

Import liberalisation by Nepal and export liberalisation by ROW can be simulated under both fixed exchange rate system and flexible exchange rate system. In the flexible exchange rate system, we project and fix a realistic value of foreign saving, FSAV, as an exogenous variable. This value is set at a 10% higher level than that of the level obtained for endogenous foreign saving under the simulation of full trade liberalisation and fixed foreign exchange rate.

Along with the effects of the import liberalisation and export liberalisation, the flexible exchange rate results in currency appreciation or depreciation. It generates further feed back

effects on the system starting from prices of imports and exports. Again the changes pass on in the same way as explained above. Furthermore, change in the exchange rate affects the level of household and government incomes through the difference in local currency equivalence of foreign remittance.

Finally, we consider a devaluation policy, where the exchange rate, EXR, is reduced by 10%. We have two objectives in conducting devaluation of domestic currency. First, we assume that money market liberalisation in developing countries can result in devaluation. Second, it is a most frequent policy lever in conventional structural adjustment reforms in developing world under IMF/World Bank type adjustment programme. As shown by the flow diagram (Figure 6.1), the consequences of devaluation work symmetrically both in import and export flows. However, unlike increase in both imports and exports in complete trade liberalisation, contraction occurs in imports due to depreciation of the domestic currency. Therefore, two forces move in different directions since the beginning of the model's functioning. The composite effects rest upon the degree of import contraction and export expansion.

Internal reforms

In this simulation, budget deficit as a percentage of GDP is lowered, with government consumption and investment same but government revenue parameters are set higher. Here we increase the domestic tax, both to direct and indirect, rates. The direct tax is the income tax upon households and firms, ty_h and *tyf,* and the indirect tax, tq_c, on the domestic production/sales. Though scaling-up the indirect tax rates creates many distortions in the economy as they are not neutral, the alternative avenues are not strong enough to raise public revenue from internal sources. As indirect taxes go on shifting and rest on the final consumer, we should be cautious in increasing their rates for protecting the poor. As average/marginal propensity to food consumption is very high for the poor as compared to non-poor, we do not increase the domestic indirect tax on agriculture but do in other sectors. In case of the direct tax, there is no problem in scaling-up the rate as the poor households are outside the income tax net.

In this reform, we have raised the non-agricultural domestic indirect tax rates by 14%, household income tax by 20% and corporate income tax by 19%. As this scheme definitely increases government revenue, it narrows the fiscal deficit both as a percentage of government expenditure and also as a percentage of GDP. These rates have been chosen in such a way as to reduce the budget deficit by 10%.

The changes in this simulation start from the two variables: domestic supplies and their prices, QD and PD, (Figure 6.1). Then the effects go in the ways the lines show in the diagram (downwards). Moreover, the effects of the increased direct tax rates start working from the disposable income of households and firms, which affect the household consumption and saving. Also the saving of corporate sector is affected. It affects the overall investment and output in the economy which again affect the institutional income, and consumption demand of goods/services from the domestic economy. Price change in the domestic sector affects imports and exports of the commodities to and from the ROW. There are many other changes caused by these major changes. Figure 6.1 and Section 6.4.6 explore the detail.

Import liberalisation and revenue replacement from internal sources (ILN+RRIS)

Upon implementation of the unilateral import liberalisation, fiscal deficit definitely widens, therefore, some supplementary measures are always envisaged. We conduct one additional policy simulation with revenue replacement from domestic sources in order to control the public deficit at benchmark level. We scale-up the level of all domestic tax rates by the same rate (R) so that budget deficit (saving) (GS) remains constant at the benchmark level. For this particular exercise, we modify the following equations (chapter 4) with the inclusion of revenue replacement variable (R):

$$PQ_c \cdot QQ_c = PD_c \cdot QD_c\,[(1 + tq_c\,(1+R)] + PM_c \cdot QM_c \qquad c \in C \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

$$QH_{ch} = \frac{\beta_{ch} \cdot (1 - aps_h) \cdot [1 - ty_h (1 + R)] \cdot YH_h}{PQ_c} \qquad c \in C,\ h \in H \ldots\ldots\ldots\ldots\ldots (17)$$

$$GY = \sum_{h \in H} ty_h\,(1+R) \cdot YH_h + tyf \cdot (1+R) \cdot YFIR + \sum_{c \in C} tq_c \cdot (1+R) \cdot (PD_c \cdot QD_c) + \sum_{c \in CM} tm_c \cdot EXR \cdot PWM_c \cdot QM_c + EXR \cdot TR_{g,r} \qquad c \in C,\ h \in H \ldots\ldots\ldots\ldots\ldots (22)$$

$$GS \text{ exogenous at benchmark level} = GY - GE \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (24)$$

The revenue replacement (R) is the new endogenous variable in the model and is expressed as a proportion with which domestic tax rates are to be scaled-up in order to stabilise the budget deficit (GS) exogenously at the benchmark level. GS in equation 24, therefore, remains exogenous in this simulation. Here, entry of one endogenous variable has converted another

endogenous variable into exogenous, therefore, the number of single variables and equations remains still balanced.

This simulation is a combination of import liberalisation and internal reform; consequently, the way this simulation works is the combination of those two simulations and also according to their relative strengths.

With Figure 6.1, which represents the working mechanism of Nepal CGE model, we are able to trace and explain the results of individual policy simulations. This figure shows the flow structure of the Nepal CGE model. The equation numbers are on the left-hand margin in boxes. The exogenous variables belonging to the corresponding equations are on the right hand side in boxes. Also in the right hand side are the simulation parameters whose values will be adjusted in the policy simulations. Furthermore, it will give insight on where the interventions take place.

The endogenous variables are encircled. These arrangements are to make the diagonal structures as far as possible. Most arrows are directed downwards, but there are some that are horizontal; and the double arrows indicate the simultaneous solutions. Dashed circles include the already mentioned variables. Use of this format is for avoiding too many crossing lines.

We can notice some symmetry between imports and exports both in terms of prices and quantities because these two subsystems work in similar ways. In order to understand how our CGE model works, we should start with the simulation parameters (except in the devaluation scenario where the change in exchange rate, exogenous variable instead of the parameter, starts generating new equilibriums in all product, factor and money markets. The relative placements of the simulation parameters guide us to follow the track how the changes take place. The encircled endogenous variable(s) around the middle of the diagram and the number of equation(s) written at the left corner give us information regarding the intervention in the model and how the changes move. For convenient reading, we have shown how the changes take place by using downward arrows and avoiding crossings as far as possible. But, there are some exceptions.

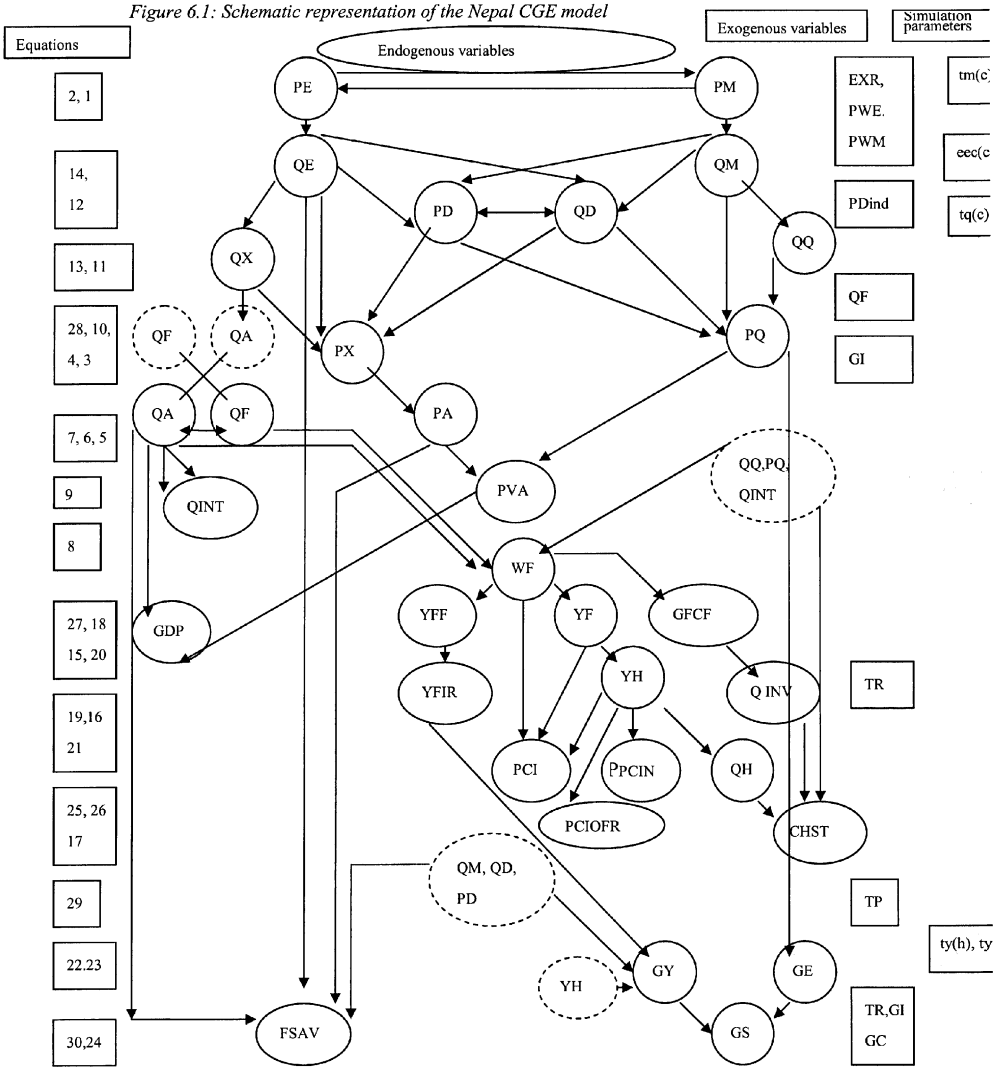
Let us make an example how the system works. If we reduce the rate of custom duties in connection with the import liberalisation, our policy simulation parameter is *tm*. When *tm* is changed, it affects the price of importable, PM, and this effect is captured by equation 1. After this point, we follow the arrows starting from PM and going downwards. The import price affects price and quantities of domestic supplies, PD and QD, as well as the total composite

supplies, QQ. All these affect the composite prices, PQ. Moreover, PD and QD affect domestic production prices, PX. So far, these changes take place through the equations 3, 4, 11, 12 and 13 as shown in the left corner.

The domestic production prices, PX, affect the activity prices, PA, which change value added prices, PVA, the major determinant of GDP. These changes occur through the equations 5, 6 and 27. On the other side, changes in composite prices, PQ, have three different effects. First, they change PVA and then GDP. Second, government expenditure, GE, is changed due to the new composite price of public commodities (equation 23). Third, it changes the wage and profit rates, WF, via the change in PVA. Changes in wage and profit rates generate reallocations of factors among activities. They affect also household and corporate incomes, YH and YFIR, (equations 15, 16, 18, and 19); change in household income affects household consumption, QH, and change in stock, CHST. The former effect is revealed by equation 17 and the latter is residual effect.

In this way, starting from the change in the import tax rates, we can envisage far reaching changes in the economy as revealed by the diagram. In similar ways, through the diagram, we can see how changes occur in case of other simulations.

Figure 6.1: Schematic representation of the Nepal CGE model



6.4. Simulation results

Here we conduct static analysis of the liberalisation measures mentioned in the previous section. We present the baseline values and the simulated values in every liberalisation drives. We use the computer software Generalised Algebraic Modelling System (GAMS) to implement this model both in its static and dynamic forms. Most researchers applying CGE models use this software to calibrate the mathematical modelling system to the data base and to analyse different policy simulations.[25]

6.4.1. Import liberalisation by Nepal

Since January 2005, Nepal has become the member of WTO. Therefore, it has to lower the custom tariff rates gradually and reach the minimum rates within a couple of decades. Moreover, Nepal is also a member of South Asia Free Trade Agreement (SAFTA); therefore, it has to eliminate custom duties in major consumer goods for promoting the free regional trade. In this context, liberalising Nepalese import trade makes a lot of sense. In the next section, we will sketch the impacts of both import liberalisation by Nepal and export liberalisation to the Nepalese products by the ROW. However, in this section, we test the impacts of import liberalisation only on commodity market, factor market, institutional income, public budget and the foreign sector.

This simulation incorporates a reduction of the import duties by 10%. The immediate effect of this import liberalisation is that the import prices, PM, of all commodities go down (Table 6.1). As the prices of importable have direct proportional impacts on the composite prices, PQ, these variables also go down except that of the composite agricultural price that marginally increases. The latter can be attributed to the fact that agricultural competitive commodity market has a very little share of import (6%) as compared to the import shares in other commodities (about 11% for industrial goods and commercial services and as high as 24% for public services) as shown by Nepal SAM 1996.[26] Therefore, reducing the tax rate does not have much influence on the composite supply of agricultural commodities as compared to others. Moreover, the increase in the price of agricultural composite goods is due to the increased demand for agricultural intermediate deliveries from the industrial sector; and this sector uses agricultural inputs in a significant proportion.

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[25] The beauty of this software is that it detects and expresses the inconsistencies, compilations and execution errors in the model so that the modeller himself can continue the exercise with the response provided by the software itself.

[26] Table 3.3.

As there is no change in the export prices, PE, because of the exogenous world market prices, PWE, and fixed exchange rate, producer prices of domestic commodities, PX, move in the same direction and are practically equal to the supply prices of domestic commodities, PD.

As activity prices, PA, in the Nepal model perfectly equal to domestic output prices, PX, which again almost equal to domestic price of domestic output, PD, we are presenting in the tables below the results for PA only. It is noted that the import liberalisation has a moderating effect on the activity price for industry by maintaining the price at the same level, while PA for the other sectors increase. The increase in the price level of these sectors is caused by a supply of goods that increases at a lower pace than the demand, partly caused by a shift of resources to industry from these sectors. This is elaborated in the tables that follow as well.

Value added price is the actual value added per unit of activity obtained by deducting the quantities of intermediate deliveries from the domestic production and imports adjusted with their respective prices. The value added price has positive relation with the corresponding activity price as the results in the last column of table 6.1 show.

Table 6.1: Baseline and simulated price indices of commodities and activities

Sectors	Baseline values					Simulated values				
	PM	PE	PQ	PA	PVA	PM	PE	PQ	PA	PVA
Agri	1.13	1.0	1.015	1.0	0.725	1.119	1.0	1.019	1.005	0.729
Ind	1.10	1.0	1.042	1.0	0.411	1.092	1.0	1.027	1.000	0.413
ComSer	1.15	1.0	1.021	1.0	0.678	1.131	1.0	1.017	1.002	0.682
OthSer	1.20	1.0	1.019	1.0	0.626	1.183	1.0	1.015	1.002	0.631

Note: Agri, Indy, ComSer, and OthSer refer to agriculture, industry, commercial services, and other services, respectively.

The unilateral import trade liberalisation causes different impacts on commodity markets in terms of production and supply. The import of industrial commodities increases fastest, followed by that of agricultural commodities; whereas in case of services, imports decline (Table 6.2). The highest growth of industrial imports in import liberalisation has three main reasons. First, Nepalese imports, QM, chiefly contain industrial products, almost half of the non-competitive imports and one-third of the competitive imports[27]. Therefore, opening foreign trade affects industrial import much more as compared to other commodities. Second, the import elasticity coefficient, ime_c is highest for industrial commodities in comparison to other commodities in our model[28]. Third, the import elasticity coefficient[29] between domestic vs.

[27] Table 3.3.
[28] Table 5.5.
[29] See Table 5.3, chapter 5. The import elasticity coefficient σ_c^q is used to define Armington exponent function for import commodities ρ_c^q, expressed as

import commodities is highest for industrial products. Therefore, higher growth of industrial import is quite obvious in import liberalisation. Agricultural import also increases due to the declining custom duties. All the factors mentioned above also apply to the agricultural import.

One may inquire why commercial and public services are imported less in import liberalisation despite the decline in the import prices. Because of the declining domestic activities of services, QA, which we will explain later, the intermediate domestic demands of services also decline. The intermediate services released from the domestic production activities go to final consumption; and therefore, making it plausible for the imports to decline despite the lower import price levels.

Because of the faster decline in composite price of industrial composite commodities as compared to others (Table 6.1), industrial production goes up more than that of the other sectors. Moreover, since Nepalese industries are highly agro-based as shown by our model calibration, [30] the increased industrial production is only possible with an expansionary agriculture. These are the reasons of the growth of industrial followed by agricultural productions, QA, in an import liberalisation scenario. Along the same reasoning, the decline in the composite price of services was least, which leads to some decline in PA of the services sector. Furthermore, the growth of the industrial and agricultural activities is only possible by the partial reallocation of factors of production from the sectors of services. This reinforces the contraction of the output in the service sectors, leading to fewer imports of services in spite of the import liberalisation.

The increase/decrease in the domestic productions by sector, QA, has proportional impacts on the domestic supply of domestic commodities, QD, supply of composite commodities, QQ, and commodity exports, QE. More specifically, high growth of domestic production, supply, import and export are all apparent in the case of industrial commodities (all these variables go up with more than 2.5%) as compared to agricultural commodities (these variables increase by less than 1%). These differences in growth rates of industrial and agricultural products are due to differences in their using of intermediate deliveries both from domestic and external sources. Table 6.2 furthermore shows QD, QQ, and QE to decline by about 3% for commercial services and by about 1% for public services because of the overall decline in QA.

$\rho_c^q = \frac{1}{\sigma_c^q} - 1$

[30] Table 5.2.

Table 6.2: Baseline and simulated quantities by commodity and activity (values in billion Rupees)

Sectors	Baseline values					Simulated values				
	QM	QE	QQ	QD	QA	QM	QE	QQ	QD	QA
Agri	8.1	5.8	128.3	119.2	125.0	8.2	5.8	129.5	120.2	126.0
Ind	16.5	33.7	105.6	86.7	120.4	17.0	34.6	108.4	88.9	123.5
ComSer	12.7	15.9	98.8	84.2	100.1	12.4	15.5	96.1	81.8	97.3
OthSer	13.3	-	53.8	38.1	38.1	13.2	-	53.5	37.8	37.8

The net effect of the growing productions of agriculture and industry and the contracting productions of services is positive as revealed by the growth in GDP (Table 6.3). The simulated values show that consumption demand of all household types' increases due to the increase in household incomes as explained by Table 6.5. Investment demand is composed of GFCF and change in stock, CHST. GFCF increases at a faster rate than the growth rate of total goods/services availability, QQ. With a supply that increases less than demand there is a decline in CHST.

The import liberalisation leads to a minimal change in the foreign savings. Having in mind that the exchange rate is fixed, foreign savings increase by about 0.8% (Table 6.3). The reason behind this inflow of more foreign capital is that import has increased faster than the export (Table 6.2). In this situation, the foreign exchange balance could only be possible with the increased foreign capital inflow.

Table 6.3: Gross domestic product, investment and change in stocks (values in million Rupees)

	Baseline values	Simulated values
GDP (at factor cost)[31]	231901.0	233238.0
Total consumption	214487.3	215570.3
Households	191469.3	192639.3
Government	23018.0	22931.0
GFCF	56081.0	56262.3
CHST	11937.0	9735.6
FSAV (in foreign currency, million)	24299.0	24506.8

Factor reallocations among sectors follow patterns consistent with growth by sectors. The growing sectors absorb more factors whereas the contracting sectors lose them. Regarding the rates of factor remunerations, they all increase due to the overall growth. However, rate of factor remuneration rises more for capital than for labour (Table 6.4). The relative rise in wages is less than that in profits. The reasons behind this relatively higher increase to the return to capital are to be found in the capital intensive mode of production of the industrial sector and in the

[31] GDP figure here is at factor cost as per our model formulation; therefore, it does not match with the total of the columns in this table. GDP at the latter approach is, in fact, at the producers' prices.

tendency for industry to be the major expanding sector in this import liberalisation policy. As factors are considered fully mobile and homogenous across all sectors, the changes in wages and profit apply to all sectors in the economy.

Table 6.4: Baseline and simulated values in factor markets

	Baseline levels	Simulated values	Total remuneration of factors in baseline= $(W_f) \cdot (QF_{fa})$	Total remuneration of factors in simulation= $(W_f) \cdot (QF_{fa})$
Wages in Rupees and profit rate				
W_f(LSL)	8068.8	8119.5		
W_f(HSL)	15255.2	15384.3		
W_f(CAP)	0.207	0.208		
QF_{fa} Factor use by activity(labour in millions, capital in mln Rupees)				
LSL-AGR	4.946	4.985	39905.0	40478.6
LSL-IND	1.265	1.296	10204.0	10522.4
LSL-CS	2.167	2.105	17482.0	17091.9
LSL-OS	1.566	1.557	12637.0	12639.6
HSL-AGR	0.498	0.501	7599.0	7708.2
HSL-IND	0.577	0.59	8809.0	9083.8
HSL-CS	0.354	0.344	5407.0	5286.4
HSL-OS	0.627	0.622	9565.0	9567.0
CAP-AGR	207860.4	209858.8	43129.0	43748.9
CAP-IND	146961.1	150835.0	30493.0	31444.3
CAP-CS	216974.0	211137.4	45020.0	44015.5
CAP-OS	7957.0	7921.3	1651.0	1651.3

We turn now to results on incomes by receiving institutions. The total factor income increases by 3.1% in the industrial sector, 1.4% in the agricultural sector and 0.2% in the public services; whereas it declines by 2.2% in the commercial services (Table 6.4). As the larger share of the agricultural value added goes to the wealthier landlords, these are in our model the large rural households, LR-HH; they become also the largest beneficiaries of the higher growth of the agricultural value added. It is shown from Table 6.5 that LR-HH income increases by 0.7%. For urban households, U-HH, it is lower at 0.52% because this household type draws its income largely from services, which is contracting under import liberalisation. But the combined effect of the returns from agriculture and industry is more than services so the net effect is still positive even to this household category. Small rural households, SR-HH, and land-less rural households, LLR-HH, benefit slightly more than the urban household category because of their high dependence on agriculture, whose production is growing. Overall, the growth of the LLR-HH income is almost equal to the national average growth rate (Table 6.5). So, there is a

reduction in poverty as all household categories have higher income following the import liberalisation. The problem left in this connection is that of persistent relative inequality, which is not reduced after import liberalisation, but is rather somewhat increased.

As the corporate sector derives more profit from commercial services than from industrial production[32], its income declines marginally due to the contraction of service activities (Table 6.5).

Table 6.5: Impact on household and firm's income (values in million Rupees)

Household and firms' income	Baseline values	Simulated values	Growth rates
YH(U-HH)	69869.0	70229.2	1.0052
YH(LR-HH)	49367.0	49712.0	1.0070
YH(SR-HH)	65488.0	65915.8	1.0065
YH(LLR-HH)	37856.0	38094.4	1.0063
PCI_{LLR-HH}	4005.2	4030.4	1.0063
PCI(N)	10690.7	10756.6	1.0062
Firms' income (YFIR)	22463.0	22339.1	-1.0055

The other major impact of import liberalisation is on the government budget. Currently custom duties comprise almost one-third of the government revenue in Nepal,[33] scaling down the import duties by 10% reduces the total revenue by about 7.6%. As there is insignificant decline in expenditure due to only the marginal decline in the composite price of public consumption goods, budget deficit increases by almost 22% (Table 6.6).

Table 6.6: Impact on government variables (values in million Rupees)

	Baseline values	Simulated values
GY	32718.0	30235.4
GE	43629.0	43542.0
GS	-10911.0	-13306.6

This import liberalisation policy has shown a reallocation of factors among the sectors that brings a higher overall GDP and that benefits poor and rich groups, the latter a bit more. But the government deficit is also bound to increase with undesirable effects for long run inflation and also for government spending on infrastructure, among others.

[32] Table 5.7.
[33] As shown in the Nepal SAM in chapter 3.

6.4.2. Export liberalisation by the ROW

In this liberalisation drive, in contrast to the previous simulation that focused on tariff reduction; however, our major concern is to analyse the effects of the non-tariff export liberalisation by the ROW applied to the Nepalese exports. As mentioned in the earlier section, we simulate the effects of the scaling-up of the export elasticity coefficient, eec_c by 10%. This non-tariff export liberalisation basically refers to relaxing the quota restrictions and similar other barriers in international trade by importing countries.

As this sort of trade liberalisation is considered from the side of the ROW and there is no domestic change in the import and export tariff structure, import and export prices, PM and PE, do not change (Table 6.7); however, other price structures do change as a result of quantity changes. Composite price, PQ, of agricultural commodities marginally increases whereas that of industrial commodities decreases. The reason behind the increase in agricultural composite price is the faster growth of the agricultural export, QE, than the domestic supply, QA, (Table 6.8) which increases relative demand in the domestic market. But this is not the case for the composite industrial commodity market. Here, the export and the domestic production grow at the same rate so that the composite price can not go up; rather the increasing import, QM, (Table 6.8) pushes the price downward. In case of the service sectors, there is virtually no change in the composite prices. The reason behind this is the almost same level of contraction in the domestic production and export. The contraction in services is further reinforced by the partial reallocation of factors of production from the services to the agricultural and industrial activities.

Because of the increasing export, activity price, PA, of agricultural commodities goes up (Table 6.7). The same is also expected in case of the industrial commodities; however, due to the greater use of production factors and intermediate deliveries in the industrial sector, being a major exporting sector in Nepal, the activity price stabilises around the baseline value. Conversely, due to the partial transfer of factors and other intermediate deliveries from the services to the other sectors, the activity prices in service sectors undergoes a slight increase.

The value added prices, PVA, increase in all sectors (Table 6.7). This is because of two reasons; declining composite prices and increasing activity prices in most of the sectors.

Table 6.7: Effects on prices of commodities and activities

Sectors	Baseline values					Simulated values				
	PM	PE	PQ	PA	PVA	PM	PE	PQ	PA	PVA
Agri.	1.132	1.0	1.015	1.0	0.725	1.132	1.0	1.018	1.004	0.728
Ind	1.103	1.0	1.042	1.0	0.411	1.103	1.0	1.028	1.000	0.413
ComSer	1.146	1.0	1.021	1.0	0.678	1.146	1.0	1.02	1.002	0.681
OthSer	1.204	1.0	1.019	1.0	0.626	1.204	1.0	1.02	1.002	0.630

Export liberalisation promotes export of most of the commodities. As Table 6.8 shows, exports of agricultural and industrial commodities increase whereas those of commercial services decrease. The higher export performance of agricultural and industrial commodities is because of the higher export elasticity coefficient in our model. Therefore, these sectors are more sensitive to the removal of export barriers. The declining export of commercial services is due to the declining production caused by the reallocation of production factors to the export oriented sectors.

Export liberalisation changes also the import structure. The imports, QM, of agricultural and industrial commodities increase while those of services decline. In the case of the increasing exports of agricultural and industrial commodities, the gap in domestic demand is fulfilled by increasing imports. However, in case of services, imports decline. This is due to the declining production of services activities, QA. These import and export changes guide the overall activity, QA, structure in the economy, i.e. expansionary in agricultural and industrial activities and contractionary in services activities. Similar changes are realised in composite supplies of commodities, QQ, and domestic supply of domestic output, QD.

Table 6.8: Impact on quantities in commodity and activity markets (values in billion Rupees)

Sectors	Baseline values					Simulated values				
	QM	QE	QQ	QD	QA	QM	QE	QQ	QD	QA
Agri	8.1	5.8	128.3	119.2	125.0	8.29	5.8	129.5	120.3	126.1
Ind	16.5	33.7	105.6	86.7	120.4	17.0	34.6	108.5	89.1	123.9
ComSer	12.7	15.9	98.8	84.2	100.1	12.3	15.4	95.9	81.7	97.2
OthSer	13.3	-	53.8	38.1	38.1	13.2	-	53.3	37.8	37.8

Because of the overall increase in the prices of value added, PVA, the GDP increases by about 4.5% (Table 6.9). Private consumption increases because of the increased household income, YH (Table 6.11). There is also a small increase in government consumption expenditure due to the higher price of public commodities. Due to the increase in domestic consumption, intermediate demand, and export of agricultural and industrial goods, the stock change declines as it is a balancing factor in the commodity balance equation. However, the gross fixed capital formation, GFCF, increases along with the growth of the GDP. Furthermore, there is an increase

in foreign savings (Table 6.9) because of the increased intermediate import and faster growth of imports than exports.

Table 6.9: Gross domestic product, investment and change in stocks (values in million Rupees)

GDP (at factor cost)	Baseline values	Simulated values
	231901.0	232942.2
Total consumption	214487.0	215462.2
Households	191469.0	192410.0
Government	23018.0	23052.2
GFCF	56081.0	56217.6
CHST	11937.0	10130.2
FSAV (million, in foreign currency)	24299.0	24330.0

The growth in GDP is consistent with the increase in the rate of remunerations (Table 6.10). All factor categories get higher rate of remuneration in this scheme of export liberalisation. This increase is due to the increased demand for production factors in the export oriented sectors. Because of the homogeneity of factors by skill categories, these higher rates apply to all sectors.

Table 6.10: Baseline and simulated values in factor markets

	Baseline levels	Simulated values	Total remuneration of factors in baseline= $(W_f) . (QF_{fa})$	Total remuneration of factors in simulation= $(W_f) . (QF_{fa})$
Wages in Rupees and profit rate				
W_f(LSL)	8068.9	8108.2	-	
W_f (HSL)	15255.2	15363.1	-	
W_f (CAP)	0.207	0.208	-	
QF_{fa} *Factor use by activity(labour in millions, capital in mln Rupees*				
LSL-AGR	4.946	4.988	39905.0	40445.8
LSL-IND	1.265	1.299	10204.0	10531.8
LSL-CS	2.167	2.102	17482.0	17042.3
LSL-OS	1.566	1.554	12637.0	12599.8
HSL-AGR	0.498	0.501	7599.0	7702.0
HSL-IND	0.577	0.592	8809.0	9092.0
HSL-CS	0.354	0.343	5407.0	5271.0
HSL-OS	0.627	0.621	9565.0	9536.90
CAP-AGR	207860.35	209931.94	43129.0	43713.6
CAP-IND	146961.11	151146.58	30493.0	31472.8
CAP-CS	216974.04	210768.45	45020.0	43887.7
CAP-OS	7957.00	7905.54	1651.0	1646.2

All three types of production factors undergo reallocations from the service sectors to the agricultural and industrial sectors. The value added of factors by skill categories in different activities change in similar way to that of the factor reallocations.

All four types of households get higher income (Table 6.11) due to higher rates of factor remunerations. However, income of large rural households, LR-HH, grows fastest (0.58%) and that of urban households at the slowest rate (0.4%). Income of the other two rural household categories grows at about 0.5%. The slowest growth of the urban household income is due to their relatively greater dependence on services, which undergoes contraction in this simulation. Households depending more on industrial and agricultural sectors are benefiting more because of the expansion of these activities.

Table 6.11: Impact on household and firm's income (values in million Rupees)

Household and firms' income	Baseline values	Simulated values	Growth rates
YH(U-HH)	69869.0	70145.4	1.0040
YH(LR-HH)	49367.0	49655.1	1.0058
YH(SR-HH)	65488.0	65838.3	1.0053
YH(LLR-HH)	37856.0	38047.2	1.0051
PCI_{LLR-HH}	4005.2	4025.4	1.0050
PCI(N)	10690.7	10743.8	1.0050
Firms' income (YFIR)	22463.0	22310.1	-1.0068

The growth rate of the land-less rural household per capita income is almost equal to that of the national average. Therefore, this policy is neither pro-poor nor anti-poor. However, the corporate sector is earning less (Table 6.11) due to the contraction of services activities, which is the major source of the corporate income.

In the public sector, government income, GY, declines (Table 6.12) due to the decline in imports of service commodities which have high rates of import duties[34]. Moreover, the decline in firms' income also reduces the corporate tax revenue to the government. Government expenditure, however, increases marginally due to the slight increase in the price of public services. The increasing government expenditure and declining revenue causes the budget deficit rise by about 17%.

[34] Table 5.6.

Table 6.12: Impact on government variables (values in million Rupees)

	Baseline values	Simulated values
GY	32718.0	30936.2
GE	43629.0	43663.2
GS	-10911.0	-12727.1

Export liberalisation by the rest of the world to the Nepalese export brings many changes not only to its external sector but also in the domestic economy. Factor reallocation occurs to the major exportable sector, i.e. industry, and also to the agricultural sector to a lesser degree that has the strong input-output linkages with the industrial sector. Due to the factor reallocation, services activities decline, so do the import and export of services as well. Due to the higher rate of factor remuneration, all household groups increase their income, least among them are the urban households, and most among them are the large rural households. The growth rate of land-less rural household income is almost equal to that of the national average. Therefore, this liberalisation, while reducing absolute poverty, seems to be neither worsening inequality nor contributing to reducing it. In the public sector, budget deficit widens (1,800 million Rupees) due to the decline in the government income caused by declining imports of services commodities. The higher capital inflow required to finance the greater trade deficit amounts to only 24,331 million. Both deficits are smaller in the export liberalisation scenario than in the import liberalisation scenario, suggesting that most developing countries would find it more feasible and attractive to pursue and push for the export rather than import liberalisation measures.

6.4.3. Import liberalisation by Nepal and export liberalisation by the ROW

Here, we implement the simulation runs of sections 6.4.1 and 6.4.2 together and examine the results of the import and export liberalisation measures, indeed under the fixed exchange rate system.

The trade liberalisations, implemented as import liberalisation by Nepal and export liberalisation by ROW, bring significant changes in the activity and commodity markets. The liberalisation measures push the prices of importable and composite goods downwards; however, the prices of exports, PE, do not change (Table 6.13). The composite price, PQ, of agricultural commodities goes up; whereas that of all other commodities/services goes down. Despite declining import prices and increasing imports, the agricultural composite price goes up because of the increased intermediate demand from agricultural and industrial sectors which are growing to meet the increasing export demand. The composite price of industrial commodities, however, follows the simple rule of a decline due to declining import price caused by import

liberalisation. Likewise, the declining composite price of services is also straightforward due to increasing supply from import liberalisation.

The activity price, PA, of industrial commodities hardly increases because industrial composite market contains a big share of imports. In rest of the cases, the activity price increases but the reasons are different for different activity markets. For agriculture, it increases because of the increasing demand for agricultural intermediate commodities as well as that of the agricultural exports. On the other hand, the activity prices of the services increase because of the partial scarcity of the production factors that reallocate to agricultural and industrial production. Moreover, due to the increase in the activity prices of almost all commodities, the value added prices also go up in all commodity markets.

Table 6.13: Effects on prices of commodities and activities

Sectors	Baseline values					Simulated values				
	PM	PE	PQ	PA	PVA	PM	PE	PQ	PA	PVA
Agri	1.132	1.0	1.015	1.0	0.725	1.119	1.0	1.019	1.005	0.729
Ind	1.103	1.0	1.042	1.0	0.411	1.092	1.0	1.027	1.000	0.413
ComSer	1.146	1.0	1.021	1.0	0.678	1.131	1.0	1.017	1.002	0.682
OthSer	1.204	1.0	1.019	1.0	0.626	1.183	1.0	1.015	1.002	0.631

In the combined trade liberalisation, we can observe increasing imports but only in agricultural and industrial commodities (Table 6.14). In services, imports decline. Similar is the case for exports. These unidirectional changes in import and export performance are quite similar to those of the separate simulations of import and export liberalisations. Therefore, similar logic applies here too. But, the degrees are different. Comparison among the figures in Table 6.2, 6.8, and 6.14 shows that import quantities are not significantly different between import liberalisation alone and combined import and export liberalisation; whereas exports are distinctly higher in export liberalisation alone as compared to the combined trade liberalisation.

In consistency with previous results, exports, QE are expected to rise because of the scaling-up of the export elasticity coefficient, eec_c; the rise is concentrated in agricultural and industrial commodities. However, there is shrinkage in commercial service export (Table 6.14). This can be attributed to the overall contraction of the service activities because of factor reallocation to agro-industrial sectors, resulting in domestic supply, composite supply, export all declining in case of commercial services. Similar is the case for public services.

The volumes of activities, QA, expand in agriculture and industry and contract in services. For the same reasons, import grows faster than export for agricultural and industrial commodities in

this scenario. It can be attributed to the higher coefficients for elasticity of substitution between import and domestic supplies than elasticity of substitution between domestic supplies and export in agricultural and industrial commodities in our model[35]. The slower decline in imports than exports of services is also due to the same reason.

Results for the composite commodity market, QQ, and domestic supplies, QD, closely resemble each other. Growth in the composite agricultural and industrial commodities and contraction in commercial and other services occur with similar changes in domestic production, QA, and supply, QD, of these commodities (Table 6.14).

Table 6.14: Impact on quantities of commodity and activity (values in billion Rupees)

Sectors	Baseline values					Simulated values				
	QM	QE	QQ	QD	QA	QM	QE	QQ	QD	QA
Agri	8.1	5.8	128.3	119.2	125.0	8.2	5.8	129.5	120.3	126.1
Ind	16.5	33.7	105.6	86.7	120.4	17.0	34.6	108.4	88.9	123.5
ComSer	12.7	15.9	98.8	84.2	100.1	12.4	15.5	96.1	81.9	97.3
OthSer	13.3	-	53.8	38.1	38.1	13.2	-	53.5	37.8	37.8

The combined effect of import and export liberalisation on GDP is positive as it grows by about 0.58% (Table 6.15). As shown by Table 6.14, industrial growth is the major contributor to this change. Due to the increase in investment demand, consumption demand, and export demand of agricultural and industrial commodities, which collectively exceeds the total growth of imports and domestic supplies of them, the stock changes declines. The foreign savings, FSAV, increase also by about 0.9% due to imports growing faster than export. It is noted that the increase in FSAV in the combined trade liberalisation is lower than in the separate import and export liberalisations.

An important conclusion is that the increase of the GDP in the combined trade liberalisation is less than the sum of the increases in the GDP in the separate import and export liberalisations. The growth in GDP is possible from two ways; either by the growth in value added prices, PVA; or by growth in activities, QA; or by both of them[36]. If we compare the simulated figures of PVA in tables 6.1, 6.7, and 6.13, we can observe insignificant differences in PVA among the simulations. Therefore, the differences in the levels of GDP must have been caused by the differences in activity levels. The changes in activity levels are limited by factor constraints[37] that are available for all sectors of activities together. This implies that some GDP benefits across countries are cancelled in a combined trade liberalisation. It can then be suggested that it

[35] Table 5.5.
[36] Equation 27, chapter 4.
[37] Equation 7, chapter 4.

can be desirable to separate the liberalisation measures, and apply them in a consecutive order instead of jointly, to assure catching more GDP benefits.

Table 6.15: Gross domestic product, investment and change in stocks (values in million Rupees)

GDP	Baseline values	Simulated values
	231901.0	233236.0
Total consumption	214487.0	215568.7
Households	191469.0	192637.8
Government	23018.0	22930.9
GFCF	56081.0	56262.01.
CHST	11937.0	9740.0
FSAV	24299.0	24511.2

Rates of return increase to all factors, more to labours and relatively less to capital. Though these differences are marginal (Table 6.16), the overall production in the economy seems moving towards intensifying the labour content. This increase in the relative demand of labours is quite useful from the perspective of poverty alleviation as majority of the poor have only the labour income supplemented by some transfers from both domestic and foreign sources.

Table 6.16: Baseline and simulated values in factor markets

	Baseline levels	Simulated values	Total remuneration of factors in baseline= $(W_f) \cdot (QF_{fa})$	Total remuneration of factors in simulation= $(W_f) \cdot (QF_{fa})$
Wages in Rupees and profit rate				
W_f(LSL)	8068.79	8119.45		
W_f(HSL)	15255.23	15384.20		
W_f(CAP)	0.207	0.208		
QF_{fa} Factor use by activity(labour in millions, capital in mln Rupees				
LSL-AGR	4.946	4.985	39905.0	40478.06
LSL-IND	1.265	1.296	10204.0	10522.62
LSL-CS	2.167	2.105	17482.0	17091.47
LSL-OS	1.566	1.557	12637.0	12639.51
SL-AGR	0.498	0.501	7599.0	7708.13
HSL-IND	0.577	0.590	8809.0	9084.06
HSL-CS	0.354	0.344	5407.0	5286.21
HSL-OS	0.627	0.622	9565.0	9566.90
CAP-AGR	207860.35	209857.76	43129.0	43748.36
CAP-IND	146961.11	150840.04	30493.0	31445.13
CAP-CS	216974.04	211133.40	45020.0	44014.29
CAP-OS	7957.00	7921.30	1651.0	1651.33

As is evident from the above table, returns to factors increase faster than the quantity of factors in activities. Likewise, in case of the contractionary sectors, decline in the total return to factors is less than the decline in the quantity of the factors employed (commercial services); and values of the factor incomes have increased despite the decrease in factors employed (public services). These are the indications to the improvement in factor productivity.

Concurrent liberalisation of both imports and exports is in favour of all household categories; however, the increases in their incomes are only marginal. The combined trade liberalisation benefits the large rural households most followed by small rural households and land-less rural households. The urban households benefit the least (Table 6.17) because of the contractonary commercial services and nominal growth of other services, which are the major sources of its income. The large rural households become the most beneficiary because of the growth of agricultural value added (Table 6.16) and the high share of agricultural income that goes to this household category[38]. The land-less rural households' per capita income growth rate is not below the rate of national average (Table 6.17). Therefore, though this liberalisation scheme is not so attractive for the pro-poor growth, neither it is regressive one.

Table 6.17: Impact on household and firm's income (values in million Rupees)

Household and firms' income	Baseline values	Simulated values	Growth rates
YH(U-HH)	69869.0	70232.40	1.0052
YH(LR-HH)	49367.0	49713.39	1.0070
YH(SR-HH)	65488.0	65912.12	1.0065
YH(LLR-HH)	37856.0	38092.84	1.0063
PCI_{LLR-HH}	4005.2	4030.26	1.0063
PCI(N)	10690.7	10756.52	1.0062
Firms' income (YFIR)	22463.0	22338.99	-1.0055

Reduction in the import tariff has significant impact on the government revenue: 10% reduction in the rate of import duties has led to approximately 8% reduction of the total government revenue. There is a marginal reduction in government expenditure (Table 6.18) due to the decline of the price of public services (Table 6.13). The high reduction in revenue and marginal reduction in expenditure cause a wide fiscal deficit of about 22% (Table 6.18).

Table 6.18: Impact on government variables (values in million Rupees)

	Baseline values	Simulated values
GY	32718.0	30235.4
GE	43629.0	43541.9
GS	-10911.0	-13306.5

[38] Table 5.7.

Summarising, the industrial sector expands in this import and export liberalisation under the fixed exchange rate system because of the higher elasticity of substitution between import and domestic supplies and higher export elasticity coefficient pertinent to this sector. Agricultural sector also follows the same trend but with lesser degree. The domestic activities and supplies also follow this order. These expansions are at the cost of contraction of services due to factor constraints. The net result of the combined trade liberalisation is an increase in the GDP but this increase is lower than the sum of the increase in the GDP in the two separate import and export liberalisations. Although household incomes increase and absolute poverty is reduced, the results in relative terms cannot be described as pro-poor growth. Government budgetary situation worsens because of a higher fiscal deficit, and more foreign capital inflow is required to satisfy the trade balance.

On the whole, the policy of combined trade liberalisation, and the implied doubling of policy efforts that go with it, do not seem to bring double benefits; suggesting that it is more desirable to pursue separate lines of external liberalisation, one at a time.

6.4.4. Complete external sector reform (CER)

Here we simulate the effect of the combined import liberalisation by Nepal, and export liberalisation by the rest of the world, under an *endogenous* flexible exchange rate regime and an *exogenous* foreign savings. Here, our experiment is with 10% reduction of the import duties, tm_c, 10% increase in export elasticity coefficient, eec_c, and 10% increase in the foreign saving, FSAV, from the level where it was solved in the last reported combined trade liberalisation. This simulation can be named "most open trade liberalisation policy" as it allows imports, exports, and the exchange rate to move more freely. Generally speaking, such an open door policy is appreciated by foreign investors, can be expected to be accompanied by more foreign direct investment and capital inflow, which is represented by the higher FSAV contemplated in the simulation. As will be shown below, the performance results of this open door policy in terms of growth, inequality and the public deficit appear to be disappointing when compared to alternative external liberalisation policies treated in the previous sections.

The driving force in the simulation is the solution for the exchange rate, EXR. There is an appreciation of the domestic currency by about 3.1% in this simulation. In the foreign exchange market, higher exogenous foreign saving, FSAV, has caused the appreciation of the domestic currency by 3.1%.

Prices of the import commodities go down as an effect of import liberalisation. The prices of exportable in terms of domestic currency, PE, go down by the same rate too (Table 6.19). The decline in the import prices lead to the overall decline of the composite prices, PQ. Due to the decline in export prices, the activity prices also decline via the decline in the prices of domestic production of commodities. This results in turn in an overall decline in the value added prices, PVA.

Table 6.19: Effects on prices of commodities and activities

Sectors	Baseline values					Simulated values				
	PM	PE	PQ	PA	PVA	PM	PE	PQ	PA	PVA
Agri	1.132	1.0	1.015	1.0	0.725	1.084	0.969	0.999	0.985	0.715
Ind	1.103	1.0	1.042	1.0	0.411	1.085	0.969	1.020	0.983	0.405
ComSer	1.146	1.0	1.021	1.0	0.678	1.096	0.969	0.999	0.984	0.669
OthSer	1.204	1.0	1.019	1.0	0.626	1.146	0.969	0.993	0.985	0.619

The agricultural and industrial imports, QM, increase because of the lower Armington function exponent to import commodity, ρ_c^q,[39] which bears inverse relation with quantity of import, and high elasticity of substitution between import and domestic commodities something which is weaker in services. The decline in the services imports is because of two factors. First, the elasticity of substitution between imports and domestic supplies are lower in services, second, the declining domestic production of services due to the factor transfer to non-service sectors releases service intermediate deliveries for final consumption causing the decline of imports (Table 6.20).

Complete external sector reform at once has a bad effect on the export performance due to the appreciation of the domestic currency. Exports of all sectors decline in this scenario (Table 6.20). On the other hand, domestic activities, QA, like agriculture and industries, which use high proportion of the intermediate imports, produce more. Additional factors of production required to realise this expansion come from services activities resulting the contraction of services activities.

Table 6.20: Impact on quantities of commodity and activity (values in billion Rupees)

Sectors	Baseline values					Simulated values				
	QM	QE	QQ	QD	QA	QM	QE	QQ	QD	QA
Agri	8.1	5.8	128.3	119.2	125.0	8.3	5.7	129.8	120.6	126.4
Ind	16.5	33.7	105.6	86.7	120.4	17.3	33.2	108.8	89.1	123.1
ComSer	12.7	15.9	98.8	84.2	100.1	12.4	15.3	96.1	81.8	97.2
OthSer	13.3	-	53.8	38.1	38.1	13.3	-	53.5	37.8	37.8

[39] Table 5.5.

Complete external sector reform all at once does not result in good performance of the economy as the GDP declines by about 1.4%. Moreover, gross fixed capital formation also declines by about 1% (Table 6.21). The rise in domestic demand of agricultural and industrial commodities is compensated by declining export (Table 6.20) and downward adjustment in inventory stocks, CHST, (Table 6.21).

Table 6.21: Gross domestic product, investment and change in stocks (values in million Rupees)

GDP	Baseline values	Simulated values
	231901.0	228674.1
Total consumption	214487.0	211325.6
Households	191469.0	188898.7
Government	23018.0	22426.8
GFCF	56081.0	55492.0
CHST	11937.0	11262.5
FSAV (million, in foreign currency)	24299.0	26962.3

Consistent with the decline in the GDP, rates of remuneration to factors also decline marginally. Though nominal, this decline is slightly more in case of low-skilled labour than the other two factors. Due to the contraction of the service sectors, all three factors of production are partially released and are absorbed by the other two sectors. Factor absorption is more in industries than in agriculture (Table 6.22).

Table 6.22: Baseline and simulated values in factor markets

	Baseline levels	Simulated values	Total remuneration of factors in baseline= $(W_f) . (QF_{fa})$	Total remuneration of factors in simulation= $(W_f) . (QF_{fa})$
Wages in Rupees and profit rate				
W_f(LSL)	8068.79	7966.25		
W_f(HSL)	15255.23	15077.83		
W_f(CAP)	0.207	0.204		
QF_{fa} *Factor use by activity(labour in millions, capital in mln Rupees)*				
LSL-AGR	4.946	4.995	39905.0	39790.50
LSL-IND	1.265	1.291	10204.0	10281.77
LSL-CS	2.167	2.101	17482.0	16736.44
LSL-OS	1.566	1.557	12637.0	12399.67
HSL-AGR	0.498	0.503	7599.0	7577.20
HSL-IND	0.577	0.589	8809.0	8876.14
HSL-CS	0.354	0.343	5407.0	5176.41
HSL-OS	0.627	0.622	9565.0	9385.36
CAP-AGR	207860.35	210487.64	43129.0	43005.25
CAP-IND	146961.11	150384.38	30493.0	30725.40
CAP-CS	216974.04	210951.49	45020.0	43100.01
CAP-OS	7957.00	7929.00	1651.0	1619.99

Factor incomes by activities decline except in industrial activities. This decline is more severe in commercial services followed by other services and agriculture (Table 6.22). These changes have direct impacts on household incomes. For all type of households, income decline due to the lower rate of remuneration to all the factors. Furthermore, urban households lose most because of their heavy dependence on services activities, which are undergoing contraction in this simulation. Among the rest of household categories, the decline is almost uniform. However decline in per capita income of the poorest household category, land-less rural households, is less than the national average decline (Table 6.23) but they also end up as losers anyway suggesting that the most open trade liberalisation scenario is the worst of all four external liberalisation scenarios. There is an overall decline in the GDP, household incomes, and those of the poorest in particular, implying a likely increase in poverty.

The corporate income declines even faster than household incomes since its source is capital income, whose rate of remuneration has declined coupled with its more share in commercial services value added that is also declining at faster rate.

Table 6.23: Impact on household and firm's income (values in million Rupees)

Household and firms' income	Baseline values	Simulated values	Growth rates
YH(U-HH)	69869.0	68790.18	-0.0154
YH(LR-HH)	49367.0	48769.10	-0.0121
YH(SR-HH)	65488.0	64667.76	-0.0125
YH(LLR-HH)	37856.0	37379.43	-0.0126
PCI_{LLR-HH}	4005.2	3954.78	-0.0126
PCI(N)	10690.7	10547.86	-0.0134
Firms' income (YFIR)	22463.0	21982.47	-0.0214

Government's budgetary situation worsens due to significant reduction (9.4%) in revenue because of the reduction in tariff rates and decline in expenditure by the price decline for composite public services, and marginal reduction in expenditure (1.4%) so that budget deficit widens by about 23% (Table 6.24). The decline in revenue and, thus, the government budgetary situation is the worst as compared to the previous three scenarios.

Table 6.24: Impact on government variables (values in million Rupees)

	Baseline values	Simulated values
GY	32718.0	29650.9
GE	43629.0	43037.8
GS	-10911.0	-13387.0

Summarising, complete external sector reform implemented altogether brings some contractionary effects in the economy, GDP; while household incomes for all groups decline due to the declining rate of remuneration to factors. Government budgetary situation worsens caused by declining custom duties. In the following section, we will consider the opposite case, i.e. the depreciation of the domestic currency but without trade liberalisation and observe the results.

The lesson learned so far is that a stage-wise liberalisation strategy is more beneficial than an all-in-one external reform. The liberalisation drive can be better started by either import liberalisation or export liberalisation by ROW, and complimented by the other policy over time. Freely moving foreign exchange rates and an elevated foreign capital inflow beyond the absorption needs of the receiving economy can be detrimental for the growth process as it may push EXR up and reduce competitiveness at a moment where the developing economy is best helped by more competitive prices in the world market. One and the other boils up to the correct timing and sequence in the application of external reform measures that are complimentary in the long run.

6.4.5. Devaluation

Devaluation of the domestic currency, though not necessarily a liberalisation measure, has been one of the most important policy levers among conventional structural adjustment programmes in developing countries like Nepal. The major goal of this policy is to promote exports, reduce imports and, thus, narrow the deficit in the balance of payments. Nepal did also devalue its currency by about 15% with reference to the currencies of major trading partners in 1986 as a part of the structural adjustment programme; however, its explicit impact on the domestic economy is seldom assessed with CGE tools. Here we examine such effects. In this section, we analyse the impact of a devaluation of Nepalese currency by 10% for the sake of comparison with other simulation scenarios where the policy variables were also changed by 10%.

The immediate effect of the currency devaluation is on the prices of importable and exportable. A 10% devaluation of the Nepalese currency leads to 10% rise in the prices of the export, PE, and import, PM, commodities in terms of the domestic currency, (Table 6.25). The increase in the prices of importables pushes the composite prices, PQ, upwards. This is counteracted by a significant increase in the production and domestic supply of industrial commodities (Table 6.26) as compared to other commodities causing only a very small increase in the composite price of industrial commodities (Table 6.25).

Due to the rise in the prices of exportables and also that of domestic supplies, the activity prices, PA, also go up. Activity prices have a positive relation and the composite prices have an inverse relation with the value added prices.[40] In total, their impact is positive in this simulation as revealed by the increase in value added prices, PVA, (Table 6.25).

Table 6.25: Effects on prices of commodities and activities

Sectors	Baseline values					Simulated values				
	PM	PE	PQ	PA	PVA	PM	PE	PQ	PA	PVA
Agri	1.132	1.0	1.015	1.0	0.725	1.245	1.1	1.082	1.067	0.775
Ind	1.103	1.0	1.042	1.0	0.411	1.213	1.1	1.048	1.054	0.44
ComSer	1.146	1.0	1.021	1.0	0.678	1.26	1.1	1.082	1.064	0.725
OthSer	1.204	1.0	1.019	1.0	0.626	1.324	1.1	1.093	1.06	0.67

Consistent with the objective of a currency devaluation, overall imports declined. Moreover, devaluation of the domestic currency by 10% causes a high growth in industrial exports (15%, Table 6.26). Furthermore, a small increase in the agricultural export, about 3%, is realised. Overall contraction of the service sector because of the reallocation of production factors

[40] Equation 6, chapter 4.

towards agricultural and industrial activities causes the export of commercial services to decline by about 1%.

Devaluation causes a reallocation of production factors to industry and agriculture (Table 6.28) leading to an expansion of agricultural and industrial activities and contraction of service activities (Table 6.26), resulting in the reported changes in domestic supplies, QD, and composite supplies of commodities, QQ.

Table 6.26: Impact on quantities of commodity and activity (values in billion Rupees)

Sectors	Baseline values					Simulated values				
	QM	QE	QQ	QD	QA	QM	QE	QQ	QD	QA
Agri	8.1	5.8	128.3	119.2	125.0	8.0	5.9	128.5	119.4	125.2
Ind	16.5	33.7	105.6	86.7	120.4	16.2	38.8	107.4	89.1	125.0
ComSer	12.7	15.9	98.8	84.2	100.1	12.3	15.8	95.9	81.9	97.5
OthSer	13.3	-	53.8	38.1	38.1	13.1	-	53.2	37.7	37.7

The net effect of expansionary agriculture and industry and contractionary services is positive as revealed by an almost 7% increase in the GDP (Table 6.27). Consumption expenditure of households has increased because of the increase in household income. On the other hand, public consumption expenditure rises as a price effect of composite commodities. Gross fixed capital formation, GFCF, has also increased by 5% (Table 6.27).

With significant expansion in the domestic demand of agricultural and industrial commodities, increase in their export, and higher investment demand, the change in stock, CHST, declines drastically (Table 6.27).

Finally, trade effects under a devaluation policy give reduced imports, increased exports, and by definition, reduced foreign saving, SAV, in this case by almost 29%.

Table 6.27: Gross domestic product, investment and change in stocks (values in million Rupees)

GDP	Baseline values	Simulated values
	231901.0	247907.2
Total consumption	214487.0	229358.2
Households	191469.0	204665.4
Government	23018.0	24692.8
GFCF	56081.0	58742.3
CHST	11937.0	5200.9
FSAV (million, in foreign currency)	24299.0	17359.1

Growth in GDP, with fixed total factor supplies, means higher rates of return to the production factors. Rates of remuneration to all three types of factors increase by almost 7%; however, it is

slightly more to skilled labour and capital as compared to the low-skilled labour. This suggests that skill-upgrade is very much essential for making policies of structural adjustment beneficial to the poor. We will incorporate similar analysis in the dynamic CGE model in the next chapter.

We can see significant reallocation of the factors in the wake of devaluation. Employment of all three types of factors increases in the industrial sector; whereas it decreases in both service sectors. Agricultural sector, however, marginally increases the low-skilled labour and shows almost no change to high-skilled labours. These factor reallocations towards tradable goods support the idea behind conventional structural adjustment belief that devaluation helps integrating and linking labour in developing economies to the global market through their reallocation to the production of tradable goods.

As households draw constant shares of the disaggregated factor income by activities, the changes in household income directly follows the changes in factor income distribution by activities. Table 6.28 shows growth in agricultural value added, the major determinant of the poor's income, is modest (7%). Industrial value added grows at highest rate (11%) whereas the services value added at lowest rates, 4% and 6% for commercial services and public services.

Table 6.28: Baseline and simulated values in factor markets

	Baseline levels	Simulated values	Total remuneration of factors in baseline= $(W_f) . (QF_{fa})$	Total remuneration of factors in simulation= $(W_f) . (QF_{fa})$
Wages in Rupees and profit rate				
W_f (LSL)	8068.79	8610.61		
W_f (HSL)	15255.23	16370.62		
W_f(CAP)	0.21	0.222		
QF_{fa} *Factor use by activity(labour in millions, capital in mln Rupees*				
LSL-AGR	4.946	4.959	39905.0	42699.6
LSL-IND	1.265	1.316	10204.0	11329.9
LSL-CS	2.167	2.113	17482.0	18196.9
LSL-OS	1.566	1.555	12637.0	13388.8
HSL-AGR	0.498	0.497	7599.0	8131.2
HSL-IND	0.577	0.597	8809.0	9781.0
HSL-CS	0.354	0.344	5407.0	5628.1
HSL-OS	0.627	0.619	9565.0	10134.0
CAP-AGR	207860.35	208021.43	43129.0	46149.3
CAP-IND	146961.11	152616.02	30493.0	33857.7
CAP-CS	216974.04	211230.31	45020.0	46861.2
CAP-OS	7957.00	7884.74	1651.0	1749.2

Incomes of all household categories go up in this simulation. Urban households, U-HH, are the most beneficiary as the industrial sector grows faster than the rate of contraction of service sectors. These two are the major sources of urban household income. Among the rest of the households, the growth rate of income is almost uniform. Even between the urban households and the rest, differences are minimal, urban households by 7.2% and the rest of the households by 6.7%. Though all the household categories benefit in this devaluation scenario, it does not lead to the desired pro-poor growth, as the per capita income growth rate of poorest household category, LLR-HH, falls marginally behind (6.7%) the national average (6.9%).

Table 6.29: Impact on household and firm's income (values in million Rupees)

Household and firms' income	Baseline values	Simulated values	Growth rates
Households			
YH(U-HH)	69869.0	74881.3	1.0717
YH(LR-HH)	49367.0	52750.8	1.0685
YH(SR-HH)	65488.0	69914.6	1.0676
YH(LLR-HH)	37856.0	40379.3	1.0667
PCI_{LLR-HH}	4005.2	4272.2	1.0667
PCI(N)	10690.7	11427.8	1.0689
Firms' income (YFIR)	22463.0	23476.6	1.0451

The government sector is not well off in the devaluation scenario. The revenue, GY, increases only marginally (0.5%) (Table 6.30), as a result of the combined effects of declining custom duties under contractionary imports and increasing domestic indirect tax revenue due to the expansion of industrial and agricultural activities. However, expenditure increases by about 3.8% because of the rise in prices of composite commodities (Table 6.25), thus widening the budget deficit by almost 14% (Table 6.30).

Table 6.30: Impact on government variables (values in million Rupees)

	Baseline values	Simulated values
GY	32718.0	32882.3
GE	43629.0	45303.8
GS	-10911.0	-12421.6

Summarising, we can reiterate that a devalued exchange rate reduces imports, increases exports and enhances production and domestic supply in consistency with neo-classical economic thinking. Moreover, the devaluation as a major policy lever of the structural adjustment seems quite useful for the short-run from the viewpoint of growing domestic activities, and the foreign payments balance. Household incomes also grow but it is not a pro-poor growth. Therefore, it is not so attractive from the distribution viewpoint. Furthermore, the government budgetary

situation worsens due to the rise in fiscal deficit. So, the resulting picture is a mixed one with some more and some less desirable effects.

6.4.6. Internal reform

The major objective of internal reform is to raise government revenue for reducing wide fiscal deficit. Here, we try to simulate the effects of reducing public deficit by 10%. This keeps in line with the 10% comparable effort in the policy simulations applied so far. In order to achieve the goals of internal reform, one possible avenue is a 14% increase in indirect tax rates to non-agricultural products, 18% increase in corporate tax rate and 20% increase in household income tax rate. Raising the indirect tax rate only to the domestic non-agricultural products is meant to prevent deterioration in the income position of agricultural poor households.

Raising the domestic indirect tax rate causes an overall increase in domestic supply prices and composite commodity prices (Table 6.31). In industrial commodities, the composite price, however, shifts downwards because of the increase in the import of industrial commodities (Table 6.32) following the heavy domestic indirect tax. As the Nepalese import is basically dominated by the industrial commodities, and there is a high import elasticity coefficient for industrial commodities in our model; this change can be expected. Due to the overall increase in domestic supply prices, the activity prices, PA, also go up. The rise in the activity prices induce the value added prices, PVA, to move upward.

Table 6.31: Effects on prices of commodities and activities

Sectors	Baseline values					Simulated values				
	PM	PE	PQ	PA	PVA	PM	PE	PQ	PA	PVA
Agri	1.132	1.0	1.015	1.0	0.725	1.132	1.0	1.017	1.002	0.727
Ind	1.103	1.0	1.042	1.0	0.411	1.103	1.0	1.033	1.000	0.412
ComSer	1.146	1.0	1.021	1.0	0.678	1.146	1.0	1.022	1.002	0.68
OthSer	1.204	1.0	1.019	1.0	0.626	1.204	1.0	1.023	1.002	0.629

The proposed increase in domestic tax rates brings some changes in domestic production, supply, import, and export. The agricultural and industrial sectors produce, supply, import and export more; whereas service sectors do less in all these respects (Table 6.32). The results are logical as this simulation has kept the indirect tax rate on domestic agricultural products constant whereas that of others were increased. This enhances agricultural activities, and because agricultural intermediate deliveries share a significant proportion in industrial activities, industrial production is enhanced as well. As the increase in activities in these two sectors could only be possible by reallocating some production factors from the service sectors; consequently, the service activities contract (Table 6.32). These changes in the activity structures cause similar

changes in domestic supplies, QD, and exports, QE. The change in import structure, however, should be understood in a somewhat different way. The overall increase in the prices of domestic supplies makes the imports relatively cheaper as import prices do not increase in this scenario. Therefore, imports, QM, increase; but they cannot increase unlimitedly in all the sectors. The elasticity of substitution between import and domestic supplies are higher in agricultural and industrial commodities;[41] therefore, rises in their imports can be expected. In case of services, the decline in the domestic production releases intermediate deliveries to the final consumption; and that leads to a decline in the import of services (Table 6.32).

Table 6.32: Impact on quantities of commodity and activity (values in billion Rupees)

Sectors	Baseline values					Simulated values				
	QM	QE	QQ	QD	QA	QM	QE	QQ	QD	QA
Agri	8.1	5.8	128.3	119.2	125.0	8.2	5.8	129.6	120.4	126.3
Ind	16.5	33.7	105.6	86.7	120.4	17.1	34.8	109.0	89.6	124.4
ComSer	12.7	15.9	98.8	84.2	100.1	12.3	15.4	95.5	81.4	96.8
OthSer	13.3	-	53.8	38.1	38.1	13.2	-	53.2	37.6	37.6

The net effect on GDP by these internal reforms is positive as it grows by 0.26% (Table 6.33). Likewise, gross fixed capital formation, GFCF, also increases marginally. The balancing factor in the commodity balance equation, the change in stocks, CHST, declines marginally because of the rise in demand of intermediate deliveries, and investment. Because of the slightly higher growth in export than import, the foreign savings, FSAV, goes down.

Table 6.33: Gross domestic product, investment and change in stocks (values in million Rupees)

GDP	Baseline values	Simulated values
	231901.0	232509.1
Total consumption	214487.0	214500.1
Households	191469.0	191377.2
Government	23018.0	23122.8
GFCF	56081.0	561508.8
CHST	11937.0	11597.0
FSAV	24299.0	24246.3

There is less than a 1% increase in the rate of remuneration to production factors. However, the growth in the profit rate and the wage rate of high-skilled labour are relatively higher than that of the low-skilled labour.

[41] Table 5.5.

Table 6.34: Baseline and simulated values in factor markets

	Baseline levels	Simulated values	Total remuneration of factors in baseline= $(W_f) . (QF_{fa})$	Total remuneration of factors in simulation= $(W_f) . (QF_{fa})$
Wages in Rupees and profit rate				
W_f(LSL)	8068.79	8091.41		
W_f(HSL)	15255.23	15335.44		
W_f(CAP)	0.21	0.208		
QF_{fa} Factor use by activity(labour in millions, capital in mln Rupees)				
LSL-AGR	4.946	4.994	39905.0	40410.9
LSL-IND	1.265	1.306	10204.0	10565.9
LSL-CS	2.167	2.094	17482.0	16939.5
LSL-OS	1.566	1.549	12637.0	12536.6
HSL-AGR	0.498	0.502	7599.0	7695.3
HSL-IND	0.577	0.595	8809.0	9121.4
HSL-CS	0.354	0.342	5407.0	5239.2
HSL-OS	0.627	0.619	9565.0	9489.0
CAP-AGR	207860.35	210114.3	43129.0	43675.7
CAP-IND	146961.11	151898.02	30493.0	31574.5
CAP-CS	216974.04	209860.69	45020.0	43623.0
CAP-OS	7957.00	7879.50	1651.0	1637.8

Internal reform measures used in this simulation results in changes in household incomes by varying rates. Urban households benefit most (0.91%) and small rural households least (-0.56%). The growth in per capita income of land-less rural households is more than the national average (0.37%). Relative benefit to urban households and land-less households in this internal reform is due to the expanding industrial and the agricultural sector through which these two household categories draw their livelihood to a significant extent, respectively. Moreover, the tax incentive to agricultural activities also benefits the large rural households and land-less rural households. These two household categories draw their income basically from agriculture, one from agricultural capital and another from agricultural labour.[42] Small rural households lose in this reform because their activities are spread on all sectors. Though they benefit from the industrial and industrial growths but they equally lose from the contracting service sectors (Table 5.7 and 6.35).

[42] Table 5.7.

Table 6.35: Impact on household and firm's income (values in million Rupees)

Household and firms' income	Baseline values	Simulated values	Growth rate
YH(U-HH)	69869.0	70503.17	1.0091
YH(LR-HH)	49367.0	49661.36	1.0060
YH(SR-HH)	65488.0	65120.69	-1.0056
YH(LLR-HH)	37856.0	38112.90	1.0068
$PCI_{LLR\text{-}HH}$	4005.2	4032.39	1.0068
PCI(N)	10690.7	10729.98	1.0037
Firms' income (YFIR)	22463.0	22256.40	-1.0092

In this internal reform, government revenue grows by about 4%. With about 0.2% increase in expenditure, government budget deficit enjoys a predetermined reduction by 10%.

Table 6.36: Impact on government variables (values in million Rupees)

	Baseline values	Simulated values
GY	32718.0	33893.5
GE	43629.0	43733.8
GS	-10911.0	-9840.3

Summarising, the stipulated internal reform leads to increases in the GDP and household incomes but marginal declines in the real volume of consumption expenditure of household groups as a result of price effects. As the formulated internal reform favoured agriculture, the growth rate of land-less rural household income is marginally higher than the national average.

6.4.7 Import liberalisation by Nepal and revenue replacement from internal sources

In this section, we test the impacts of import liberalisation along with the adjustments in the domestic tax rates so that the fiscal deficit stabilises at the benchmark level. We study the impacts in commodity, activity and factor markets as well as the changes in institutional income, investment, public revenue and expenditures.

This simulation incorporates a reduction of the import duties by 10%. Therefore, its immediate effect is on import prices, PM; they all go down (Table 6.37). There is no change in the export prices, PE, as world prices in the international market is considered exogenous in our model and exchange rate is also fixed.

The prices of importable have direct impacts on the composite prices, PQ; consequently, composite prices also go down except in case of agricultural goods, where price increases marginally. The latter phenomenon can be attributed due to the small share of agricultural import (6%) as compared to that of other commodities (about 11% for industrial goods and

commercial services and 24% for public services) (Nepal SAM 1996, Table 3.3). Moreover, the increase in the price of agricultural composite goods is also due to the increased demand for agricultural intermediate deliveries from both expanding industrial and agricultural sectors.

Import liberalisation along with revenue replacement by mark-ups in domestic taxes have a moderating effect on the activity price for industry by maintaining the price at the same level; while PA for the other sectors increase because of the supply constraint while meeting increased demand. This constraint is partly caused by a shift of resources to industry from other sectors.

The value added price has a positive relation with the corresponding activity price and a negative relation with the composite price applied to the intermediate deliveries (equation 6, chapter 4). As Table 6.37 shows, the composite effect is positive, therefore, there is all round increase in the value added prices.

Table 6.37: Baseline and simulated price indices of commodities and activities

Sectors	Baseline values					Simulated values				
	PM	PE	PQ	PA	PVA	PM	PE	PQ	PA	PVA
Agri	1.13	1.0	1.015	1.0	0.725	1.119	1.0	1.019	1.003	0.728
Ind	1.10	1.0	1.042	1.0	0.411	1.092	1.0	1.031	1.000	0.413
ComSer	1.15	1.0	1.021	1.0	0.678	1.131	1.0	1.019	1.001	0.681
OthSer	1.20	1.0	1.019	1.0	0.626	1.183	1.0	1.016	1.002	0.629

In the commodity market, the import, QM, of industrial commodities grows faster (3.6%) than that of agriculture (1.2%). In the service sectors, imports decline. The growth of import is straightforward as importable are becoming cheaper and domestic commodities are becoming dearer in this simulation. The sectoral differences in the growth of imports are due to the structural parameters specified in our Nepal CGE model pertinent to the characteristics of the Nepalese economy; see Section 6.4.1 where the same reasons apply here too.

Because of the declining domestic activities of services, QA, the intermediate domestic demands of services also decline. The intermediate services released from the domestic production activities go to final consumption; and therefore, making it plausible for the imports to decline despite the lower import price levels.

Faster decline in the composite price of industrial commodities (Table 6.37) causes the growth of industrial sectors itself because this sector uses industrial intermediate deliveries at a significantly higher level as compared to other sectors. Growth of industrial sector requires the growth of the agricultural sector also because Nepalese industries are mainly agro-based. These

are the reasons for the growth of industrial followed by agricultural productions, QA. The growth in these activities is only possible by the partial reallocation of factors of production from the service activities. This reinforces the contraction of the output in the services, leading to fewer imports of services in spite of the import liberalisation. These changes in an import liberalisation along with revenue replacement scenario are quite similar to that of import liberalisation alone because the additional condition imposed in this simulation treats all the sectors equally in terms of the mark-ups in the domestic tax rate.

Changes in the level of domestic productions by sector, QA, has proportional impacts on the domestic supply of domestic commodities, QD, supply of composite commodities, QQ, and exports, QE. Growth of industrial sector is more apparent as compared to that of the agricultural sector. In case of services, contraction is more in commercial services than in public services.

Table 6.38: Baseline and simulated quantities by commodity and activity (values in billion Rupees)

Sectors	Baseline values					Simulated values				
	QM	QE	QQ	QD	QA	QM	QE	QQ	QD	QA
Agri	8.1	5.8	128.3	119.2	125.0	8.2	5.8	129.5	120.2	126.1
Ind	16.5	33.7	105.6	86.7	120.4	17.1	34.7	108.9	89.4	124.1
ComSer	12.7	15.9	98.8	84.2	100.1	12.3	15.4	95.8	81.6	97.1
OthSer	13.3	-	53.8	38.1	38.1	13.2	-	53.4	37.7	37.7

The net effect of the growth in agricultural and industrial activities and contractions in services activities is positive as revealed by growth in GDP of 0.3% (Table 6.39). In case of import liberalisation simulation, the GDP growth rate was found to be 0.6% Table 6.3). Here, we get an interesting conclusion that import liberalisation alone has more growth effect than import liberalisation associated with revenue replacement from domestic taxes. Likewise, the growth of gross fixed capital formation (GFCF) and foreign savings (FSAV) are also higher in import liberalisation alone than when it is associated with revenue replacement by higher domestic tax rates (Tables 6.3 and 6.39).

Table 6.39: Gross domestic product, investment and change in stocks (values in million Rupees)

GDP (at factor cost)	Baseline values	Simulated values
	231901.0	232725.6
Total consumption	214487.3	214733.5
Households	191469.3	191776.3
Government	23018.0	22957.2
GFCF	56081.0	56183.3
CHST	11937.0	11079.6
FSAV (in foreign currency, million)	24299.0	24423.5

Factor reallocations among sectors follow the patterns consistent with growth by sectors. The industrial and agricultural sectors absorb more factors whereas the contracting sectors lose them. Regarding the rates of factor remunerations, they all increase due to the overall growth of the economy. However, the wage rate of skilled labour increases faster (7%) than that of low skilled labour (4%) and capital (5%) (Table 6.40).

Table 6.40: Baseline and simulated values in factor markets

	Baseline levels	Simulated values	Total remuneration of factors in baseline= $(W_f) . (QF_{fa})$	Total remuneration of factors in simulation= $(W_f) . (QF_{fa})$
Wages in Rupees and profit rate				
W_f(LSL)	8068.8	8098.9		
W_f(HSL)	15255.2	15355.0		
W_f(CAP)	0.207	0.208		
QF_{fa} *Factor use by activity(labour in millions, capital in mln Rupees)*				
LSL-AGR	4.946	4.986	39905.0	40384.9
LSL-IND	1.265	1.303	10204.0	10550.9
LSL-CS	2.167	2.100	17482.0	17004.9
LSL-OS	1.566	1.554	12637.0	12586.6
HSL-AGR	0.498	0.501	7599.0	7690.4
HSL-IND	0.577	0.593	8809.0	9108.5
HSL-CS	0.354	0.343	5407.0	5259.4
HSL-OS	0.627	0.620	9565.0	9526.9
CAP-AGR	207860.4	209801.8	43129.0	43647.6
CAP-IND	146961.1	151554.3	30493.0	31529.7
CAP-CS	216974.0	210492.2	45020.0	43791.3
CAP-OS	7957.0	7904.3	1651.0	1644.4

Now, we turn to results on incomes by receiving sectors. The total factor income grows by 3.4% in the industrial sector, 1.2% in the agricultural sector; whereas it declines by 2.7% in the industrial sector and by 0.4% in the public services (Table 6.40). It is evident that total industrial value added grows faster in import liberalisation associated with revenue replacement from domestic taxes than in import liberalisation alone. On the other hand, there is less growth in agriculture whereas contractions deepen in services. Overall, import liberalisation together with some mark ups in the domestic tax rates lowers the potential growth of economy compared to import liberalisation implemented without revenue replacement from domestic taxes.

Urban households are the most beneficiary group among all in this scenario (Table 6.41). The reason behind it is the higher growth of the wage level to skilled workers and more dependence of these households in industrial activities that is growing faster in this simulation. LLRHH and LRHH are also beneficiary groups because of the moderate growth in agricultural activities. The bigger contraction in commercial services followed by public services cause the decline of SRHH income because these two sectors constitute the bigger shares of their household income.

As the major share of corporate income is from commercial services, the big contraction of commercial services activities (Table 6.38, also see Table 6.40) causes the overall decline of corporate income (Table 6.41).

Table 6.41: Impact on household and firm's income (values in million Rupees)

Household and firms' income	Baseline values	Simulated values	Growth rates
YH(UHH)	69869.0	70549.1	1.0097
YH(LRHH)	49367.0	49689.0	1.0065
YH(SRHH)	65488.0	65220.2	-1.0041
YH(LLRHH)	37856.0	38119.0	1.0069
$PCI_{LLR\text{-}HH}$	4005.2	4033.0	1.0069
PCI(N)	10690.7	10738.6	1.0045
Firms' income (YFIR)	22463.0	22293.7	-1.0075

As fiscal imbalance is controlled in this simulation, the impact on the government sector is less as compared to other simulations except that of internal reform. The decline in the custom duties by tariff reduction is compensated by the mark-ups (R) in the domestic tax rates. It needs 12.9% increase in the domestic tax rates from their respective levels in order to stabilise the budget deficit at the benchmark level (Table 6.42).

Table 6.42: Impact on government variables (values in million Rupees)

	Baseline values	Simulated values
GY	32718.0	32657.1
GE	43629.0	43568.1
GS	-10911.0	-10911.0
R (necessary increase in domestic tax rates)		12.9%

The import liberalisation policy along with revenue replacement from internal sources has shown a reallocation of factors among the sectors that brings a higher overall GDP, though less than import liberalisation alone, and that benefits poor and rich groups, the richest group benefiting the most. To maintain the same government deficit, domestic tax rates need to be scaled up by 12.9%.

6.5. Choice of the numeraire and robustness of results

We performed some sensitivity analysis to check on the direction and stability of results in case the simulations were run with different numeraires like domestic supply prices of agricultural commodities PD(AGR-C), or commercial services PD(CS-C), or public services PD(OS-C) instead of the domestic supply price of the industrial commodities PD(IND-C), which has served so far. However, we got consistently similar results of the expansionary industrial

Table 6.43: Level of activities under different simulations and numeraires (values in million Rupees)

Numeraires and simulations	Level of activities			
	AGR-A	IND-A	CS-A	OS-A
Benchmark	124996.0	120442.0	100103.0	38079.0
Numeraire PD(IND-C)				
ILN	126071.5	123495.2	97342.1	37820.3
ELROW	126130.9	123761.1	97179.7	37753.0
ILN+ELROW (EXR fixed)	126070.9	123499.3	97340.3	37820.3
ILN+ELROW (EXR flexible) [43]	126389.1	123098.5	97229.3	37835.1
DEV	125160.4	125044.0	97472.9	37716.3
Internal reform	126260.1	124386.7	96770.1	37636.5
ILN + RRIS	126063.4	124093.8	97056.1	37746.7
Numeraire PD(AGR-C)				
ILN	125894.9	123469.8	97533.6	37834.1
ELROW	126005.5	123829.8	97268.5	37756.9
ILN+ELROW (EXR fixed)	125918.4	123580.2	97449.8	37825.2
ILN+ELROW (EXR flexible)	126412.9	123189.7	97158.2	37824.6
DEV	121454.0	128149.6	99344.1	37937.3
Internal reform	126194.6	124419.5	96619.1	37637. 9
ILN + RRIS	125979.9	124144.0	97114.2	37747.4
Numeraire PD(CS-C)				
ILN	125958.7	123438.9	97485.4	37832.7
ELROW	126057.7	123801.3	97231.5	37755.2
ILN+ELROW (EXR fixed)	125993.6	123539.8	97396.1	37822.7
ILN+ELROW (EXR flexible)	126411.2	123183.1	97163.3	37825.4
DEV	122901.1	126886.4	98647.6	37847.7
Internal reform	126213.0	124410.2	96805.4	37637.5
ILN + Revenue Replacement	126026.9	124115.6	97081.6	37747.0
Numeraire PD(OS-C)				
ILN	125969.2	123433.9	97477.4	37832.5
ELROW	126070.2	123794.5	97222.6	37754.9
ILN+ELROW (EXR fixed)	126005.5	123533.6	97387.6	37822.3
ILN+ELROW (EXR flexible)	126416.8	123204.7	97146.6	37822.9
DEV	122119.0	127673.4	98948.7	37908.6
Internal reform	126214.8	124409.3	96804.0	37637.5
ILN + RRIS	126025.6	124116.4	97082.5	37747.0

[43] In this chapter, we also use the term Compete External Reform (CER) to ILN+ELROW (EXR flexible).

activities and contractionary services activities under alternative numeraires, as is shown briefly in Table 6.43.

Careful examination of the figures in Table 6.43 shows that, whichever numeraire we adopt, industrial activities expand. Likewise, both of the services activities contract irrespective of the choice of numeraire. Regarding the agricultural activities, they also expand in majority of the cases. However, in case of the devaluation scenarios, with numeraire other than domestic supply price of industrial commodities, PD(IND-C), agricultural activities marginally contract.

Though there are minor differences in the price movements, basic macroeconomic aggregates move in similar ways in all scenarios with different numeraires. For example, GDP grows in all the simulations except in complete external reform irrespective of the choice of the numeraire. The same is the case of value added prices, PVA. Likewise, consumer's price index declines in most of the cases except in devaluation; whereas gross fixed capital formation, GFCF, increases except in complete external reform. The same is the case of household income. All these results are directly related to the level of activities which have been summarised in Table 3.37 under different simulations and numeraires. Therefore, the results and analysis presented in section 6.4 are fully consistent and independent of the choice of numeraire.

6.6. Macroeconomic constraints

There are different ways of approaching and modelling macroeconomic constraints in the context of a developing country. Some economists like to call them resource gaps – which constrain investment. The most important constraint is, of course, domestic savings given the fact that difference between savings and investment directly widens the current account deficit and could increase external vulnerability. In a country like Nepal, domestic saving is the main bottleneck for investment and growth. Different from investment, savings never improved distinctly but remained around 10 percent of GDP for the last two decades. A second constraint is the import export gap, which can constrain the import of capital goods in countries like Nepal. The third constraint is revenue expenditure gap of the government. The wide fiscal deficit financed by increasing money supply mostly translates into inflation followed by changes in income distribution and unfavourable foreign trade.

Here we calculate three major macroeconomic constraints, domestic saving investment ratio, export-import ratio, and budget deficit public expenditure ratio. For better macroeconomic stability, the first two constraints are desired at higher level; whereas the third one to the lower

level. The following table shows comparative pictures of these macroeconomic constraints under the base-run and seven simulation scenarios.

Table 6.44: Comparison among some macroeconomic indicators

	Selected macroeconomic indicators		
Simulations	Dom. saving/Investment	Export/Import	Budget deficit/Public exp.
External Reform			
ILN	0.629	0.580	0.306
ELROW	0.633	0.577	0.291
ILN+ELROW	0.629	0.580	0.306
CER	0.596	0.563	0.311
DEV	0.729	0.617	0.274
Internal Reform	0.642	0.578	0.225
ILN + RRIS	0.637	0.581	0.250
Base-run	0.643	0.575	0.250

Total domestic saving as a share of domestic investment does not change much in most of the liberalisation drives. In case of devaluation, however, it rises to about 73% from the baseline value of 64%. The reason behind this improvement is the distinct growth in household and corporate incomes (Table 6.29). In other cases, the investment grows faster than domestic savings allowing more foreign savings. Notably, in the complete external reform, the saving investment ratio contracts most due to the overall decline in household as well as corporate income (Table 6.23). Virtually, domestic saving to total investment ratio remains almost at the same level in the internal reform and import liberalisation with revenue replacement (Table 6.44).

Consistent with neo-liberal thinking, our analysis reveals that the devaluation of domestic currency improves the foreign payments balance more as compared to other liberalisation drives. Making a devaluation of domestic currency by 10%, the export as a percentage of import increases to 62% from 58% of the base-run. In the complete external reform, export-import ratio declines by 1 percentage point; whereas in other four cases, there is not much difference in this regard. In case of complete trade liberalisation, revaluation of the domestic currency causes export decline.

The budget deficit as a share of total government expenditure increases in all simulations, except in the internal reform where it was prefixed to fall down. The budget deficit is widening most in complete external reform followed by import liberalisation as well as import plus export liberalisations under fixed exchange rate system. The reason behind this wider deficit is the reduced custom duties in trade liberalisation, which form a major part of the government

revenue. In case of devaluation, the widening fiscal deficit is because of the declining import and, consequently, the import duties, which is a major source of the public revenue in Nepal.

6.7. Household welfare

Economists have developed many approaches to the measurement of economic welfare. One of the most convincing adaptations in the general equilibrium framework is that developed by Minot and Goletti (2000). They have used a household welfare change index $(\Delta W_h/W_h)$ using the following expression:

$$\frac{\Delta W_h}{W_h} = \left[\sum_j IS_j^o\left(\frac{\Delta P_j^o}{P_j^o}\right) - \sum_k BS_k^I\left(\frac{\Delta P_k^I}{P_k^I}\right)\right] + \sum_j IS_f^W\left(\frac{\Delta w_f}{w_f}\right) - \sum_i BS_j^C\left(\frac{\Delta P_j^C}{P_j^C}\right) \quad ....(6.1)$$

where W is the measure of welfare, IS_j^O indicates the value of output j as a share of household income, $(\Delta P_j^O/P_j^O)$ is the percentage change in the price of output j, BS_k^I is the budget share of input costs, IS_f^W is the income share of net factor income from factor f (in most cases equal to the income share of wages), and BS_j^C is the budget share of good j in consumption.

Nicita, Olarreaga and Soloaga (2002) later made simple modification to the version of Minot and Goletti (2000). The only difference between these two versions is that the Nicita et al. include the households' transfer income in the welfare function, which Minot and Goletti (2000) do not do. However, in our case, we do not have data on self-produced and consumed goods. Rather, we have remittances from the rest of the world, ISTR, and these can affect the household welfare index through the change in exchange rate, dEXR/EXR. Therefore, removing the output-input differential expression and incorporating the adjusted foreign exchange earning in the above expression gives a new equation as below. Equation 6.2 calculates the welfare change.

$$\frac{\Delta W_h}{W_h} = ISTR_{h,ROW}\left(\frac{\Delta EXR}{EXR}\right) + \sum_j IS_f^W\left(\frac{\Delta w_f}{w_f}\right) - \sum_i BS_j^C\left(\frac{\Delta P_j^C}{P_j^C}\right) \quad .....(6.2)$$

We have used this equation of welfare change by household group to construct a welfare change index that scales the progress made from the baseline, following the different policy simulations. We need to specify the upper and lower limits of this welfare change index.

Assuming the possibility of 100 percent change in the values of each term in the expression, i.e. the terms for the exchange rate, wage rate, and composite commodity prices; the aggregated upper and lower limits of this welfare index change can then range between +3 and –3, respectively. The value of zero would mean that there is no welfare change from the baseline. As Table 6.45 shows, there is always some positive change; the highest is when the devaluation policy is used. This is not in variance with other presentations of results in this chapter.

All four conventional liberalisation drives as well as devaluation, internal reforms, and revenue replacement discussed in this chapter have positive impact on the household welfare. Our welfare measure takes into account three effects, exchange rate effect, wage effect and the consumption effect. The first two have direct positive impact on the household welfare whereas the third one has negative impact. The net impact, however, seems positive in all the cases but their degrees are different based on the differences in household income structures and consumption patterns.

Table 6.45: Welfare change index of households in response to policy simulations
(-3= maximum negative change, 0=no change, 3=maximum positive change)

Policy simulations	Households			
	U-HH	LR-HH	SR-HH	LLR-HH
External Reform				
ILN	0.0086	0.0093	0.0088	0.0077
ELROW	0.0065	0.0076	0.0073	0.0060
ILN+ELROW	0.0085	0.0093	0.0088	0.0077
CER	0.0060	0.0058	0.0051	0.0039
DEV	0.0167	0.0219	0.0222	0.0206
Internal Reform	0.0041	0.0051	0.0048	0.0035
ILN + RRIS	0.0060	0.0068	0.0060	0.0049

All household types in Nepal have a significant share of the foreign remittance income; therefore, devaluation of the domestic currency leads to a positive impact on household welfare (Table 6.45). The welfare impacts from other measures are relatively less. One important conclusion that stems from this analysis is that the poorest household category has least benefit from all these conventional liberalisation discourses except in devaluation. In this case, urban household group is the least beneficiary because it has less foreign remittance income[44] as compared to its population size. The land-less households are also not able to grasp substantial benefit from the devaluation despite its high share of foreign remittance income because of the

[44] Table 3.3.

high consumption effect of the price changes. In case of the complete external reform, the urban households benefit most as compared to others. Import liberalisation by Nepal highly benefits the large rural households, whereas the devaluation benefits most to the small rural households.

6.8. Conclusion

Overall, the net impact of the economic reforms is expansionary. The higher growth in almost all the simulated liberalisations is due to the expansion in industrial and agricultural activities. The higher growth in these two activities is due to the declining prices of intermediate deliveries and the fact that these activity types use more intermediate deliveries per unit of their activity as compared to the services activities. The expansion of these two sectors requires more factors to be transferred from other sectors. Consequently, contraction occurs in the services activities. Moreover, these expansion and contraction in different activities is reinforced by parametric differences among the sectors. In the Nepal CGE model, the elasticity of substitution between import and domestic commodities are higher in case of the agricultural and industrial commodities than that of services. Likewise, the export elasticity coefficients are also higher among the formers as compared to that of latter.[45] These parameters promote agricultural and industrial trade causing higher growth of these two activities in trade liberalisations. In the case of internal reform, the tax incentive to the agricultural activity causes this sector to expand; and because of the strong input-output linkages, the industrial sector also expands. Due to factor constraints, the service sectors contract.

An important conclusion that follows from the simulations in this chapter is that staged external liberalisations bring higher growth in the economy than all external liberalisations implemented altogether. GDP growth when import and export liberalisations implemented together is less than the addition of the GDP growths accrued when these two liberalisations are implemented separately. The reason behind this is in the lack of time to internalise all the benefits of the separate simulations so that there remain possibilities of the cross-cancellation of some of the partial benefits. To put it in a different way, doubling the modes of liberalisation increases the benefit by less than the double because some of the expansionary effects would be diluted by some other contracting effects. The situation further aggravates if import and export liberalisations are implemented together with flexible exchange rate. In this situation, economic activities contract leading to the decline in GDP. Moreover, other macro-economic aggregates like savings, investment, exports also deteriorate in this case. On the other side, the case of devaluation is more growth enhancing from export promotion.

[45] Table 5.5.

In the import and export liberalisations, there are two major benefits to the household sectors. First, the activity prices and, consequently, value added prices increase because of the more factor demands created in high growth sectors. This increasing demand of the factors pushes their rates of remunerations upwards and it spreads to all the sectors because we consider homogenous factors in our model. Second, the composite prices decline especially in case of import liberalisation, and this also favours household welfare.

External liberalisation results in the domestic saving to total investment ratio falling down, and the inflow of foreign capital rising. The case of devaluation is different; it has more domestic savings and less foreign capital inflow; whereas the internal reform and revenue replacement for import liberalisation do not change the situation much. External liberalisation affects the public sector deficit unfavourably. Budget deficit as a share of public expenditure increases in the policy simulations due to tariff reduction. Likewise, the profit of the corporate sector also declines because of the contracting service sectors.

In all these scenarios, the liberalisation reforms do provide some good results for household welfare; however, much should be done to make them pro-poor. This welfare gain has become possible by higher rates of return to factors and high growth of some activities in the course of liberalisation. The challenge for development lies in enhancing these positive effects furthermore towards the benefit of poor household category. The challenge is more compelling when one considers that the advantages of liberalisation can be further reduced when liberalisation is accompanied by tax increasing measures to maintain the budget deficit at its benchmark level, as is the case in the policy simulation ILN + RRIS.

This chapter suggests that efficiency parameters must be scaled up to enhance higher growth of the economy; and the resource endowments need to be redirected so that more benefits would go to the poorer household categories. In such a restructured economy, the co-occurrence of liberalisation and pro-poor growth could be made possible. In this connection, in the next chapter, we will extend the model presented in chapter 4 and 5 and implemented in chapter 6 to explore the conditions under which both liberalisation reforms and higher as well as pro-poor growth can be realised in the dynamic version of the model.

7. Dynamic Nepal CGE model: developing win-win strategies for pro-poor growth

7.1. Introduction

Our objective in this chapter is to explore avenues where liberalisations and reform measures can produce pro-poor growth in a small economy like Nepal. The static CGE analysis in chapter 6 showed that in the existing structure of the Nepalese economy liberalisations and reforms could produce some additional growth but they were not pro-poor. Therefore, in this chapter, we are working with the realm of the modelled economy. We restructure some of the economic fundamentals of the Nepalese economy in a future year, we model the dynamics of the economy towards that future year, study the growth path, and explore whether liberalisation policies could produce pro-poor growth in the future year.

Thus, there are four tasks for this chapter that can be summarised as follows: (1) Moving from SAM 1996, reconstruct a restructured favourable scenario SAM for 2006, and compare the multiplier properties of the two SAMs in a check for plausibility and bias. (2) Moving from the static CGE model, extend it to a dynamic CGE model towards 2006. (3) Calibrate the dynamic CGE model for 2006 and study the growth path of main variables from 1996 to 2006. (4) Apply the policy simulations to the dynamic CGE model of 2006, study their effects for pro-poor growth and other consequences, and evaluate the results in light of the results obtained in chapter six under the static CGE model for 1996. This will allow us to draw conclusions on developing win-win strategies for pro-poor growth.

In task one, we project a restructured SAM for some 10 years after 1996, i.e. SAM 2006. We want to incorporate in the projected SAM the ingredients of a pro-poor growth development that is pertinent to the success of globalisation policies over the long run. As restructuring requires time, we consider a time span of about 10 years as appropriate and feasible. Readers would bear in mind that Nepal SAM 2006 is a hypothetical but plausible scenario of a restructured economy that is more geared towards openness and that capitalises on the advantages of liberalisation reforms. Our hypothesis in this connection is that under globalisation an improvement would occur in the efficiency parameters in the production of activities, leading to the generation of a

higher value added per unit of output. These improvements are likely to contribute to a higher and pro-poor growth when liberalisation reforms are implemented. Furthermore, the static CGE analysis in chapter 6 concluded that the industrial sector expands in most of the liberalisation drives. The agriculture sector follows this trend to some extent; whereas the service sectors contract. Therefore, to capitalise on these tendencies we conceive of a restructured economy for 2006 that privately and publicly puts more investment in agriculture and industry than their corresponding shares in SAM 1996. Factors of production will also redistribute towards more remunerative activities. Likewise, the production factors of poor household groups are envisaged to move to these fast growing sectors. These changes are not peculiar to the Nepalese scenario, but have been experienced in many countries during their development process. These changes are expected to generate redistributive growth when liberalisation reforms are implemented.

In order not to lose oversight of the restructuring introduced in a prospective favourable scenario SAM for 2006, it is imperative to evaluate the properties of this prospective SAM 2006 with the actual SAM of 1996. To underline the realism and neutrality of the prospective SAM 2006 we apply a SAM multiplier analysis for both 1996 and 2006 and compare the results. We shall conclude that the results of the multiplier analysis for the two years are consistent with each other and that the prospective SAM 2006 is a plausible and an unbiased setting for pursuing the further testing of our hypothesis. It is emphasized that the multiplier effects in a SAM represent only a potential that can only be partially realised, depending on the movement of prices and factors in the right direction over time. These aspects can be only tackled within a dynamic CGE model, which is the next task.

In task two, the static CGE model is extended to a dynamic CGE that is then applied for 2006. This task requires making the capital stock endogenous, as well as the two differentiated labour skills. We assume a steady endogenous path for investment growth between 1996 and 2006, and we let the relative returns to high and low skills labour categories determine the future composition of their supplies.

In task three, the dynamic CGE model is calibrated for 2006 and the growth paths of the main variables are displayed between 1996 and 2006.

In task four, we take up the seven policy simulations we conducted in the static model in chapter 6, and we all apply them in the context of the dynamic CGE for 2006. In studying the results of these policy simulations, we can visualise what type of structural reforms and

liberalisation avenues are conducive with improving household welfare, especially that of the rural landless households. Analysis of the results from all these simulation scenarios would help us answer our research question on how poverty reduction and structural reforms for the liberal economy could be supportive to each other.

In conformity with the four tasks, this chapter is organised as follows. Section 7.2 postulates the hypothetical but plausible Social Accounting Matrix of Nepal for 2006. The section elaborates the step-wise procedure for obtaining the prospective SAM 2006 from SAM 1996 and other projected trends in the underlying period. Once there, we study the comparative properties of the two SAMs making use of a multiplier analysis. In section 7.3 we display the basic features of the dynamic Nepal CGE 2006. In section 7.4 we calibrate the dynamic Nepal CGE, and present the growth paths of main variables between 1996 and 2006. In section 7.5 we apply the policy simulations and study their impact. The list of policy simulations include (1) unilateral import liberalisation by Nepal, (2) export liberalisation by the ROW, (3) import and export liberalisation by Nepal and ROW under a fixed exchange rate, (4) same but under a flexible exchange rate, (5) devaluation of the domestic currency, (6) internal reforms for downsizing the fiscal deficit, and finally (7) import liberalisation supplemented by the revenue replacement from internal sources. This section compares also the results for the static and dynamic models and responds to the question whether these structural reforms could promote higher and pro-poor growth of the economy under some macroeconomic constraints. The selected macroeconomic constraints are general price level, import-export gap, foreign saving/investment, and public deficit. Section 7.6 concludes the chapter.

7.2. Nepal SAM 2006 and comparison with Nepal SAM 1996: construction and multipliers

7.2.1 Construction of Nepal SAM 2006

As mentioned earlier, this section presents a hypothetical but realisable SAM 2006 that is used for calibrating the dynamic Nepal CGE model. While preparing the Nepal SAM 2006, we followed the following procedure to get the consistent macro-SAM and a disaggregated SAM 2006, starting from the SAM 1996. In the first round of reconstructing the macro-SAM, we upgrade the accounts and incorporate some restructuring relating to efficiency aspects. In the second round, in disaggregating SAM, we assume a redistribution of investment in favour of poorer groups and make slight change in the factor and income distribution structure of the SAM.

With respect to the first round, the following was done, giving as a result the macro-SAM in the form as found in Table 7.1.

i. Growth rates of investment, government consumption, GDP, imports and exports were projected based on the middle three years' trend (1998/99-2001/02) for the whole period 1996-2006 because last three years real growth rates are still not available.

ii. All government account variables are projected at the same rate of government consumption growth.

iii. Annual rate of inflation has been assumed around 5%. All current year values for the year 2006 SAM have been deflated by the same figure (approximately by 0.63).

iv. We considered the investment in agriculture should go up on top of the general trend that would be conducive to the restructured model economy benefiting the poor. We have made 1.5% additional investment in agriculture and 0.5% additional investment in industries, which has a strong input-output linkage with the agriculture.

v. We envisage a high growth of public investment in agriculture and related activities. The higher investment in agriculture is partly private and partly public. The rise of investment in agriculture is assumed to be partially financed by the inflow of higher foreign capital, thus, allowing a high level of import.

vi. To enhance the efficiency in production activities, we increase the factor share in activities. Factor input as a proportion of the total production activities increased from 0.60 to 0.64 reflecting higher efficiency in a restructured economy. Intermediate deliveries as a proportion of the total production activities declined from 0.30 to 0.27.[46] This point is elaborated in Section 7.4.1.

With respect to the second round, the following was done.

i. In obtaining the disaggregated macro-SAM 2006, we took as reference point the distribution pattern of income-expenditure blocks of different sub-accounts in SAM 1996 (Table 7.2), but incorporate a restructuring of endowments towards the lower income population groups who work mostly in agriculture and would benefit from the envisaged greater investment in agriculture. Furthermore, the upgrading of human capital from low to high skill will also benefit the poorer groups and a greater participation in the labour force.

ii. In the factor market, the wage share in total value added is slightly increased at the cost of profit share. We will explain more about it in Section 7.4.1.

iii. These adjustments take the form of a premium of 3% growth in the total share of low-

[46] Share of factor input and intermediate deliveries do not add to 1 because there are imported intermediate deliveries as well. The share of these is estimated to have slightly declined from 0.1 to 0.09.

skilled wage earning, 1.5% growth in the growth in the total share of high-skilled wage earning, and around 4.5% decline in the total share of profit. This decline in the profit share is approximated by a 1.5% decline from each household category except from landless rural households. The landless rural households themselves do not have large profit shares in their incomes.

iv. These adjustments of wage and profit shares were carried further to the activity account. The other public service sector being a highly labour intensive is kept in its original factor distribution proportions. In the cases of agriculture, industry, and commercial services, we applied a 3% increase in low-skilled wage earning, 1.5% to the high-skilled wage earning and around 4.5% decline in the profit share.

v. For the other accounts, the distributions follow the same pattern of the 1996 SAM. Consequently, we got the new distribution matrix for SAM 2006 as in Table 7.3.

vi. The disaggregation of the SAM created various imbalances in the accounts. These imbalances are the results of changes in the structure of factor income. They change the household income structure that furthermore affects the household expenditure. As the household expenditure structure is changed, it affects the whole commodity market. As the commodity accounts (both income and expenditure flows) are affected, they affect activity account also.

vii. These imbalances are rebalanced via rational adjustments in the respective accounts aiming at minimising the degrees of deviations from the inserted levels.

viii. Contribution by the foreign saving has been taken as a residual to balance the rest of the world account and the national capital account.

The implementation of the above procedures leads to Table 7.1 to Table 7.4, as shown below.

Table 7.1: Nepal macro-SAM 2006 (values in million Rupees)

	Factors	Households	Firms	Gov.	S - I	Activities	Comm.	ROW	Total
Factors						354624			354624
Households	331167			5200				5035	341402
Firms	23457			9901					33358
Government		7363	8840				25179	10698	52079
S - I		38971	24518	1656				46271	111416
Activities							550126		550126
Commodities		295068		35323	111416	150045		62465	654316
ROW						45457	79012		124469
Total	354624	341402	33358	52079	111416	550126	654317	124469	2221791

Note: (i) Commodity account paying to the government (Rs. 25179 mi.) includes both domestic indirect tax (Rs. 13893 mi.) and the tariff (Rs. 11286 mi.).
(ii) Gov. S – I, and Comm. refer to government, saving-investment, and commodity accounts, respectively.

Table 7.2: Distribution of the macro-SAM into different sub-accounts based on SAM 1996 proportions

	Activities				Commodities				Factors			Households				FIRMS	GOV	S-I	YTAX	STAX	TAR	ROW
	AGR-A	IND-A	CS-A	OS-A	AGR-C	IND-C	CS-C	OS-C	WLSL	WHSL	PROFIT	U-HH	SR-HH	LR-HH	LLR-HH	FIRMS	GOV	S-I	YTAX	STAX	TAR	ROW
AGR-A					0.326																	
IND-A						0.314																
CS-A							0.261															
OS-A								0.099														
AGR-C	0.133	0.190	0.000	0.001								0.120	0.152	0.061	0.102			0.152				0.104
IND-C	0.002	0.200	0.042	0.039								0.050	0.084	0.039	0.035			0.562				0.608
CS-C	0.078	0.044	0.136	0.048								0.129	0.056	0.044	0.028			0.247				0.287
OS-C	0.007	0.023	0.046	0.011								0.028	0.026	0.018	0.028			0.039				0.000
WLSL	0.172	0.044	0.075	0.054																		
WHSL	0.033	0.038	0.023	0.041																		
PROFIT	0.186	0.131	0.194	0.007																		
U-HH									0.091	0.053	0.154						0.095					0.114
SR-HH									0.121	0.029	0.122						0.424					0.251
LR-HH									0.049	0.037	0.124						0.084					0.102
LLR-HH									0.085	0.016	0.046						0.397					0.533
FIRMS											0.072											
GOV																						
S-I												0.179	0.171	0.614	0.036							
YTAX												0.522	0.000	0.478	0.000							
STAX					0.193	0.520	0.213	0.074														
TAR					0.146	0.231	0.253	0.370														
ROW	0.106	0.214	0.076	0.034	0.091	0.186	0.143	0.150														

Table 7.3: Pro-poor distribution of the macro-SAM 2006

	Activities				Commodities				Factors			Households				FIRMS	GOV	S-I	YTAX	STAX	TAR	ROW
	AGR-A	IND-A	CS-A	OS-A	AGR-C	IND-C	CS-C	OS-C	WLSL	WHSL	PROFIT	U-HH	SR-HH	LR-HH	LLR-HH	FIRMS	GOV	S-I	YTAX	STAX	TAR	ROW
AGR-A					0.326																	
IND-A						0.314																
CS-A							0.261															
OS-A								0.099														
AGR-C	0.133	0.190	0.000	0.001								0.120	0.152	0.061	0.102			0.169				0.104
IND-C	0.002	0.200	0.042	0.039								0.050	0.084	0.039	0.035			0.565				0.608
CS-C	0.078	0.044	0.136	0.048								0.129	0.056	0.044	0.028			0.229				0.287
OS-C	0.007	0.023	0.046	0.011								0.028	0.026	0.018	0.028			0.037				0.000
WLSL	0.182	0.054	0.085	0.054																		
WHSL	0.038	0.043	0.028	0.041																		
PROFIT	0.171	0.116	0.179	0.007																		
U-HH									0.101	0.058	0.139						0.095					0.114
SR-HH									0.131	0.034	0.107						0.424					0.251
LR-HH									0.059	0.042	0.109						0.084					0.102
LLR-HH									0.085	0.016	0.046						0.397					0.533
FIRMS											0.072											
GOV																						
S-I												0.179	0.171	0.614	0.036							
YTAX												0.522	0.000	0.478	0.000							
STAX					0.193	0.520	0.213	0.074														
TAR					0.146	0.231	0.253	0.370														
ROW	0.126	0.214	0.076	0.034	0.091	0.186	0.163	0.110														

Table 7.4: Disaggregated social accounting matrix of Nepal 2006 (values in million Rupees, 1996 price level)

	Activities				Commodities				Factors			Households				FIRMS	GOV	S-I	YTAX	STAX	TAR	ROW	Total
	AGR-A	IND-A	CS-A	OS-A	AGR-C	IND-C	CS-C	OS-C	WLSL	WHSL	PROFIT	U-HH	SR-HH	LR-HH	LLR-HH			S-I	YTAX	STAX	TAR	ROW	
AGR-A					181249																		181249
IND-A						169308																	169308
CS-A							142195																142195
OS-A								57374															57374
AGR-C	19901	28482	18	98								33722	45722	16180	32218			18873				6504	201720
IND-C	302	30053	6238	5903								14610	24970	11060	11619			62915				38003	205673
CS-C	11688	6630	20427	7170								37160	17243	12763	8827			25558				17958	165424
OS-C	1048	3521	6952	1613								8204	7815	4922	8032		35323	4070				0	81500
WLSL	65578	23094	32162	19906																			140740
WHSL	10754	14081	6861	16388																			48085
PROFIT	60747	40879	61499	2673																			165799
U-HH									37574	19125	46902						494					575	104670
SR-HH									47787	9262	42220						2204					1263	102736
LR-HH									23692	12346	34730						435					514	71717
LLR-HH									31687	7352	18490						2066					2683	62279
FIRMS									0	0	23457						9901						33358
GOV																			16203	13893	11286	10698	52079
S-I												7052	6986	23350	1582	24518	1656					46271	111416
YTAX												3921	0	3442	0	8840							16203
STAX					2719	7111	2977	1086															13893
TAR					2070	2732	2580	3904															11286
ROW	11230	22568	8038	3622	15682	26522	17671	19136															124469
Total	181249	169308	142195	57374	201720	205673	165424	81500	140740	48085	165799	104670	102736	71717	62279	33358	52079	111416	16203	13893	11286	124469	

The envisaged restructuring of the economy would become complete after more disaggregated changes are incorporated in the distribution pattern of the factor income from economic activities and by receiving households and firms.

Here we need the extended matrix for the household and firms factor income distribution by activities and skill categories as we did in Tables 3.4 and 3.5 for the Nepal SAM 1996. The guiding principle for the pro-poor distribution of these factor earnings in the course of liberalisation is that the shares of value added from agriculture and industries would go more to the poorer household categories as these are the two expanding sectors in the course of liberalisation as revealed by the static analysis in chapter 6. Being the poorest of the poor the landless rural household chiefly sells its unskilled labour to these two growing sectors of agriculture and industry. The second poor household group is the small rural households and they also have a relatively more profit earning as compared to the poorest group; therefore, in the restructuring, the profit share of this household income comes basically from the agricultural and industrial sectors. In consequence, the composition of the income of the richer household categories would be inclined to be more coupled to the service sectors. This greater link with the service sectors would apply, therefore, to the urban households followed by the large rural households.

Here, one question arises what would be the effective restructuring policies the government can pursue in promoting the agricultural and industrial activities of the poor? It would be possible for the government to upgrade skills and trainings to landless rural households in the villages pertinent to the agricultural and agro-based industrial activities. Regarding the small rural households, the implications of the public policy is the provision of incentives to them to invest in modern agricultural and agro-based industries. The expected results of this restructuring is that the poorer household would be more linked to agricultural and industrial sectors which grow more with liberalisation; and that in relative terms the income shares of the richer household categories would be more linked to the services sectors which do not grow as much following liberalisation reforms.

Keeping these policies in mind, our new household-activities-factor income distribution matrix has been derived in the form as in Table 7.5. There are very small exceptions in some cells, which have not changed in the prescribed way because some of them had to be worked out as balancing cells. In total, poorer household categories have moved towards agricultural and industrial activities and richer household categories towards service activities. The absolute distribution of the factor income as a fully consistent set with the corresponding block to SAM 2006 is presented in Table 7.6.

Table 7.5: Factor shares to households and firms for SAM 2006

Households and firms	Activities and factors											
	AGR-A			IND-A			CS-A			OS-A		
	WLSL	WHSL	PROFIT	WLSL	WHSL	PROFIT	WLSL	WHSL	PROFIT	WLSL	WHSL	PROFIT
U-HH	0.157	0.117	0.095	0.202	0.332	0.400	0.555	0.634	0.359	0.240	0.540	1.000
LR-HH	0.165	0.275	0.292	0.157	0.236	0.097	0.187	0.154	0.212	0.162	0.306	0.000
SR-HH	0.460	0.329	0.308	0.192	0.124	0.323	0.149	0.212	0.168	0.422	0.154	0.000
LLR-HH	0.218	0.279	0.304	0.450	0.309	0.000	0.109	0.000	0.000	0.176	0.000	0.000
FIRM	0.000	0.000	0.000	0.000	0.000	0.180	0.000	0.000	0.262	0.000	0.000	0.000
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 7.6: Distribution of the factor income to household and firms for SAM 2006 (values in million Rupees)

Households and firms	Activities and factors											
	AGR-A			IND-A			CS-A			OS-A		
	WLSL	WHSL	PROFIT	WLSL	WHSL	PROFIT	WLSL	WHSL	PROFIT	WLSL	WHSL	PROFIT
U-HH	10284.62	1259.07	5789.00	4656.68	4670.91	16361.16	17855.15	4350.18	22078.86	4777.61	8845.31	2673.07
LR-HH	10834.38	2956.64	17764.82	3617.90	3316.87	3956.87	6013.48	1057.80	13008.18	3226.37	5014.41	0.00
SR-HH	30159.46	3538.25	18703.73	4432.50	1741.52	13197.08	4793.38	1453.24	10318.88	8401.93	2528.62	0.00
LLR-HH	14300.00	3000.00	18489.88	10386.98	4352.18	0.00	3500.00	0.00	0.00	3500.00	0.00	0.00
FIRM	0.00	0.00	0.00	0.00	0.00	7363.82	0.00	0.00	16093.27	0.00	0.00	0.00
Total	65578.46	10753.97	60747.42	23094.06	14081.49	40878.93	32162.00	6861.22	61499.19	19905.92	16388.34	2673.07

In the next few paragraphs we discuss background aspects of the restructuring of the efficiency distribution patterns. In general, liberalization reforms will work more effectively under an enhanced efficiency and a progressive distribution. In the SAM and CGE models an improvement in efficiency parameters refers to higher shares of factor income in activities and lower shares of intermediate inputs; which have been realised in the construction of the new SAM (2006). The distribution parameters are the shares of different factors in total value added and their spread over household groups and sectoral activities. While constructing the SAM 2006, we incorporated for the various sectors slightly higher shares of the value added in output, along with higher shares of the labour income and a declining share of the capital income in the value added. These are well established tendencies that are observed during the course of economic development for most countries.

It can be asked: what are factors that will make an enhanced efficiency and a progressive distribution sustainable for a longer term given the orientation of the Nepalese economy? These factors are twofold: (a) redistribution of investment in physical capital more towards agriculture and industry, (b) redistribution of skill endowments from low to high skills, and relatively more so among lower income households than high income households.

In the situation of improved physical infrastructure for agricultural and agro-based industrial activities in the villages, the benefit to the landless workers would definitely improve. Furthermore, a shift from low skills to high skills over time is a basic requirement in this context. Through this the efficiency parameters are also improved. The distribution parameters also become more pro-poor since this group benefits more than non-poor with the general upgrading of skills because this group depends more on wage income than profit income. Moreover, starting from a low profile and being the over majority of the population, the poor are more able than others to significantly increase their share of the high skilled labour force in the long run. Government policy can also be helpful in stimulating greater access of the poor to high skill works by providing costless education.[47] Besides, the greater supplies of high skills, it would also reduce the wage differential and benefit the poor groups in a relative sense. Furthermore, the improvement in the investment climate and the greater expected returns to labours effort will increase labour force participation which will ultimately raise economic growth and benefit the poorer groups more.[48]

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[47] This will be incorporated in the dynamic CGE model in the next section.

48 We simulate a slight increase in the projected labour force for 2006 from 15.51 millions to 15.86 millions. The difference of 0.35 is equivalent to 10% on the addition of the inflow between 1996 and 2006. This 10% increase is consistent with the magnitude of liberalization measures applied, also 10%..

7.2.2 Comparison between Nepal SAM 1996 and 2006: the SAM multipliers

As we are working with two SAMs, 1996 SAM for the static CGE analysis and hypothetical but plausible 2006 SAM for the dynamic CGE analysis, it is essential to compare the properties and implications of the two SAMs before proceeding further with SAM 2006. The practical approach to analyse these properties is a comparative analysis of SAM multipliers in these two SAMs. Here we explain very briefly how the multipliers are obtained from the SAM and apply the same to produce SAM multipliers for 1996 and 2006.

Construction of SAM multipliers requires the specification of endogenous and exogenous accounts in the SAM. Here, we shall follow convention and consider the government and the ROW accounts as an exogenous block and the rest of the accounts as the endogenous block. Furthermore, let us represent the vector of exogenous totals by x; the endogenous vector by y_n; and a coefficient matrix, which is average propensity of each endogenous cell calculated by dividing the same by the corresponding column total, by A_n. Then, the vector of endogenous variables, y_n, can be expressed as:

$$y_n = A_n y_n + x \qquad \ldots\ldots\ldots\ldots (7.1)$$

Equation 7.1 can also be written as:

$$y_n = (I - A_n)^{-1} x = M_a x \qquad \ldots\ldots\ldots\ldots (7.2)$$

Here, M_a is the SAM multiplier matrix. If there are some impulses in the exogenous accounts, their impacts on endogenous accounts can be traced through the SAM multipliers. There are two types of impulses which are generally studied with SAM multipliers, demand injections to sectors and transfer injections to institutions. The impact of either impulse can be traced to the four types of endogenous accounts: expenditure by product, earning by factors, output by sectoral activity, and income by household groups. In this chapter, we are interested with the last two endogenous accounts only, i.e. we analyse the effects of demand injections of one unit in the individual activity accounts on sectoral outputs and household incomes; and the effects of one unit transfer injections to the individual household groups on sectoral outputs and household incomes. These effects can be specified in terms of output multiplier effects spread on all the four activity accounts and income multiplier effects spread on all the four household groups. Though we use only four sub-matrixes in our analysis in following paragraphs, in complete form, our SAM multiplier matrix is disaggregated with activities, commodities, households and factor types for both 1996 and 2006 SAMs (see Appendix 7A for the full multiplier matrixes generated from both 1996 and 2006 SAMs).

Here, we briefly comment on the differences between 1996 and 2006 SAM multipliers, specifically with demand injections to sectors and transfer injections to households both by sectoral output and household incomes. To begin with, Table 7.7 presents the size of output and income multiplier effects of demand injections on different activities and income of households. The output multiplier effects reveal that a demand injection in agriculture of 1 unit leads to an output increase in agriculture by 2.38 (this is the 1 unit plus 1.38 more), plus an output increase in industry by 0.80, in commercial services by 0.88, and in other services by 0.23. Altogether the demand injection by 1 unit in agriculture leads to a total output increase by 4.29 units. Similarly, demand injections by 1 unit in industry, commercial services and public services increase total output by 3.92, 4.09, and 4.17 units, respectively.

Considering income multiplier effects, the total household incomes increase by a multiplier of 2.65 due to 1 unit demand injection in agricultural sector. It is composed of 0.65, 0.66, 0.86, 0.48 multipliers to U-HH, LR-HH, SR-HH and LLR-HH, respectively. The household income growth is more among SR-HH followed by LR-HH. The reason behind these differential impacts is the possession of both agricultural capital and labour income in more proportions by these two household categories as compared to other household groups (see Table 3.4, chapter 3).

The ratio of income to output multiplier for injections is highest in agriculture at 0.62 and lowest in industry at 0.53. The high output and income multipliers of agriculture are due to the greater frequency of agricultural flows in the total circular flows of the economy. Likewise, the flows are relatively less in case of industries, in addition to higher proportions of intermediate deliveries, which result in a small income output multiplier ratio in industry (Table 7.7).

Table 7.7: SAM multipliers 1996 of demand injections in activities

		Activities			
Size of multipliers		AGR-A	IND-A	CS-A	OS-A
Activities	AGR-A	2.38	1.18	1.12	1.16
	IND-A	0.80	1.81	0.80	0.84
	CS-A	0.88	0.73	1.93	0.93
	OS-A	0.23	0.20	0.24	1.24
Sum output multiplier		4.29	3.92	4.09	4.17
Households	U-HH	0.65	0.69	0.77	0.84
	LR-HH	0.66	0.46	0.52	0.54
	SR-HH	0.86	0.60	0.70	0.64
	LLR-HH	0.48	0.31	0.35	0.43
Sum income multiplier		2.65	2.06	2.34	2.45
Income/output multiplier		0.62	0.53	0.57	0.59

Table 7.8 shows the proportional distribution of the multiplier effects which follows from Table 7.7. As the effect of demand injection is highest to the same sector because the injection of one unit goes to the same sector, the diagonal proportion of injecting sector on receiving sector is always the highest in the column.

Table 7.8: Proportional distribution of the SAM multipliers 1996 among activities and households

		Activities			
Proportional distribution		AGR-A	IND-A	CS-A	OS-A
Activities	AGR-A	0.56	0.30	0.27	0.28
	IND-A	0.19	0.46	0.20	0.20
	CS-A	0.21	0.19	0.47	0.22
	OS-A	0.05	0.05	0.06	0.30
Sum output multiplier		1.00	1.00	1.00	1.00
Households	U-HH	0.25	0.33	0.33	0.34
	LR-HH	0.25	0.22	0.22	0.22
	SR-HH	0.33	0.29	0.30	0.26
	LLR-HH	0.18	0.15	0.15	0.18
Sum income multiplier		1.00	1.00	1.00	1.00

Table 7.9 presents the impacts of transfer injections to households on sectoral output and income of households. One unit of income transfer injection to U-HH, which could be initiated by government or ROW, induces 1.33 units increase in agricultural activity due to the increased food demand of this household group, among others. Moreover, the 1 unit transfer injection to this household group causes 0.81 units of growth in industrial activities, 1.05 units in commercial services and 0.25 units to other services activities. Similarly, the effects of 1 unit transfer injections to other household groups' incomes can be studied from the table. It is clear that due to the higher average propensity to food consumption as compared to other type of goods and self-propelling agricultural production, the output multiplier of agricultural activities is quite high in Nepal among all household groups. Agricultural output multiplier due to transfer injections to household group is highest (1.58) among poorest households, LLR-HH, followed by the multiplier (1.51) to next poor households, SR-HH. Likewise, transfer injections to LLR-HH has highest impact on total output multiplier (3.60) followed by transfer injection to SR-HH (3.59).

The effect of transfer injection to households on household income, Table 7.9, shows that 1 unit growth in transfer injection to U-HH income has 1 unit growth in household income as a direct impact and 0.60 units of growth by indirect impact. Likewise, 1 unit transfer injection to LR-HH, SR-HH, and LLR-HH have 0.44, 0.65, and 0.37 units of growth to their household income as an indirect impact of the transfer injection. Overall, the total income multiplier by transfer injection is highest if it is made through LLR-HH (3.14) followed by through SR-HH (3.10). This is because

these household groups have higher average propensity to consume and are producers of own consumption as well as consumption of others, which induce more production leading to overall growth of household incomes.

Income output multipliers ratio does not vary much among household groups. They are within the range of 0.86 to 0.88.

Table 7.9: SAM multipliers 1996 of transfer injections to households

		Households			
Size of multipliers		U-HH	LR-HH	SR-HH	LLR-HH
Activities	AGR-A	1.33	1.26	1.51	1.58
	IND-A	0.81	0.94	0.93	0.85
	CS-A	1.05	0.91	0.90	0.88
	OS-A	0.25	0.24	0.25	0.29
Sum output multiplier		3.44	3.35	3.59	3.60
Households	U-HH	1.60	0.58	0.60	0.60
	LR-HH	0.47	1.44	0.50	0.51
	SR-HH	0.61	0.58	1.65	0.66
	LLR-HH	0.33	0.31	0.35	1.37
Sum income multipliers		3.01	2.91	3.10	3.14
Income /output multipliers		0.88	0.87	0.86	0.87

Besides analysing the levels of multipliers, it is also important to study the distribution of the multiplier effects across the respective sectors and households, and in this way discover the underlying structural bias in the SAM. In order to do so, we calculate the Relative Distributive Measure (RDM) from these output and income multipliers. Relative Distributive Measures can be calculated as introduced by Cohen (1988). The RDM shows the direction of bias in the SAM multipliers, indicating which sectors and which household groups are more favoured and less favoured as a result of demand injections or transfer injections. Equations 7.3 and 7.4 define RDM for output and income multipliers ($RDM_{ss'}$ and $RDM_{hs'}$ respectively) generated from demand injections to sectors. Likewise, equations 7.5, and 7.6, compute RDM for output and income multipliers ($RDM_{sh'}$ and $RDM_{hh'}$ respectively) generated from transfer injections to household groups. These formulations of RDMs were used by Cohen (2002b) in making a comparative study of SAM multipliers among some eastern and western European economies.

$$RDM_{ss'} = \frac{\left(M_{a,ss'} - d_{ss'}\right)}{\left(\sum_s M_{a,ss'},-1\right)} \Big/ \frac{Output_{s,0}}{\sum_s Output_{s,0}} \qquad (7.3)$$

$$RDM_{hs'} = \frac{M_{a,hs'}}{\sum_h M_{a,hs'}} \Big/ \frac{Income_{h,0}}{\sum_s Income_{h,0}} \qquad (7.4)$$

$$RDM_{sh'} = \frac{M_{a,sh'}}{\sum_s M_{a,sh'}} / \frac{Output_{s,0}}{\sum_s Output_{s,}} \quad (7.5)$$

$$RDM_{hh'} = \frac{M_{a,hh'} - d_{hh'}}{\sum_h M_{a,hh'} - 1} / \frac{Income_{h,0}}{\sum_h Income_{h,0}} \quad (7.6)$$

where $M_{a,ss'}$ and $M_{a,hs'}$ represent output multipliers and income multipliers, respectively, generated from demand injections to sectors. Likewise, $M_{a,sh'}$ and $M_{a,hh'}$ are the output multipliers and income multipliers generated from transfer injections to households. Here, s and h represent sector and household group, respectively. These multipliers are component blocks of the SAM multiplier matrix (M_a) in the appendix. In these equations, $M_{a,ss'}$ is divided by the column sum of multipliers of *s* after deducting the initial injection. Here, $d_{ss'}$ stands for the Kronecker symbol that equals 1 if *s=s'* and 0 in other cases. Similar is the case for $M_{a,hh'}$. We take $d_{hh'}$= 1 if d = d'. These subtractions are to remove the direct impacts of demand (transfer) injections to the same sector (household). Furthermore, in the case of the output multiplier, the result is divided by the recorded (actual) output share of sector *s* in year 0, as found in the SAM for the recorded year 0. Similarly, in the case of the income multiplier, the result is divided by the recorded (actual) income share of that household group h in the recorded year 0. For values of RDM >1, <1, and = 1, there are positive, negative and neutral redistributive effects. For instance, values of $RDM_{ss'}$ = 1 mean that sectoral injections would reproduce exactly the sectoral distribution pattern of the recorded year. An endogenous variable with RDM above unity enjoys a favoured position, and below unity is disfavoured. Likewise, similar interpretations can be made for the three other RDMs.

Applied to Nepal SAM 1996, Table 7.10 shows demand injection in activities which result in a favourable bias towards agriculture. Moreover, the own effect is always positive to every sector, except in case of industry. Overall, sectoral injections do give more favour to agricultural growth, followed by commercial services. Industry and public services get disfavoured redistributive effects from every demand injection. The agricultural orientation of the economy is very vividly shown by the RDM.

Turning to household income effects, a demand injection to agricultural activities has positive redistributive effects for all rural households, RDM>1, and a negative redistributive impact to urban households U-HH, where $RDM_{hs'}$ = 0.78. A demand injection to the industrial sector does have negative redistributive impact to both SR-HH and LLR-HH. Likewise, a demand injection to commercial services has negative redistributive impact to LLR-HH and that of public services has

negative impact to the SR-HH. Overall, impact of demand injections on household income shows neutral or positive redistributive impacts on all household groups except the poorest. The poorest group of households, LLR-HH, is disfavoured with an average RDM of 0.96, but if the demand injections are restricted to agriculture then LLR-HH is among the most favoured, RDM = 1.06.

Table 7.10: RDM 1996 of demand injections in activities

		RDM by activities				
RDM		AGR-A	IND-A	CS-A	OS-A	average
$RDM_{ss'}$	Activities					
	AGR-A	1.29	1.24	1.11	1.12	1.19
	IND-A	0.77	0.88	0.82	0.84	0.83
	CS-A	1.03	0.96	1.15	1.12	1.06
	OS-A	0.70	0.69	0.78	0.76	0.73
$RDM_{hs'}$	Households					
	U-HH	0.78	1.07	1.05	1.09	1.00
	LR-HH	1.12	1.01	1.00	0.99	1.03
	SR-HH	1.10	0.99	1.02	0.89	1.00
	LLR-HH	1.06	0.88	0.88	1.03	0.96

Taking up the sectoral redistributive impacts of transfer injections to household groups, the agricultural sector gets a positive redistributive impact in all cases (Table 7.11). However, the RDM for agriculture is higher from transfer injections to poor rural household groups than to rich groups because of the greater linkages in production, income and consumption between the rural poor and the agricultural sector. Transfer injections to U-HH and LR-HH have positive redistributive impacts to commercial services. Transfer injections to all household groups have negative redistributive impacts to industry and public services.

Finally, there are $RDM_{hh'}$ as well, (Table 7.11). It is interesting to note here that the middle income household group LR-HH and SR-HH are able to secure positive redistributive impacts from transfer injections to households, scoring an average RDM of 1.06 and 1.04, respectively. In contrast, the richest and poorest household groups experience greater leakages, ending up with an average RDM of 0.93 and 0.98, respectively.

What are the results of the multiplier analysis for the prospective SAM 2006? Are they consistent with those of SAM 1996, and hence plausible? We shall make here a comparative analysis of the output and income multipliers between 1996 and 2006. This will be followed by a comparison of RDMs.

Table 7.11: RDM 1996 of transfer injection to households

RDM		RDM by household groups				
		U-HH	LR-HH	SR-HH	LLR-HH	average
$RDM_{sh'}$	Activities					
	AGR-A	1.19	1.15	1.29	1.35	1.24
	IND-A	0.75	0.89	0.83	0.75	0.80
	CS-A	1.17	1.04	0.96	0.94	1.03
	OS-A	0.73	0.72	0.70	0.81	0.74
$RDM_{hh'}$	Households					
	U-HH	0.95	0.97	0.91	0.89	0.93
	LR-HH	1.05	1.04	1.07	1.07	1.06
	SR-HH	1.03	1.03	1.05	1.05	1.04
	LLR-HH	0.97	0.95	0.98	1.02	0.98

In the projected scenario of SAM 2006, demand injections in all the sectors have higher multiplier effects (Table 7.12) than that of SAM 1996 (Table 7.7). The reason to this overall increase in the size of multipliers is due to the relative decline of the size of exogenous sectors in SAM 2006 as compared to that of 1996, and by definition, the relative increase in the size of the endogenous component in the SAM. These magnitudes for 2006 are the results of projections of past trends of the exogenous accounts of government and ROW, and are not the result of stipulated changes in the structure of the SAM. The combined share of these two accounts in total circular flow has declined from 17% (SAM 1996, Table 3.4) to 15% (SAM 2006, Table 7.4), and as result the sizes of the output multipliers generated from demand injections in sectors are pushed slightly upwards.

Table 7.12: SAM multipliers 2006 of demand injection in activities

		Activities			
		AGR-A	IND-A	CS-A	OS-A
Activities	AGR-A	2.41	1.23	1.13	1.20
	IND-A	0.82	1.84	0.81	0.86
	CS-A	0.90	0.76	1.97	0.96
	OS-A	0.24	0.21	0.25	1.24
Sum output multiplier		4.37	4.04	4.16	4.26
Households	U-HH	0.70	0.69	0.91	0.90
	LR-HH	0.63	0.47	0.56	0.58
	SR-HH	0.94	0.69	0.70	0.79
	LLR-HH	0.58	0.43	0.36	0.41
Sum income multiplier		2.85	2.28	2.53	2.68
Income/output multipliers		0.65	0.56	0.61	0.63

The same logic works for the size of multipliers that show the impact of the 1 unit demand injection in sectors to household incomes. For example, a unit injection in agriculture resulted in an output multiplier of 4.29 in 1996 compared to 4,37 in 2006, while the income multiplier of 2.65 in 1996 reaches 2.85 in 2006. As a result, there is a slight improvement in the income/output

multiplier ratio in 2006 as compared to 1996, for example 0.65 from 0.62 in case of agriculture. This is largely due to the stipulated overall rise of the efficiency parameters in the prospective SAM 2006, which was argued to be in line with higher stages of economic development and a more global setting.

Comparing the proportional distribution of the multipliers from demand injections in activities between 1996 (Table 7.8) and 2006 (derivable from Table 7.12 but not shown here), we do not find any significant difference. They follow almost the same distributional pattern. The same applies for the distribution pattern of income effects on household groups except that the LLR-HH group gains slightly at the cost of LR-HH, both belonging to the rural groups. This effect is primarily due to the postulated adjustments in the prospective SAM 2006.[49]

The multipliers of transfer injections to households show no additional significant differences between 1996 and 2006 than so far discussed (Table 7.9 and Table 7.13). The output and income multipliers are higher in 2006 because the projected size of the endogenous circular flow, following past trends, is relatively higher ten years. The distribution of these multiplier effects on receiving sectors and household groups is also largely the same for 1996 and 2006.

Table 7.13: SAM multipliers 2006 of transfer injection to households

		Households			
Size of multipliers		U-HH	LR-HH	SR-HH	LLR-HH
Activities	AGR-A	1.33	1.26	1.52	1.59
	IND-A	0.82	0.94	0.94	0.87
	CS-A	1.06	0.92	0.91	0.88
	OS-A	0.25	0.24	0.26	0.29
Sum output multiplier		3.46	3.36	3.63	3.63
Households	U-HH	1.65	0.62	0.64	0.64
	LR-HH	0.47	1.45	0.49	0.50
	SR-HH	0.65	0.63	1.70	0.72
	LLR-HH	0.38	0.37	0.42	1.43
Sum income multiplier		3.15	3.07	3.25	3.29
Income/output multipliers		0.91	0.91	0.90	0.91

Turning now to a review of results of RDM, it is noted that as the proportions of the multipliers from the demand injection in sectors do not vary significantly between 1996 and 2006 (Table 7.8 and derivable from 7.12), and as the sectoral shares of activities in total activity remain almost the same between these two years, RDM of demand injections in activities on activities are not much

[49] For example, LLR-HH would get 0.48 income out of a 2.65 income multiplier in 1996 (or 18%), as compared to 0.58 out of an income multiplier of 2.85 (or 20%) LR-HH falls from 25% to 22%. The changes are not very remarkable, especially when one keeps in mind that both groups belong to the rural households.

different between 1996 and 2006 (Table 7.10 and 7.14). In case of RDM of demand injections in agriculture on household groups it is noted that the poorest group gains more in 2006 than in 1996, the RDM of LLR-HH increases from 1.06 to 1.12, reflecting the postulated higher earnings scenario for this group from agriculture in SAM 2006. However, if an overall RDM is considered the average RDM for the poorest group shows a decline from 0.96 in 1996 to 0.94 in 2006. This suggests that to achieve a pro-poor growth for the poorest group their fate is to be linked to a high growth of the agricultural sector.

Table 7.14: RDM 2006 of demand injections in activities

		RDM by activities				
RDM		AGR-A	IND-A	CS-A	OS-A	average
$RDM_{ss'}$	Activities					
	AGR-A	1.27	1.23	1.09	1.12	1.18
	IND-A	0.79	0.90	0.83	0.86	0.84
	CS-A	1.03	0.97	1.19	1.14	1.08
	OS-A	0.68	0.66	0.76	0.71	0.70
$RDM_{hs'}$	Households					
	U-HH	0.80	0.99	1.17	1.10	1.01
	LR-HH	1.05	0.98	1.05	1.03	1.03
	SR-HH	1.10	1.01	0.92	0.98	0.98
	LLR-HH	1.12	1.03	0.78	0.84	0.94

Finally, we consider Table 7.15. Moving to the distributionary impact of transfer injections to households on receiving sectors ($RDM_{sh'}$), it is noted that there are no significant differences among these when compared between 1996 and 2006 for the reasons mentioned earlier. In case of the distributionary impact of transfer injection to households on receiving households ($RDM_{hh'}$), some differences between 1996 and 2006 are observed. Transfer injections to all household groups raise the RDMs to U-HH in 2006 from the level of RDMs in 1996 because of the relative decline of the share of U-HH income in total household income in 2006. As for the rural households there is a mixed picture concerning gainers and losers over the two periods, and yet it can be concluded on the whole that the changes in RDM among the rural household groups is of a more equalizing income distribution mechanisms over the two periods. The poorest LLR-HH tends to maintain its income share, at RDM=1 in 2006, RDM was .98 in 1996, which can be seen as an improvement. The other rural household groups tend to increase their shares in 2006 but at a lower rate than in 1996. They score RDMs of 1.04 and 1.02 in 2006 as compared to 1.06 and 1.04. These tendencies can be partly due to the postulated adjustments in the distributionary parameters in the prospective SAM 2006.

Table 7.15: RDM 2006 of transfer injection to households

RDM		RDM by household groups				
		U-HH	LR-HH	SR-HH	LLR-HH	average
$RDM_{sh'}$	Activities					
	AGR-A	1.17	1.14	1.27	1.33	1.23
	IND-A	0.77	0.91	0.84	0.78	0.82
	CS-A	1.19	1.06	0.97	0.94	1.04
	OS-A	0.69	0.68	0.69	0.77	0.71
$RDM_{hh'}$	Households					
	U-HH	0.99	0.98	0.93	0.91	0.95
	LR-HH	1.04	1.03	1.04	1.04	1.04
	SR-HH	1.00	1.01	1.03	1.04	1.02
	LLR-HH	0.97	0.98	1.02	1.03	1.00

To summarise, Table 7.16 gives the sizes of the weighted output and income multipliers in actual SAM 1996 and prospective SAM 2006.[50] Total output and total income multipliers increased in 2006 from their 1996 levels. The increase is due to a relatively greater endogenous circular flow over time that is projected on the basis of past trends. In case of output multipliers, this increase is mainly caused by agricultural and public services multipliers; whereas in the case of income multipliers all sectors have significant contributions in the scaling up of the size of the multiplier. The distributionary analysis of the multiplier effects, as facilitated by the RDMs, shows a large degree of consistency and stability of results for the two SAMs, with slightly favoured positions for agriculture and the LLR household group.

Table 7.16: Comparison of weighted output and income multipliers between 1996 and 2006

Year	Weighted output multipliers					Weighted income multipliers				
	Agri.	Ind.	ComSer.	PubSer.	Total	Agri.	Ind.	ComSer.	PubSer.	Total
1996	1.40	1.23	1.07	0.41	4.11	0.86	0.65	0.61	0.24	2.36
2006	1.44	1.24	1.08	0.44	4.20	0.94	0.70	0.65	0.28	2.57

In this SAM multiplier analysis, we could observe that scenario 2006 is slightly more favourable for growth and income generation for the poorest group, but this is only partly because we assume such a scenario for 2006. It is partly the result of projected trends and partly reflecting a favourable scenario under a more open, mobile and efficient economy that capitalises on globalisation effects. But these favourable growth and distributionary effects are only potential. There are several reservations on the validity of SAM multipliers.[51] The most important reservation is that the SAM multipliers give quantity effects only assuming that prices do not change. Hence, the predicted volume multipliers of SAM 2006 are potential assuming that prices do not matter. It is in the CGE

[50] The weights represent the output shares of the activities injected, and the income shares of household groups, respectively.
[51] See Cohen (2000b), among others.

dynamic model that the relative prices change and thus only part of the potential positive effects are materialised. The realised effects depend also on how much factors of production are created and shifted over time between the sectors in the dynamic CGE model. The rest of the chapter treats the dynamic CGE model.

7.3. Extension of Nepal CGE 1996 to Nepal CGE 2006

7.3.1 Background

Since the seminal book of Auerbach and Kotlikoff (1987), the dynamic computable general equilibrium (CGE) modelling has become a standard instrument for economic policy analyses. The first generation of CGE models used to evaluate the effects of macroeconomic shocks by comparative static analysis, therefore, it was static in nature. Limitations of applied comparative static analysis, which are described in some detail in Farmer and Wendner (1997), have led to an increasing popularity of dynamic CGE models. However, the static and dynamic CGE models are quite interrelated. The solution to the dynamic linkage problem; which generates the inter-temporal equilibrium, has intensive use among general equilibrium model builders these days. Though the major advantages of this more recent generation of CGE models comprise their ability to deal with lifecycle behaviour, intergenerational issues, inter-temporal investment, consumption decisions, and government deficits; the implementation of such models involve many complexities in addition to those faced in static CGE models. These include the incorporation of equations of motion, the necessity to endow the agents with a specific type of expectations and – dependent on these characteristics – the calibration procedure, Wender (1999), p. 266.

As with the static model, the actual output for each sector in a specific base year is replicated through the calibration. In addition, however, the economy is expected to grow with all sectors, quantities, and factors of production at the same steady-state rate. In the dynamic model, certain variables, which are fixed in the short-term, are explicitly modelled. Overall, dynamic model is partitioned into a static within period equilibrium model and a separate between-period model. This division provides necessary inter-temporal linkages and shifts the sectoral demand and supply functions, Debris et al. (1982), p. 173. Most importantly, it is necessary to have the sectoral disequilibrium in the labour market and the pattern of investment determination in the capital markets, which are "taken out" of the core equilibrium model and put into a second stage dynamic CGE adjustment model that links the sequences of years into a consistent whole, Adelman and Robinson (1978).

When a counterfactual shock is given to a dynamic CGE model, two things occur. First, the affected prices and quantities traverse to a new growth path in the years following the shock. Second, the new growth path itself returns to a steady state but at a level different from that in the benchmark case. Generally, the interest in these dynamic models is on how much higher or lower it is than the original benchmark path. It links the dynamic modelling to the growth empirics. Analytical treatment of aggregate economic growth has its origin in the work of early theorists such as Ramsey (1928), Solow (1956) and Koopsmans (1965). Nonetheless, because of their heavy computational requirements, interest has now shifted towards the dynamic extensions of CGE models as a fairly recent development. In the past few years, authors such as Goulder and Summers (1989), Jorgenson and Wilcoxen (1990), and Rutherford and Light (2002) have begun to use dynamic CGE models to explore a variety of policy issues using a single consuming agent.

The extension of a static CGE model to a dynamic one is fairly straightforward. Although computationally more complex, a dynamic CGE model differs from its static counterpart only in the inclusion of a driving force to move the economy from period to period. In most dynamic models, this force is provided by the growth in the underlying labour force, capital stock, and/or a change in the level of technology in one or more sectors of the economy. These changes are facilitated by new investments and the growth of the capital stock in the economy.

The dynamic CGE consists of both inter-temporal and intra-period equations. The intra-period equations are those used in static (benchmark) analysis. Moreover, there are some motion equations, called inter-period (inter-temporal) equations, which make the endogenous variables changing from one to another year. As mentioned earlier, the major factors behind them are the changes in capital stock and labour. Moreover, adjustment of the efficiency parameter is also reasonably adjusted for the long run analysis.

One of the most important stages in dynamic CGE modelling is the treatment to capital. There are two basic approaches in this regard: the infinitely lived agent (ILA) type and the overlapping generation (OLG) type. A decade ago, most dynamic CGE models represented a one sector version of either the Ramsey (1928) type of ILA model or the Diamond (1965) type of OLG model. Over the last decade, a number of researchers have adopted an OLG type dynamic multi-sector framework for CGE models.

In dynamic multi-sector CGE modelling, many papers follow the practice of determining sectoral investments by fixed investment shares. Accordingly, sectoral investment is aggregated by fixed

shares to composite capital goods. We also follow this approach in Nepal dynamic CGE model. Other examples of this approach include Ballard et al. (1985), Ballard (1989), Farmer and Steininger (1999) and Wendner (1999). In these models, outputs of the industries combine according to fixed coefficients to produce representative capital goods. This practice stems from a custom in static multi-sector modelling where investment by sector of origin is determined according to fixed shares of total savings, see Bergman et al. (1990), Dervis et al. (1982); and Kilkenny (1999).

Aggregating sectoral investments by fixed shares to one aggregate capital raises three problems. First, the investment shares can be non-optimal. No condition in CGE models that make use of this approach ensures that the exogenously fixed shares maximize the present value of household income. Second, the investment shares remain constant over time; even during the transition, i.e., when relative prices change from period to period. Third, the investment shares do not change as a consequence of a policy shock. Moreover, the approach also implies that sector specific tax policy has no impact on sectoral investment shares. For all these reasons, serious doubts have been cast on the approach of specifying investment aggregation according to exogenously fixed shares. The main question to be answered in this connection is: does the framework of fixed investment shares represent a sufficiently close approximation to an optimization model with heterogeneous capital that determines investment shares by household optimization? If it does not, the use of fixed investment shares leads to biased policy simulations results.

In our model, we work with the concept of homogenous capital. Moreover, we are not going to conduct optimisation model. Likewise, in most of the cases, tax rates do not change with the dynamic model. Therefore, adopting the approach of constant share of investment into different sectors does not harm our model rather it simplifies many things in connection with saving and investment. However, while departing from static to dynamic model, we make some adjustments in the relative shares of investment but will keep the proportion fixed to all the simulations.

7.3.2 Basic features of Nepal dynamic CGE model (2006)

Nepal CGE has the following assumptions while converting static into dynamic recursive model:

i. The static model was solved for the base year 1996; the dynamic model is solved for the 10^{th} year, 2006, assuming the constant average annual growth rates in different sub-accounts throughout the period.
ii. Factors are homogenous and mobile across activities similar to the static model.
iii. Investment is savings-driven. Capital stock growth is endogenous.

iv. Growth rate in labour force is exogenous. However, labour reallocation into different activities and skill categories is endogenous.

v. The dynamic calibration must reproduce the restructured SAM 2006.

Additional variables, parameters and equations in dynamic model:

Here are five additional endogenous variables and five additional equations in dynamic model as compared to the static one.

The additional variables are listed below.

GRIV	annual growth rate of gross fixed capital formation
LTLR	long-term projected ratio of labour by skill categories
QFS('LSL')	total quantity of low skilled labour
QFS('HSL')	total quantity of high skilled labour
QFS('CAP')	total quantity of capital

In fact, the last three variables are the same as they were used in the static model; rather they were exogenous in the static model but became endogenous in the dynamic model.

As a result, the dynamic model contains also some additional parameters.

ζ	rate of depreciation
ς	calibration constant in labour supply equation
ξ_1	share of the education cost for low skilled labour borne by the user
ξ_2	share of the education cost for high skilled labour borne by the user
ψ_1	education cost for the low skilled labour
ψ_2	education cost for the high skilled labour
η	education cost exponent parameter
τ	distribution parameter of the present skill ratio to the future skill ratio
$\hbar$	annual growth rate of labour.

The additional equations are stated below.

1. Annual growth rate of total gross fixed capital

Here we assume a constant growth rate of the gross fixed capital (GRIV).

$$GRIV = \left(\frac{GFCF}{GFCF_0} \right)^{\frac{1}{t}} - 1 \qquad (7.7)$$

where t is the number of year, we have considered it to be 10 years. $GFCF_0$ is the static benchmark value (1996) of the total gross fixed capital formation. Therefore, we will get the value of the capital stock for the year 2006 using the annual growth rate of GFCF, denoted by GRIV.

2. Total quantity of capital in t^{th} year

$$QFS(CAP) = QFS(CAP)_0(1-\zeta)^t + GFCF_0\sum_{i=1}^{t}(1-\zeta)^{t-i}(1+GRIV)^i \qquad (7.8)$$

QFS('CAP')$_0$ refers to the quantity of capital in the benchmark year, i.e. 1996. Here two factors play determinant role in estimating the capital stock, the rate of depreciation and the growth rate of capital. They reduce and increase the level of capital stock, respectively. Equation 7.8 calculates the net growth of capital stock as a resultant effect of these two forces.

3. Total supply of labour by skill categories

$$\text{QFS(LSL)} = [QFS(LSL)_0 + QFS(HSL)_0](1+\hbar)^t - QFS(HSL) \qquad (7.9)$$

where QFS(LSL)$_0$ and QFS(HSL)$_0$ respectively refer to the number of low-skilled and high-skilled labour force of benchmark level, i.e. year 1996. Here, we assume that the composite labour force, decomposed into high-skilled and low-skilled types, grows at an annual rate of $\hbar$. The basis of the decomposition is given by equation 7.10.

4. Long-term ratio of labour quantities by skill categories

The long-term division of labour into skill categories depends on their corresponding wage rates (WF), cost of education (ψ_i) and the share of it the individual beneficiary has to bear (ξ_i).

$$LTLR = \frac{QFS(LSL)_T}{QFS(HSL)_T} = \varsigma\left[\frac{\frac{WF(LSL)}{(\xi_1.\psi_1)}}{\frac{WF(HSL)}{(\xi_2.\psi_2)}}\right]^{\eta} \qquad (7.10)$$

For the labour market, total labour force grows at a constant rate ($\hbar$) as shown in equation 7.9. This growth rate has been made exogenous in this model.

Distribution of labour over both skill types changes endogenously. The workers' choice between low-skilled and high-skilled employment depends on the relative wages and relative education costs. The notation T refers to long term and ς is a calibration constant.

Education and skill differences are the major reasons of inequality in wage/income distribution, Lofgren et al. (1999), p. 4. In most of the developing countries, these differences also cause the rural-urban income differences, Karshenas (1994). The Nepal SAM 1996 is also evident that rural poor households mainly draw their livelihood from unskilled labour, whereas the urban and non-poor households draw from the skilled labour and capital rental. The baseline solution of Nepal CGE 1996 (Chapter 5) and subsequent simulations in chapter 6 show that without changing this labour ratio in terms of skill category, it is very difficult to restructure the economy in favour of the poor households. Many dynamic CGE models incorporate these issues for long-term redistributive growth of the economy.

Equation 7.10 tells us that how labour ratio with skill category adjusts in the long run along with wage ratio and the cost of education ratio. However, these adjustments are not made instantaneously in the short run. There are many factors behind it, most importantly, the imperfect information on wages and restrictions on free access to education, and gestation lag between entry and graduation with a high skill. These factors have been captured by equation 7.10. The equation is obtained by calibration and it approximates the movement towards the long-term ratio between the supplies of labour skills. The calibration reflects the rationale behind the decision-making as well as the involved lags.

5. Allocation of labour by skill categories

The ratio of labour by skill categories for the year t can be determined as a weighted average of the ratio in benchmark year and the ratio in the long run.

$$\mathrm{QFS(LSL)_t} = \left[(1-\tau)\left(\frac{QFS(LSL)_0}{QFS(HSL)_0}\right) + \tau.\frac{QFS(LSL)_T}{QFS(HSL)_T} \right] \mathrm{QFS(HSL)_t} \qquad (7.11)$$

where τ is the distribution parameter of the present skill ratio to the future skill ratio.

6. Working of the dynamic model

The working of the dynamic model differs with that of the static model in two respects. First, the factors are modelled with motion equations. Their values after 10 years are determined with the help of the five equations given above. The first two equations calculate the capital stock; whereas the last three calculate the number of labour by skill categories. Second, it requires the scaling-up of all the variables used in the static model. This we do with the help of the new social accounting matrix. It requires the construction of the new SAM based on the sectoral growth rates upon the availability of figures and if the figures are not available then based on some assumptions. We considered this approach of using new SAM a better option as compared to others because this

requires complete set of balanced data so that we can make a reliable prediction to all the simulations we conduct in connection with dynamic CGE.

As we envisage the results for the year 2006 (based on simulation from the dynamic framework), we have developed Nepal SAM 2006 to work as a new baseline dynamic equilibrium. The procedure of the construction and underlying assumptions behind it are described in the previous section.

7.4 Estimation and calibration of the dynamic Nepal CGE model (2006)

While converting the static CGE model into a dynamic one, we have two alternatives to follow. Either, we could set different growth rates to different sub-accounts and use different motion equations to each of them to get long-term values of the model variables. However, in this approach the model parameters do not change over time. Or, we develop a new SAM based on some guiding principles/policies and subsequently get new parameters. The beauty of this second approach is that it works with the balanced data sets and policy changes are also fully integrated while deriving the SAM. This new equilibrium in the CGE modelling is often called the inter-temporal equilibrium; the simulation results are considered as the changes from the inter-temporal equilibrium level. The policy changes induce some parameters to adjust while the rest are not affected. In the Nepal dynamic CGE model, we work within the realm of the second approach and use the new SAM developed for 2006 along with the new distribution parameters. As in chapter 6, we make use of GAMS in calibrating the CGE to 2006 data base and later in running various policy simulations.

Using the new Nepal SAM 2006 as developed in section 7.2, we implemented the dynamic Nepal CGE with additional equations and variables explained in Section 7.3. The calibration of the model reproduced the SAM 2006 using the model parameters as given in Appendix 7B. The calibrated values of the dynamic CGE model variables are given in the Appendix 7C.

Before proceeding further with the policy simulation results, it is thought desirable to have a bird's eye-view on the level and growth rates of major macroeconomic variables between 1996 and 2006, even though these are evident from Appendix 7C. Table 7.17 presents the growth pattern of Nepalese economy. The sectoral GDP and consumption are according to the general trend of Nepalese economy during 1996-2006. However, some adjustments are on the growth rate of factors and distribution of the household income. Likewise, exports and imports have been

restructured slightly in order to fine-tune the investment. Foreign saving also follows the normal trend.

Table 7.17: Major macroeconomic aggregates in 1996 and 2006

Major macroeconomic aggregates	Values (in mln. Rupees)		Annual growth rate (in %)
	1996	2006	
GDP	231901.0	354624.1	5.29
Sectoral GDP			
Agriculture	90633.6	137079.8	5.12
Industry	49504.9	78054.5	5.77
Commercial services	67909.3	100522.4	4.80
Public services	23853.2	38967.3	6.34
GDP by factors			
WLSL	80228.5	140740.4	7.54
WHSL	31379.5	48085.0	5.32
Profit	120293.0	165798.6	3.78
Factor income of households			
U-HH	69075.6	103601.6	5.00
LR-HH	48660.8	70767.7	4.54
SR-HH	63101.4	99268.6	5.73
OFR-HH	34288.8	57529.0	6.78
Total consumption	214487.0	330390.7	5.40
Total investment	68018.0	111417.0	6.38
Total exports	55405.0	62465.0	1.27
Total imports	88996.0	124469.0	3.99
Foreign savings	24299.0	46271.0	9.04

Note: GDP in this table is at factor cost, therefore, it equals to total factor remuneration and does not equal to the total of sectoral GDP which is in market prices.

GDP grows with about 5.3% annually; the highest growth rate (6.3%) is at public services followed by that of industry (5.8%) and agriculture (5.1%). The growth of commercial services is less than 5%.

As to the GDP composition by factors, there are two important implications for income distribution. First, the wage profit ratio has increased from 0.92 to 1.14 during this period. Second, the growth rate of the wage bill to LSL (7.5%) is higher than to HSL (5.3%).

Change in the factor composition of GDP has significant effects for the growth pattern of household income. Because of both higher share and higher growth rate of wage bill, particularly to the low-skilled type, poor household categories, LLR-HH and SR-HH, would benefit more as revealed by the structure of growth rates of household factor incomes. Factor income of LLR-HH grows fastest (6.78%) followed by the growth rate to SR-HH (5.73%). The growth rates of factor income to richer household groups, U-HH and LR-HH, are predicted to be slower than that of poor household groups.

Table 7.17 shows an annual growth rate of consumption of 5.4%. This is the composite figure of private and public consumptions together. The annual growth rate of investment is 6.4%, while the annual growth of foreign saving is 9%. The annual growth rate of import and export are 4 and 1.3 percentages, respectively.

Our prospective and plausible economy for 2006 is moving towards a more skilled economy as annual growth rate of high-skilled labour (3.4%) exceeds that of low-skilled labour (2.8%) as shown by Table 7.18. This is the reason for the reduction of the wide gap between remuneration rates by skill category. The low-skilled to high-skilled wage ratio was 0.53 in 1996 and is projected to rise to 0.63 in 2006. Consistent with the high annual growth rate of investment of 6.4%, the rate of remuneration to capital is projected to marginally decline at the annual rate of 1.8%.

Table 7.18: Quantities and rate of remuneration to factors in 1996 and 2006

Factors	Values		Annual growth rate (in %)
	1996	2006	
Quantities			
LSL (in millions)	9.943	12.750	2.82
HSL (in millions)	2.057	2.760	3.42
Capital (in million rupees)	579752.0	979844.0	6.90
Rates of remuneration to			
LSL	8068.8	11038.4	3.68
HSL	15255.0	17422.1	1.42
Capital	0.207	0.169	-1.84

7.5. Policy simulation results: comparison between static 1996 and dynamic 2006

Here we repeat all the simulations conducted in chapter 6; Appendix 7C presents the results. In this section, we confine ourselves to explain the changes in price, quantities, wage/profit rates, investment, GDP, household incomes, CPI, foreign saving or investment, and budget deficit only if the changes from the baseline are moving in different directions as compared to that of the static simulations conducted and explained in chapter 6. If they move in the same directions as in static simulations, we do not repeat the same explanation here too. For all the results, please see Appendix 7C.

7.5.1. Price movements

In the dynamic version also, we have kept the domestic supply price of industrial commodities as a numeraire; therefore, all the price changes should be understood as a reference from this point. Most of the price change scenarios are similar between the static and dynamic versions; however, there are some small differences. They are specifically related to the public services. The only

significant change in the dynamic version is that activity price, domestic supply price and the value added price of the public services are declining in all simulations except in devaluation (Table 7.19). The reason behind this change is the increasing domestic supply of public services. We will explain this further in section 7.5.2. Also, the activity price and domestic supply price of agricultural product declined marginally in the internal reform, when compared to the static simulations. The reason behind it is the increasing low skilled labour at a cheaper rate (Section 7.5.3) which agricultural sector basically employs coupled with the tax incentive going to this sector. These two factors did not work together for the other sectors.

Table 7.19: Domestic supply, production and value added price indices

Variables	Benchmark	Simulations						
		External reform					Internal reform	ILN+ RRIS
		ILN	ELROW	ILN+ELROW	CER	DEV		
PDc								
AGR-C	1.000	1.001	1.000	1.001	0.978	1.051	0.999	1.000
IND-C	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
CS-C	1.000	1.003	1.003	1.003	0.985	1.044	1.003	1.002
OS-C	1.000	0.998	0.997	0.998	0.973	1.051	0.997	0.997
PAa								
AGR-A	1.000	1.001	1.000	1.001	0.977	1.054	0.999	1.000
IND-A	1.000	1.000	1.000	1.000	0.979	1.047	1.000	1.000
CS-A	1.000	1.003	1.002	1.003	0.979	1.053	1.002	1.002
OS-A	1.000	0.998	0.997	0.998	0.973	1.052	0.997	0.997
PVAa								
AGR-A	0.756	0.758	0.757	0.758	0.739	0.797	0.756	0.757
IND-A	0.461	0.463	0.463	0.463	0.452	0.487	0.462	0.463
CS-A	0.707	0.711	0.710	0.711	0.694	0.746	0.709	0.710
OS-A	0.679	0.679	0.678	0.679	0.660	0.718	0.677	0.678

Note: i. ILN = import liberalisation by Nepal, ii. ELROW = export liberalisation by the ROW
iii. ILN+ELROW = combined i and ii under fixed exchange rate
iv. CER = complete external reform (combined i and ii under flexible exchange rate)
v. DEV = devaluation, vi. Int. Reform = internal reform
vii. ILN + RRIS = import liberalisation by Nepal along with revenue replacement from internal sources.

In rest of the cases, there is no change in the obtained tendencies from the static simulation.

7.5.2 Domestic productions, supplies, investment, imports and exports

Agricultural and industrial productions increase in these dynamic simulations. The falling prices in connection with trade liberalisation lead to increases in their production, supply, import and export. Production of the public services increases also but for other reasons. This sector is more

labour intensive, more than 93% of the total value added goes as the wage bill as compared to less than 40% in case of commercial services, and we are working with the realm of a higher

Table 7.20: Sectoral productions, supplies, investments, exports, and imports (values in billion Rupees)

Variables	Benchmark	Simulations						
		External reform					Internal reform	ILN+ RRIS
		ILN	ELROW	ILN+ELROW	CER	DEV		
QA_a								
AGR-A	182.2	184.98	185.02	184.98	184.93	185.16	185.21	185.00
IND-A	169.3	175.18	175.54	175.18	173.59	178.95	176.14	175.81
CS-A	142.2	140.80	140.54	140.80	140.26	141.63	140.00	140.36
OS-A	57.4	57.60	57.50	57.60	57.63	57.47	57.36	57.51
QD_c								
AGR-C	174.7	178.34	178.38	178.34	178.29	178.52	178.57	178.37
IND-C	131.3	135.86	136.14	135.86	134.98	138.04	136.61	136.35
CS-C	124.2	123.02	122.79	123.02	122.56	123.72	122.32	122.64
OS-C	57.4	57.60	57.50	57.60	57.63	57.47	57.36	57.51
$QINV_c$								
AGR-C	16.3	16.41	16.40	16.41	16.56	16.10	16.40	16.40
IND-C	52.9	54.05	53.91	54.05	53.70	54.73	53.69	53.85
CS-C	21.9	22.15	22.09	22.15	22.32	21.75	22.04	22.11
OS-C	3.5	3.60	3.58	3.60	3.66	3.47	3.57	3.60
QE_c								
AGR-C	6.5	6.63	6.64	6.63	6.48	6.89	6.65	6.64
IND-C	38.0	39.32	39.40	39.32	36.63	44.79	39.54	39.46
CS-C	18.0	17.76	17.73	17.76	17.46	18.26	17.66	17.71
QM_c								
AGR-C	15.7	16.07	16.01	16.07	16.20	15.79	16.02	16.07
IND-C	26.5	27.57	27.50	27.57	28.04	26.64	27.59	27.67
CS-C	17.7	17.52	17.47	17.52	17.50	17.52	17.40	17.46
OS-C	19.1	19.23	19.17	19.23	19.28	19.10	19.13	19.20
QQ_c								
AGR-C	192.33	196.32	196.34	196.32	196.32	196.38	196.53	196.34
IND-C	160.912	166.66	166.83	166.66	166.47	167.41	167.41	167.26
CS-C	144.43	143.15	142.78	143.14	142.87	143.39	142.23	142.70
OS-C	79.98	80.35	80.15	80.35	80.49	79.93	79.95	80.23

participation rate of labour in the course of these liberalisation drives; consequently, part of this increased labour force is employed by the public services next to agriculture and industries. The greater part is found to be strong enough to push the domestic production activities of public services upwards. As there is no export of public services, all this increased production comes in the domestic market in the form of increased domestic supply of domestic output, QD, which

again increases the composite supply in the domestic market, QQ, and this pushes the domestic supply price downward (Table 7.20).

Quantities of investment in agricultural activity had gone down in all static policy simulations except in complete external liberalisation. But this is changed after restructuring the economy as revealed by the increasing investment in agriculture in the dynamic simulations. It has connection with the restructuring of the economy (Table 7.3) where the agricultural sector gets a higher investment share in 2006 than in the Nepal SAM 1996 (Table 3.3). Moreover, it has helped agricultural sector grow faster than in the static simulations conducted in chapter 6. Only in the case of devaluation, this restructuring is still not sufficient enough to end up in an increase in investment in agriculture.

We could observe some changes in the trend of imports and exports. The case of a 10% devaluation of the domestic currency does not reduce import in agricultural and industrial commodities; productions in these sectors is growing faster (by 2 and 1.8 percentage points, respectively) and they are exporting more (3.2 and 2.7 percentage points, respectively) than in the case of devaluation in static simulation. Therefore, a higher growth of exports than domestic production has caused imports to grow despite the devaluation of currency. Moreover, the commercial services sector gains ability to export more in the devaluation scenario, which was not the case in the static simulation. This has become possible notwithstanding the case of contractionary commercial services because of two reasons. First, the contraction of commercial services activity is only by 1% (Table 7.20) in the dynamic simulation as against 3% in the static simulation (Table 6.26). Second, import of commercial services commodities has also declined just by 1% in the dynamic simulation as compared to 3% in the static simulation with devaluation. These have allowed the increased part of domestic production to be exported, after almost fulfilling the demand in the composite domestic market, QQ.

7.5.3 Impacts in the factor market

As we have considered additional 10% labour participation rate throughout all policy simulations (Section 7.2, see also the foot-note), there is a general increase in the labour supply across all activities. Basically, these new entrants join the labour market in the form of low-skilled workers; their immediate impact is to push the low-skilled wage rate slightly downward (Table 7.21). As the low-skilled labour, high-skilled labour and capital bear some proportional relationship to each other by the nature of production function in our model (equation 7, chapter 4), the quantities of the high-skilled labour and capital must also be increased. The increases in their demands push

their rate of remuneration upwards (Table 7.21). This causes the anticipated transformation of low-skilled labours into high skilled category via the labour education conversion equations in the dynamic model (eqs. 7.9-7.11). From here on, the increments in the labour supply spread to the various activities by skill categories. Moreover, the capital stock also grows, and absorbs labour employment. Thus, we can see more unskilled labour coming to the labour market, part of the low-skilled labour transformed to the high-skilled category due to the wage rate differentials, and the capital stock also growing in a compatible way to adjust to this phenomenon. This is all about the dynamics in the factor market.

Table 7.21: Impact on wage and profit rates and employment of factors

Variables	Benchmark	Simulations (wage rate in Rs., labour in millions, capital in billions Rs.)						
		External reform					Internal reform	ILN+ RRIS
		ILN	ELROW	ILN+ELROW	CER	DEV		
Wage in Rupees and profit rate								
LSL	11038.43	10938.82	10923.63	10938.80	10643.42	11576.36	10909.20	10922.08
HSL	17421.74	17541.44	17516.93	17541.43	17053.59	18597.92	17494.06	17519.22
Capital	0.16900	0.17130	0.17114	0.17130	0.16766	0.17905	0.17096	0.17111
Factor use by activity								
LSL-AGR	5.941	6.128	6.131	6.128	6.142	6.102	6.138	6.130
LSL-IND	2.092	2.195	2.2	2.195	2.182	2.229	2.208	2.204
LSL-CS	2.914	2.926	2.922	2.926	2.925	2.921	2.911	2.918
LSL-OS	1.803	1.825	1.822	1.825	1.826	1.821	1.818	1.823
HSL-AGR	0.617	0.627	0.627	0.627	0.629	0.623	0.628	0.627
HSL-IND	0.808	0.835	0.837	0.835	0.83	0.846	0.84	0.838
HSL-CS	0.394	0.389	0.389	0.389	0.389	0.388	0.387	0.388
HSL-OS	0.941	0.937	0.935	0.937	0.938	0.933	0.933	0.936
CAP-AGR	359.00	362.51	362.51	362.51	361.21	365.44	362.82	36.25
CAP-IND	241.59	248.15	248.60	248.15	245.17	255.08	249.43	24.90
CAP-CS	363.45	357.30	356.59	357.29	355.11	361.17	355.18	35.61
CAP-OS	15.80	15.65	15.62	15.65	15.57	15.81	15.57	15.62

There are some other important changes as well in the factor market. In the short-term static simulations, some labour used to reallocate to the expanding sector from the contracting sector because of the factor constraint in the economy. But, in the long run, factor constraint is not so serious; it can be adjusted to some extent. As our dynamic simulations show, capital stock is adjusting in accordance with the simulated growth. For example, total capital stock has declined to a lower level by about 1.2% in case of complete external reform (CER) because of the overall contraction of economic activities so that the rate of profit did not fall down much in the dynamic model, only by 0.1% in this simulation, as compared to 0.3% in the corresponding static

simulation. However, due to the nature of our model, this sort of adjustment in total is not possible to maintain in the case of the labour. However, labour ratio in terms of skill category changes in the course of simulation according to equation 7.10 (Section 7.3).

The increased labour supply has resulted in a marginally lower wage rate of the low-skilled labour but the level of their employment became higher. However, the case of high-skilled labour is different as more of them are allocated to the highly growing sectors, i.e. agriculture and industry from the slow growing and contracting sectors like commercial and public services. As the high growth sectors generate more value added they can accommodate more workers with them. Also, the growth rate of the low-skilled workers is higher in the growing sectors and very low in the contracting or slow growing sectors in all the simulations.

7.5.4. GDP and household income

As our major concern with the dynamic CGE model is to explore the conditions to generate higher and pro-poor growth of the economy, we present the comparative pictures regarding the growth rates of GDP and household income under static and dynamic simulations. Our implemented restructuring measures cause the distinctly higher growth of the GDP in dynamic simulations as compared to the static simulations (Table 7.22). This is also evident with the higher growth of activities in dynamic version of the model in all the simulations (Table 7.20) except in complete external reforms as compared to the corresponding simulations in the static model (Table 6.43).

Table 7.22: Growth rates of GDP

Models	Growth rates (% change from the benchmark) under different simulations						
	ILN	ELROW	ILN+ELROW	CER	DEV	Int. Reform	ILN+RRIS
1996 static	0.58	0.45	0.58	-1.39	6.90	0.26	0.36
2006 dynamic	1.64	1.50	1.63	-1.16	7.67	1.37	1.49

Note: Please see the Appendix 7C.5 for absolute values for dynamic model and chapter 6 for static model.

From Table 7.22, it is also evident that in the complete external reform the contraction of GDP is less in dynamic version as compared to the static one. The common conclusion in both models remains that the results of a complete external reform are negative when compared to a piecemeal external reform. It is remembered that a complete external reform envisages import liberalisation (ILN) and export liberalisation by rest of the world (ELROW) in an endogenous exchange rate system. The policy simulation of a budget neutral import duty reduction, ILN + RRIS, results in a GDP growth that is closer to ILN in the 2006 dynamic model, than was the case in the 1996 static model. This suggests that in a favourable scenario and a dynamic context, the conflict between revenue loss due to duty reduction and a balanced budget reduction is less severe.

An important conclusion that stemmed out from the static analysis in chapter 6 is that GDP growth is more in the staged liberalisation of imports and exports than if these two liberalisations are implemented together still holds true in case of the dynamic model as well (Table 7.22, and see 7C.5 in Appendix also). As was just mentioned, a complete external reform is worst of all.

Table 7.23 shows that the growth rate of national per capita income is nearly three times higher in most of the dynamic simulations as compared to the static simulations. The same table shows the distribution of household income to have a pro-poor growth pattern in the dynamic model. The poorest household category, the landless rural households (LLR-HH), stood as second least beneficiary in almost all the static simulations. However, after the restructuring, they have become the most beneficiary group in all these liberalisation and structural reform policy simulations. More importantly, the order of the growth in household income is now increasing with the level of poverty. The landless rural households' (LLR-HH) income is growing at the highest rate in all the policy simulations in the dynamic model. It is followed by the growth rate of the small rural household (SR-HH) income, then by the large rural household (LR-HH) income. The richest household category, the urban household (U-HH) group, is the least beneficiary (Table 7.23). This pro-poor growth pattern has become possible after the restructuring of the model economy where the labour factor of the poorer household groups reallocates to the most growing sectors of the economy.

Also in the complete external reform, the household incomes of the poor group, LLR-HH and SR-HH, decline very slowly as compared to that of the richer household categories.

It is also noted that the income effects of policy simulations ILN and ILN + RRIS in 2006 are very close to each other in the 2006 dynamic model, in contrast to the 1996 static model, which is an additional indication that import liberalisation and a balanced budget can be more reconciled in a favourable scenario and a dynamic context.

Table 7.23: Relative changes in the household income

Models	Percentage change in household income from the benchmarks of 1996 and 2006, respectively						
	ILN	ELROW	ILN+ELROW	CER	DEV	Int. Reform	ILN+RRIS
1996 static							
YH(U-HH)	0.52	0.40	0.52	-1.54	7.17	0.91	0.97
YH(LR-HH)	0.70	0.58	0.70	-1.21	6.85	0.60	0.65
YH(SR-HH)	0.65	0.52	0.65	-1.25	6.76	-0.56	-0.41
YH(LLR-HH)	0.63	0.53	0.63	-1.26	6.67	0.68	0.69
All Nepal	0.62	0.50	0.62	-1.34	6.89	0.37	0.45
2006 dynamic							
YH(U-HH)	1.19	1.02	1.19	-1.66	7.30	0.81	1.00
YH(LR-HH)	1.50	1.35	1.50	-1.23	7.38	1.20	1.33
YH(SR-HH)	1.87	1.76	1.87	-0.84	7.76	1.68	1.75
YH(LLR-HH)	2.19	2.12	2.19	-0.58	8.24	2.12	2.14
All Nepal	1.64	1.51	1.64	-1.13	7.63	1.39	1.50

Note: see the Appendix 7C.4 for absolute values for dynamic model and chapter 6 for static model.

7.5.5 Additional endogenous variables in the dynamic model

There are five additional endogenous variables in our dynamic model (Section 7.3) on top of the 128 endogenous static model variables. These five additional endogenous variables include the total quantities of low-skilled labour (QFS'LSL'), high-skilled labour (QFS'HSL'), capital (QFS'CAP'), long-term ratio of labour by skill category (LTLR), and the growth rate of gross fixed capital formation (GRIV). Here, we observe the changes on these variables in the course of simulations.

Table 7.24: Effects on employment of factors, labour ratio, and growth rate of gross fixed capital (GRIV)

Variables	Benchmark 2006	Simulations (labours' number in millions, capital in billion Rupees)						
		External reform					Internal reform	ILN + RRIS
		ILN	ELROW	ILN + ELROW	CER	DEV		
QF(LSL)	12.7500	13.0751	13.0750	13.0750	13.0760	13.0730	13.0750	13.0747
QF(HSL)	2.760	2.7877	2.7877	2.7877	2.7868	2.7898	2.7877	2.7880
LTLR	4.620	4.5466	4.5466	4.5466	4.5504	4.5383	4.5466	4.5454
QF(CAP)	979.84	983.61	983.32	983.61	977.053	997.498	983.00	983.26
GRIV	0.057	0.058	0.058	0.058	0.056	0.062	0.058	0.058

Note: The extended figures after decimal are to observe the changes because they are minimal.

Although the immediate impact of the higher participation rate is the increase in the ratio of the low-skilled labour to the high-skilled labour, yet the long-term labour ratio (LTLR) by skill category falls down in the course of liberalisation as shown by all the simulations (Table 7.24). Regular transfer of the low-skilled labour to the high-skilled category makes the ratio of low-skilled to high skilled labour always falling down with the course of time. As shown by the static

analysis, this ratio was around 4.83 during 1996 and it has fallen to 4.62 for the inter-temporal (new baseline) equilibrium for 2006. The ratio does not differ significantly based on the mode of liberalisation; it tends to stabilise around 4.55, with some marginal differences. Devaluation demands more high skilled labour whereas complete external reform (CER) less. The reason behind this difference is that devaluation promotes exportable sector; in our case it is industrial sector. This sector as compared to other exportable sectors like agriculture and commercial services has a higher concentration of the skilled labour force. So it demands more skilled labour in the course of further expansion. However, in the complete external reform, the growth rate of this sector is lowered down similar to other sectors (QA_c in Table 7.20), and the difference becomes much smaller. In this situation the prospect of employing more skilled labour slightly goes down because of the change in this dominant sector. The ratio is then marginally less in this simulation as compared to others. However, in general, the simulation results reveal that economy is moving towards more high-skilled in the path of long-term liberalisation. The dynamics of the Nepal CGE model via equations 7.9-7.11 allows the incorporation and tracing of these developments.

The capital stock grows in congruence with the high growth of the GDP in all these dynamic simulations except in the complete external reform. In the latter case, the GDP itself has declined so is the case of capital stock also. The annual growth rate of gross fixed capital formation (GRIV) during 1996-2006 has been estimated at 5.7%, and all these simulations have promoted it at a marginally higher level (5.8%). However, due to the overall expansion of the activities by a higher rate in case of devaluation, the GRIV also becomes higher (6.3%); likewise, the opposite holds true in case of complete external reform (5.6%) (Table 7.24). Here too, the dynamics of the Nepal CGE model via equation 7.7 allows us giving a role for investment at the end of the period in determining the stock of capital available and the production capacity. This was not the case in the static model whereby the stock of capital was known beforehand for the period and was unrelated to investment at the end of the period.

7.5.6 Macroeconomic constraints

Here we observe the changes in consumer's price index (CPI), export import ratio, foreign savings/investment (FSAV), and budget deficit (GS) in the course of dynamic simulations. Making a comparison of CPI changes in two models reveals that CPI declines in most of the cases except in devaluation (Table 7.25) in both of the models. To be more specific, CPI declines faster in the dynamic model as compared to the static one in all the simulations implying that consumer's

welfare by price changes does not deteriorate along with the pro-poor growth in the restructured economy.

Table 7.25: Changes in CPI in the two models

Models	Growth rates (% change from the benchmark) under different simulations						
	ILN	ELROW	ILN+ELROW	CER	DEV	Int. Reform	ILN+RRIS
1996 static	-0.20	-0.10	-0.20	-1.86	5.28	0.00	-0.10
2006 dynamic	-0.39	-0.29	-0.39	-2.64	4.5	-0.20	-0.30

Note: Please see the Appendix 7B.5 for absolute values.

Table 7.26 shows the trend in export and import performance of the economy under different static and dynamic simulations. In terms of export, though the economy could export less as a percentage of GDP in the new baseline 2006 as compared to the old baseline 1996, in the course of liberalisations, the situation improves. The lower export as a share of GDP in the modelled economy for 2006 was because of the high investment proposed in the domestic economy so that the export was less as a share to GDP. But, in the course of the simulations, it all improved, except in complete external reform. Even in import liberalisation (ILN) and import as well as export liberalisation (ILN+ELROW), the export performance has improved which was not the case in static version. Decline in the export performance in the case of complete external reform (CER) in both the cases is because of the appreciation of the domestic currency (Table 7C.6 and Section 6.4.4) resulted in this simulation.

Table 7.26: Changes in export and import ratio to GDP in the two models

Models	Export to import ratio in benchmark and simulations							
	Bench-mark	ILN	ELROW	ILN + ELROW	CER	DEV	Int. Reform	ILN+ RRIS
1996 static								
Exports/GDP	0.239	0.239	0.240	0.239	0.230	0.269	0.241	0.240
Import/GDP	0.250	0.246	0.249	0.246	0.245	0.252	0.249	0.250
2006 dynamic								
Exports/GDP	0.176	0.177	0.177	0.177	0.164	0.202	0.178	0.177
Imports/GDP	0.255	0.252	0.254	0.252	0.248	0.260	0.255	0.255

Note: Here, import refers only to the competitive import including the tariff.
Please refer Tables 7B.2 and 7B.5 for absolute values under dynamic model and chapter 6 for static model.

For imports to GDP ratio, there is a little difference in the results between the two models; this ratio has gone down marginally for both the import liberalisation and export liberalisation. Two things are important in this connection. First, despite the appreciation of the domestic currency in the case of complete external reform, import share does not grow up because of the overall contraction in the economy. Second, despite the devaluation of the domestic currency, the import share grows up because of the high growth of the economy.

We can observe a clear difference in foreign saving (FSAV) between the two models (Table 7.27). It changes by less than 1% in import, export, import and export liberalisation under fixed exchange rate as well as in import liberalisation with revenue replacement under the static model. However, with these same simulations under dynamic model, it grows by more than 2% except in case of external liberalisation. Though less than 2%, the policy simulations with export liberalisation and internal reform have also led to higher flows of foreign saving than in the baseline in the dynamic model. The devaluation of the domestic currency reduced the foreign capital inflow significantly in the static model but the reduction is less in the dynamic model. Finally, compared to the case of the static model, foreign capital inflow in the complete external reform (CER) increases by almost two percentage points in the dynamic model (Table 7.27). Overall, the restructuring of the economy reveals the prospect of more foreign capital inflow to the country because the modelled economy is growing faster as compared to before.

Table 7.27: Changes in the foreign savings (FSAV) in the two models

Models	Growth rates (% change from the benchmark) under different simulations						
	ILN	ELROW	ILN+ELROW	CER	DEV	Int. Reform	ILN+RRIS
1996 static	0.86	0.13	0.87	10.96	-28.56	-0.22	0.512
2006 dynamic	2.39	1.80	2.39	12.63	-17.46	1.68	2.28

Note: Please see the Appendix 7C.6 for absolute values under dynamic model and chapter 6 for values under static model.

The restructured economy 2006 possesses the better prospect of reducing the fiscal deficit than the structure of the economy in 1996. Share of the budget deficit to the government expenditure in all types of trade liberalisations and devaluation under dynamic simulations has reduced significantly as compared to the similar result from static simulations (Table 7.28).

Table 7.28: Budget deficit (government saving) in the two models

Models	Budget deficit to public expenditure ratio in benchmark and simulations							
	Bench-mark	ILN	ELROW	ILN + ELROW	CER	DEV	Int. Reform	ILN+ RRIS
1996 static	0.25	0.31	0.29	0.31	0.31	0.27	0.23	0.25
2006 dynamic	0.19	0.23	0.21	0.23	0.24	0.19	0.17	0.19

Note: please refer Table 7C.7 for absolute values under dynamic model and chapter 6 for values under static model.

In between these two economic structures, one major difference is that the internal reform to narrow down the fiscal deficit requires less effort in the modelled economy 2006 as compared to that of 1996. Reducing the share of fiscal deficit in government expenditure by 10% required scaling-up the rate of domestic indirect tax on non-agricultural productions by 14%, on corporate income by 18% and on household income by 20%. However, in the case of the dynamic simulation, only 11% growth in the household and corporate income tax rate and 10% in domestic indirect tax rate on non-agricultural productions are sufficient to meet the target. This became

possible in the dynamic simulation because the economy is growing faster so that less increment in the tax rates can fulfill the same target of narrowing the fiscal deficit. Similar inference can be drawn from the simulation of import liberalisation with revenue replacement from internal sources (ILN+RRIS). In static model, all domestic tax rates were to be scaled-up by about 13% to stabilise the level of budget deficit in the benchmark level or to compensate the revenue loss of the government from import liberalisation; whereas in the case of dynamic model, it requires only 8.7% to meet the same goal.

To sum up the major changes in macroeconomic aggregates, we can observe that modelled economy is performing better with regard to controlling the general price level, promoting export, promoting foreign capital inflow, and reducing fiscal deficit. Moreover, the changes in import are almost similar in both types of the model.

7.6 Conclusion

The dynamic model reveals good prospect of the pro-poor growth of the economy along with the higher growth rate of GDP than in the static model. Therefore, the whole thrust of this generation of higher and pro-poor growth rests on the way the economy is restructured. In Nepal dynamic CGE model, the major focus is on the improvement of distribution and efficiency parameters. The distribution parameters have slightly changed in favour of labour specifically to low-skilled labour working in agriculture and industry. As a result, this change benefits the landless rural households, which is the poorest household category among the four household groups. Next to the landless rural households, the benefit goes to the small rural households, which is the second poorest household group. All the seven policy simulation runs have generated a similar order in the growth pattern of the household income though the degrees are different. However, in none of the simulations, the richer household groups, i.e. urban households and large rural households, experience a loss in their income. They are also benefiting but less than the poor household groups. This confirms the liberalisations and structural reforms as favouring the poor.

Another condition for the higher and pro-poor growth followed by our analysis is the efficiency gain in activities. In the dynamic Nepal CGE, it is well reflected by the reduction in intermediate deliveries per unit activity as well as by the reduction in intermediate import per unit activity. It has paved the way for more factor inputs in activities.

Macroeconomic constraints also do not deteriorate rather they improve in most of the simulations. Consumer's price index declines more in the dynamic version as compared to the static one. Similar is the case of public deficit, which is lower as a share of public expenditure in every simulation after restructuring the economy. Export to GDP ratio reveals upward trend in import as well as import and export liberalisations together under fixed exchange rate system. This is the net improvement in the macroeconomic performance of the economy.

Growth of the inflow of foreign capital is distinctly higher in the dynamic simulations over the static ones. It has become a part and parcel of a fast growing economy in its take-off phase. Budget deficit, on the other, is narrowing down in the restructured economy under all liberalisation drives. This contraction in the fiscal deficit has become possible by the higher growth of the economic activities and institutional incomes so that government can collect more tax revenues. Higher growth of the economy in the dynamic model has made it possible to narrow down the fiscal deficit by internal reform with smaller increments in tax rates as compared to that of the static model. Likewise, revenue replacement from internal sources to stabilise public deficit in import liberalisation requires less increment in the domestic tax rates in the dynamic version of the model than in the static one.

Among all the liberalisation schemes in the dynamic version of the model, similar to the static simulations, devaluation reveals more expansionary effects whereas complete external reform implemented all at once produces contractionary effects. Regarding import and export liberalisations, growth in the GDP when these two liberalisations are implemented separately is greater than the growth in GDP when both of them are implemented at once. This conclusion stemmed from the static CGE analysis at chapter 6 equally holds true in dynamic CGE analysis as well. Therefore, this study recommends staged liberalisation instead of complete external reform implemented altogether at once from both short term and long-term perspectives.

Furthermore, differences in results on growth and income between the policy simulations of reduced import duties (ILN) and the same combined with a neutral budget (ILN + RRIS) are shown to diminish in the dynamic model as compared to the static model, which is comforting for policy makers.

Following the progressive scenarios of the restructured economy, the effects of policies of liberalisation in terms of growth with equity are found to be superior in the dynamic as compared to the static model because these policies are accompanied by major structural changes in

efficiency and distribution, implying an active government strategy in redirecting investment and endowments.

Analysing the results of our static and dynamic simulations shows that marginal increase in the labour participation rate in the dynamic model can bring some of the contracting activities in the short-run period under expansion in the long-run. Public services activities reveal this prospect. Next to the highly growing sectors like industry and agriculture, inflow of more labour in the labour market would go to public services, which is a highly labour intensive sector. It presses the wage rate of low-skilled labour marginally downward because the new entrants are mostly low-skilled. Moreover, it causes some of the low-skilled labour to be transformed to the high-skilled category. The capital stock also grows at a higher rate to absorb the growing labour force. This growth dynamics is very important in leading the economy in the higher growth path in the long run. But, there should be supportive policies in the economy to materialise this prospect. First, the investment in agriculture must go up to absorb this increasing low-skilled labour force because agriculture is the main activity that employs a majority of the low-skilled labour in Nepal. Second, the modern sector of the economy like industry and commercial services should also be able to absorb some of the new entrant labours in the course of the simulations. We have included both of these prospects while making the restructured economy in the form of SAM 2006. On the one hand, the investment in agriculture has been scaled up from its normal trend, government transfer to the corporate sector as a share of the public expenditure has also been scaled up on the other to promote the industrial sector and commercial services so that their higher investment could absorb more labour.

Another important change we made in the dynamic model is the distribution pattern of endowments. Poorer households earn more from the highly growing sectors like industry and agriculture while factor income of the richer household categories comes more from the slow growing services sectors. The effective public policy to this end is the promotion of landless rural households to have more access to skill trainings pertaining to agricultural and agro-based industrial activities so that they will gradually shift to these activities. Next to this, promotion of the small rural household category, which is also poor next to the landless group, is necessary to invest its capital in agriculture and agro-based industries so that they could also enjoy with the higher growth of these two sectors. Our recommendation to promote this group to invest more in growing sectors is because of their possession of some capital though less than the higher income group households. The government is required to provide some incentives to this household category to invest their capital in agriculture and industry. The large rural household group would

definitely benefit to some extent by the growing agriculture sector. The benefit to the richest group, urban household category, only comes from the higher rate of wage to high skilled workers and profit to invested capital.

To summarise, there are conditions necessary for combining a higher pro-poor growth together with external and internal liberalisation and reforms. This study recommends the followings. The economy should identify the sectors that have high growth potential in the course of liberalisation. The targeted poor group must be encouraged to participate in those fastest growing activities with the factors they have at their disposal, in most of the cases the low-skilled labour. The provision of skill training pertaining to the employment in the high growth sectors is expected to promote the labour transfer. Credit incentive would also be another factor to promote poor to invest in the high growth sectors provided that the poor also possess capital. Moreover, employment promotion schemes should complement the liberalisation process so that new entry of low-skilled labour would raise the wage rate of high skilled labour and rate of return to capital. It raises the incentive to low-skilled labour to get transformed to the high skilled worker. This scheme, in fact, pushes the economic system in motion and leads towards the high growth of the economy in the long run as the quality of factors get improved over time. Moreover, when public policy becomes able to redirect the factor endowments of the poor into the most growing sectors, the high growth attained also becomes a pro-poor growth.

8. Summary and Conclusions

Economic growth and poverty reduction are undisputed development objectives. Among the undisputed facts is also the recent increase in liberalisation measures, trade openness, and accelerated integration of national economies in the world economy, generally termed as globalisation. The two sets of facts raise important issues for the economist and the politician. What is the relationship between the growth and poverty objectives on the one hand and liberalisation and globalisation on the other hand? Do they help each other or are they in conflict with each other? Under which country conditions are such relations generated? What structural reforms would reinforce positive results in both directions, i.e. pro-poor growth with liberalisation reforms? Last, and very relevant for the present study, there is the concern of developing and analysing analytical and policy modelling frameworks that can address these questions. The last question is the major concern of this study.

In chapter 2 we review four questions (a) What do theoretical studies tell on the relationship between liberalisation and pro-poor growth? (b) What is the empirical evidence on this relationship between liberalisation and distribution? (c) How did international assistance agencies, like the World Bank, WB, and International Monetary Fund, and recipient governments in developing countries formulate their development policy in the context of knowledge on the relationship between liberalisation and distribution? (d) In the case of Nepal, what are the specifics of the problem and how were these treated? With respect to the last question, we examined the policies that Nepal adopted in connection with the economic reforms under Structural Adjustment Programme (SAP) of the IMF and World Bank in Nepal initiated in 1986 and continued through Poverty Reduction and Growth Facilities (PRGF) from 1999. Though there are common features between SAP and PRGF framework, but the major differences relate to the policy autonomy of the government regarding the speed of reform which is fully considered in PRGF, and above all the PRGF considers the welfare of the poor as its focal point. The terms pro-poor growth and liberalisation which are also the focus of this research occur quite often as well in the PRGF framework.

The Social Accounting Matrix (SAM) of Nepal is the major data base for this research. In chapter 3 we displayed the Nepal SAM that consists of several sets of accounts: commodities; activities; factors of production; institutional accounts relating to households, firms, government; saving and investment account; and the rest of the world (ROW) account. Nepal SAM has broadly classified

economic activities into four sub-accounts: agriculture, industries, commercial services, and other services. Analogous four sub-accounts have been made in the commodity account. We worked with remunerations for three types of factors: low-skilled labour, high-skilled labour, and capital. We prepared the Nepal SAM with four household sub-accounts for urban households, large rural households, small rural households, and landless rural households. The former two are the richer household categories and latter two the poorer ones. The landless rural households are the poorest groups.[52] The SAM has been extended to account for cross-links in the income distribution between factor income types, activity sectors and household groups. This extension is essential for studying the questions posed.

In chapter 4 we have formulated a CGE model that is close to that developed by the International Food Policy Research Institute (IFPRI) and implemented to several developing countries. We follow the neo-liberal closure in our CGE that makes equilibriums in factor and product markets due to the flexible prices. We considered homogenous factors and no distortions in both factor and product markets. We used standard mathematical software GAMS for model calibration and policy simulations. However, the Nepal CGE model contains several extensions relating to factors, institutions, and activities. Likewise, we made some modifications in investment function.

In chapter 5, we calibrated the Nepal CGE model to the data base as found in the SAM, supplemented where needed by additional data.

In chapter 6 we analysed the impact of external reforms (i.e. liberalisation policies) and internal reforms (i.e. budget policy). The liberalisation policies treated included reductions in import duties, reduction in export barriers by the rest of the world, combinations of both with a fixed exchange rate as well as flexible exchange rate, and a devaluation of the national currency. The internal reform policy simulation aimed at reducing the budget deficit at a higher general expenditure level. Moreover, the effects of import liberalisation along with the domestic tax rates adjustment in order to stabilise the public deficit at the benchmark level are also assessed. The simulations showed, next to several findings that will be discussed later in this chapter, positive growth effects but very marginal or absent pro-poor growth effects. This prepared the ground for

[52] Land-less rural household group is the most vulnerable group. It has the highest share of low-skilled labour income and least share of capital income in the household income composition. According to the 1996 survey, they constitute approximately 38% of the total households in the country but share only 17% of the total household income. Next to this, small rural households are also mostly poor; approximately 41% of the households sharing about 30% of the total household income. Urban households and large rural households are relatively rich with about 10 and 11% of the total households but with 31 and 22% share in total household incomes.

chapter 7 where a dynamic version is developed and where experimentation with a restructuring of the economy is done that could lead to a pro-poor growth with liberalisation reforms.

In chapter 7 we project a restructuring of the economy towards a profile in 2006 that has the potential of combining pro-poor growth and liberalisation. It is only a potential, since the realisation depends on how prices of factors move, in which direction and to which extent. A prospective SAM 2006 represents the projected profile for 2006. To capture the preserved harmony of the actual SAM of 1996 and the hypothetical but plausible SAM of 2006, we apply a multiplier analysis to both and underline the common properties. The chapter then extends and restructures the static version of the model towards a dynamic version for 2006. Major differences between these two versions are in the treatment of capital and labour supply. The capital stock is made endogenous and linked to the investment done at the end of the period and previous years with due consideration of the rate of depreciation. Labour supplies by low and high skill categories have become endogenous and their allocation on these skills is specified based on their production costs and returns to education. After that, the solution path of main variables for 2006 is depicted, and the same set of policy simulations run in chapter 6 are rerun in chapter 7, and their results compared and evaluated against the background of achieving a pro-poor growth with liberalisation.

The general conclusion of the policy simulations applied is that liberalisation and budget reform policies are expansionary. Another conclusion is that staged external liberalisation brings higher growth in the economy than all external liberalisations implemented together. Growth of GDP when import and export liberalisations implemented at once is less than when these two liberalisations are implemented separately. The reason for this is that duplicated benefits disappear. If import and export liberalisations are simulated with flexible exchange rate, many important macroeconomic variables like GDP, exports, composite price levels, saving, and investment tend to deteriorate. Moreover, household sector suffers with decline in income and government sector with widening budget deficit. These conclusions holds true for both static and dynamic simulation results.

In most of the static model policy simulations, agriculture and the industrial sectors expand whereas service sectors contract. The reason behind these expansions and contractions are the downward movement of the composite price levels, and the high share of intermediate deliveries in their production. Furthermore, the reallocation of factors of production to these activities causes contraction in the services activities. These findings hold true for dynamic model also, but in the

dynamic model, contraction does not occur in public services and is only limited to commercial services.

In the static model most of the external liberalisations, household groups benefit, but the benefits that go to the richer groups is somewhat more than for the poorer groups. As a result, liberalisation effects cannot be stated to have pro-poor growth. In the case of the government, it collects less revenue because of the lower tariff rates. Furthermore, more foreign saving comes in but domestic saving investment gap and fiscal deficit widen. The internal reform, despite its major objective of reducing the fiscal deficit, also causes more foreign capital inflow; and the domestic saving to total investment ratio also does not deteriorate significantly in this case.

The major difference between these static and dynamic model simulation results is that the growth rate was marginal in the former but higher and pro-poor in the latter. The restructuring of the economy towards a win-win strategy of pro-poor growth and liberalisation that we postulated and implemented in chapter 7 proved to be essential to meet this end.

In an economic restructuring, the scaling up of efficiency parameters and the redirecting of the distribution parameters are necessary to achieve the higher growth and redirect more benefit of this high growth towards the poor. Regarding the scaled up efficiency parameters, in the dynamic Nepal CGE model, these are incorporated via the reduction in intermediate deliveries per unit activity as well as by the reduction in intermediate import per unit activity. These pave the way for greater shares of factor remunerations across activities. As for the redistribution, we conducted the restructuring in two stages. In the first round, the strategy of promoting labour intensive modes of production is followed as reflected in a greater increase in the shares of value added by activity for low-skilled labour type and this filters to poor households who draw their income from low-skilled labour. The share of high-skilled labour also increases but less than that of the low-skilled type. These adjustments imply a slightly declining share of profit in different activities. In the second round, we make the redistribution of the factor income by household types through channelling more factor income to poorer household categories from high growth sectors, i.e. agriculture and industry in the case of Nepal. The public policies to promote this redistribution can be designed in manners that allow labour from land-less rural households, the poorest of the poor, to receive some skill trainings pertinent to agricultural and agro-based industrial activities so that they will reallocate more to agriculture and industry and enjoy the benefit of the high growth of these two sectors under liberalisations. Likewise, policies are meant to be designed in such manners that small rural households, the second poor household category, will be inclined to invest the capital at

their disposal to these two high growing sectors so that they will also get higher benefits from the liberal reforms. The income of the richer household categories also do not fall down in the course of liberalisation and reforms because of the increasing wage rate to the high skilled labour and rate of profit to the capital; these two factors remain to be concentrated in the richer household categories.

While achieving this higher and pro-poor growth after economic restructuring, macroeconomic constraints also do not deteriorate rather they improve in most of the simulations. Consumer's price index declines more in the dynamic version as compared to the static one. In both import, and import and export liberalisations under fixed exchange rate system, export to GDP ratio shows an upward trend. Growth of the inflow of foreign capital is distinctly higher in the dynamic simulations over the static ones. Higher capital inflow has become a part and parcel of a fast growing economy in its take-off phase. Budget deficit, on the other, is narrowing down in the restructured economy under all liberalisation reforms. This becomes possible due to the higher growth of the economic activities and institutional incomes so that government can collect more tax revenues. Higher growth of the economy in the dynamic model has made it possible to narrow down the fiscal deficit by internal reform with smaller increments in tax rates as compared to that of the static model. Likewise, required increment in the domestic tax rates to compensate the revenue loss from the import liberalisation is less in the dynamic version of the model than in the static version due to the higher economic growth. Furthermore, differences in results on growth and income between the policy simulations of import liberalisation and the same combined with revenue replacement from internal sources are shown to diminish in the dynamic model as compared to the static model, which is comforting for policy makers.

A comparison of the results of our static and dynamic simulations shows that a marginal increase in the labour participation rate in the dynamic model can turn some contracting activities into expansion in the course of liberalisation. Public services activities reveal this prospect. Next to the highly growing sectors like agriculture and industry, inflow of more labour in the labour market would go to public services, which is a highly labour intensive sector. It presses the wage rate of low-skilled labour marginally downwards because the new entrants are mostly low-skilled. But for the same reason, it causes some of the low-skilled labour to be transformed to the high-skilled category. The capital stock also grows at a higher rate to absorb the growing labour force. This growth dynamics is very important in leading the economy in the higher growth path in the long run.

But, there should be supportive policies in the economy to materialise this prospect. First, the investment in agriculture must go up to absorb the above mentioned increasing low-skilled labour force because agriculture is the main activity that employs a majority of the low-skilled labour in Nepal. Second, the modern sector of the economy like industry should also be able to absorb some of the new entrant labours in the course of these policy simulations. We have included both of these prospects while restructuring the economy.

The improvement in efficiency and growth in the Nepalese factor markets are essential also due to the recent emergence of two gigantic economic powers in Asia, India and China. Their emergence is intensifying the competitive pressure felt by other Asian economies, slowing the growth of their exports and challenging the sustainability of high growth more generally to those which are exporting consumer goods. More importantly, different stages of economic development, technological capability and comparative advantage of Nepal should better cope with the present situation to penetrate the enormous markets in these two economies where Nepal was enjoying with preferential trade so far.

To summarise, there are conditions necessary for combining a higher pro-poor growth together with external liberalisation and internal reforms. This study recommends in this connection that policy makers should identify the sectors that have high growth potential in the course of liberalisation. The targeted poor group must be encouraged to participate in those fastest growing activities with the factors they have at their disposal, in most of the cases the low-skilled labour. The rise in the remuneration of high skilled labour, pertaining to the employment in the high growth sectors, is expected to promote the labour transformation from low to high skills. Credit incentives would also be another factor to promote poor to invest in the high growth sectors. Moreover, employment promotion schemes should complement the liberalisation process so that the new entry of low-skilled labour would raise the wage rate of high skilled labour and rate of return to capital. All this would raise the incentive of low-skilled labour to get transformed to high skilled category. This restructuring pushes the economic system in motion and leads towards a high growth economy in the long run as the quality of factors get improved over time. Moreover, when public policy becomes able to redirect the factors possessed by the poor into the most growing sectors, the high growth attained from external liberalisation and internal reforms also becomes a pro-poor growth.

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Appendix to chapter 7

Appendix 7A.1: Multipliers generated from SAM 1996

Continued...

		Activities				Commodities				Factors			
		AGR-A	IND-A	CS-A	OS-A	AGR-C	IND-C	CS-C	OS-C	WLSL			
										AGR-A	IND-A	CS-A	OS-A
Activities	AGR-A	2.38	1.18	1.12	1.16	2.18	0.99	0.96	0.80	1.46	1.42	1.44	1.44
	IND-A	0.80	1.81	0.80	0.84	0.73	1.52	0.69	0.58	0.90	0.88	0.87	0.86
	CS-A	0.88	0.73	1.93	0.93	0.81	0.61	1.66	0.65	0.92	0.95	0.94	0.94
	OS-A	0.23	0.20	0.24	1.24	0.21	0.16	0.21	0.86	0.26	0.25	0.26	0.27
Commodities	AGR-C	1.50	1.28	1.22	1.26	2.38	1.08	1.04	0.87	1.59	1.54	1.56	1.56
	IND-C	0.95	0.97	0.95	1.00	0.87	1.81	0.82	0.69	1.07	1.05	1.03	1.02
	CS-C	1.03	0.85	1.09	1.09	0.95	0.72	1.93	0.76	1.07	1.11	1.10	1.10
	OS-C	0.33	0.28	0.35	0.34	0.31	0.24	0.30	1.24	0.37	0.36	0.38	0.38
WLSL	AGR-A	0.76	0.38	0.36	0.37	0.70	0.32	0.31	0.26	1.47	0.45	0.46	0.46
	IND-A	0.07	0.15	0.07	0.07	0.06	0.13	0.06	0.05	0.08	1.07	0.07	0.07
	CS-A	0.15	0.13	0.34	0.16	0.14	0.11	0.29	0.11	0.16	0.17	1.16	0.16
	OS-A	0.08	0.06	0.08	0.41	0.07	0.05	0.07	0.29	0.09	0.08	0.09	1.09
WHSL	AGR-A	0.14	0.07	0.07	0.07	0.13	0.06	0.06	0.05	0.09	0.09	0.09	0.09
	IND-A	0.06	0.13	0.06	0.06	0.05	0.11	0.05	0.04	0.07	0.06	0.06	0.06
	CS-A	0.05	0.04	0.10	0.05	0.04	0.03	0.09	0.04	0.05	0.05	0.05	0.05
	OS-A	0.06	0.05	0.06	0.31	0.05	0.04	0.05	0.22	0.06	0.06	0.07	0.07
Profit	AGR-A	0.82	0.41	0.39	0.40	0.75	0.34	0.33	0.28	0.50	0.49	0.50	0.50
	IND-A	0.20	0.46	0.20	0.21	0.19	0.38	0.17	0.15	0.23	0.22	0.22	0.22
	CS-A	0.40	0.33	0.87	0.42	0.37	0.28	0.75	0.29	0.41	0.43	0.42	0.42
	OS-A	0.01	0.01	0.01	0.05	0.01	0.01	0.01	0.04	0.01	0.01	0.01	0.01
Households	U-HH	0.65	0.69	0.77	0.84	0.60	0.58	0.66	0.58	0.78	0.94	0.94	0.95
	LR-HH	0.66	0.46	0.52	0.54	0.60	0.39	0.45	0.37	0.61	0.64	0.63	0.64
	SR-HH	0.86	0.60	0.70	0.64	0.79	0.51	0.60	0.44	1.14	0.99	0.81	0.72
	LLR-HH	0.48	0.31	0.35	0.43	0.45	0.26	0.30	0.30	0.54	0.46	0.68	0.75
	FIRMS	0.14	0.16	0.26	0.14	0.13	0.13	0.22	0.10	0.15	0.15	0.15	0.15
	S-I	0.43	0.36	0.47	0.39	0.39	0.30	0.40	0.27	0.45	0.46	0.45	0.45

		Return to factors				Factors				Households					National Capital
		WHSL				Profit				U-HH	LR-HH	SR-HH	LLR-HH	FIRMS	S-I
		AGR-A	IND-A	CS-A	OS-A	AGR-A	IND-A	CS-A	OS-A						
Activities	AGR-A	1.41	1.40	1.35	1.35	1.41	1.28	1.24	1.33	1.33	1.26	1.51	1.58	0.85	1.16
	IND-A	0.90	0.87	0.85	0.87	0.90	0.86	0.88	0.81	0.81	0.94	0.93	0.85	0.85	1.16
	CS-A	0.91	0.95	1.00	0.97	0.91	0.94	0.88	1.05	1.05	0.91	0.90	0.88	0.66	0.90
	OS-A	0.26	0.26	0.25	0.25	0.26	0.23	0.22	0.25	0.25	0.24	0.25	0.29	0.15	0.21
Commodities	AGR-C	1.54	1.52	1.47	1.47	1.53	1.39	1.35	1.45	1.45	1.37	1.65	1.72	0.92	1.26
	IND-C	1.08	1.04	1.02	1.04	1.08	1.02	1.05	0.97	0.97	1.12	1.11	1.02	1.01	1.38
	CS-C	1.06	1.11	1.16	1.14	1.06	1.10	1.03	1.22	1.22	1.06	1.05	1.02	0.77	1.05
	OS-C	0.37	0.37	0.35	0.35	0.37	0.33	0.32	0.36	0.36	0.34	0.36	0.42	0.22	0.30
WLSL	AGR-A	0.45	0.45	0.43	0.43	0.45	0.41	0.40	0.42	0.42	0.40	0.48	0.50	0.27	0.37
	IND-A	0.08	0.07	0.07	0.07	0.08	0.07	0.07	0.07	0.07	0.08	0.08	0.07	0.07	0.10
	CS-A	0.16	0.17	0.17	0.17	0.16	0.16	0.15	0.18	0.18	0.16	0.16	0.15	0.12	0.16
	OS-A	0.08	0.09	0.08	0.08	0.09	0.08	0.07	0.08	0.08	0.08	0.08	0.10	0.05	0.07
WHSL	AGR-A	1.09	0.09	0.08	0.08	0.09	0.08	0.08	0.08	0.08	0.08	0.09	0.10	0.05	0.07
	IND-A	0.07	1.06	0.06	0.06	0.07	0.06	0.06	0.06	0.06	0.07	0.07	0.06	0.06	0.08
	CS-A	0.05	0.05	1.05	0.05	0.05	0.05	0.05	0.06	0.06	0.05	0.05	0.05	0.04	0.05
	OS-A	0.06	0.06	0.06	1.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.04	0.05
Profit	AGR-A	0.49	0.48	0.47	0.47	1.49	0.44	0.43	0.46	0.46	0.43	0.52	0.55	0.29	0.40
	IND-A	0.23	0.22	0.22	0.22	0.23	1.22	0.22	0.21	0.21	0.24	0.24	0.22	0.22	0.29
	CS-A	0.41	0.43	0.45	0.44	0.41	0.42	1.40	0.47	0.47	0.41	0.40	0.39	0.30	0.41
	OS-A	0.01	0.01	0.01	0.01	0.01	0.01	0.01	1.01	0.01	0.01	0.01	0.01	0.01	0.01
Households	U-HH	0.71	0.95	1.25	1.09	0.69	1.11	0.85	1.60	1.60	0.58	0.60	0.60	0.44	0.60
	LR-HH	0.85	0.73	0.63	0.74	0.88	0.57	0.60	0.47	0.47	1.44	0.50	0.51	0.32	0.43
	SR-HH	0.91	0.77	0.79	0.85	0.87	0.76	0.84	0.61	0.61	0.58	1.65	0.66	0.42	0.57
	LLR-HH	0.56	0.58	0.33	0.33	0.59	0.31	0.30	0.33	0.33	0.31	0.35	1.37	0.22	0.30
	FIRMS	0.15	0.15	0.15	0.15	0.14	0.31	0.40	0.16	0.16	0.15	0.14	0.14	1.11	0.15
	S-I	0.51	0.48	0.46	0.49	0.51	0.55	0.61	0.43	0.43	0.66	0.43	0.39	0.99	1.34

Appendix 7A.2: Multipliers generated from SAM 2006

Continued...

		Activities				Commodities				Return to factors			
		AGR-A	IND-A	CS-A	OS-A	AGR-C	IND-C	CS-C	OS-C	WLSL			
										AGR-A	IND-A	CS-A	OS-A
Activities	AGR-A	2.41	1.23	1.13	1.20	2.16	1.01	0.97	0.84	1.46	1.47	1.37	1.44
	IND-A	0.82	1.84	0.81	0.86	0.73	1.51	0.70	0.61	0.90	0.88	0.87	0.90
	CS-A	0.90	0.76	1.97	0.96	0.81	0.62	1.69	0.67	0.93	0.93	0.99	0.94
	OS-A	0.24	0.21	0.25	1.24	0.22	0.17	0.21	0.87	0.26	0.27	0.26	0.26
Commodities	AGR-C	1.56	1.37	1.26	1.33	2.41	1.13	1.09	0.94	1.63	1.64	1.53	1.61
	IND-C	0.99	1.02	0.99	1.05	0.89	1.84	0.85	0.74	1.10	1.07	1.05	1.09
	CS-C	1.05	0.88	1.12	1.11	0.94	0.72	1.97	0.78	1.08	1.08	1.15	1.10
	OS-C	0.34	0.30	0.35	0.35	0.31	0.24	0.30	1.24	0.37	0.38	0.36	0.37
WLSL	AGR-A	0.87	0.45	0.41	0.43	0.78	0.37	0.35	0.31	1.53	0.53	0.50	0.52
	IND-A	0.11	0.25	0.11	0.12	0.10	0.21	0.10	0.08	0.12	1.12	0.12	0.12
	CS-A	0.20	0.17	0.44	0.22	0.18	0.14	0.38	0.15	0.21	0.21	1.22	0.21
	OS-A	0.08	0.07	0.09	0.43	0.08	0.06	0.07	0.30	0.09	0.09	0.09	1.09
WHSL	AGR-A	0.14	0.07	0.07	0.07	0.13	0.06	0.06	0.05	0.09	0.09	0.08	0.09
	IND-A	0.07	0.15	0.07	0.07	0.06	0.13	0.06	0.05	0.08	0.07	0.07	0.07
	CS-A	0.04	0.04	0.09	0.05	0.04	0.03	0.08	0.03	0.04	0.04	0.05	0.05
	OS-A	0.07	0.06	0.07	0.36	0.06	0.05	0.06	0.25	0.07	0.08	0.07	0.07
Profit	AGR-A	0.81	0.41	0.38	0.40	0.72	0.34	0.33	0.28	0.49	0.49	0.46	0.48
	IND-A	0.20	0.44	0.20	0.21	0.18	0.36	0.17	0.15	0.22	0.21	0.21	0.22
	CS-A	0.39	0.33	0.85	0.41	0.35	0.27	0.73	0.29	0.40	0.40	0.43	0.41
	OS-A	0.01	0.01	0.01	0.06	0.01	0.01	0.01	0.04	0.01	0.01	0.01	0.01
Households	U-HH	0.70	0.69	0.91	0.90	0.63	0.57	0.79	0.63	0.80	0.84	1.20	0.88
	LR-HH	0.63	0.47	0.56	0.58	0.57	0.39	0.48	0.41	0.65	0.64	0.66	0.64
	SR-HH	0.94	0.69	0.70	0.79	0.84	0.57	0.60	0.56	1.14	0.88	0.81	1.10
	LLR-HH	0.58	0.43	0.36	0.41	0.52	0.36	0.31	0.29	0.62	0.86	0.50	0.58
	FIRMS	0.14	0.17	0.26	0.15	0.12	0.14	0.22	0.10	0.14	0.14	0.15	0.15
	S-I	0.43	0.38	0.49	0.42	0.39	0.31	0.42	0.30	0.46	0.45	0.47	0.46

		WHSL				Profit				Households					National Capital
		AGR-A	IND-A	CS-A	OS-A	AGR-A	IND-A	CS-A	OS-A	U-HH	LR-HH	SR-HH	LLR-HH	FIRMS	S-I
Activities	AGR-A	1.44	1.42	1.36	1.34	1.45	1.30	1.23	1.33	1.33	1.26	1.52	1.59	0.88	1.19
	IND-A	0.90	0.88	0.86	0.88	0.91	0.88	0.87	0.82	0.82	0.94	0.94	0.87	0.85	1.16
	CS-A	0.92	0.95	1.01	0.99	0.92	0.93	0.90	1.06	1.06	0.92	0.91	0.88	0.66	0.90
	OS-A	0.26	0.26	0.25	0.25	0.26	0.24	0.23	0.25	0.25	0.24	0.26	0.29	0.16	0.22
Commodities	AGR-C	1.61	1.58	1.51	1.49	1.61	1.45	1.37	1.48	1.48	1.41	1.69	1.76	0.98	1.33
	IND-C	1.10	1.07	1.05	1.06	1.10	1.06	1.06	1.00	1.00	1.14	1.14	1.05	1.04	1.41
	CS-C	1.07	1.11	1.17	1.16	1.07	1.08	1.05	1.23	1.23	1.07	1.06	1.03	0.77	1.05
	OS-C	0.37	0.37	0.36	0.36	0.37	0.34	0.32	0.36	0.36	0.35	0.36	0.42	0.22	0.31
WLSL	AGR-A	0.52	0.51	0.49	0.48	0.52	0.47	0.44	0.48	0.48	0.46	0.55	0.57	0.32	0.43
	IND-A	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.11	0.11	0.13	0.13	0.12	0.12	0.16
	CS-A	0.21	0.22	0.23	0.22	0.21	0.21	0.20	0.24	0.24	0.21	0.21	0.20	0.15	0.20
	OS-A	0.09	0.09	0.09	0.09	0.09	0.08	0.08	0.09	0.09	0.08	0.09	0.10	0.05	0.07
WHSL	AGR-A	1.09	0.08	0.08	0.08	0.09	0.08	0.07	0.08	0.08	0.08	0.09	0.09	0.05	0.07
	IND-A	0.08	1.07	0.07	0.07	0.08	0.07	0.07	0.07	0.07	0.08	0.08	0.07	0.07	0.10
	CS-A	0.04	0.05	1.05	0.05	0.04	0.04	0.04	0.05	0.05	0.04	0.04	0.04	0.03	0.04
	OS-A	0.07	0.08	0.07	1.07	0.08	0.07	0.06	0.07	0.07	0.07	0.07	0.08	0.05	0.06
Profit	AGR-A	0.48	0.47	0.46	0.45	1.48	0.44	0.41	0.45	0.45	0.42	0.51	0.53	0.29	0.40
	IND-A	0.22	0.21	0.21	0.21	0.22	1.21	0.21	0.20	0.20	0.23	0.23	0.21	0.21	0.28
	CS-A	0.40	0.41	0.44	0.43	0.40	0.40	1.39	0.46	0.46	0.40	0.39	0.38	0.29	0.39
	OS-A	0.01	0.01	0.01	0.01	0.01	0.01	0.01	1.01	0.01	0.01	0.01	0.01	0.01	0.01
Households	U-HH	0.75	0.97	1.28	1.18	0.73	1.01	0.95	1.65	1.65	0.62	0.64	0.64	0.46	0.63
	LR-HH	0.75	0.71	0.62	0.77	0.77	0.54	0.64	0.47	0.47	1.45	0.49	0.50	0.32	0.44
	SR-HH	1.01	0.80	0.87	0.81	0.99	0.95	0.77	0.65	0.65	0.63	1.70	0.72	0.46	0.62
	LLR-HH	0.68	0.70	0.38	0.38	0.71	0.37	0.35	0.38	0.38	0.37	0.42	1.43	0.27	0.37
	FIRMS	0.14	0.15	0.15	0.15	0.14	0.32	0.40	0.16	0.16	0.15	0.14	0.14	1.11	0.15
	S-I	0.49	0.48	0.47	0.51	0.49	0.56	0.63	0.43	0.43	0.67	0.43	0.39	0.99	1.35

Appendix 7B: Model Parameters and Coefficients in Dynamic Nepal CGE

7B.1. Model parameters: a comparison between CGE 1996 and 2006

Most of the model parameters have remained at the same level in both the static and dynamic versions of the Nepal CGE model. Domestic indirect tax rates (tq_c), direct tax rates to household and firms (ty_h and *tyf*), tariff rates (tm_c), average propensity of save of households and firms (aps_h & *apsf*), elasticity of substitution between domestic vs. import goods, elasticity of transformation between domestic vs. export goods, armington function exponent to import commodity (ρ_c^q), armington function exponent for export commodity (ρ_c^t), export elasticity coefficient (eec_c), shares in change in stock ($chstsh_c$), and conversion coefficients(θ_{ac}) have all remained at the same level in the dynamic model as they were in the static model. In a few cases, the parameters do change in the course of restructuring the SAM.

The proposed restructuring of the economy promotes labour intensive mode of production in all sectors of the economy except in public services, which is itself highly labour-intensive even according to SAM 1996. But, even between the labour inputs, it has become more high-skilled. As Table 7A.1 shows, shares of total labour inputs are increased at the expense of the share of profit in agriculture, industries and commercial services activities. The rationale behind this change is to deliver pro-poor growth as the poor household categories basically draw their income from labour. Moreover, the calibration constants in the production function have risen in the dynamic 2006 model as compared to static 1996 one.

Table 7B.1: Factor shares (α_{fa}) and calibration constant (ad_a) in production function (2006)

parameters	activities			
	AGR-A	IND-A	CS-A	OS-A
factor share (α_{fa})				
low skilled labour wage (LSLW)	0.478 (0.440)	0.296 (0.206)	0.320 (0.257)	0.511 (0.530)
high skilled labour wage (HSLW)	0.078 (0.084)	0.180 (0.178)	0.068 (0.080)	0.421 (0.401)
profit	0.443 (0.476)	0.524 (0.616)	0.612 (0.663)	0.069 (0.069)
calibration constant (ad_a)	277.169 (193.231)	214.407 (83.078)	42.663 (25.830)	22442.18 (19443.181)

Note: Figures in the parentheses in this and following tables represent the values for static model based on Nepal SAM 1996.

Intermediate inputs per unit activity decrease in the dynamic model as compared to the static model. This reduction reflects improving efficiency in production. See changes in factor share (α_{fa}) (Table 7A.1) and intermediate input per unit activity (Table 7A.2).

Table 7B.2: Quantities of commodities as intermediate inputs per unit of activity (ica_{ca}) (2006)

commodities/services	activities			
	AGR-A	IND-A	CS-A	OS-A
AGR-C	0.108 (0.119)	0.166 (0.176)	0.0001 (0.001)	0.002 (0.002)
IND-C	0.002 (0.002)	0.170 (0.181)	0.042 (0.045)	0.099 (0.112)
CS-C	0.063 (0.069)	0.038 (0.041)	0.141 (0.151)	0.122 (0.139)
OS-C	0.006 (0.006)	0.020 (0.022)	0.048 (0.051)	0.028 (0.031)

We observe marginal differences between 1996 and 2006 models regarding the parameters presented in Table 7A.3. We got Armington import share and export share of composite commodities (δ_c^q and δ_c^t) reduced marginally except in agricultural sector. In agriculture, the import share has increased to some extent because of the enhanced investment. They have induced the Armington function shift parameters for supply and demand (aq_c and at_c) to adjust accordingly.

The intermediate deliveries per unit activity go down because of the improvement in the efficiency parameter, similarly for intermediate import deliveries per unit activity ($ncir_a$). Weights in the consumer's price are perfectly equal in the two models. Shares in investment ($qinsh_c$) go more in favour of agriculture followed by industrial activities. Table 7B.3 also includes import and export calibration constants in the two models.

Table 7B.3: Market interaction relating to commodities (2006)

parameters	commodities			
	AGR-C	IND-C	CS-C	OS-C
import share of composite commodity (δ_c^q)	0.08 (0.06)	0.16 (0.16)	0.12 (0.13)	0.24 (0.25)
export share of composite commodity (δ_c^t)	0.04 (0.05)	0.23 (0.28)	0.13 (0.16)	-
function shift parameter for supply of c (aq_c)	1.26 (1.20)	1.67 (1.66)	2.503 (2.48)	2.21 (2.21)
armington function shift parameter for demand of c (at_c)	1.06 (1.08)	1.48 (1.63)	1.25 (1.32)	-
non-competitive import coefficient ($ncir_a$)	0.06 (0.08)	0.13 (0.16)	0.06 (0.07)	0.06 (0.08)
import calibration constant (im_c)	5.47 (5.30)	0.72 (0.77)	0.28 (0.33)	0.49 (0.55)
export calibration constant (ec_c)	0.0001 (0.0001)	0.03 (0.06)	0.003 (0.01)	0.0 (0.0)
weights in the cpi ($cwts_c$)	0.43 (0.43)	0.21 (0.21)	0.26 (0.26)	0.1 (0.1)
share of investment ($qinsh_c$)	0.17 (0.15)	0.57 (0.56)	0.23 (0.25)	0.04 (0.04)

Virtually, there is no significant change in the consumption pattern of households (Table 7A.4). However, we observe marginal change in the consumption shares among household by commodity types. It is because we considered the household consumption account as a balancing sub-account between household income and expenditure accounts.

Table 7B.4: Share of household consumption spending on commodities and services (β_{ch}) (2006)

commodities/services	households			
	U-HH	LR-HH	SR-HH	LLR-HH
AGR-C	0.360 (0.367)	0.360 (0.375)	0.478 (0.478)	0.531 (0.530)
IND-C	0.156 (0.152)	0.246 (0.262)	0.261 (0.262)	0.191 (0.179)
CS-C	0.397 (0.394)	0.284 (0.272)	0.180 (0.177)	0.145 (0.146)
OS-C	0.088 (0.087)	0.110 (0.110)	0.082 (0.083)	0.132 (0.144)

7B.2. Parameters/coefficients used specifically for dynamic model

We have used the growth rate of total labour supply ($\hbar$) equal to 2.6% as per the estimate of Nepal Population Report *(Ministry of Population and Environment, 2002, Kathmandu)*. This trend has increased the labour participation in the country by about 3.51 millions during 1996 and 2006. However, following the structural reforms in our modelled economy, we assume an additional 10% of this 3.51 million workers to join the labour market in every policy simulation following the enhanced government investment.

Investment is agriculture has been made almost 1.5% higher than the normal trend followed by 0.5% growth of investment in industries. The incentive for firms to launch some new employment schemes is reflected in the form of a higher share of the government expenditure going as a transfer to firms. The transfer to the firms goes up to 19% (SAM 2006) from 17% (SAM 1996). As we have made both of these two phenomena as common denominators to all policy simulations, we considered to adjust these changes in the SAM so that they would transfer to all the policy simulations with slightly scaled-up participation rate.

There is no reliable study made to estimate the cost of education for producing a low-skilled and high-skilled labour in Nepal. Shares of the education cost (ξ_1 and ξ_2 for skilled and unskilled labours) that households' bear in Nepal are even more scarce. However, based on some related studies, CBS (1997), and World Bank (2000), we could make a broad estimate of 20% and 40% of the primary and higher secondary education costs to their children borne by the households. Moreover, we consider the primary school education and higher secondary school educations necessary for labours to work as low-skilled and high skilled workers. Based on these two studies mentioned, we estimated the education cost for low-skilled and high-skilled labours (ψ_1 and ψ_2) to be Rs. 1032 and 5280, respectively, in 1996 price level.

We have kept the education cost ratio exponent parameter (η), an exponent put in labour ratio equation 7.4, equal to unity leaving the calibration constant to adjust fully by itself. Moreover,

the distribution parameter of the present skill ratio to the future skill ratio (τ) has been fixed at 0.5 assuming that present skill ratio of labours is the median of the initial benchmark value and the future ratio.

Rate of depreciation (ζ) to the capital as used to be 0.05 shows the full depletion of the present capital in 20 years.

Appendix 7C: Model Variables in Benchmark and Simulations

Table 7C.1: Levels of price indices in the dynamic model

Variables	Benchmark 2006	Simulation values						
		External reform					Internal reform	ILN + RRIS
		ILN	ELROW	ILN + ELROW	CER	DEV		
PE_c								
AGR-C	1.000	1.000	1.000	1.000	0.952	1.100	1.000	1.000
IND-C	1.000	1.000	1.000	1.000	0.952	1.100	1.000	1.000
CS-C	1.000	1.000	1.000	1.000	0.952	1.100	1.000	1.000
OS-C	1.000	1.000	1.000	1.000	0.952	1.100	1.000	1.000
PM_c								
AGR-C	1.132	1.119	1.132	1.119	1.065	1.245	1.132	1.119
IND-C	1.103	1.093	1.103	1.093	1.041	1.213	1.103	1.093
CS-C	1.146	1.131	1.146	1.131	1.077	1.261	1.146	1.131
OS-C	1.204	1.184	1.204	1.184	1.127	1.324	1.204	1.184
PXc								
AGR-C	1.000	1.001	1.000	1.001	0.977	1.054	0.999	1.000
IND-C	1.000	1.000	1.000	1.000	0.979	1.047	1.000	1.000
CS-C	1.000	1.003	1.002	1.003	0.979	1.054	1.002	1.002
OS-C	1.000	0.998	0.997	0.998	0.973	1.051	0.997	0.997
PDc								
AGR-C	1.000	1.001	1.000	1.001	0.978	1.051	0.999	1.000
IND-C	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
CS-C	1.000	1.003	1.003	1.003	0.985	1.044	1.003	1.002
OS-C	1.000	0.998	0.997	0.998	0.973	1.051	0.997	0.997
PQc								
AGR-C	1.015	1.015	1.015	1.015	0.99	1.07	1.014	1.015
IND-C	1.042	1.030	1.032	1.030	1.02	1.052	1.036	1.033
CS-C	1.021	1.019	1.021	1.019	0.995	1.073	1.022	1.020
OS-C	1.019	1.012	1.017	1.012	0.98	1.087	1.020	1.013
PAa								
AGR-A	1.000	1.001	1.000	1.001	0.977	1.054	0.999	1.000
IND-A	1.000	1.000	1.000	1.000	0.979	1.047	1.000	1.000
CS-A	1.000	1.003	1.002	1.003	0.979	1.053	1.002	1.002
OS-A	1.000	0.998	0.997	0.998	0.973	1.052	0.997	0.997
PVAa								
AGR-A	0.756	0.758	0.757	0.758	0.739	0.797	0.756	0.757
IND-A	0.461	0.463	0.463	0.463	0.452	0.487	0.462	0.463
CS-A	0.707	0.711	0.710	0.711	0.694	0.746	0.709	0.710
OS-A	0.679	0.679	0.678	0.679	0.660	0.718	0.677	0.678

Table 7C.2: Levels of quantities by commodity and activity, million Rupees, dynamic model

Variables	Benchmark 2006	Simulation values						
		External reform					Internal reform	ILN + RRIS
		ILN	ELROW	ILN + ELROW	CER	DEV		
QD_c								
AGR-C	174745.0	178340.3	178382.3	178340.7	178294.8	178515.7	178565.0	178363.6
IND-C	131305.0	135858.5	136136.2	135860.5	134984.8	138044.5	136606.2	136348.4
CS-C	124237.0	123017.0	122794.4	123015.2	122563.7	123718.4	122324.2	122636.9
OS-C	57374.0	57600.5	57500.3	57600.4	57631.2	57466.5	57359.0	57512.3
$QINV_c$								
AGR-C	16255.9	16413.1	16399.8	16413.0	16556.3	16104.3	16402.5	16395.9
IND-C	52938.5	54049.3	53909.0	54049.2	53697.1	54732.7	53688.9	53847.8
CS-C	21897.8	22153.9	22089.3	22153.5	22321.4	21746.7	22040.8	22114.9
OS-C	3545.0	3603.1	3582.4	3603.0	3661.4	3470.4	3570.1	3597.2
QE_c								
AGR-C	6504.0	6631.8	6637.6	6631.2	6480.8	6891.7	6649.9	6638.2
IND-C	38003.0	39320.9	39401.3	39321.5	36627.2	44794.7	39537.3	39462.7
CS-C	17958.0	17759.5	17727.4	17756.9	17455.1	18263.3	17663.8	17710.1
OS-C								
QM_c								
AGR-C	15682.0	16070.7	16010.0	16070.7	16199.6	15787.9	16021.2	16067.4
IND-C	26522.0	27565.6	27497.8	27566.0	28038.5	26636.4	27592.8	27665.0
CS-C	17671.0	17519.8	17469.9	17519.6	17498.1	17523.3	17402.4	17464.6
OS-C	19136.0	19234.0	19173.9	19234.0	19281.0	19097.8	19126.2	19203.7
QQ_c								
AGR-C	192331.0	196316.2	196335.1	196316.7	196322.5	196381.8	196534.0	196339.6
IND-C	160911.7	166662.5	166832.2	166664.9	166473.8	167412.1	167408.2	167263.4
CS-C	144431.9	143145.3	142779.1	143143.4	142870.1	143392.2	142228.8	142696.6
OS-C	79980.4	80354.4	80145.4	80354.2	80492.2	79930.0	79947.1	80229.2
QX_c								
AGR-C	181249.0	184978.1	185021.7	184978.5	184929.8	185161.9	185211.2	185002.3
IND-C	169308.0	175179.4	175537.5	175181.9	173591.1	178954.4	176143.5	175811.1
CS-C	142195.0	140797.2	140542.5	140795.0	140263.6	141625.3	140004.6	140362.6
OS-C	57374.0	57600.5	57500.3	57600.4	57631.2	57466.5	57359.0	57512.3
QA_a								
AGR-A	181248.0	184977.1	185020.6	184977.5	184928.7	185160.9	185210.2	185001.2
IND-A	169308.0	175179.4	175537.5	175181.9	173591.1	178954.4	176143.5	175811.1
CS-A	142195.0	140797.2	140542.5	140795.0	140263.6	141625.3	140004.6	140362.6
OS-A	57373.0	57599.5	57499.3	57599.4	57630.2	57465.5	57358.0	57511.3

Table 7C.3: Benchmark and simulation results for in the factor market

Variables	Benchmark 2006	Simulation values						
		External reform					Internal reform	ILN + RRIS
		ILN	ELROW	ILN + ELROW	CER	DEV		
WF_f								
LSL Rupees	11038.4	10938.8	10923.6	10938.8	10643.4	11576.4	10909.2	10922.1
HSL Rupees	17421.7	17541.4	17516.9	17541.4	17053.6	18597.9	17494.1	17519.2
Capital	0.1690	0.1713	0.1711	0.1713	0.1677	0.1791	0.1710	0.711
$QF_{fa\ millions}$								
LSL-AGR	5.941	6.128	6.131	6.128	6.142	6.102	6.138	6.130
LSL-IND	2.092	2.195	2.200	2.195	2.182	2.229	2.208	2.204
LSL-CS	2.914	2.926	2.922	2.926	2.925	2.921	2.911	2.918
LSL-OS	1.803	1.825	1.822	1.825	1.826	1.821	1.818	1.823
HSL-AGR	0.617	0.627	0.627	0.627	0.629	0.623	0.628	0.627
HSL-IND	0.808	0.835	0.837	0.835	0.830	0.846	0.840	0.838
HSL-CS	0.394	0.389	0.389	0.389	0.389	0.388	0.387	0.388
HSL-OS	0.941	0.937	0.935	0.937	0.938	0.933	0.933	0.936
CAP-AGR	359004.7	362513.1	362508.8	362514.0	361205.3	365435.5	362819.9	362486.7
CAP-IND	241589.4	248149.8	248604.2	248153.5	245172.7	255080.6	249427.5	249008.8
CAP-CS	363450.9	357295.6	356587.7	357290.1	355106.5	361173.1	355181.8	356143.3
CAP-OS	15796.8	15651.3	15617.6	15651.3	15568.3	15808.1	15574.9	15623.2
$YF_{fa\ million\ Rupees}$								
LSL-AGR	65578.0	67037.0	66972.8	67037.0	65376.3	70636.3	66961.9	66956.5
LSL-IND	23094.0	24014.3	24035.6	24014.6	23222.2	25802.4	24090.5	24070.3
LSL-CS	32162.0	32008.1	31914.5	32007.6	31136.2	33820.1	31756.2	31868.9
LSL-OS	19906.0	19966.1	19904.2	19966.0	19438.4	21079.0	19829.6	19907.8
HSL-AGR	10754.0	10993.3	10982.7	10993.3	10720.9	11583.5	10980.9	10980.1
HSL-IND	14081.0	14642.2	14655.1	14642.3	14159.2	15732.4	14688.6	14676.3
HSL-CS	6861.0	6828.2	6808.2	6828.1	6642.2	7214.7	6774.4	6798.5
HSL-OS	16388.0	16437.5	16386.5	16437.4	16003.0	17353.7	16325.1	16389.5
CAP-AGR	60747.0	62098.6	62039.1	62098.6	60560.1	65432.7	62028.9	62023.9
CAP-IND	40879.0	42508.1	42545.7	42508.6	41106.0	45673.2	42643.0	42607.1
CAP-CS	61499.0	61204.8	61025.7	61203.7	59537.6	64669.5	60723.1	60938.6
CAP-OS	2673.0	2681.1	2672.8	2681.1	2610.2	2830.5	2662.7	2673.2

Table 7C.4: Benchmark and simulation results for household income in million Rupees, and PCI

Variables	Benchmark 2006	Simulation values						
		External reform					Internal reform	ILN + RRIS
		ILN	ELROW	ILN + ELROW	CER	DEV		
YH_h								
YH_{uhh}	104669.0	105910.0	105737.1	105909.5	102930.1	112313.4	105516.3	105711.5
YH_{lrhh}	71717.0	72792.0	72687.0	72791.7	70831.4	77011.7	72577.9	104538.7
YH_{srhh}	102736.0	104659.9	104544.2	104659.8	101868.4	110708.5	104459.1	72668.5
YH_{llrhh}	62278.0	63642.0	63599.4	63642.1	61914.7	67408.0	63598.1	63608.3
YFIR	33358.0	33588.1	33548.0	33587.9	32898.9	35065.6	33486.2	33536.2
PCI_{llrhh}	5404.1	5522.5	5518.8	5522.5	5372.6	5849.3	5518.7	5519.6
PCI(N)	13126.5	13342.0	13325.2	13342.0	12978.3	14127.8	13309.2	13323.6

Table 7C.5: Benchmark and simulation results for saving, investment, and consumption in million Rupees

Variables	Benchmark 2006	Simulation values						
		External reform					Internal reform	ILN + RRIS
		ILN	ELROW	ILN + ELROW	CER	DEV		
CHST	13785.2	12294.8	12920.3	12297.8	14169.0	8762.2	14435.5	13740.0
GRIV	0.05700	0.05799	0.05792	0.05799	0.05627	0.06157	0.05783	0.05790
GFCF	97631.8	98545.9	98475.0	98545.6	96955.6	101934.4	98398.7	98461.3
GDP	354620.6	360419.2	359942.9	360418.2	350512.2	381827.9	359465.1	359890.5
CPI	1.023	1.019	1.020	1.019	0.996	1.069	1.021	1.020
Priv Consumption	295067.7	299973.7	299603.7	299973.1	291792.9	317656.8	298600.8	299054.6
Gov. Consumption	35323.0	35079.5	35256.8	35079.5	33963.5	37672.7	35350.9	35106.8
Total Consumption	330390.7	335053.1	334860.5	335052.6	325756.4	355329.5	333951.7	334161.4

Table 7C.6: Benchmark and simulation results for EXR and FSAV, in million Rupees

Variables	Benchmark 2006	Simulation values						
		External reform					Internal reform	ILN + RRIS
		ILN	ELROW	ILN+ELROW	CER	DEV		
EXR	1.00	1.00	1.00	1.00	0.95	1.10	1.00	1.10
FSAV	46271.00	47375.79	47101.66	47378.87	52116.76	38190.74	47046.36	46324.7

Table 7C.7: Benchmark and simulation results for government variables, in million Rupees

Variables	Benchmark 2006							
		External reform					Internal reform	ILN + RRIS
		ILN	ELROW	ILN+ELROW	CER	DEV		
GE	64207.2	63963.6	64140.9	63963.7	62847.7	66556.9	64235.1	63991.0
GS	-12127.2	-14537.8	-13624.8	-14537.8	-14931.1	-12711.1	-10891.6	12127.2
GY	52080	49425.9	50516.1	49425.9	47916.6	53845.8	53343.5	51863.8

Table 7C.8: Benchmark and simulation results for total factor supplies

Variables	Benchmark 2006	Simulation values						
		External reform					Internal reform	ILN + RRIS
		ILN	ELROW	ILN+ELROW	CER	DEV		
LSL mln.	12.750	13.07505	13.07500	13.07504	13.07597	13.07300	13.07504	13.07475
HSL mln.	2.760	2.78774	2.78773	2.78775	2.78682	2.78979	2.78775	2.78804
LTLR	4.620	4.54664	4.54668	4.54663	4.55041	4.5383	4.54661	4.5454
Capital (mln. Rupees)	979844.0	983609.8	983318.2	983608.9	977052.7	997497.3	983004.1	983262.0

As intermediate deliveries in every simulation are constant shares of total activities, we have not presented figures on them. Similar is the case of household consumption of commodities.

Values of exogenous variables in the dynamic model

Table 7C.9: Transfer income from institutions to institutions

Transfer to	Transfer from	
	Government	ROW
UHH	494.00	575.00
LRHH	435.00	514.00
SRHH	2204.00	1263.00
LLRHH	2066.00	2683.00
Firms	9901.00	-
Government	-	10698.00

Note: Transfer from government to institutions is in domestic currency whereas from ROW is in foreign currency. Both are in millions.

Quantities of government consumption goods (GC) = 28800.785 units

Government expenditure on investment goods (GI) = Rs. 23685.182 millions

Initial capital for the benchmark 1996 (IK) = 579752.5

Initial gross fixed capital formation (1996 level) (IGFCF) = Rs. 56081 millions

Initial quantity of the low-skilled labour (IQLSL) = 9.943 millions

Initial quantity of the high skilled labour (IQHSL) = 2.057 millions

SAMENVATTING

Ekonomische groei en armoedebestrijding zijn ontbetwiste ontwikkelingsdoelstellignen. Andere onbetwistbare feiten zijn de recentelijke maatregelen tot liberalisering, handelsbevordering, en versnelde integratie van nationale ekonomieen in de wereldekonomie, in het algemeen aangeduid als globalisering. Deze twee klusters van feiten werpen belangrijke vragen op voor ekonomen en politici. Wat is het verband tussen groei- en armoededoelstellingen, liberalisatie en globalisering? Versterken zij elkaar of zijn ze tegenstrijdig? Wat zijn de kondities van een land waaronder dergelijke relaties ontstaan? Welke strukturele hervormingen kunnen positieve resultaten in beide richtingen versterken, i.e. armoedeverlichtende groei tegelijk met liberalisatie? Tenslotte, en zeer relevant voor de huidige studie, is daar het belang van het ontwikkelen en bestuderen van modellen voor beleidsanalyse, die van toepassing zijn op deze vragen. Dit laatste vormt de hoofdzaak van deze studie.

In hoofdstuk twee, bespreken we vier vragen: (a) Wat hebben theoretische studies te melden over het verband tussen liberalisatie en armoede verlichtende groei? (b) Wat zijn de empirische feiten over liberalisatie and verdeling? (c) Hoe hebben internationale hulporganizaties hun ontwikkelingsbeleid geformuleerd in het licht van de relatie tussen liberalisatie en verdeling? (d) Voor Nepal in het bijzonder, wat zijn de specifieke problemen en hoe is daar mee omgesprongen? We hebben het beleid bestudeerd dat Nepal heeft aanvaard met betrekking tot het Structural Adjustment Programme (SAP) van het IMF en de Wereld Bank in Nepal, en heeft voortgezet in het Programma voor Armoedebestrijding en Groei (Poverty Reduction and Growth Facilities, PRGF). De begrippen armoedeverlichtende groei en liberalisering, die immers de focus van dit ondersoek vormen, worden tevens regelmatig gehanteerd in PRGF.

De matrix van sociale rekeningen (Social Accounting Matrix, SAM) van Nepal levert de belangrijkste gegevens voor dit onderzoek. In hoofdstuk 3 bespreken we de SAM 1996 voor Nepal die ekonomische activiteiten onderscheidt in termen van landbouw, industrie, handel, en openbare diensverlening. Analoog daaraan is de goederenrekening onderveeld in vier rekeningen. Drie productie factoren zijn onderschieden: laag-opgeleide arbeid, hoog-opgeleide arbeid, en kapitaal. We introduceerden vier rekeningen voor huishoudens: stedlijke huishoudens, grootschalige plattelandshuishoudens, kleinschalige plattelandshuishoudens, en grondloze plattelandshuishoudens, welke de armste groep inhoudt. De SAM heeft verder rekeningen voor de overheid, bedrijven, kapitaal, en de rest van de wereld. Een

belangrijke bijdrage van de studie is het uitbreiden van de SAM met kruisrelaties tussen faktorinkomens, produktiesektoren en ontvangende groepen huishoudens.

In hoofstuk 4 formuleren we een CGE model met neo-liberale sluiting.We gebruiken standaard wiskundige software GAMS voor de kalibratie van het model en voor beleidssimulaties.

In hoofdstuk 5, kalibreren we het Nepal CGE model met betrekking tot de gegevens van de SAM, waar nodig aangevuld met gegevens van andere bronnen.

In hoofdstuk 6 analyseren we de gevolgen van externe beleidswijzigingen (i.e. liberaliseringsbeleid) en interne beleidswijzigingen (i.e. begrotingsbeleid). Het liberaliseringsbeleid omvat verlaging van importtarieven, verlaging van uitvoerbeperkingen van de rest van de wereld, kombinaties van beiden onder een vaste wisselkoers alsmede een variabele wisselkoers, en een devaluatie van de nationale munteenheid. De simulatie van de interne beleidswijziging betrof een vermindering van het begrotingstekort bij een hoger uitgavenniveau. Er is ook een simulatie die verlaging van importtarieven kombineert met kompenserende hogere overheidsbelasting. De simulaties lieten positieve groeieffecten zien maar zeer marginale of afwezige effecten voor armoedevermindering. Dit legt de grondslag voor hoofstuk 7 waar een dynamische versie is ontwikkeld en waar een experiment is gedaan met veranderingen in ekonomische struktuur zodanig dat dit kan leiden tot armoedebestrijding met groei en beleidswijzgingen tot liberalisering.

In hoofdstuk 7 introduceren we een herstrukturering van de ekonomie naar een toekomstig profiel voor 2006 dat armoedbestijding *kan* kombineren met groei en liberalisering. De realisering van dit potentieel is afhankelijk van de beweging van prijzen in de juiste richting en de mate daarvan. Het toekomstige profiel voor 2006 is weerspiegeld in een geprojekteerde SAM voor 2006. De SAMs van 1996 en 2006 hebben vergelijkbare eigenschappen zoals is gebleken uit een uitgebreide multiplier analyse. Vervolgens, bouwen we de statische versie van het model om tot een dynamische versie dat wordt opgelost voor het jaar 2006 . Belangrijke verschillen tussen deze twee versies bestaan uit de behandeling van kapitaal en arbeidsaanbod. De kapitaalvoorraad is endogeen gemaakt en is gekoppeld aan de investeringen die aan het einde van de periode gemaakt zijn, tezamen met die van vorige jaren met inachtname van afschrijving. Arbeidsaanbod van laagopgeleide en hoogopgeleide arbeidsklassen is endogeen gemaakt en het verkijgen van opleiding is gespecificeerd als zijnde gebaseerd op de kosten en baten van onderwijs. In dit hoofdstuk, worden de resultaten van het dynamische model voor het jaar 2006 bestudeerd. Daarna worden de beleidssimulaties van hoodstuk 6 herhaald in hoodstuk 7, en worden ze vergeleken en beoordeeld in het licht van het bewerkstelligen van armoedeestrijding met groei en liberalisering.

De algemene konclusie van de beleidssimulaties is dat liberalisering en veranderingen in begrotingsbeleids expansionair zijn. Een andere conclusie is de trapgewijze liberalisering hogere groei bewerkstelligt dan wanneer alle externe liberaliseringsmaatregelen tegelijkertijd worden utgevoerd. GDP groei met gelijktijdige uitvoering van importliberalisering en exportliberalisering is lager dan wanneer dee twee liberaliseringen apart worden uitgevoerd. De reden hiervoor is dat de overeenkomstige voordelen verdwijnen. Deze konclusies gelden voor zowel statische als ook dynamische resultaten.

In de meeste beleidssimulaties van het statische model, breiden de landouw en industriele sektoren zich uit, terwijl de dienstensektor inkrimpt. De reden voor deze uitbreidingen en inkrimpingen zijn de neerwaardse beweging van de samengestelde prijsniveaus, en het hoge aandeel van toeleveringen van halffabrikaten in hun produktie. Verder veroorzaakt de herverdeling van produktiefaktoren tusen deze aktiviteiten de inkrimping in de dienstensektor. Deze uitkomsten gelden ook voor het dynamische model, maar in het dynamische model vindt de inkrimping niet plaats in de overheidsdienstensektor en is beperkt tot de private dienstensektor.

In de meeste externe liberaliseringen binnen het statische model, gaan de huishoudens erop vooruit, maar de voordelen voor de rijkere groepen is enigzins groter dan voor de arme groepen. Dus kunnen de liberaliseringseffecten niet worden beschreven als armoedeverlichtende groei. Met betrekking tot de overheid, zij ontvangt minder inkomsten vanwege de lagere invoertarieven. Bovendien komen er meer buitenlandse besparingen binnen maar het binnenlandse besparings/investerings tekort en het begrotingsterkort worden groter. Het belangrijkste verschil tussen de resultaten van het statische en het dynamische model is dat de groeivoet marginaal was in de eerste maar groter en armoedeverminderend in de laatste. De herstructurering van de ekonomie in de richting van een win-win strategie van armoedebestrijding, groei en liberalisering, die wij postuleerden en uitvoerden in hoofdstuk 7, bleek essentieel voor het bereiken van deze doelstelling. In een ekonomische herstrukturering zijn het opwaarderen van de parameters voor efficientie en het herzien van de verdelingsparameters noodzakelijk voor het bereiken van hogere groei en de toewijzing van meer voordelen van deze groei aan de armen.

Een vergelijking van de resultaten van onze statische en dynamische resultaten laat zien dat een marginale toename in de arbeidsparticipatie in het dynamische model in staat is om inkrimpende activieiten in groeiende activiteiten te veranderen. Openbare diensten tonen dit vooruitzicht aan. Naast de snel groeiende sektoren als landbouw en industrie, gaat de toename van arbeid in de arbeidsmarkt naar openbare dienstverlening, hetgeen een zeer arbeidsintensieve sektor is. Dit drukt het loon voor laagopgeleide arbeid marginaal omlaag omdat de nieuwe

binnenkomers voornamelijk laagopgeleid zijn. Maar vanwege dezelfde reden, veroorzaakt dit dat sommige laagopgeleiden zich omscholen tot hoogopgeleiden. De kapitaalvoorraad groeit ook sneller om het groeiende arbeidsaanbod op te nemen. Deze groeidynamiek is zeer belangrijk om de ekonomie op een hoger groeitraject te krijgen op de lange termijn.

Samenvattend, bepaalde vooorwaarden zijn noodzakelijk om te komen tot hogere groei met armoedebestrijding tezamen met externe liberalisering en interne hervormingen. Deze studie beveelt aan dat beleidsmakers sektoren identificeren met hoog groeipotentieel onder liberalisering. De doelgroep van de armen moet worden aangemoedigd om deel te nemen in deze snelgroeiende activiteiten met de middelen die zij beschikbaar hebben, in de meeste gevallen laagopgeleide arbeid. De toename van de beloning voor hoogopgeleide arbeid, die betrekking heeft op de werkgelegenheid in de hoge groeisektoren, wordt geacht de omvorming van laageschoolden tot hooggeschoolden te bevorderen. Deze herstructurering duwt het ekonomische systeem voorwaarts en leidt tot een snel groeiende ekonomie op de lange termijn terwijl kwaliteit van produktie factoren steeds verder toeneemt. Bovendien, naarmate het overheidsbeleid beter in staat is om de factoren in het bezit van de armen te sturen naar de snelst groeiende sektoren, wordt de snelle groei die bereikt wordt door externe liberalisering en interne hervormingen tevens groei met amoedebestrijding.