Financial Market Liberalization and Economic Growth

ISBN: 978 90 5170 878 3

Cover Design: Crasborn Graphics Designers bno, Valkenburg a.d. Geul

This book is no. 426 of the Tinbergen Institute Research Series, established through cooperation between Thela Thesis and the Tinbergen Institute. A list of books which already appeared in the series can be found in the back.

Financial Market Liberalization and Economic Growth

Liberalisering van financiële markten en economische groei

Thesis

to obtain the degree of Doctor from the
Erasmus University Rotterdam
by command of the
Rector Magnificus

Prof.dr. S.W.J. Lamberts

and according to the decision of the Doctorate Board

The public defense shall be held on

Thursday 18 September 2008 at 09:00 hrs

by

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born in San José, Costa Rica

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Acknowledgements

The book before you is the product of a "long" and winding road known as "the PhD". Fortunately, I have learned that despite the occasional tendency to run out of inspiration, if you stick to it and try to keep your wits about you, the road will lead repeatedly to the same point of clarity, while winding less and less each time around. In here, I have tried to stay true to my love for International Macroeconomics or what Maurice Obstfeld and Kenneth Rogoff call "International Finance". In doing so, I have had the advantage of moral, technical, practical and intellectual support from a large number of individuals, some of whom I, and despite my best intentions, will undoubtedly fail to mention here.

First of all, thanks to my colleagues at the department of economics at Erasmus University Rotterdam and at the Tinbergen Institute, who have contributed to giving me a laid-back work environment, and who appear to see my "non-European" background not so much as a flaw, but rather as an asset ;-) I am particularly grateful to Guido Baltussen, Sandra Phlippen, and Chen Zhou, who 'broke the ice' for me my first few months at TI in many ways; they provided a sounding board for ideas, and have been a source of comic relief when needed. Additionally, thanks to Chen for introducing me to EVT. Thanks also to Julia Swart who, throughout the last year, has made the "Finance and Growth Panel Dataset" possible, while at times painstakingly entering data the old-fashioned way.

Both within the world of TI and without, I owe a great debt of gratitude to Charles van Marrewijk, for his seemingly limitless ability to inspire, to come up with clever solutions, "to juggle too many balls", and to give me just enough room to do my own thing. Our collaboration over the past few years has been extremely fluid, largely due to an unusual level of synergy and accord between our intellectual perspectives. I am also indebted to Joe Francois. Despite being hard to concentrate in our meetings due to his thorough and quick thoughts, while at the same time being shelled and inspired with new ideas and research opportunities, it was always motivating to meet with him.

I also want to thank the other members of my doctoral committee, professors Steven Brakman, Douglas Nelson, Job Swank, Jean-Marie Viaene, and Roy Thurik for dedicating

their valuable time to read my dissertation, and for their helpful comments and suggestions.

During the last few years I have interacted, studied, discussed, and had good times with several people during different periods; and although they might not have directly participated or contributed to my current research, they definitely have made the last few years quite special for me. To my Tilburg (mphil) friends Salima, Reza, Guo, Jing, thank you so much for the great times. We certainly learned a lot with each other, but most importantly, we learned a lot from each other. A non-comprehensive list of (non)economists with whom I enjoyed so many good times include, Eddy Bekkers, Sjoerd van Bekkum, Diana Budiono, Harris Munandar, Marielle Non, Michiel de Pooter, Cerag Pince, Francesco Ravazzolo, and Stefan Trautmann.

Finally yet importantly, my thanks to my parents for supporting me, encouraging me, and expecting nothing less than the best I have to give. True friends like Ron Hagen, Jelle Idenburg and Mike van Winden, and my two "paranymphs", Patricia Heijndijk and Sandra Phlippen, have complemented that support. I know our friendships will last a lifetime!

However, during my period as a PhD candidate, the focus centered on my own little nuclear family through the "growing-up" process of my two kids, Thomas and Anna Karla. They have made the challenge of completing my dissertation "on time" all the greater, but even more worth it. Of course, I would not have even made it to writing these acknowledgements had it not been for Karin, my rock in the stream, who had the wherewithal to encourage me, the love to believe in me, and the patience to put up with me. Without her, I would be a much lesser man, and certainly one without a PhD.

Contents

List of Figures

List of Tables

Chapter 1

Introduction

Globalization has become one of the most widely used buzzwords of the late $20th$ and early $21st$ centuries. People discuss it with passion, concern, and sometimes disappointment. Globalization can take numerous forms, from wider coverage of trade to deeper foreign direct investment; however, and despite the hype and excitement, globalization (from an economic perspective) simply means economic integration. Accordingly, the main concern of this thesis is the integration of world capital markets, which is an issue that lies at the top of the agenda for international macroeconomists, since financial markets perform an important function in economic development, particularly by providing information to investors, international diversification, and allocating finance to various productive activities. By taking a historical look at the evolution of financial integration (see Figure 1.1)we can discern, for example, that the 1900-1914 ratio of foreign investment to output in the world economy was not equaled again until 1980s, but by now it has more than tripled. As Obstfeld and Taylor (2002) discuss, the flow of international capital since the 19th century illustrates recurring difficulties as well as the alternative perspectives through which policymakers have tried to confront these capital flows. However, throughout the first decade of the 21st century, the merits of international financial integration are under more forceful attack than at any previous point in time; where the resurgence of concerns over international financial integration is understandable in light of the financial crisis of the 1990's and early 21^{st} century. According to the IMF (2007), there have been two great waves of private capital flows (especially to emerging market countries) in the past two decades (see Figure 1.2) mainly impelled by the reduction of capital controls in many countries. The first began in the early 1990s and ended abruptly with the 1997–98 Asian crisis.

Figure 1.1: Foreign Capital Stocks; foreign assets/World GDP

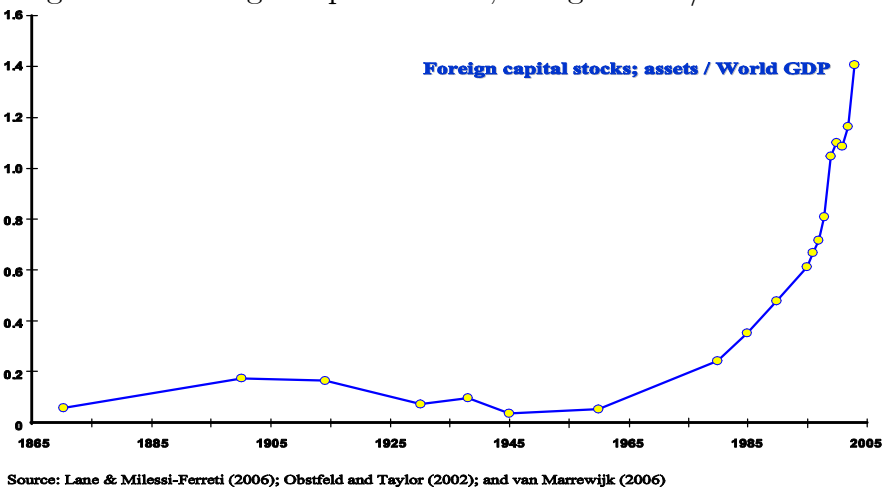
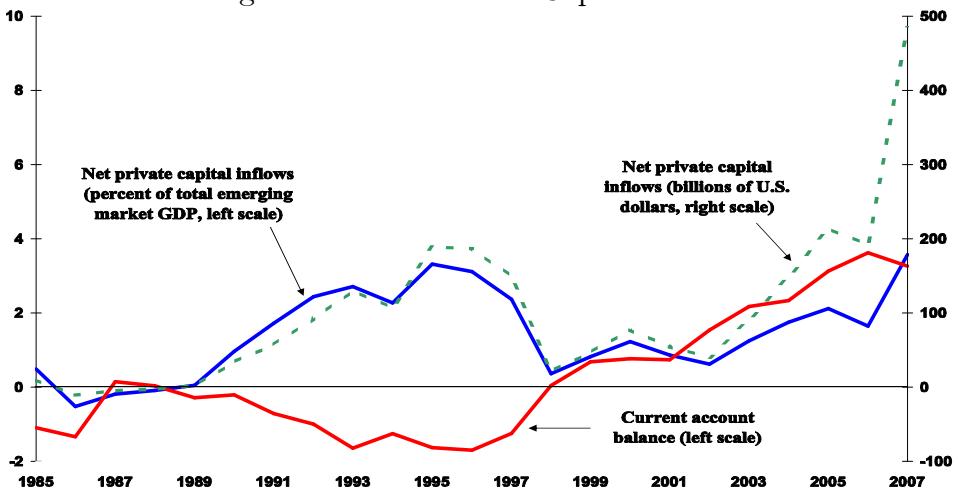
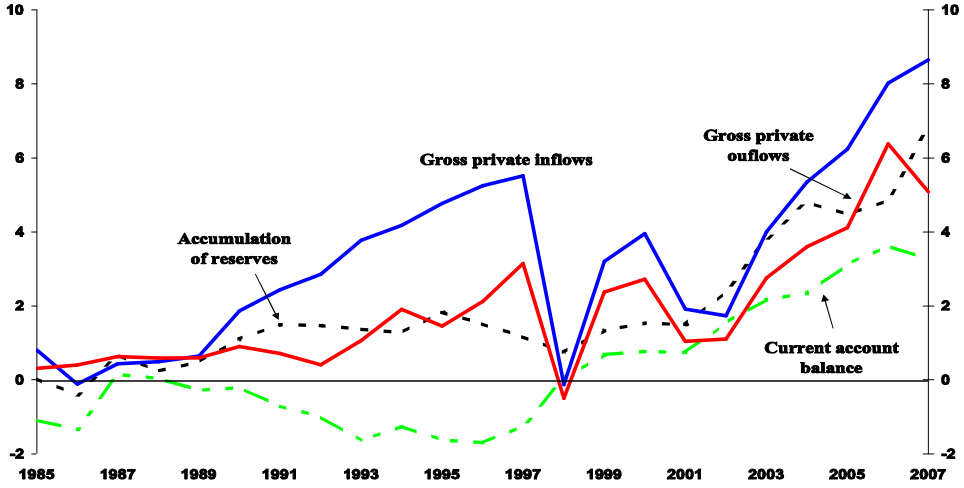


Figure 1.2: Net Private Capital Inflows



The most recent wave has been building since 2002, with cross-border financial flows among industrial economies and between industrial and developing economies in the first half of 2007 already far exceeding the total for 2006 (see IMF, 2007). Looking at the nature and composition of the inflows reveals interesting differences between the current wave of capital inflows and the one in the 1990s. In particular, the current wave is taking place in the context of much stronger current account positions and a substantial acceleration in the accumulation of foreign reserves (Figure 1.3). The figures show that surge in private capital inflows has also been accompanied by a sharp increase in outflows, in line with the global trend toward increasing diversification of international portfolios (IMF, 2007).

Figure 1.3: Gross Private Flows, Current Account Balance, and Reserve Accumulation



The aforementioned reduction of capital controls has been put into practice based on the expectation that cross-border capital movements can bring a better allocation of capital and an improvement in international risk-sharing possibilities. The strong supposition (i.e. the textbook perspective) has been that these benefits are large, especially for developing countries that tend to be relatively capital-poor. However, with the increased flow of capital came a string of currency and financial crises, especially in the 1990s. These insidious side effects of capital movements has led to the perception that developing countries, which allowed (all types of) capital flows, were more susceptible to crises, and in turn are much more adversely affected. These developments have led to a fierce debate among economists on the costs and benefits of financial globalization. For example, some economists view the unregulated movement of capital flows as a serious impediment to global financial stability (see for example Bhagwati, 1998; Rodrik, 1998; Stiglitz, 2000)[1], leading to calls for capital

[1]Stiglitz (2000, 2002) argues that short-term capital flows are the ones that should be regulated.

controls (i.e. "Tobin taxes")[2] on international financial transactions. Other economists argue (e.g. Prsasad et al., 2006) that increased openness to capital flows is essential for economies that want to evolve from lower to middle-income economies, while significantly enhancing stability among the industrialized countries (Fischer, 1998; Summers, 2000).

Although the rapidly growing empirical literature is tilting toward supporting a significant positive role for financial globalization, there remain many unanswered questions *vis-à-vis* the pace, rhythm and scope of financial globalization. The fundamental point to keep in mind is that the main benefits from financial globalization are most likely indirect in nature, rather than simply consisting of improved access to financing for domestic investment (Kose et al., 2006). Of course, this perspective differs from the standard neoclassical model, which views the key benefit of integrating financial markets as arising from the flow of long-term capital from industrial to emerging and developing economies. Moreoever, as the textbook argument goes, this would produce economy-wide improvements for types of economies, since industrial countries are capital rich while emerging and developing economies are relatively capital poor. However, Eichengreen (2001) concludes that there is no empirical corroboration of the conventional theoretical model about the growth benefits of capital account liberalization. More recent surveys by Prasad et al. (2003) and Kose et al. (2006) on the broader dimensions of financial globalization intensifies the puzzle. That is, they still conclude that the fast-growing empirical literature provides little evidence of a causal relationship between financial openness and growth, even after taking into account the distinction between *de jure* and *de facto* financial integration. Moreover, they show that among developing countries, the volatility of consumption growth relative to income growth appears to be positively linked with financial integration (openness), which is in opposition to what the canonical theoretical models would predict (Agenor, 2001).

The literature has also argued that the ability of capital flows to generate a number of what Kose et al. (2006) label "the potential collateral benefits of financial integration", is even more important than the direct growth effects of access to more capital. For example, they show that there is now evidence that financial openness can promote the development of the domestic financial sector, compel macroeconomic discipline, engender efficiency gains among domestic firms by exposing them to competition from foreign entrants, and unchain forces that lead to better government and corporate governance. The "collateral benefits" perspective proposed by Kose et al. (2006) also ties in with the literature on thresholds in the effects of financial globalization. That is, it has become a deep-seated belief in academic and policy circles that financial globalization can be good for any country in

[2]The tax, as originally intended, is to place a penalty on short-term speculation in currencies.

terms of delivering the benefits and minimizing the risks, but that the benefits-to-cost ratio is much more absorbing for countries with strong institutions and good macroeconomic policies. Obviously, most developing and emerging economies do not (yet) live-up-to a wish list of preferred policies, and for many of them, the length of any such laundry list makes things look discouragingKose et al. (2006).

However, does this mean that developing and emerging economies are better off by shielding themselves from the world economy, while trying to improve their rules of the game to attain a "suitable" level? In my opinion, the answer is clearly no; however, the academic literature does not seem to offer a simple answer, in part because the relationship runs both ways. In theory (and with some supporting evidence as we will see later in the book), financial openness can play an important *creatively-destructive* role in improving institutions, allowing for the transfer of good governance practices, strengthening macroeconomic discipline, and more importantly to enhance economic growth, just to name a few items on the aforementioned list.

1.1 Costs of Financial Integration

The experiences since the 1980's has led economists and policymakers to recognize that in addition to potential benefits (discussed later in the Introduction), open financial markets can also engender significant costs. Such potential costs (see Agenor, 2001; and IMF, 2007 for further elaboration) include; (a) the high degree of concentration of capital flows and a lack of access to financing for developing economies, either permanently or when they need it most; (b) inadequate (domestic) allocation of capital inflows; (c) macroeconomic instability; (d) the risk of "abrupt reversals" of certain types of capital flows; (e) herding and contagion effects; and (f) risks associated with foreign bank penetration.

1.1.1 Lack of Access to Capital Flows

As the IMF (2007) has discussed (and as Chapters 2 and 3 show), there is ample evidence that suggests that cross-border capital flows tend to gravitate towards a small number of recipient countries. However, as the World Bank (2001) highlights, the share of total private capital flows going to the top recipients increased significantly during the last decade of the 20th century, whereas the share gravitating towards developing economies actually fell during this same period. Moreover, it should be noted that although many countries have received a comparatively tiny proportion of flows in absolute terms, some of them have

received substantial inflows after adjusting for country size. By and large, the reality is such that "many low-income countries simply do not have access to world capital markets"(see World Bank, 2001).

Moreover, many emerging and developing economies are hindered in their ability to access international financial markets, since are only able to tap into these markets in good times (this implies an asymmetry of accessibility since in bad times these economies tend to face credit rationing); this implies that access to world capital markets is pro-cyclical as has been elaborated by the IMF (2007). Clearly, in such conditions, one of the supposed benefits of accessing world capital markets (i.e. the ability to borrow to smooth consumption in the face of temporary adverse shocks), is non-existent (see World Bank, 2001). This "pro-cyclicality" of borrowing in world capital markets can have vicious effects by, for example, reducing macroeconomic stability[3](see World Bank, 2001).

1.1.2 Entry by Foreign Banks (Risk of)

Although foreign bank entry can yield many types of benefits (see Section 1.2), it also has some potential drawbacks that need to be considered. First, foreign banks may ration credit to small firms largely than domestic banks, and concentrate instead on larger and stronger ones (see for example Beck et al., 2007). As Beck et al. (2007) argue, if foreign banks do indeed engage in "credit rationing", then their presence will be less likely to "contribute to an overall increase in efficiency in the financial sector".

Second, entry of more efficient (foreign) banks can stimulate mergers of domestic banks in order to remain (or become)competitive. This process of concentration can lead to banks that are "too big to fail"; that is, leading to an extensive apprehension by monetary authorities that the failure of a single large bank could seriously disrupt financial markets. Although these potential problems could be mitigated through "prudential supervision", these may lead to moral hazard problems. That is, domestic banks may increase their risk appetite vis-à-vis their operations, especially when it comes to allocating credit and screening potential customers, stemming from the existence of a "safety net". Concentration in the banking sector can also lead to an increase in the mark-up over marginal cost, thereby putting downward pressure on the efficiency of the banking system and the availability of credit. Moreover, the increase in the mark-up over marginal cost may adversely affect output and growth by yielding both higher interest rate spreads and a lower amount of loans

[3]Economically speaking, this simply means that favorable shocks can draw large capital inflows, promote consumption and spending at levels that are unsustainable; thereby forcing economies to over-adjust to adverse shocks due to sudden (and perhaps unexpected) capital reversals.

than in a more competitive system (World Bank, 2001).

1.1.3 Misallocation of Capital Flows

Although capital inflows may increase domestic investment, their impact on long-run economic growth can be limited if such inflows only finance "low-quality" projects. For example, as economic theory suggests, low-productivity investments in the non-tradables sector may weaken an economy's capacity to export, which in turn can lead to mounting external imbalances. However, the mismanagement of capital inflows vis-à-vis their misallocation may be the artifact of pre-existing distortions in the (domestic) financial system (Agénor, 2001); that is, in countries with "weak" banks and "weak" supervision of the financial system, the direct (or indirect) intermediation of large amounts of funds by the banking system may exacerbate the moral hazard problems associated with the insurance of deposits (as previously mentioned). That is, through moral hazard creditors may engage in practices that are more speculative. An example of how asymmetric information problems can affect the benefits of capital inflows is provided by Razin et al. (1999), who focus on the impact of FDI flows.

1.1.4 Macroeconomic Instability

The large inflows of capital brought about by financial openness policies can, have unwanted macroeconomic effects such looser monetary policy, inflationary pressures, appreciation of the real exchange rate, and amplifications of current account deficits (see IMF, 2007). As we know, under flexible exchange rates, growing current account deficits bring about a depreciation of the dmoestic currency, which may eventually lead to a realignment of relative prices, thereby affecting the terms-of-trade. By contrast, under a fixed exchange rate regime, losses in competitiveness and higher current account imbalances can erode confidence in the viability and sustainability of the peg and thus hasten a currency crisis and increase financial instability, as argued in "first generation" type models.

1.1.5 Crisis and Contagion

A "high-degree" of financial openness may also contribute to volatility in capital movements, leading to large capital flow reversals (i.e. of short-term capital), and as Chang and Velasco (2000) argue, this possibility raises the probability that borrowers face "liquidity runs". That is, for a debtor country, the higher the amount of short-term debt relative to international reserves, then the higher the risk that "liquidity runs" will pose (Agenor, 2001). Moreover,

high levels of short-term liabilities intermediated by the financial system also creates the possibility of bank runs and systemic financial crises (see deBandt and Hartmann, 2004).

In general, the volatility of capital flows is related to movements in economic fundamentals (both actual and perceived), as well as exogenous movements in world interest rates (Agenor, 1999). More generally, the fact that investor sentiment is constantly changing in response to new information, creates the potential for markets to overshoot, thereby generating financial crises. Financial contagion can also affect the volatility of capital flows. That is, when a country experiences considerable capital outflows prompted by a perceived increase (by international investors) in the vulnerability of a country's currency or when investors loose confidence in an economies' prospects as a result of developments elsewhere, then financial contagion may occur (see Dornbusch et al., 2000; Masson, 2000). Moreover, financial contagion may also occur through: (1) macroeconomic and financial similarity, (2) trade links; (3) financial sector links, and (4) cross-market rebalancing; that is, by indirectly effecting the volatility of capital flows as previously mentioned.

1.2 Benefits of Financial Openness

Economic theory suggests a number of benefits that may accompany financial liberalization. For example, an open capital account can advance a more efficient allocation of resources, provide opportunities for risk diversification, and help promote financial development. While analysis of the costs of financial openness has slow-growing, there is a large and growing literature that tests the benefits of financial liberalization and its influence on long-run growth and development. The basic procedure in almost all of these studies (see Kose et al., 2006 for an overview) is through the augmentation of a basic growth model by including variables such as human capital (i.e. the level of schooling), investment, and the level of GDP in the initial year, with a measure of financial openness (or capital account liberalization). Theoretical arguments supporting financial openness (or an open capital account) revolve around the following main arguments: (a) the benefits of international risk sharing; (b) the influence of capital flows on investment and growth; (c) macroeconomic discipline; and (d) increased efficiency, and greater stability of the financial system.

1.2.1 Consumption Smoothing

Theoretically speaking, access to world capital markets allows an economy to borrow in dire times (e.g. during a crisis) and to lend in "good" times. In other words, financial openness

enables households to smooth their consumption over time, thereby increasing welfare. As Obstfeld (1994) has argued, this "counter-cyclical" role of world capital markets allows for international risk sharing.

1.2.2 Investment and Growth

As previously mentioned, financial openness gives access to international (economic) resources that may affect (domestic) investment and growth. For example, in many low-income developing economies the capacity to save is (almost) non-existant due to their low-income status. Therefore, as long as the return from investment is lower than the cost of capital, then net foreign resource inflows will never be able to complement domestic savings, and will actually decrease the levels of physical capital per worker, and decrease the rate of economic growth. These potential risks can be particularly large for some types of capital inflows, most notably short-term inflows. In addition to this direct effect on growth, FDI may also have significant indirect long-run effects ss emphasized by Berthélemy and Démurger (2000); Borensztein et al. (1998); Grossman and Helpman (1991). That is, FDI may smooth the transfer of "know-how" (e.g. managerial and/or technological). In addition, as suggested by Markusen and Venables (1999), although increased competition (brought about by FDI) may reduce the profits of domestic firms, the spill-over effects generated by FDI may reduce costs, raise profits, and encourage domestic investment.

1.2.3 Macroeconomic Discipline

Since the early beginnings (see for example Fisher, 1998), the literature has argued that by rewarding "good policies", the unfettered flow of capital can actually stimulate economies to undertake a more disciplined approach vis-à-vis macroeconomic policies (see Obstfeld, 1998). A related argument put forth by Bartolini and Drazen (1997), is that the liberalization of the capital account can act as a signal that an economy is ready to undertake "proper" macroeconomic policies. From this perspective, a "free" capital account may also encourage macroeconomic and financial stability, ensuring a more efficient allocation of resources and higher rates of economic growth.

1.2.4 Banking System Efficiency and Financial Stability

A progressively more common argument in favor of financial openness is that it may increase the depth and breadth of domestic financial markets and lead to an increase in the degree

of efficiency of the financial intermediation process by lowering costs and "excessive" profits associated with monopolistic or cartelized markets, thereby lowering the cost of investment and improving resource allocation (Levine, 1996). For example, Levine (1996) shows that foreign bank penetration may; (a) improve the quality and availability of financial services in the domestic market, by increasing the degree of bank competition; (b) serve to stimulate the development of supervisory and legal frameworks; (c) contribute to the stability of the domestic financial system.

1.3 The Road Ahead

International macroeconomics is alive with great practical questions, as highlighted in this introduction. Accordingly, this dissertation will evolve around most of the above-mentioned issues by first looking into the drivers of (long-term) capital flows, and then by investigating the positive effects and possible down-side risks to an economy of pursuing "financial openness" policies. Therefore, this book will proceed as follows[4]:

Chapters 2 looks at the drivers of long-term capital flows, as proxied by mergers and acquisitions. Therefore, one of the hypothesis we test is whether M&A activity (as measured by the number of cross-border deals) increases with more financial openness, which includes a more open capital account. The neoclassical model suggests that financial openness will increase FDI inflows (Kose et al., 2004); however, this might not be the case if the neoclassical assumptions of perfect information and competitive markets are relaxed. Developing economies, with their "weak" financial markets, lack of transparency, and propensity to large exchange rate movements, might be particularly susceptible to perverse impacts of financial openness, and in particular to low levels of cross-border M&As. By using a large dataset for the period 1986-2005, we analyze financial openness in explaining FDI and more specifically the number of cross-border mergers and acquisition (M&A) for 210 acquiring countries and 210 target countries. The results of our gravity model fit the data well, and these results suggest that financial openness increases M&A activity; that is, a one standard deviation increase in financial openness implies (for those that are active in M&As) a 10% increase in the number of expected M&A deals for the target country, and a 12% increase in M&A activity for the acquiring country. Moreover, financial openness reduces the probability of remaining inactive in M&As by 21% for the acquirer and by 10% for the target. In addition, our results indicate that M&A activity tends to cluster in particular "close-by" locations.

[4]The respective co-authors are: Ch2 - Charles van Marrewijk; Ch3 - Steven Brakman, Harry Garretsen, and Charles van Marrewijk; Ch4 - Leon Bettendorf; Ch5 - Chen Zhou.

That is, M&A activity depends on a countries past flows of FDI; for example, countries that have been successful in attracting M&As in the past are more likely to do so in the future (the wave effect). Last but not least, the results also suggest that several broad categories of factors influence cross-border M&As. These are a country's macroeconomic performance, the investment environment, the quality of institutions and global factors.

Chapter 3 is a follow-up to chapter 2, but now the focus shifts to the value of cross-border M&As. Accordingly, this chapter deals with the puzzle, first identified by Neary (2007a, b), that most FDI takes place between the relatively rich countries. The goal of the chapter is twofold. First, we want to establish whether our gravity approach can help us understand the value of cross-border M&As. To date, and despite its quantitative importance, the recent surge in gravity studies has focused on trade or on FDI in general, and has ignored cross-border M&As (for exceptions see Evenett (2004) and di Giovanni (2005)). Second, and related to the above observations, by focussing on the distance variable and also on financial openness, we seek to find out if our gravity model can help us to improve our understanding of the relationship between financial integration and exchange rate volatility on the one hand and the value of cross-border M&As on the other hand. Our main results are that the market-seeking motive is important and that market size variables related to the target stimulate M&As, and also that the data seem consistent with the prediction of Neary (2003, 2007, 2004), as far as economic integration is reflected by the distance variable. With regard to variables indicating financial integration the results are less unambiguous.

Having discussed the drivers behind long-term capital flows, the point of departure of chapter 4 is the link between *de jure* and *de facto* financial openness and economic growth, where the empirical literature (thus far) suggests that this link is weak. However, our results indicate that for developing economies, financial openness and FDI have a positive direct effect on economic growth, in addition to an indirect effect through capital accumulation. Furthermore, M&As stimulate economic growth through capital accumulation. The results for developed economies are markedly different; for example, financial openness does not have a significant effect on growth, either directly or indirectly. However, FDI and portfolio inflows, both contribute directly to economic growth. Moreover, portfolio inflows also have an effect on growth through capital accumulation. The one similarity between developed and developing economies is that FDI positively affects TFP in both cases.

Last but not least, chapter 5 looks at the possible downside risks to an economy from pursuing "financial openness" policies. As we know, throughout the 1990s, developed and developing economies alike experienced severe financial difficulties, including balance-of-payments crises and systemic banking failures. For example, the 1994 Mexican peso crisis

and the Asian crisis were likely a mixture of both. In this light, a common approach in the "crisis and contagion" literature is to analyze the probability of a currency crisis. The basic idea is first to sort different countries and time-periods into two discrete episodes, that is, into a crisis period and a "tranquil" period. However, due to the non-normality of the statistical distribution of any EMP index, caution is warranted *vis-à-vis* relying too much on parametric assumptions in identifying the statistical threshold. In accordance, this chapter employs an alternative statistical method known as extreme value theory (EVT) to identify large values of an exchange market pressure index.

The results in this chapter indicate that the probability of a currency crisis in a given country increases significantly by a crisis elsewhere in its own region. As far as Asia, we have seen that higher exchange market pressure is associated with a stronger acceleration of CPI inflation, and expansionary fiscal policy. Moreover, these economies tend to experience high levels of exchange market pressure stemming from "too much of a good thing"; that is they experience high levels of pressure from high levels of GDP. This indicates that Asian economies should really be wary of "overheating". Western Hemisphere economies, behave slightly different from Asian economies in relation to the impact of GDP growth. These economies can reduce the probability of a currency crisis by actually increasing their GDP growth in a more stable fashion. Furthermore, lack of international reserves and higher levels of CPI inflation can have quite damaging effects as far as excessive pressure in their respective currencies. As far as African countries, we find that when it comes to inflation, the government budget balance and international reserves, African economies can certainly benefit from improvements in these policy areas. The major difference between Africa the other two regions, is that GDP growth does not affect the probability of a currency crisis. When it comes to capital flows, we find that all regions benefit from "persistent" FDI inflows, and that Asia is the only region that benefits from a steady increase in portfolio inflows.

Chapter 2

Countries of a feather flock together...

2.1 Introduction

The[1] extent of financial integration around the world (see Figure 1.1 in introduction) has increased significantly, especially since the 1980's, where a key driver has been the increased movement of capital flows seeking the opportunity to diversify risk, while earning a higher return. At the same time, and as shown by the World Bank (2001), many developing and transition economies have moved away from regimes of "financial repression", by for example, removing restrictions on international financial transactions. That is, policies have been aimed at increasing the openness of domestic financial markets to foreign investors, by phasing-out capital controls (e.g. on capital outflows) and the liberalization of restrictions on foreign direct investment. Furthermore, the increase in the degree of integration of world capital markets has been accompanied by a marked increase in private capital flows to developing and emerging economies (see IMF, 2007 and/or Figure 1.3 in the introduction).

Ask an economist about financial openness and he/she will tell you that it provides important benefits. That is, access to world capital markets expands investors' opportunities for diversification and provides a potential for achieving higher risk-adjusted rates of return. From the beneficiary's point of view, there are potentially large benefits as well since, as has been discussed on many occasions throughout the literature (see for example, Agenor, 2001; and World Bank, 2001), the smoothing of consumption made possible by borrowing possibilities through the access to world capital markets, in addition to potential growth and welfare gains resulting from international diversification, can be large (Obstfeld, 1994a). Furthermore, the positive impact of capital flows on domestic investment and growth enables

[1] This chapter is co-authored with Charles van Marrewijk.

countries to draw upon international resources allowed by financial openness. For example, in many countries, the growth rate of savings is constrained by low levels of income; therefore, as long as the return from investment is at least equal to the cost of capital, then foreign capital inflows can: (i) complement domestic savings, (ii) increase the physical capital per worker level in an economy, and (iii) help the recipient economy increase the economic growth rate (Agenor, 2001). These potential benefits can be particularly large for some types of capital inflows, most notably foreign direct investment (FDI). In addition to this direct effect on growth, FDI may also have significant indirect long-run effects. As emphasized by Berthélemy and Démurger (2000), Borensztein et al. (1998), and Grossman and Helpman (1991), FDI may smooth the transfer of "know-how" (e.g. managerial and/or technological).

In this respect, the most important issue is to identify the institutional prerequisites that can allow economies to utilize the gains, while curtailing the risks associated with the openness of financial markets. In this context it is important to differentiate between *short-term* (i.e. portfolio) and *long-term* capital flows (i.e. FDI). As previously mentioned, the latter type of investment brings with it not only resources, but also technology, access to markets, and knowledge. Furthermore, FDI is also not as volatile, and therefore not as troublesome as short-term flows that can quickly come in and out of a country.[2] Therefore, we take the decomposition of capital flows a step further, by looking only at FDIs largest component; that is, M&As (see section 2 for a discussion). In this light, we employ a gravity model, which has been widely used to analyze trade data and to estimate the impact of various policies since its inception into mainstream economics by Tinbergen (1962).

Even though some critique emerged early on for its lack of theoretical underpinnings, nowadays the gravity model rests on solid theoretical foundations (see Anderson, 1979; Anderson and van Wincoop, 2003). In its simplest form, the model simply assumes that the flow of capital between two economies is a positive function of their economic size, and a negative function of the *distance* between them; however, these core variables are most often than not complemented by other explanatory variables. Although the gravity model was initially conceptualized for trade flows, it has been subsequently applied to capital flows (see Eaton and Tamura, 1994; de Menil, 1999; Portes et al., 2001; Portes and Rey, 2005). However, to date it has not been readily applied to M&As (with the exception of Ashcroft et al., 1994; Evenett, 2004; di Giovanni, 2005; Delannay and Meon, 2006). The main hypothesis we test in this paper, is whether M&A activity increases with more financial openness, which includes a more open capital account. The neoclassical model suggests that financial openness will increase FDI inflows (Kose et al., 2004); however, this might not be

[2]See Stiglitz (2000) for a further development of this argument.

the case if the neoclassical assumptions of perfect information and competitive markets are relaxed. Developing economies, with their "weak" financial markets, lack of transparency, and propensity to large exchange rate movements, might be particularly susceptible to perverse impacts of financial openness, and in particular to low levels of cross-border M&As. Therefore, one of the goals of this paper is to examine macroeconomic data to investigate the relationship between financial openness policies and the inflows of foreign direct investment (as measured by mergers and acquisitions).

By using a large dataset for the period 1986-2005, we analyze financial openness in explaining FDI and more specifically the number of cross-border mergers and acquisition (M&A) for 210 acquiring countries and 210 target countries. The results of our gravity model fit the data well, and these results suggest that financial openness increases M&A activity; that is, a one standard deviation increase in financial openness implies (for those that are active in M&As) a 10% increase in the number of expected M&A deals for the target country, and a 12% increase in M&A activity for the acquiring country. Moreover, financial openness reduces the probability of remaining inactive in M&As by 21% for the acquirer and by 10% for the target. In addition, our results indicate that M&A activity tends to cluster in particular "close-by" locations. That is, M&A activity depends on a countries past flows of FDI; for example, countries that have been successful in attracting M&As in the past are more likely to do so in the future (the wave effect). Last but not least, the results also suggest that several broad categories of factors influence cross-border M&As. These are a countries' macroeconomic performance, the investment environment, the quality of institutions and global factors.

The paper is organized as follows: section 2 elaborates on some of the key issues that will be considered, and describes some of the underlying theoretical background. Section 3 describes the data and the econometric methodology. Section 4 discusses the empirical results of our benchmark specification, while section 5 augments our benchmark model and conducts various sensitivity analysis. Last but not least, section 6 summarizes and concludes.

2.2 Motivation and Theoretical Background

During the past thirty years, foreign direct investment (FDI) has grown in importance (especially for developing economies), especially for a select few being able to attract FDI in larger amounts. As we know, theoretical FDI models identify a number of mechanisms through which FDI can be valuable to an economy. However, empirically, the literature has lagged behind and has had tremendous difficulty identifying these mechanisms in practice

(see Durham, 2004; Li and Liu, 2005). The consensus that is slowly emerging is that FDI is beneficial when compared to other types of capital inflows, though there are economists who maintain that even this beneficial effect is limited. Additional research has been done to identify features that are "unique" to FDI, such as its relative durability and/or the positive spillovers that it can generate (see Aitken and Harrison, 1999; Fernadez-Arias and Montiel, 1996; Sarno and Taylor, 1999).

Despite these "mixed" academic conclusions, most economies continue to implement policies in order to encourage more FDI inflows. Multilateral organizations such as the OECD, the WTO, and the IMF have also been vocal supporters of FDI promotion policies, and one of their more common prescriptions within this context is the liberalization of the capital account. Hitherto, and perhaps quite surprisingly, little empirical work has been done to examine the link between financial openness and FDI inflows, and especially the link with cross-border M&As. Table 1 presents trends in FDI inflows (over the last 25 years), both as a percentage of GDP and as a percentage of fixed capital formation.[3] A close examination of Table 1 reveals the worldwide increase in the importance of FDI throughout the 1980s and 1990s, with FDI inflows after the turn of the century (i.e. in 2000) increasing several times from the level experienced during the 1980s. However, it is also worth pointing out that several regions of the world (i.e. Sub-Saharan Africa, Latin American and Caribbean, and East Asia & Pacific), net FDI flows peaked in 1995-1999 period.

[3]Fixed capital formation measures net new investment in the "domestic" economy in fixed capital assets during an accounting period (WDI, 2006).

Table 2.1: World Distibution of FDI

	FDI net inflows (% of GDP)				
	1980-1989	1990-1994	1995-1999	2000-2004	1980-2004
World	0.86	3.32	3.58	2.65	1.35
Sub-Saharan Africa	0.07	0.72	2.61	2.54	1.28
South Asia	0.09	0.23	0.68	0.86	0.39
M. East & N. Africa	0.46	0.88	0.55	1.04	0.68
L. America & Caribbean	0.80	1.17	3.26	3.20	1.84
European Monetary U.	0.54	0.98	2.19	5.07	1.86
Europe & Central Asia	0.07	0.49	2.31	3.09	1.24
East Asia & Pacific	0.74	2.89	3.81	2.64	2.16
USA	0.77	0.60	1.68	1.45	1.05
	FDI as % of Fixed Capital Formation				
	1980-1989	1990-1994	1995-1999	2000-2004	1980-2004
World	2.63	3.67	8.96	13.11	5.91
Sub-Saharan Africa	2.18	4.05	11.01	16.10	7.11
South Asia	0.43	1.06	3.12	3.71	1.75
M. East & N. Africa	1.81	2.81	2.02	3.86	2.46
L. America & Caribbean	3.69	6.00	16.20	16.58	9.23
European Monetary U.	2.45	4.51	10.60	24.44	8.89
Europe & Central Asia	N/A	1.87	10.68	15.18	8.68
East Asia & Pacific	2.67	8.94	11.99	8.27	6.91
USA	4.01	3.53	8.85	8.22	5.62

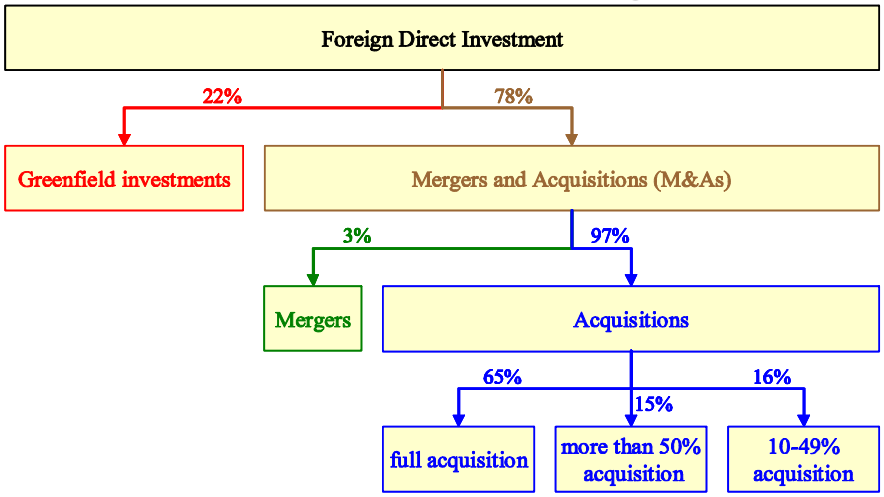
Source: WDI 2006

2.2.1 M&A and FDI

Theoretical developments in international economics are sometimes motivated by empirical findings. The 'new trade theory', for example, was to a large extent inspired by empirical work on intra-industry trade (Neary, 2004), and this also holds for the recent outburst of research on foreign direct investment (FDI) as one of the driving forces behind the current wave of globalization. Many economists have noted that FDI grows much faster than merchandise trade (see for example Navaretti and Venables, 2004), which leads to a stylized fact in search of an explanation. For years, economists have relied upon the OLI-categorization scheme (see Dunning, 1993) in order to understand the underlying reasons behind a firms'

decision to engage in FDI. However, and notwithstanding its usefulness *vis-à-vis* FDI, a "categorization scheme" is not a model. Therefore, new theories are being developed in which the firm's decision to engage in FDI is determined in a full-fledged micro-economic model.

Figure 2.1: Distribution of different types of FDI

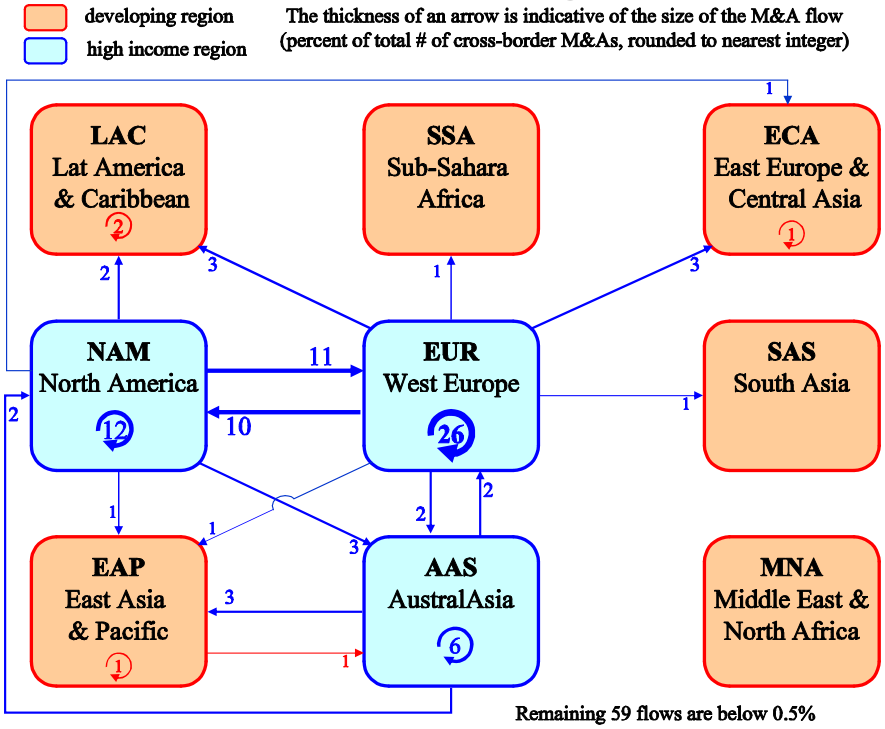


Interestingly, looking at FDI as a broad category obscures the fact that most FDI is in the form of cross-border mergers & acquisitions. Figure 2.1[4] shows a recent decomposition of FDI, from which it is clear that M&As constitute the bulk of FDI; whereas greenfield FDI is considerably less important. The main difference between these two forms of investments is that in an M&A "control of assets and operations is transferred from a local to a foreign company, the former becoming an affiliate of the latter" (UNCTAD, 2000), and only recently have models in international economics been developed that allow us to understand M&As (Neary, 2004). Neary's model takes the standard explanations for M&As a step further; that is, his model combines general-equilibrium trade theory with imperfect markets and strategic behavior between firms. A moments thought will show that this is difficult, since pricing decisions of large firms not only directly affect profits, but their market (pricing) behavior also affects national income and the real income of their customers; furthermore, large firms can also influence factor prices. All of these effects combined imply that firms have to "...calculate the full general equilibrium of the whole economy in making decisions" (Neary, 2003).

[4]Source is van Marrewijk (2007); 78%-22% in value terms, other % in # of deals.

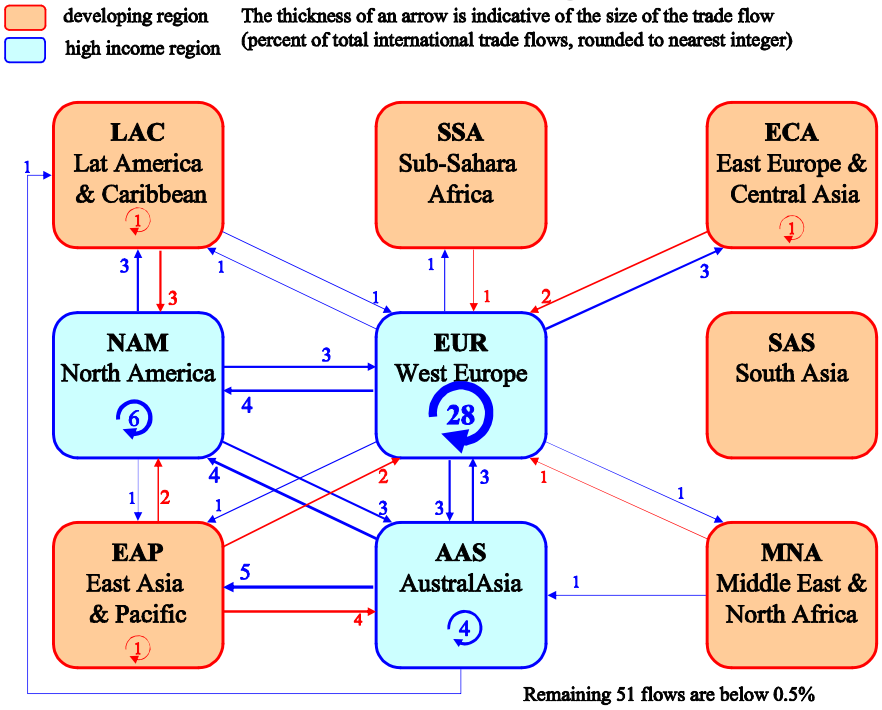
Neary's (2003) General Oligopolistic Equilibrium (GOLE) model avoids some of the standard drawbacks of modeling oligopolistic markets, while it simultaneously allows for strategic interaction between firms. Interestingly, by allowing for M&As in his model, one can derive straightforward conjectures on cross-border M&As; that is, firms that have a cost advantage have an incentive to merge or acquire a weaker firm. If these cost differences are felt economy-wide, then the model explains cross-border M&As. Furthermore, the model also explains the stylized fact of M&A waves; that is, an initial M&A makes the next one more attractive, which leads to more M&As (i.e. waves).

Figure 2.2: Cross-border M&As; # of deals, percent of total, 2000-2005



Usually two motives are mentioned to explain M&As: (1) a market seeking or strategic motive, and (2) an efficiency motive (i.e. a factor cost motive); however, an explanation of cross-border M&As also has to explain the cross-border part of the deals, and in this light, trade theory suggests that comparative advantage could be included in full explanations of M&As (see Neary, 2004; Brakman et al., 2008b). A different, and equally novel line of research in international economics seeks to understand the conditions under which firms decide to locate (part of) their production abroad, that is, through an off-shoring decision (see Navaretti and Venables, 2004; Helpman, 2006). When firms decide to off-shore, some firms do so under the FDI umbrella, while other firms go for straight outsourcing. The down-

Figure 2.3: International Trade Flows; percent of total flows



side of this literature, and in contrast to the empirical relevance illustrated in Figure 2.1, is that the role of cross-border M&As is largely ignored. The World Bank identifies seven global regions, namely (*i*) East Asia and Pacific (EAP; including China and Indonesia), (*ii*) (East) Europe and Central Asia (ECA; including Russia and Turkey), (*iii*) Latin America and the Caribbean (LAC; including Brazil and Mexico), (*iv*) Middle East and North Africa (MNA; including Egypt), (*v*) South Asia (SAS; including India), (*vi*) Sub-Saharan Africa (SSA; including Nigeria and South Africa), and (*vii*) the high-income countries. Following van Marrewijk (2002, 2007) we subdivide the group of high-income countries into three subgroups, namely North America (NAm), Western Europe (EUR), and AustralAsia (AAs, including Japan and Australia), leading to a total of nine global regions.

Table 2.2: Regional Distribution of Cross-border Mergers, 2000-2005 percent of total

a. Number of deals (% of total)

from	AAS	EAP	ECA	EUR	LAC	MNA	NAM	SAS	SSA	sum
AAS	5.7	2.7	0.1	1.8	0.1	0.0	2.2	0.4	0.1	13.1
EAP	0.7	1.0	0.0	0.2	0.1	0.0	0.2	0.0	0.0	2.2
ECA	0.0	0.0	1.1	0.2	0.0	0.0	0.1	0.0	0.0	1.4
EUR	2.5	1.3	3.4	26.5	2.6	0.4	9.7	0.8	0.6	47.8
LAC	0.0	0.0	0.0	0.1	1.6	0.0	0.4	0.0	0.0	2.1
MNA	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.1
NAM	3.1	1.2	0.8	11.2	2.1	0.1	12.1	0.4	0.3	31.2
SAS	0.1	0.0	0.0	0.2	0.0	0.0	0.2	0.2	0.0	0.9
SSA	0.2	0.1	0.0	0.3	0.0	0.0	0.1	0.1	0.3	1.2
sum	12.2	6.3	5.5	40.6	6.6	0.6	25.0	2.0	1.3	100

b. Value of deals in (constant 2005 dollars, % of total)

from	AAS	EAP	ECA	EUR	LAC	MNA	NAM	SAS	SSA	sum
AAS	3.0	1.5	0.0	1.9	0.1	0.0	2.1	0.1	0.0	8.7
EAP	0.3	0.4	0.0	0.2	0.0	0.0	0.1	0.0	0.0	1.0
ECA	0.0	0.0	0.9	0.1	0.0	0.0	0.0	0.0	0.0	1.0
EUR	2.0	0.5	2.2	38.1	2.7	0.3	15.8	0.2	0.6	62.4
LAC	0.0	0.0	0.0	0.0	1.0	0.0	0.6	0.0	0.0	1.5
MNA	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.4
NAM	1.8	0.4	0.4	10.5	1.2	0.0	9.9	0.1	0.1	24.3
SAS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2
SSA	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.4
sum	7.1	2.9	3.5	51.3	5.0	0.4	28.6	0.4	0.9	100

c. Ratio of value of deals (% of total) to number of deals (% of total)

	AAS	EAP	ECA	EUR	LAC	MNA	NAM	SAS	SSA	sum
AAS	0.5	0.6	0.5	1.0	0.5	0.1	1.0	0.2	0.2	0.7
EAP	0.4	0.4	0.2	0.9	0.3	5.3	0.4	0.1	0.1	0.4
ECA	0.7	na	0.8	0.6	na	0.2	0.4	na	1.3	0.7
EUR	0.8	0.4	0.6	1.4	1.0	0.8	1.6	0.2	1.1	1.3
LAC	na	0.2	0.1	0.1	0.6	0.2	1.6	na	na	0.7
MNA	3.7	na	na	6.3	na	0.4	na	0.2	0.1	2.6
NAM	0.6	0.4	0.5	0.9	0.6	0.3	0.8	0.2	0.3	0.8
SAS	0.2	0.1	1.8	0.2	0.1	0.1	0.1	0.2	0.9	0.3
SSA	0.2	0.2	0.1	0.5	0.7	0.0	0.6	0.2	0.4	0.4
sum	0.6	0.5	0.6	1.3	0.8	0.7	1.1	0.2	0.7	1

Focussing our attention on intra (inter)-regional M&As gives us an indication of the extent to which different global regions interact with one another. Figure 2.2 graphically depicts the intra (inter)-regional cross-border connections for the most recent five-year period (2001-2005) in our sample, rounded to the nearest integer; while Table 2.2 shows the regional distribution. Since there are 9 global regions (as classified by the World Bank) there are 81 different inter-regional connections. Only 22 of these are actually shown in Figure 2.2 because the remaining 59 are rounded to 0 per cent. First, we note that by far the largest inter-regional M&As are from North America to Western Europe (11 per cent of the total), and vice versa (10 per cent of the total). Together these two regions account for almost 60 per cent of all M&A activity (including intra-regional activity) and clearly dwarf the importance of all other inter(intra)-regional connections. Second, we note that Western Europe is substantially buying up firms in Eastern Europe (3 per cent), which highlights a common border effect. Third, M&A activity toward East Asia and the Pacific is still rather small, certainly compared to the attention this receives in the popular press. Fourth, it is quite interesting to note that Western Europe is the only global region with connections to all other regions. Fifth, and finally, the only region that is completely left out of M&A activity is the middle east and north Africa. By looking closer at panel C of Table 2.2, we notice that a ratio bigger than 1 implies that the value of M&As is larger than the number of deals, and we can discern this pattern for regions (countries) that are "far" from each other. A ratio smaller than 1 implies a pattern for countries that are "close" to each other (e.g. the diagonal is smaller than 1, except for EUR-EUR). Therefore, it seems safe to conclude with the observation that indeed most M&A activity takes place between the relatively wealthy, and the more developed and stable parts of the world; between economies that possess better institutions, and a less uncertain business environment. In other words, M&As take place between the parts of the world that are closer together (i.e. countries of a feather flock together).

2.2.2 International Capital Flows & FDI

What drives international capital flows and what explicates their cyclicality is a question of utmost importance for both academics and policymakers. Early contributions to this literature analyzed “pull” and “push” factors in total capital flows (see Agénor, 1998), stressing the important role of U.S. interest rates as a “push” factor (see also Fernadez-Arias and Montiel, 1996; Calvo et al., 1996). A more recent strand of literature has focused on the "push" and "pull" factors of specific types of capital, namely portfolio equity (Griffin

et al., 2004), and FDI (Albuquerque et al., 2005). In particular, Albuquerque et al. (2005) emphasize the increasing importance of a global factor ("a correlated push factor") in driving FDI. Our paper aims to contribute to this literature by looking in more detail to M&As, which are by far the most important component of FDI (see Figure 2.1).

Evenett (2004) presents evidence that the value of American M&As directed abroad depends on the target's GDP, the distance from the United States, the target's corporate tax rate, the target's average tariff rate, and whether the target was once a British colony (Evenett used this dummy to proxy for the use of a common-law system, and whether business costs were minimized by using English as a business language). In addition, Evenett (2004) also finds that the presence of merger review laws in the target economy actually reduces the amount of American M&As received. In a related study, Feliciano and Lipsey (2002) examine FDI into the United States (for 50 sectors over the period 1980-1990). By using the share of U.S. corporate assets acquired by non-US firms and the share of U.S. corporate assets as reported by new foreign ventures. They find that a strong U.S. dollar discourages M&As, whereas the exchange rate does not play a role vis-à-vis foreign investment in new establishments. Moreover, they find that higher stock prices in the US exert a stronger positive influence vis-à-vis foreign investment in new establishments than on foreign acquisitions; however, acquisitions and establishments of new firms tend to occur in periods of high growth in the United States. More recently, Rossi and Volpin (2004), with reference to location-specific determinants of international M&A activity, find that firms in countries with weaker investor protection are more likely to be acquired than those in countries with stronger investor protection, whereas "acquirers" are more likely to come from countries that possess strong investor protection. They also find that countries with more "concentrated ownership" experience more M&As (including international M&As).

2.3 Data & Econometric Methodology

Our overview of the structure and developments of cross-border M&As is based on Thomson's Global Mergers and Acquisitions database, which provides the best and most extensive data source for M&As to date. Thompson gathers information on M&As exceeding one million US dollars. Our Thompson data set begins in 1979 and ends in 2006; however, Thomsons' initial focus was on American M&As, implying that systematic M&A data for almost all countries is available since 1986. Therefore, in presenting the data we focus on the period 1986 – 2005.

2.3.1 Cross-border M&As: basic characteristics

We collected information on all completed / unconditional cross-border M&As with a deal value of at least $10 million. In the period 1986 – 2005 this provided us with 27,118 cross-border M&As (see the overview in Table 2.3 and Figure 2.4 for the distribution). Moreover, Table 2.4 shows the countries that are most active in the merger and acquisition game.

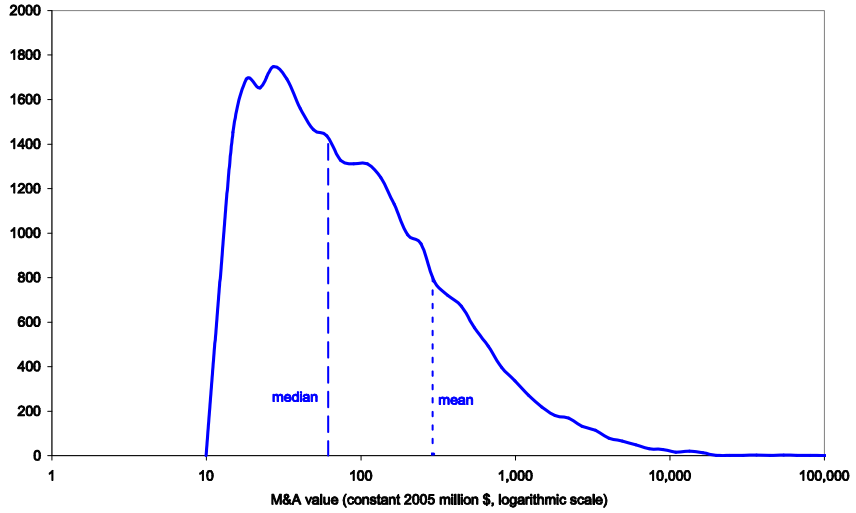
Table 2.3: Descriptive Statistics; value in constant 2005 (million) dollars

Mean	292.1	Kurtosis	7731
Median	61.5	Skewness	71.5
Std. Dev	1887	Minimum	10.0
Obs	27,118	Maximum	225,454

Table 2.4: Most Active Countries; number of deals

Most Active Acquirers			Most Active Targets		
Country	No. of deals	%	Country	No. of deals	%
USA	6,921	25.5	USA	6,218	22.9
UK	4,576	16.9	UK	3,386	12.5
Canada	1,600	5.1	France	1,374	5.1
France	1,383	5.9	Canada	1,341	4.9
Germany	1,160	4.3	Germany	1,273	4.7
Australia	994	3.7	Australia	1,235	4.6
Japan	956	2.3	Spain	784	2.9
Netherlands	907	3.3	Netherlands	689	2.5
Hong Kong	737	2.2	Italy	682	2.5
Sweden	677	2.7	Hong Kong	613	2.3
Sum	19,911	71.9	Sum	17,595	64.9

Figure 2.4: Frequency Distribution of cross-border M&As (1986-2005)

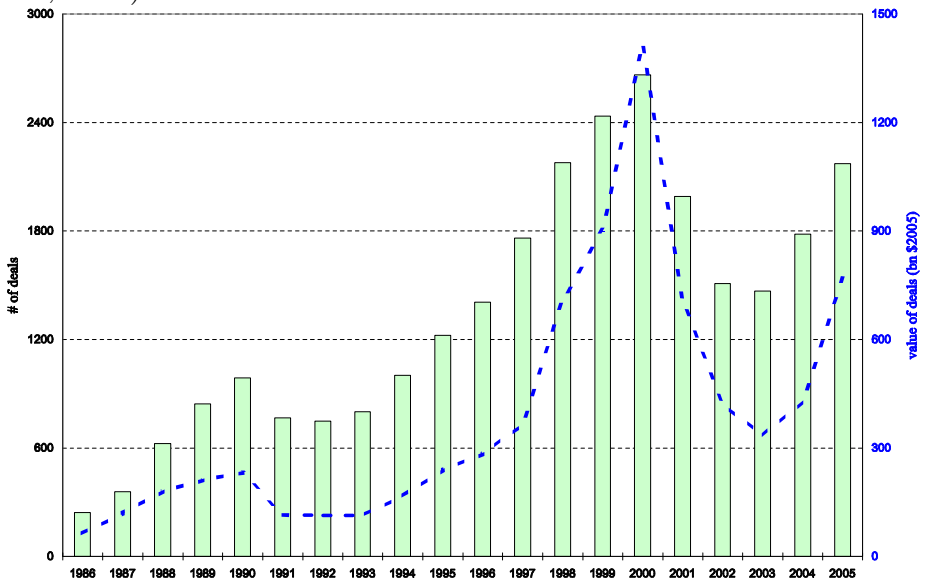


2.3.2 Merger Waves

A historical look at the data reveals a remarkable characteristic of M&As. Figure 2.5 depicts the evolution of all cross-border M&As over the last twenty years, both measured as the number of deals and the value of deals (in constant 2005 $ bn., using the US GDP deflator). Clearly, there is substantial variation over time, with periods of rapid increase followed by periods of rapid decline. Five merger waves have been identified during the 20th century, three of which are recent (Andrade et al., 2001). The 3rd wave took place in the late 1960-early 1970s; the 4th wave ran from about the mid 1980s until 1990; the 5th wave started around 1995 and ended in 2000 with the collapse of the "new economy". However, Figure 2.5 also shows that a subsequent (still ongoing) 6th merger wave started around 2003.

While substantial research has been devoted to understanding what drives U.S. domestic merger waves (see Evenett, 2004), not much has been done to understand the driving forces underlying the global (i.e. cross-border) merger waves that have taken place over the past few decades. The literature classifies merger waves into three categories: neoclassical, strategic and mis-valuation. *Neoclassical* theories emphasize the role of deregulatory and technological shocks at the industry level. These theories predict that, in an environment with fully rational agents, industry level shocks lead to a reallocation of capital or ownership from lower to higher productivity firms, thus generating a merger wave (Jovanovic and Rousseau, 2002). *Strategic* theories (see Toxvaerd, 2007), focus on the relative scarcity of targets with a relationship to the acquirers. That is, acquirers compete (imperfectly) over time for scarce targets, thus leading to an equilibrium in which all the potential acquirers bid for targets

Figure 2.5: Cross-Border M&As 1986-2005; # of deals (LHS) and value of deals (billion constant 2005$, RHS)



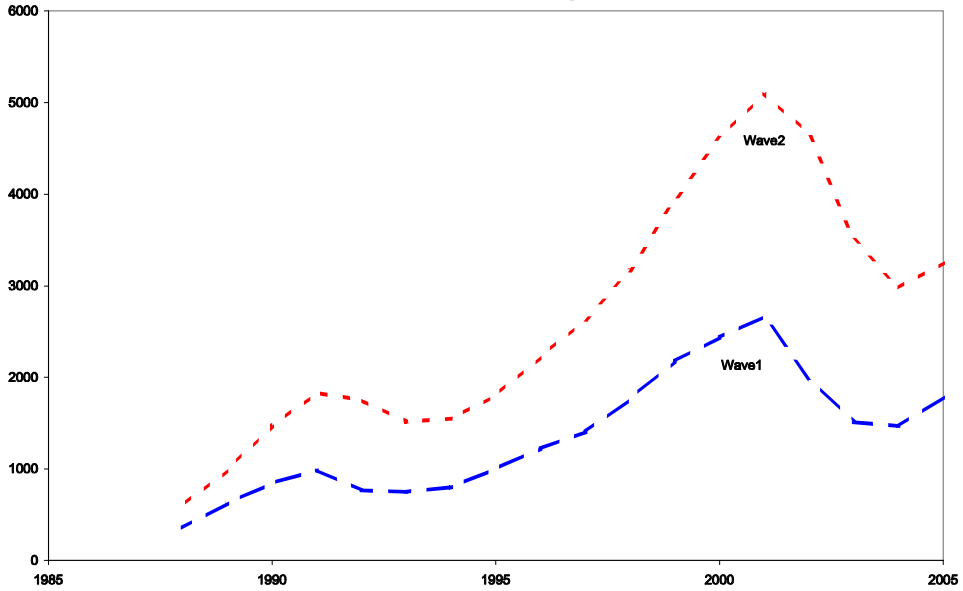
simultaneously. *Mis-valuation* theories focus the perception of the value of the traded assets by the agents (see Shleifer and Vishny, 1986; Rhodes-Krop and Viswanathan, 2004).

Recent empirical work seems to point to the relevance of neoclassical theories to explain merger waves. For example, Mitchell and Mulherin (1996) and Harford (2005) argue that industry-specific shocks lead to industry waves. Harford (2005) shows that industry merger waves are a necessary but not a sufficient condition to induce an aggregate merger wave; that is a macroeconomic factor must be at play. Building on recent work on capital reallocation and liquidity by Eisfeldt and Rampini (2006), Harford (2005) shows that a proxy for "high liquidity - low cost of capital" reallocation correlates strongly with aggregate merger waves. Although the empirical literature has long recognized the importance of the location determinants of FDI flows across countries, it has largely ignored the determinants of cross-border FDI flows through M&As. For example, Gugler et al. (2003) argue that merger waves can be understood if one acknowledges that M&As do not boost efficiency and hence do not increase shareholders' wealth. Instead, they find that M&A waves are best understood as the result of overvalued shares and managerial discretion. For the case of the USA and restricting their sample to firms that are publicly traded, Andrade et al. (2001) show that with each merger wave the value of the M&A deals (measured by firms' market capitalization) increases strongly.

During the 5th merger wave, European firms engaged in a number of (mega) M&As

with the cross-border take-over of Mannesmann (Germany) by Vodafone (UK) for $203bn. in 1999-2000, as to date the largest M&A. It turns out that especially this part of M&A waves is difficult to model. First of all, an M&A wave must start at some point in time; that is, a reduction of competition makes an M&A profitable, which implies that it is rational to wait for other M&As to "go first" because this reduces competition and makes the next M&A more profitable than the first one. Second, an M&A wave must stop at some point, and both elements should be incorporated into a full M&A model. Luckily for current research, Neary (2007) does just that: waves have to start at some point in time or else M&A profits are foregone. Moreover, since it is a general equilibrium model, the excess supply on the labor market following an M&A (lower wages resulting in higher profits) finally stop the wave.

Figure 2.6: Merger and Acquisition Waves



Therefore, to get an indication of M&A waves, we let $M_{s,ij}$ denote the number of M&As in the S year period immediately preceding time t. We denote their sum by M_{t-k}, that is $M_{t-k} = \sum_{s=t-1}^{t-k} \sum_{ij} M_{s,ij}$. Figure 2.6 depicts the evolution over time of M_{t-1}, and M_{t-2}; that is, the number of M&As in the previous one, and two years. Figure 2.6 confirms that there have been two clear waves in the 1990s; one around 1990-1991, and the other one around 1999-2000. Furthermore, the figure also shows that there is an ongoing third wave, which started around 2003 as previously mentioned.

2.3.3 Financial Openness (Chinn-Ito Index)

The literature has long recognized that it is remarkably difficult to gauge the degree of the openness of the capital account (see Eichengreen, 2001; Edison et al., 2004). As Chinn and Ito (2005) argue, although there has been considerable effort aimed at capturing the extent and intensity of capital account controls, the consensus in the literature is that any such measures fail to capture (in its entirety) the complexity of capital controls for a number of reasons[5]. First, usual measures of measuring capital controls (or financial openness) fail to account for the intensity of capital controls, where the most prominent example of such measures include dummy variables based upon the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions* (AREAER). Second, the IMF dummy variables are too aggregated to illustrate the complexity of actual capital controls (see Edison et al. 2004); that is, capital controls can differ depending on the direction of capital flows as well as the type of financial transactions targeted. Thirdly, it is almost impossible to distinguish between *de jure* and *de facto* controls on capital transactions, since capital control policies are often implemented without explicit policy goals to control the volume and/or type of capital flows. On the other hand, the private sector has the incentive to circumvent any capital account controls (and in many occasions they succeed); thereby cancelling out the expected effect of this type of regulation (Edwards, 1999). Therefore, researchers often talk about financial integration among economies and interpret it as *de facto* restrictions on capital transactions (Chinn and Ito, 2005).

In the research herein, we rely on the financial liberalization index developed by Chinn and Ito (2002). This index is the first principle component of the four IMF binary variables discussed above. One of the qualities of their index is that it measures the intensity of capital controls insofar as the intensity is correlated with the existence of other restrictions

[5]See Edison and Warnock (2001), Edwards (2001), and Edison et al. (2004) for an extension of this way of thinking, and for discussions and comparisons of various measures on capital account controls.

on international transactions (Chinn and Ito, 2005). By the nature of its construction, the Chinn-Ito index captures the depth of capital controls, because it does not directly refer to the severity of restrictions on cross-border transactions, but to the existence of different types of limitations; accordingly, this ability to measure the extensiveness of capital controls is a good proxy for the intensity of capital controls (Chinn and Ito, 2005)[6]. Another merit of this index is its wide coverage of more than 150 countries for the period 1970 through 2005 (see Chinn and Ito 2005 for a description of their index).

2.3.4 Additional Variables

FDI may be a substitute or a complement to trade in goods; that is FDI can act as a substitute for trade flows because of trade costs, regardless of whether they are due to transport costs or tariffs.[7] However, a stylized fact is that FDI and trade are positively correlated in the industrial world.[8] Therefore, if cross-border M&As acts as a substitute for trade, then everything else equal, we would expect a positive coefficient for the *distance* between two countries. Moreover, the cost of investment may also increase with distance (e.g. due to information asymmetries), so one might also find a negative coefficient for the distance variable, implying complementarity between M&As and trade. The intuition behind the *distance* variable implies that the greater the distance between two economies makes managing foreign "subsidiaries" or acquisitions more difficult (i.e. costly), and therefore, detracts from the desirability of buying or merging with that nation's firms. We will also include the square of the distance, in order to measure the speed at which these "transport" costs are increasing or decreasing.

Information costs can also play a role for the investment decision of firms. In this light, Gordon and Bovenberg (1996) provide a model to explain the Feldstein and Horioka (1980) puzzle; their model relies on the existence of asymmetric information between investors in different countries, albeit by concentrating on greenfield investment rather than M&As.

[6] The Quinn (1997) index as a measure of the intensity of capital controls. The Quinn index is a composite measure of financial regulation that ranges from 0 to 14, with 14 representing the least regulated and most open regime. According to Chin and Ito (2005), the correlation between the Quinn index and their index is 83.7%, suggesting that their index proxies the intensity of capital controls.

[7] See Mundell (1957) for early work adressing the relationship between trade and foreign investment in the presence of trade barriers. Also see Markusen (1995) for a survey on multinational enterprises, where economies of scale, firm-specific capital and other considerations are essential to a firm's investment decision.

[8] See Baldwin and Ottaviano (2001) who show that firms engage in both intra-industry FDI and intra-industry trade at the same time. Markusen (1997) provides "knowledge-capital" models, which allow for horizontal and vertical integration of firms accross countries in the presence of trade costs among other factors.

More recent theoretical work by Martin and Rey (2004) shows the importance of information costs in hindering cross-border asset flows, while Portes and Rey (2005) provide empirical evidence for this theory by examining gross bilateral equity flows using a gravity model. De Ménil (1999) also recognizes the importance of information costs in analyzing bilateral FDI flows in a gravity framework, where he uses distance as a proxy for information costs. We also consider a *common language* and *common border* as potential factors for reducing the costs of doing business. The potential importance of *language* as a contributor to trade links has several foundations, each of which is linked to some aspect of the reasoning behind the importance of national border effects. Perhaps the simplest argument is based on transaction costs, with communication across language barriers being more expensive, thus increasing the economic distance between potential trading partners not sharing a language. Moreover, we also include a *colony* variable to proxy for cultural distance as well as similarities in jurisprudence, implying intimate knowledge of the target economy, thereby reducing business costs. Last but not least, we use *GDP* and *GDP per capita* data from Angus Maddison, where GDP simply captures the size of the potential market (e.g. more firms are available as potential M&A targets), and GDP per capita captures how rich that particular market is, in addition to being a proxy for the quality of institutions and good policies. The data for *language, common border* and *colony* are taken from CEPII.[9]

2.3.5 Empirical Procedure

We focus attention on the determinants of the number of bilateral cross-border M&As. As this is a count variable, the first empirical candidates for our estimation procedure are the Poisson Regression Model (PRM) and the Negative Binomial Regression Model (NBRM). The PRM extends the Poisson distribution by allowing for observed heterogeneity, that is observation i is drawn from a Poisson distribution with mean μ, which is estimated from observed characteristics x_i as:[10] $\mu_i = E(m_i \mid x_i) = \exp(x_i\beta)$. The Poisson distribution imposes the restriction that the mean be equal to the variance, that is $E(m_i \mid x_i) = var(m_i \mid x_i)$. In practice, the PRM rarely fits in most empirical studies due to overdispersion, indicating that the variance exceeds the expected value. The NBRM addresses this issue by adding a parameter reflecting unobserved heterogeneity among observations: $\widetilde{\mu}_i = \exp(x_i\beta)\delta_i$, where the uncorrelated disturbance term δ_i has mean 1 and is drawn from a gamma distribution. We thus have: $E(\widetilde{\mu}_i) = \exp(x_i\beta)$, such that the PRM and the NBRM have the same mean

[9] See appendix B for descriptive statistics of all the variables used in this paper.

[10] Taking the exponential of $x_i\beta$ forces μ_i to be positive.

structure.

Since $E(m_i \mid x_i) = \exp(x_i\beta)$ for both the PRM and the NBRM, they are examples of the 'constant-elasticity' models as discussed in Silva and Tenreyro (2006) with respect to the gravity model. The essence of the model is as follows: if T_{ij} is the flow from country i to country j, D_{ij} is a measure of the bilateral distance between the two countries, and Y_i and Y_j are their respective income levels, a basic specification explaining the name gravity equation is: $T_{ij} = \beta_0 Y_i^{\beta_1} Y_j^{\beta_2} / D_{ij}^{\theta}$. If we add a disturbance term and control variables and all observations are positive, this equation can be estimated by log-linearizing it and using Ordinary Least Squares (OLS). However, this approach is problematic because it is not defined for observations with 'zero' flows (which are abundant in trade flows and occur, as we have seen, very frequently in M&A flows), which leads to biased and inefficient estimates when ignored as the zeros are not randomly distributed.

To overcome the zero-flow problem, Silva and Tenreyro (2006) suggest to incorporate them directly in the estimation procedure simply by using the PRM instead of log-linearizing. However, given that the PRM assumes overdispersion, then the next step is to use the NBRM to take account of the usual overdispersion problem. Although we follow this procedure in principle, theoretical considerations suggest to make additional modifications. For trade flows, Helpman et al. (2008) develop a theoretical model with heterogeneous firms that predicts positive as well as zero trade flows in a generalized gravity equation. They propose a two-stage estimation procedure that uses a selection equation into trade partners in the first stage and a trade flow equation in the second.[11] The distinction of two different types of groups is similar in spirit to the analysis of sample selection and specification error(see Heckman, 1974).

Returning to FDI flows in general and M&As in particular, the empirical tradition to explain FDI flows using gravity models is more recent, less extensive, and less abundant. Nonetheless, Navaretti and Venables (2004) conclude: "the cross-country pattern of FDI is quite well approximated by the 'gravity' relationship," while Blonigen et al. (2007) argue that: "a "gravity" specification .. is arguably the most widely used empirical specification of FDI." Unlike its trade counterpart, we are only aware of one theoretical foundation for the use of gravity models in FDI, provided recently by Bersgtrand and Egger (2007) in a three-factor model, who conclude (p. 281): "bilateral trade, FAS, and FDI flows' economic determinants should be "well-approximated" by gravity equations — yet not precisely

[11] To implement their estimator, one needs to find an appropriate exclusion restriction for identification of the second stage equation, which can be quite difficult.

the same gravity relationships."[12] In their Markusen (2002) – based model in which scale economies (level effects) play a key role, the trade and FDI flows depend on the endogenously determined distribution of national firms, horizontal multinationals, and vertical multinationals. Depending on the circumstances, there may be no bilateral FDI flows. Similarly, in the Neary (2007) M&A context explaining the relationships between comparative advantage and merger waves, there are no M&A flows between countries unless specific circumstances hold, as discussed in Brakman et al. (2008b), in a heterogeneous firm context.[13]

The above discussion indicates that we should distinguish between two groups of observations to adequately deal with the zero-flow problem (in our M&A setting about 98 percent of the total number of observations). This can be done in an empirically flexible way by using a zero-inflated approach (see Lambert, 1992)[14]. The zero-inflated model assumes that there are two latent groups of observations on cross-border bilateral M&As. An observation in the (always 0) Passive Group has an outcome of 0 with a probability of 1. A country in the (potentially) Active Group might have a zero outcome, but there is a positive probability that there is a non-zero outcome. This process is developed in two stages: (i) model membership into the latent groups (Active or Passive) and (ii) model counts for those in the Active Group.

- Ad (i). Latent group membership. Let y_i be a binary indicator of membership in the Passive Group ($y_i = p$) or the Active Group ($y_i = a$) for observation i. As group membership is not directly observable but depends on observable characteristics z_i, it can be empirically estimated using a binary regression model, such as logit or probit. By definition, the count for an observation from the Passive Group is zero.

- Ad (ii) Counts for the active group. Given that an observation is from the Active Group, we can model the number of M&As using a count model based on the observed characteristics x_i.[15]

The above discussion identifies four main count models, namely PRM, NBRM, Zero-Inflated Poisson (ZIP), and Zero-Inflated Negative Binomial (ZINB), which raises the ques-

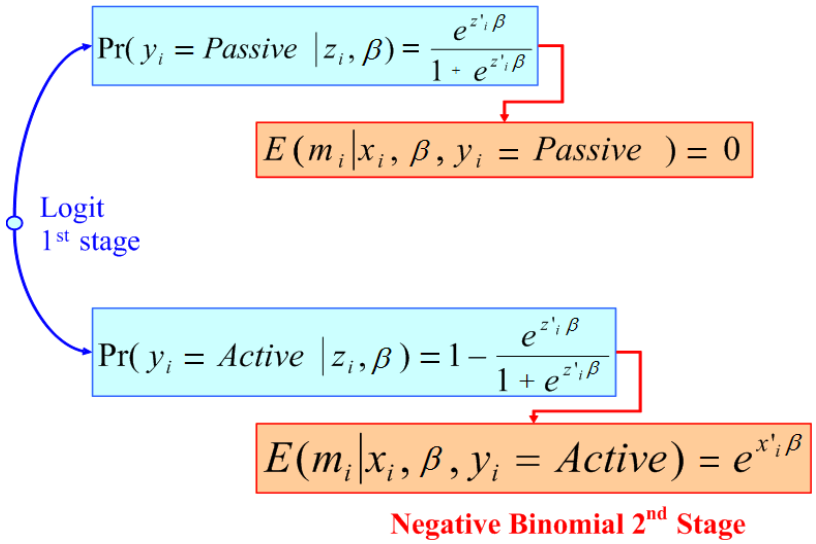
[12] FAS = Foreign Affiliate Sales

[13] Both countries must be active in a sector and it must be profitable to take over another firm; roughly translated this means differences in comparative advantage must not be too large nor too small.

[14] This avoids the difficulty of trying to find an appropriate exclusion restriction (Helpman et al, 2007).

[15] The characteristics x_i need not be the same as the characteristics z_i. Using the PRM in combination with stage (i) results in the Zero-Inflated Poisson model. Using the NBRM in combination with stage (i) results in the Zero-Inflated Negative Binomial model. Note that the outcome can be zero even though it is an observation from the Active Group.

Figure 2.7: Model Framework



tion of empirical model selection.[16] The Vuong (1989) test can be used for selection of non-nested models, and in our case it provides overwhelming support in favour of the zero inflated negative binomial model. As summarized in Figure 2.7, the discussion below therefore only reports the Zero Inflated Negative Binomial (ZINB) estimates, using a logit binary regression model in the first stage.

2.4 Results

Part of our economic interpretation of the estimated coefficients below is based on the odds ratio and the incidence rate ratio. For the first stage of the estimation procedure, let $\Pr(y_i = p \mid z_i)/\Pr(y_i = a \mid z_i)$ be the odds of a passive outcome versus an active one in the logit model. Suppose b is the estimated coefficient for some variable, and δ the standard deviation for non-dummy variables (respectively, a unit change for dummy variables). Then $e^{b\delta}$ is the odds ratio, that is the expected factor change in the odds of a passive outcome for a δ-size change in the variable in question, holding all other variables constant. Note that the odds ratio is multiplicative, so the magnitude of positive and negative effects should be compared using the inverse (that is, a 50 percent decline is comparable in magnitude to a 100 percent increase). For the second (negative binomial) stage of the procedure, we report

[16] Six if we include the distinction between using probit and logit at the first stage of the zero inflated models; as the logit specification performed better we restrict attention to this possibility, which has the added benefit of using the odds ratio for economic interpretation.

$100(e^{b\delta}-1)$ which, similarly denotes the percentage change in the expected count for a δ-size change in the variable in question, holding all other variables constant. In addition, at the second stage the estimated coefficients of the variables measured in natural logarithms can be interpreted as elasticities.

Table 2.5 reports the estimation results for two basic specifications and our baseline case. The Basic I specification ignores waves and the impact of financial openness but includes time fixed effects. It thus has the main gravity equation ingredients at both stages of the estimation procedure, namely economic size of acquirer and target (as measured by GDP), economic development of acquirer and target (as measured by per capita income), distance between acquirer and target, and the main dummy control variables (common language, colony, and common border). The Basic II specification replaces the (serially correlated) time fixed effects by wave variables. This has little impact on any of the estimated coefficients and the benefit of providing an economic interpretation for the serial correlation. Moreover, if we include time fixed effects and the wave variables, none of the time fixed effects are statistically significant. Since M&As are the main ingredients of FDI flows, and since there has been a long discussion on the impact of financial openness for the ability of countries to successfully attract FDI flows, the third, baseline specification analyses in detail the impact of financial openness for acquirer and target on the global M&A flows. As can be concluded from Table 2.5, the inclusion of the financial openness variables has relatively mild, but non-negligible effects on the impact of the other (standard) variables of the gravity equation listed in the Basic I and Basic II specifications. The discussion below therefore restricts attention to the economic effects of the baseline specification.

Table 2.5: Basic and Baseline Regression Results (Zero-Inflated Negative Binomial)

	basic I	irr_I	basic II	irr_{II}	base case	irr_{bc}	StdDev
Active, negative binomial							
LnGDP_{acq}	0.522 ***	172	0.517 ***	169	0.480 ***	160	1.99
LnGDP_{tar}	0.631 ***	236	0.612 ***	222	0.631 ***	252	1.99
LnGDPpc_{acq}	0.474 ***	71	0.382 ***	54	0.489 ***	77	1.17
LnGDPpc_{tar}	0.741 ***	131	0.714 ***	125	0.678 ***	120	1.17
LnDist_{ij}	-0.501 ***	-35	-0.500 ***	-35	-0.526 ***	-36	0.85
Financial Openness							
Acquirer					0.072 ***	12	1.61
Target					0.062 **	10	1.61
wave_1			0.3 ***	18	0.2 ***	13	0.63
wave_2			0.06 ***	8	0.06 ***	8	1.24
Common Language‡	0.511 ***	67	0.507 ***	66	0.564 ***	76	0.38
Colony‡	0.761 ***	114	0.693 ***	100	0.790 ***	120	0.11
Common Border‡	-0.117 **	-11	-0.010 ***	-9	-0.115 **	-11	0.13
Passive, logit							
LnGDP_{acq}	-0.463 ***	-59	-0.460 ***	-59	-0.498 ***	-63	1.99
LnGDP_{tar}	-0.385 ***	-52	-0.403 ***	-54	-0.375 ***	-53	1.99
LnGDPpc_{acq}	-1.383 ***	-79	-1.382 ***	-79	-1.267 ***	-77	1.17
LnGDPpc_{tar}	-0.071		-0.096		-0.062		1.17
LnDist_{ij}	0.885 ***	113	0.873 ***	111	0.889 ***	113	0.85
Financial Openness							
Acquirer					-0.148 ***	-21	1.61
Target					-0.062 **	-10	1.61
Common Language‡	-1.053 ***	-65	-1.014 ***	-64	-1.129 ***	-68	0.38
Colony‡	-1.046 ***	-65	-1.125 ***	-68	-0.963 ***	-62	0.11
Common Border‡	-1.891 ***	-85	-1.723 ***	-82	-1.536 ***	-79	0.13
# of obs	380,492		345,646		255,468		
Nonzero obs	5868		5710		5290		
McFadden adj. R^2	0.461		0.456		0.453		

Notes: 1) Dependent variable is # of deals; 2) *, **, *** are 10%, 5%, 1% sig. levels

3) irr = 100 [exp(β*StdDev)-1] = % change in expected count for StdDev increase in X

4) ‡ the irr is calculated as 100[exp(β)-1] for a discrete change of 0 to 1

5) StdDev = standard deviation of X

6) Basic 1 regression includes time fixed-effects (no waves)

2.4.1 Passive Group (first stage, logit)

The bottom part of Table 2.5 discriminates as to whether an observation belongs to the Passive Group (always 0) or the Active Group (potentially positive). The estimates can be interpreted as in a standard logit model, determining the probability that the observation should be classified in the Passive Group. With the exception of the target's per capita GDP (which is not significant), all included variables are important for the Passive Group – Active Group classification. We list the impact of the significant variables in decreasing order of economic magnitude, first for the continuous variables and then for the dummy control variables.[17]

In order of magnitude, an observation is more likely to belong to the Passive Group:

1. The lower the acquirer's development level as measured by GDP per capita.

2. The smaller the acquirer's market size as measured by total GDP.

3. The greater the distance to a potential target country.

4. The smaller the target's market size as measured by total GDP.

5. The higher the acquirer's financial openness.

6. The higher the target's financial openness.

Similarly, for the dummy control variables, in order of magnitude an observation is less likely to belong to the Passive Group if:

1. The two countries share a common border.

2. The two countries share a common language.

3. The two countries share a colonial history.

Evidently, to become active in the global M&A game it is crucial to have a sufficiently high level of development as measured by per capita GDP or to share a common border. Other important economic factors for becoming active are the total size of both the acquirer's and target's market (positively), the distance to potential targets (negatively), and common language or colonial history (the last two indicate mutual knowledge of each other's markets and therefore lower costs of interaction). The negative impact of distance and the positive

[17] Recall that the magnitude of positive and negative effects should be compared using the inverse.

influence of sharing a common border on the probability of becoming active appear to be in contrast to the jumping argument. Part of this argument, however, is restored when we discuss the size of M&A flows for the Active Group (see below). The impact of imposing restrictions on capital flows (exchange controls, quantitative restrictions, multiple exchange rates, or taxes) is detrimental to the probability of engaging in M&As, either as an acquirer or a target; therefore, the probability that an observation belongs to the Passive Group decreases if the financial openness variable for acquirer or target increases. The economic importance of financial openness for acquirer and target is fairly modest (a percent change in the odds ratio of -21 and -10 percent, respectively, see Table 2.5).

2.4.2 Active Group (Second Stage)

The top part of Table 2.5 indicates the size of cross-border M&As (as measured by their number) given that the observation belongs to the Active Group. The estimates can be interpreted as in a standard negative binomial model, determining the expected number of M&As given the observed characteristics. All estimated coefficients are significant at the 5 percent level or stronger.

In order of economic magnitude, given that an observation belongs to the Active Group, the expected number of M&As increases:

1. The higher the target's market size as measured by total GDP.

2. The higher the acquirer's market size as measured by total GDP.

3. The higher the target's development level as measured by GDP per capita.

4. The higher the acquirer's development level as measured by GDP per capita.

5. The lower the distance to a potential target country.

6. The higher the one-year lagged wave variable.

7. The higher the acquirer's financial openness.

8. The higher the target's financial openness.

9. The higher the two-year lagged wave variable.

Similarly, for the dummy control variables given that an observation belongs to the Active Group and in order of magnitude, the expected number of M&As increases if:

1. The two countries share a colonial history.

2. The two countries share a common language.

3. The two countries do not share a common border.

To determine the size of cross-border M&As, market access as measured by the target's total GDP is by far the most important variable (a standard deviation increase raises the expected number of counts by 252 percent), followed by market size of the acquirer (indicative of the potential number of acquiring firms). Development levels of both acquirer and target as measured by GDP per capita are also important (positively), followed by the distance between acquirer and target (negatively). The economic impact of the financial openness and wave variables is more modest (fairly low percentage changes in expected counts). For the dummy control variables, mutual knowledge of each other's markets (lower costs of interaction) as measured by a common colonial history and common language is very important, as it raises the expected number of M&As by 120 and 76 percent, respectively. For the Active Group, in contrast to the Passive Group, sharing a common border is less important. Note that this effect provides some support for the jumping argument as sharing a common border decreases the expected number of counts by 11 percent. Given that a country is active in cross-border M&A activity, this suggests that there is an incentive to create some distance between acquiring and target country.

2.4.3 Elasticities for Active Group and Trade discussion

To compare the main economic forces determining cross-border M&As relative to international trade flows, Table 2.6 lists the elasticity and dummy control estimates for the number of M&As (see Table 2.5) and the bilateral trade estimates taken from Santos Silva and Tenreyro (2006, Table 3, column PPML). Since the latter focus on the value of trade flows, we also include comparable estimates for the *value* of M&As (see Brakman et al., 2008a), which are based on the same ZINB procedure used in this paper.

There are some remarkable differences in the elasticities for trade and M&A flows.

- First, the impact of the size of the market as measured by GDP on M&A flows is *less pronounced* when compared to trade flows. For an active acquirer, the elasticity for M&As is 0.48 in number of deals and 0.35 in value terms, substantially lower than the 0.72 elasticity for trade flows. Similarly, for an active target the elasticity for M&As is 0.63 in number of deals and 0.37 in value terms, also both lower than the 0.73 elasticity for trade flows.

Table 2.6: Comparison Between Estimates

	Cross-border M&A Estimates (Active Group)		Bilateral trade estimates
	Number of Deals	Value of Deals	
LnGDP_{acq}	0.480 ***	0.347 ***	0.721 ***
LnGDP_{tar}	0.631 ***	0.372 ***	0.732 ***
LnGDPpc_{acq}	0.489 ***	0.139	0.154 ***
LnGDPpc_{tar}	0.678 ***	0.342 ***	0.133 ***
LnDist_{ij}	-0.526 ***	-0.285 ***	-0.776 ***
Common Language	0.564 ***	0.400 ***	0.752 ***
Colony	0.790 ***	0.454 ***	0.019
Common Border	-0.115 **	-0.136 *	0.202

- Second, the impact of the target's market structure as measured by per capita GDP is *more pronounced* for M&A flows than for trade flows. The M&A elasticity of per capita GDP for an active target is 0.68 in number of deals and 0.34 in value terms, substantially larger than the elasticity of 0.13 for trade flows.[18]

- Third, the elasticity of GDP and per capita GDP for acquirer and target is *asymmetric*. This holds for the elasticity of GDP regarding the number of M&As ($0.48 < 0.63$); compare to the elasticity for value of M&As ($0.35 \approx 0.37$) or trade flows ($0.72 \approx 0.73$). Similarly it holds for the elasticity of per capita GDP for number of M&As ($0.49 < 0.68$) and value of M&As ($0.14 < 0.34$); compare to the elasticity for trade flows ($0.15 \approx 0.13$). This asymmetry has important modeling implications that can be dealt with by the Bersgtrand and Egger (2007) approach.

- Fourth, as was to be expected based on the *a priori* ambivalent nature of the relationship between M&As and distance, we find that the impact of distance is *less pronounced* for M&As than for trade flows. Other things equal, a 10 percent increase in distance reduces the value of trade flows by 7.8 percent,[19] substantially higher than

[18] In value terms, an active acquirer's GDP per capita is not significant, although it is important for first stage active – passive distinction (see Brakman *et al.* 2008).

[19] This estimate is slightly below the mean effect reported in the Disdier and Head (2008) meta analysis of a 9 percent decline in trade flows following a 10 percent increase in distance.

the reduction in the number of M&As for active countries of 5.3 percent or the reduction in value of M&As of 2.9 percent. The different impact of distance on the number and value of M&As suggests that the more distant M&As are more valuable, thereby corroborating the story presented in panel C of Table 2.2.

- Fifth, the dummy control variables are important for determining the size of M&A flows, but not for the Santos Silva and Tenreyro (2006) trade estimates. This is in contrast to most other (positive and significant) trade estimates reported in the literature, which Santos Silva and Tenreyro attribute to their estimation procedure. Possibly, a zero-inflated procedure to deal with the excess zero problem for the trade data as used here for the M&A estimates modifies their findings in this respect.

2.4.4 Countries of a feather flock together...

To summarize the above results: (i) market size (GDP) of both acquirer and target is more important for trade flows than for cross-border M&As, (ii) market development (per capita GDP) is more important for cross-border M&As than for trade flows, indicating that M&As are predominantly a rich-person's game, (iii) for M&As, the target's market, both in size and development, is more important than the acquirer's market, and (iv) the impact of distance is larger on trade flows than for M&As.

From a theoretical perspective, FDI flows, such as M&As, may be both a substitute for trade flows (if the presence of a local production plant eliminates the need for (final) goods trade) or a complement to trade flows (if the local production plant is part of a fragmentation process with intricately linked trade flows). Our estimates show that, from an empirical perspective, M&As and trade flows are complementary, that is if the distance between two locations increases, the expected number of M&As decreases. As was to be expected based on the *a priori* ambivalent nature of the relationship between M&As and distance, we find that the impact of *distance* is *less pronounced* for M&A flows than for trade flows (see Table 4). For active acquirers and targets, the M&A elasticity of distance is about -0.53, substantially lower in absolute value than the trade elasticity of -0.78. As such, other things equal, cross-border M&As decline less rapidly with distance than international trade flows. However, other things are not equal, and as stressed above, not only the size of the market is important but also the structure of this market in terms of per capita income, particularly from a target's perspective. For example, starting from a country in an active high-income region, say Switzerland in Western Europe, M&As decline less rapidly with distance than trade flows as long as we remain within this high-income region, say the

distance to Germany, France, and the U.K. As distance increases further, bringing African and West Asian nations within reach, the potential target's per capita income level also falls drastically, making M&As unattractive and leading only to limited M&A flows. A further increase in distance, bringing North America, Japan or South America within reach, would further decrease M&A flows, except when this is sufficiently compensated by an increase in the target's attractiveness from a market access (size *and* structure) perspective. Consequently, there are substantial M&A flows between Western Europe and North America, as well as, but in view of the above understandably to a lesser extent, between these two regions and Asian high income countries.

For example, starting from a country in an active high-income region, say Switzerland in Western Europe, M&As decline less rapidly with distance than trade flows as long as we remain within this high-income region, say the distance to Germany, France, and the U.K. As distance increases further, bringing African and West Asian nations within reach, the potential target's per capita income level also falls drastically, making M&As unattractive and leading only to limited M&A flows. A further increase in distance, bringing North America, Japan or South America within reach, would further decrease M&A flows, except when this is sufficiently compensated by an increase in the target's attractiveness from a market access (size and structure) perspective. Consequently, there are substantial M&A flows between Western Europe and North America and (in view of the above) to a lesser extent between these two regions and the Asian high income countries. This market similarity (countries of a feather) that is important for M&As allows us to understand the global M&A flows relative to global trade flows, as depicted in Figure 2.2 and Table 2.2.

2.5 "Pull" & "Push" Factors

In this section, we augment our baseline model with several "pull" and "push" factors, considered as important determinants of cross-border M&As. That is, while push factors may help explain the timing and magnitude of new capital inflows, pull factors may be necessary to explain the regional distribution of new capital flows (Montiel and Reinhart, 1999). An important "push" factor is the level of interest rates in the "home" country, which we will proxy by the 10-year US bond yield.[20] In the literature there is a general consensus that high real interest rates hamper FDI, other things being equal. Albuquerque et al. (2003) find a significant and negative relation between the US T-Bill yield and FDI

[20] We also constructed a weighted average of G7 bond yields; where the coorelation between *G7yield* and *USyield* is 0.94.

flows. Calvo et al. (2001) show that FDI flows to emerging markets are lower during US monetary tightening. Although no empirical literature exists for the specific case of the number of M&A deals, the same result should (in principle) be expected, since low interest rates at "home", leading to narrow interest rate margins and lower cost of capital at home, are one of the main reasons offered by multinationals to explain their operations abroad. As can be seen in Table 2.7 (column *IV*), the *USyield* has a negative effect[21] for the *Active group* (as theory predicts), corroborating the "push" factor story behind the fact that tighter monetary policy lowers M&A activity. More specifically, our results imply that a 100 basis point increase in the US interest rate will decrease M&A activity by 10% for the active group.[22]

2.5.1 Capital Market Structure and Capital Flows

Capital inflows in the 1990s were associated with a stern rise in bond and equity portfolio flows; however, by the early 2000s many of these flows have gravitated towards larger equity emerging markets, bypassing many countries (Montiel and Reinhart, 1999). An often given explanation has been that in order to attract capital flows, "domestic" capital markets must possess a threshold set of requirements (e.g. market size, accounting standards, disclosure requirements, transparency, etc.).

Accordingly, in order to examine whether there is a systematic link between capital flows and the structure of the "domestic" capital market, we augment our gravity model by including two proxies for the size and the institutional setting of the "domestic" capital market; that is, we include the lagged *stock market capitalization* as a percentage of GDP taken from the International Finance Corporation (which we label LagSMC). While this variable pertains mainly to the equity market, it is also likely to proxy indirectly for the size of the banking sector, as typically countries with underdeveloped capital markets also tend to have a smaller financial sector (see Montiel and Reinhart, 1999); furthermore, and perhaps more importantly, the lag will take care of any endogeneity issues.

[21] We also ran the regression using the weighted average of G7 bond yield (*G7yield)*, and the results are quite similar (these results are available upon request).

[22] A 50 basis point increase in the US interest rate will decrease M&As by almost 5%, and a 25 basis point increase will decrease M&As by almost 3%.

Table 2.7: Augmented ZINB Estimates (US yield, stock market value, transparency)

Active	IV	irr_{IV}	V	irr_{V}	VI	irr_{VI}	StdDev
LnGDP_{acq}	0.481 ***	162	0.512 ***	168	0.489 ***	169	1.99
LnGDP_{tar}	0.620 ***	245	0.569 ***	199	0.629 ***	256	1.99
LnGDPpc_{acq}	0.779 ***	118	0.331 ***	45	0.643 ***	111	1.17
LnGDPpc_{tar}	0.641 ***	110	0.761 ***	134	0.530 ***	85	1.17
LnDist_{ij}	-0.510 ***	-35	-0.440 ***	-31	-0.516 ***	-36	0.85
Financial Openness							
Acquirer	0.090 ***	16			0.051 *	9	1.61
Target	0.070 *	12			0.115 ***	20	1.61
USyield	-9.208 ***	-10					
LagSMC_{acq}			0.006 ***	27			
LagSMC_{tar}			-0.00002				
$\text{Transparency}_{acq}$					0.006		
$\text{Transparency}_{tar}$					0.049		
wave_1					0.2 ***	12	0.63
wave_2					0.07 ***	8	1.24
Common Language‡	0.545 ***	72	0.352 ***	42	0.558 ***	75	0.38
Colony‡	0.793 ***	121	0.629 ***	88	0.788 ***	120	0.11
Common Border‡	-0.134 **	-13	-0.095		-0.117		0.13
Passive							
LnGDP_{acq}	-0.467 ***	-61	-0.402 ***	-54	-0.499 ***	-64	1.99
LnGDP_{tar}	-0.398 ***	-55	-0.478 ***	-60	-0.386 ***	-54	1.99
LnGDPpc_{acq}	-1.157 ***	-74	-1.201 ***	-74	-0.882 ***	-64	1.17
LnGDPpc_{tar}	-0.013		0.237 ***	-23	0.117		1.17
LnDist_{ij}	0.892 ***	114	0.847 ***	106	0.879 ***	112	0.85
Financial Openness							
Acquirer	-0.163 ***	-23			-0.248 ***	-33	1.61
Target	-0.101 ***	-15			-0.100 **	-15	1.61
USyield	6.583						
LagSMC_{acp}			-0.005 ***	-16			
LagSMC_{tar}			0.001				
$\text{Transparency}_{acq}$					-0.095		2.99
$\text{Transparency}_{tar}$					-0.006		2.99
Common Language‡	-1.083 ***	-66	-1.004 ***	-63	-1.033 ***	-65	0.38
Colony‡	-0.940 ***	-61	-1.087 ***	-66	-0.948 ***	-61	0.11
Common Border‡	-1.829 ***	-84	-2.066 ***	-87	-1.689 ***	-82	0.13
# of obs	282,378		291,692		197,785		
Nonzero obs	5432		3985		4002		
McFadden adj. R^2	0.453		0.465		0.457		

Notes: 1) Dependent variable is # of deals; 2) *, **, *** are 10%, 5%, 1% sig. levels

3) irr = 100[exp(β*StdDev)-1] = % change in expected count for StdDev increase in X

4) ‡ the irr is calculated as 100[exp(β)-1] for a discrete change of 0 to 1

5) StdDev = standard deviation of X

We also add the *Transparency International corruption index* (which we label TRANSPAR)[23] to proxy for the business environment in the "local" economy. As far as our market structure variables, the results can be seen in Table 2.7 (columns V and VI respectively). Our results are as expected; that is, the lagged stock market capitalization coefficient is highly significant and has the anticipated sign, where a one standard deviation increase in the lagged capitalization of the stock market increases the number of M&As by just under 30% for those acquirers in the active group, and will decrease the probability of remaining in the passive group by 16%. This last result also corroborates the results found by di Giovanni (2005), where economies with more developed domestic financial markets are more likely to engage in M&A operations.

2.5.2 Market and Business Uncertainty

As a last sensitivity analysis, we add the *black market premium* (labelled BMP)[24] and the exchange rate. The black market premium can be interpreted both as a measure of expectations of depreciation of the "local" currency", and as a rudimentary index of distortions. As Fischer (1998) explains, expectations of depreciation may affect investment through several channels: (1) it is more attractive to hold foreign assets when a depreciation is expected[25]; (2) economic uncertainty is higher under such conditions; (3) for those who can obtain foreign exchange at the official rate, foreign capital goods are cheap to import. While the first two points suggest a negative relationship between the black market premium and foreign investment (i.e. M&As), the third point implies the opposite. Furthermore, to the extent that the black market premium serves as a general index of distortions, and therefore of an "unsustainable" situation, it is likely to be negatively correlated with M&As.

The results for the black market premium can be seen in Table 2.8 (column VII), where the black market premium is strongly negatively correlated with M&A activity as expected. That is, a one standard deviation increase in LnBMP_{acq} translates into an almost 20% reduction in M&A activity for those acquirers in the active group, and just over a 40% reduction for the targets in this same group. This result indicates that the black market premium serves as a general index of distortions, and therefore of an "unsustainable" situation in the "local economy". As far as the link between FDI and exchange rate uncertainty, the litera-

[23] The Transparency International corruption index ranges from 0 = highly corrupt, to 10 = highly clean.

[24] This variable ranges from 1986-1999. Data is taken from the Global Development Network Growth database at New York University.

[25] This assumes domestic interest rates have not adjusted, which is implied by the presence of a black market premium.

ture is rather mixed, as exchange rate volatility can both discourage FDI (Cushman, 1988), and produce an incentive to hedge against exchange rate shocks through foreign location (Aizenman, 1991).

However, empirical studies tend to point to a negative effect of exchange rate volatility on FDI. As far as the choice of exchange rate regime, a negative relationship between uncertainty and M&As (FDI) would represent another justification for why developing countries choose to fix their nominal exchange rate, and a support for the argument made by Calvo and Reinhart (2000) that floating could make developing countries loose their access to international credit. In order to test this effect, we add the *exchange rate volatility* (labelled *EXV*); which is measured by the bilateral coefficient of variation yearly average. The results for the exchange rate volatility in Table 2.7 indicate that if the coefficient of variation increases by one standard deviation, then the number of M&As will decrease by 7% for those active in M&As. In this respect, there are two aspects worth mentioning; flexibility and uncertainty. Although a flexible exchange rate is one of the most important factors for encouraging international financial flows, high exchange rate volatility will discourage M&A activity because it would be considered as increased uncertainty (or at least increased risk), rather than flexibility of the exchange rate for potential investors.

As far as the exchange rate, Blonigen (1997a) shows that real dollar depreciations increase foreign acquisitions involving firm-specific assets by foreign firms. To illustrate this claim Blonigen uses data on Japanese acquisitions in the US from 1975 to 1992. The argument that real dollar depreciations increase foreign acquisitions that is put forth by Blonigen differs, for example, from Froot and Stein (1991)[26], although both studies have the same outcome. That is, Froot and Stein (1991) show that exchange rate movements are important because markets are imperfect, while Blonigen (1997a) shows that exchange rate movements matter because while domestic and foreign firms may have the same opportunities to purchase firm-specific assets in the domestic market, foreign and domestic firms do not have the same opportunities to generate returns on these assets in foreign markets. Due to an unequal level of market access, exchange rate movements may affect the relative level of foreign firm acquisitions.

[26]Froot and Stein (1991) argue that when capital markets are subject to information imperfections, exchange rate movements do in fact influence foreign investment. Information asymmetry causes a divergence between internal and external financing, making the latter more expensive than the former, since lenders incur monitoring costs and thus lend less than the full value of the asset.

Table 2.8: Black Market Premium and Exchange Rates

Active	VII	irr_{VII}	$VIII$	irr_{III}	StdDev
LnGDP_{acq}	0.522 ***	165	0.464 ***	152	1.99
LnGDP_{tar}	0.587 ***	200	0.607 ***	236	1.99
LnGDPpc_{acq}	0.603 ***	102	0.431 ***	66	1.17
LnGDPpc_{tar}	0.652 ***	114	0.654 ***	115	1.17
LnDist_{ij}	-0.481 ***	-35	-0.540 ***	-37	0.85
Financial Openness					
Acquirer			0.048 ***	8	1.61
Target			0.088 ***	15	1.61
LnBMP_{acq}	-0.115 ***	-19			
LnBMP_{tar}	-0.307 ***	-43			
Exchange rate var			-0.104 *	7	
wave_1	0.3 ***	18	0.2 ***	11	0.63
wave_2	0.08 ***	7	0.1 ***	14	1.24
Common Language‡	0.409 ***	51	0.591 ***	81	0.38
Colony‡	0.941 ***	156	0.758 ***	113	0.11
Common Border‡	-0.231 ***	-21	-0.197 **	-18	0.13
Passive					
LnGDP_{acq}	-0.518 ***	-62	-0.443 ***	-59	1.99
LnGDP_{tar}	-0.493 ***	-60	-0.402 ***	-55	1.99
LnGDPpc_{acq}	-1.431 ***	-81	-1.180 ***	-75	1.17
LnGDPpc_{tar}	0.018		-0.023		1.17
LnDist_{ij}	0.899 ***	123	0.950 ***	125	0.85
Financial Openness					
Acquirer			-0.192 ***	-27	1.61
Target			-0.058		1.61
LnBMP_{acp}	0.279 ***	67			
LnBMP_{tar}	-0.360 ***	-49			
EXV			0.008		
Common Language‡	-1.392 ***	-75	-1.098 ***	-67	0.38
Colony‡	-0.711 **	-51	-1.140 ***	-68	0.11
Common Border‡	-1.854 ***	-84	-1.544 ***	-78	0.13
# of obs	94,182		211,256		
Nonzero obs	2595		3921		
McFadden adj. R^2	0.443		0.462		

Notes: 1) Dependent variable is # of deals; 2) *, **, *** are 10%, 5%, 1% sig levels 3) irr = 100[exp(β*StdDev) -1] = % change in expected count for StdDev increase in X; 4) ‡ the irr is calculated as 100[exp(β)-1] for a discrete change of 0 to 1; 5) StdDev = standard deviation of X

2.6 Robustness

As a last exercise, we address three important issues. First, regarding the impact of outside market potential of the target country on FDI flows, based on the recent work of Blonigen et al. (2007). Second, regarding the impact of the Rest Of World (ROW) GDP, that is total world income excluding acquiring and target nation, on FDI flows, based on the recent work of Bersgtrand and Egger (2007). Third, regarding the impact of selection bias on the estimated coefficients and elasticities.

2.6.1 Surrounding Market Potential

Blonigen et al. (2007) analyze inter alia the impact of surrounding-market potential on FDI. It is measured for country j as the inverse-distance-weighted GDPs of all other countries in the world, and therefore similar to Harris (1954) market potential approach while excluding the target country GDP. The surrounding-market potential should only affect export-platform M&A decisions. Target country GDP is taken up separately in the estimation procedure.[27] Indeed, the authors's main findings are (i) a clear rejection of a common coefficient of target country GDP and surrounding-market potential and (ii) a significant negative coefficient of surrounding-market potential. The latter effect is contrary to expectations and current theoretical explanations. The authors discuss how this may be explained by border effects between neighboring countries, making the largest country in the area (with the smallest surrounding-market potential) the most attractive location for export-platform FDI.

Table 2.10 (see Appendix C) provides the estimation results for the surrounding-market potential specification using our M&A data and procedure, both for the number of M&As and their value (in constant 2005 US $). The results are similar for both cases. At the first (logit) stage, the target's market size (GDP) and the target's surrounding market potential work in opposite directions. The higher the target's surrounding-market potential, the higher the probability that the observation belongs to the Passive Group. Similarly, at the second (negative binomial) stage (given that the observation belongs to the Active Group) the target's market size and the target's surrounding market potential work again in opposite directions. The estimated elasticity for the target's surrounding-market potential is -0.71 for the number of deals and -0.28 for the value of M&As. Our findings thus support the

[27] We follow Blonigen et al. (2007) in normalizing the distance between Amsterdam and Brussels (173 km) to unity. This also holds for lower distances. All other distances receive a weight that declines according to $173/d_{ij}$, where d_{ij} is the distance between countries i and j.

conclusions of Blonigen et al. (2007).

2.6.2 Rest of World GDP

Bergstrand and Egger (2007; B&E) develop a three-factor general equilibrium model to explain gravity-type relationships for both international trade and FDI flows. One of the testable hypotheses derived from their model is the relationship between FDI and GDPROW. The latter measures global income excluding target and acquiring nation income levels (not weighted by distance). Their model predicts a negative relationship between FDI and GDPROW if the sum of target and acquiring nation GDP is smaller than GDPROW (which is the case for any combination of countries). Using data for 17 OECD countries, they find empirical support for their hypothesis.

Table 2.11 (see Appendix C) provides the estimation results for the GDPROW specification using our M&A data and procedure, both for the number of M&As and their value. Let's first focus attention on columns 2 and 4, which incorporates the wave variables in the estimation. Contrary to the findings of B&E, the impact of GDPROW is not significant for determining the number of cross-border M&As, neither at the first stage nor at the second stage. When we (like B&E) analyze the value of M&As, however, things change and the impact of GDPROW becomes stronger than analyzed by B&E. At the first (logit) stage GDPROW has a negative impact on the likelihood of a passive observation. Thus, other things equal, the bigger the economy of the rest of the world, the larger the probability an observation belongs to the Active Group. At the second (negative binomial) stage, given that the observation belongs to the Active Group, the impact of GDPROW on the size of cross-border M&As is negative (elasticity of -0.88), which is similar to the impact found by B&E. These results provide some support for the B&E findings in value terms (enriched by an opposite effect of the size of the global economy on the probability of being active).

Most countries are relatively small compared to the global economy, as are most country pairs. For most observations, therefore, GDPROW is a close measure of global GDP. Consequently, this variable is highly correlated with the global business cycle, which generates M&A waves (i.e. GDPROW is highly correlated with the wave variables). Taking a closer look at columns 3 and 5 of Table 2.11 (which show the estimates of the same procedure without the wave variables), indicates opposing results in the first stage of the estimation, and significantly positive results for GDPROW at the second stage of the estimation, both for number of M&As and for their value. This shows that the first stage results for GDPROW are not very robust, arguably because this variable is simply a proxy for the business cycle

(which was included in the estimates of columns 2 and 4 and proxied by the time fixed effects in the B&E estimation).

2.6.3 Sample Selection

Data restrictions have prompted most previous FDI studies using the gravity analysis to focus on a small set of countries. Most studies have an American perspective relative to one or a limited number of (high income) other countries or at best analyze cross-border bilateral FDI for the OECD countries over a given decade[28]. Our results are generally hard to compare directly with these previous studies, not only because we analyze cross-border M&As, but also because we focus on M&A flows rather than FDI stocks. In this sub-section, we want to analyze the selection bias that is created when restricting attention to "more easily available" data. Table 2.12 (in Appendix C) lists the estimation results of our baseline case for all countries (Table 4.3) and when restricting attention only to the OECD countries, both for number of deals and value of M&As (Brakman et al., 2008a).

The OECD countries fulfill most of the requirements for becoming active in cross-border M&As (generally high GDP, high per capita GDP, financially open, etc.). The first thing to note when restricting attention to this group of countries, is the large decline in the number of zero observations (from 98 percent to 51 percent). Not surprisingly, therefore, many of the aspects that are relevant for passing the first stage hurdle before becoming active in M&As (at the global level) are no longer important at the OECD level, particularly for the number of deals (insignificant for GDP of acquirer, financial openness target, common language, common colony, and common border). At the second stage, this holds for per capita GDP of the acquirer for the number of deals and some of the (size-wise) less important variables (financial openness and waves). The direction and significance of all main gravity type variables (GDP acquirer and target, per capita GDP target, distance, common language, colony, and common border) is robust at the second stage, although the size of the estimated effects and their relative impact differs substantially. This holds in particular for the estimated elasticities, where at the OECD level the relative importance of market size for acquirer and target is reversed and the impact of the target's per capita GDP becomes much more important. In contrast, the estimated elasticity for distance is fairly robust. In short, caution is warranted when extrapolating results obtained in FDI studies for a limited set of high income countries to the global level.

[28] Examples include Bergstrand and Egger (2007); Blonigen *et al.* (2007); Blonigen *et al.* (2005); Blonigen and Davis (2004); Brainard (1997); and Eaton and Tamura (1994).

2.7 Conclusions

We analyze the economic forces underlying cross-border Mergers and Acquisitions (M&As), the most important type of FDI flows, using a large bilateral panel data set (encompassing over 200 countries and 20 years). The large share of "zero" observations provides essential information on the structure of these flows, which we model empirically using a zero-inflated negative binomial model. At Stage I, an observation is either classified in the Passive Group (always zero) or in the (potentially) Active Group using a logit model. At Stage II, the M&A flows in the Active Group are modeled using a gravity-type negative binomial model. We find that at Stage I, an observation is less likely to be in the Passive Group if the GDP of either country is high, if the acquirer's per capita GDP is high, if financial openness of either country is high, and if the two countries share a common language, a common border, or former colonial ties. At Stage II, that is given that the observation belongs to the Active Group, the variables that make it less likely to belong to the Passive Group usually increase the size of M&A flows. An exception is provided by the *common border* variable, which we interpret as evidence of a jumping motive for M&A flows. Compared to bilateral trade flows, we find that for M&As: (i) market size (GDP) is less important, (ii) market structure (GDP per capita) is more important (M&As are a rich-man's game), (iii) the target's market size and structure is more important than that of the acquirer (asymmetry), and (iv) the bilateral distance is less important. We emphasize that our findings, for example on the asymmetry between acquirer and target and on the border effect, have crucial implications for theoretical model building; furthermore, they point at the importance of market access and jumping motives.

The aim of this paper has been to present macroeconomic determinants, as well as the gravitational forces behind M&A activity. Using an extensive data set, we show that cross-border mergers and acquisitions (M&As) have a number of features:

- Most FDI is in the form of cross-border M&As
- M&As tend to flow (mainly) between developed economies
- Waves play an important role in the mergers and acquisitions game
- Financial Openness (e.g. capital account liberalization) stimulates M&A activity
- A less uncertain business environment attracts more M&As
- The opportunity cost for direct investment (M&A) is driven by the US interest rate and the return on long-run global assets

It is well known that the evidence linking financial openness (e.g. capital account openness) to economic growth has been weak at best, but this stems from the fact that most economists try to test for a direct relationship between these two variables. What our results show, is that more financial openness leads to more FDI (as measured by cross-border M&As), and we believe that it is this type of capital flow that has the potential to lead to economic growth through its lower volatility and through its positive spillover effects (e.g. knowledge, technology, improvements to the labor force). Therefore, while the literature suggests that transitional risks are associated with financial openness, resisting liberalization over an extended period may prove counterproductive; that is, as the pace, rhythm, and scope of globalization advances, it becomes harder and perhaps even riskier for countries to be financially repressive due to the often argued positive effects stemming from FDI (see Chapter 4 for analysis of these issues).

2.8 Appendix 2

Table 2.9: Descriptive Statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
Number of deals	0.031	0.831	0	144	882000
LnGDP	10.34	1.92	5.05	15.95	548940
LnGDPpc	8.09	1.13	5.33	10.28	564900
Ln(GDP_{ROW})	17.16	0.18	16.68	17.47	379456
Ln(Outside Market Potential)	13.83	0.48	12.60	15.36	427716
$LnDist_{ij}$	8.69	0.86	-0.005	9.89	760500
Financial Openness	0.15	1.56	-1.75	2.62	625800
Stock Market Capitalization	12.47	35.27	0	541.72	617400
USyield	0.067	0.013	0.047	0.089	882000
Exchange Rate Variability	0.36	0.71	0	10.27	574829
Ln(Black Market Premium)	2.09	1.87	-0.82	12.93	285180
Transparancy	1.17	2.53	0	10	573300
Wave1	1401	668.49	359	2663	793800
Wave2	2498.41	1184.48	603	4655	749700
Common language	0.19	0.39	0	1	882000
Colony	0.008	0.091	0	1	882000
Common border	0.011	0.11	0	1	882000

Appendix B - Robustness Checks

Table 2.10: Surrounding Market Potential, ZINB estimates

	Active Observations (negative binomial)		Active Observations (logit)	
	Number	Value	Number	Value
LnGDP_{acq}	0.314***	0.269***	-0.417***	-0.650***
LnGDP_{tar}	0.345***	0.160***	-0.563***	-0.668***
LnGDPpc_{acq}	0.447**	0.252**	-1.299***	-1.497***
LnGDPpc_{tar}	0.589***	0.410***	-0.317**	-0.690***
LnDist_{ij}	-0.460***	-0.260***	0.951***	0.915***
Ln(Surr. market_{tar})	-0.713***	-0.284***	0.487***	0.784***
Fin. Open_{acq}	-0.015	0.050**	-0.168***	-0.122***
Fin. Open_{tar}	0.031	0.009	-0.081*	-0.058***
wave_1 (coef*100)	0.024***	0.008		
wave_2 (coef*100)	0.021***	0.024***		
Common Language	0.241**	0.411***	-0.838***	-0.831***
Colony	0.673***	0.618***	-1.107***	-1.135***
Common Border	0.034	-0.094	-0.609**	-0.289***
Observations	184,702	160,503		
Non-zero Obs.	3,012	2,639		

Dependent variable is # of deals or value of deals

*, **, ***, indicate 10%, 5%, 1% significance levels

Table 2.11: Rest of World GDP, ZINB estimates

	Number of Deals		Value of Deals	
Active, negative binomial				
LnGDP_{acq}	0.220 ***	0.260 ***	0.254 ***	0.301 ***
LnGDP_{tar}	0.676 ***	0.690 ***	0.170 ***	0.194 ***
LnGDPpc_{acq}	0.058	0.011	0.272 *	0.226 *
LnGDPpc_{tar}	0.718 ***	0.696 ***	0.365 ***	0.379 ***
LnDist_{ij}	-0.439 ***	-0.426 ***	-0.241 ***	-0.244 ***
$\text{Ln}(\text{GDP}_{ROW})$	0.032	2.486 ***	-0.878 ***	1.253 ***
Fin. Open_{Acq}	-0.008	0.049 **	0.058 **	0.086 ***
Fin. Open_{Tar}	0.062 ***	0.067 ***	0.006	0.005
wave_1 (coef*100)	0.020 ***		0.006	
wave_2 (coef*100)	0.017 ***		0.027 ***	
Common Language	0.100	0.090	0.450 ***	0.458 ***
Colony	1.329 ***	1.284 ***	0.691 ***	0.700 ***
Common Border	0.110	0.094	-0.162	-0.186 *
Passive, logit				
LnGDP_{acq}	-0.752 ***	-0.728 ***	-0.666 ***	-0.668 ***
LnGDP_{tar}	-0.163 **	-0.197 ***	-0.706 ***	-0.712 ***
LnGDPpc_{acq}	-1.748 ***	-1.726 ***	-1.360 ***	-1.323 ***
LnGDPpc_{tar}	0.358 ***	0.344 ***	-0.476 ***	-0.461 ***
LnDist_{ij}	0.924 ***	0.940 ***	0.781 ***	0.762 ***
$\text{Ln}(\text{GDP}_{ROW})$	0.335	0.476	-1.220 ***	-1.947 ***
Fin. Open_{Acq}	-0.252 ***	-0.223 ***	-0.150 ***	-0.163 ***
Fin. Open_{Tar}	-0.028	-0.044	-0.043 **	-0.052 ***
Common Language‡	-1.456 ***	-1.384 ***	-0.930 ***	-0.862 ***
Colony‡	0.076	-0.044	-1.083 ***	-1.081 ***
Common Border‡	-0.257	-0.319	-0.459 ***	-0.396 ***
# of obs	160,503	179,319	160,503	179,319
Nonzero obs	2639	2678	2639	2678

Notes: Dependent variable is # of deals or value of deals
*, **, *** are 10%, 5%, 1% significance levels

Table 2.12: ZINB estimates, All and OECD

	Number of Deals		Value of Deals	
	All	OECD	All	OECD
Active, negative binomial				
LnGDP_{acq}	0.480 ***	0.606 ***	0.347 ***	0.480 ***
LnGDP_{tar}	0.631 ***	0.372 ***	0.372 ***	0.281 ***
LnGDPpc_{acq}	0.489 ***	0.159	0.139	0.074
LnGDPpc_{tar}	0.678 ***	2.078 ***	0.342 ***	2.105 ***
LnDist_{ij}	-0.526 ***	-0.485 ***	-0.285 ***	-0.333 ***
Fin. Open_{Acq}	0.072 ***	0.032	0.055 ***	-0.109
Fin. Open_{Tar}	0.062 ***	0.093 *	0.028	0.073
wave_1 (coef*100)	0.20 ***	-0.001	0.010 **	-0.005
wave_2 (coef*100)	0.06 ***	0.015 ***	0.022 ***	0.048 ***
Common Language	0.564 ***	0.391 ***	0.400 ***	0.454 ***
Colony	0.790 ***	0.975 ***	0.454 ***	0.708 ***
Common Border	-0.115 ***	-0.367 ***	-0.136 *	-0.354 **
Passive, logit				
LnGDP_{acq}	-0.498 ***	0.171	-0.680 ***	-0.624 ***
LnGDP_{tar}	-0.375 ***	-1.161 ***	-0.708 ***	-0.552 ***
LnGDPpc_{acq}	-1.267 ***	-7.665 ***	-1.354 ***	-2.254 ***
LnGDPpc_{tar}	-0.062	2.915 *	-0.601 ***	-0.139
LnDist_{ij}	0.889 ***	1.195 ***	0.787 ***	0.664 ***
Fin. Open_{Acq}	-0.148 ***	-0.716 ***	-0.161 ***	-0.138 *
Fin. Open_{Tar}	-0.062 **	0.337	-0.072 **	-0.069
Common Language	-1.129 ***	-16.62	-1.143 ***	-0.469 **
Colony	-0.963 ***	-1.223	-1.022 ***	-1.704 ***
Common Border	-1.536 ***	-15.07	-0.441 ***	0.159
# of obs	255,468	2918	255,468	2981
Nonzero obs	5290	1461	5290	1461

Notes: Dependent variable is # of deals or value of deals; source for # of deals "all" estimates is Table 3 (baseline column); source for value of deals "all" estimates is Brakman et al. (2008a) Table 2.
*, **, *** are 10%, 5%, 1% significance levels

Appendix C - Gravity Equation Derivation

Theoretical derivation of the gravity equation (see Anderson and van Wincoop, 2003)

Assumptions:

- All goods are differentiated by place of origin (the Armington assumption)
- Each economy is specialized in the production of only one good
- The supply of each good is fixed
- Preferences are homothetic, and are approximated by a CES function

Consumers in economy j maximize:

$$\max U = \left(\sum_i \beta_i c_{ij}^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}} \tag{D1}$$

$$s.t \quad \sum_i p_{ij} c_{ij} = y_j \tag{D2}$$

where
c_{ij} = consumption by economy j consumers of goods from economy i
σ = elasticity of substitution between all goods
β_i = positive distribution parameter
y_j = Nominal income of region j residents
p_{ij} = price of economy i goods for region j consumers

assuming

$$p_{ij} = p_i \tau_{ij}$$

where
p_i = exporter i supply price (net of transport costs)
τ_{ij} = transport costs

and

$$x_{ij} = p_i c_{ij} + (\tau_{ij} - 1) p_i c_{ij} = p_{ij} c_{ij}$$

with

x_{ij} = nominal value of exports from i to j; and $y_i = \sum_j x_{ij}$

substituting (D2) into (D1) and maximizing yields the nominal demand for economy i goods by economy j consumers:

$$x_{ij} = \left(\frac{\beta_i p_i \tau_{ij}}{p_j}\right)^{1-\sigma} y_j \tag{D3}$$

with the consumer price index of economy j being

$$p_j = \left[\sum_i \left(\beta_i p_i \tau_{ij}\right)^{1-\sigma}\right]^{\frac{1}{1-\sigma}} \tag{D4}$$

the sum of i's exports to all countries must equal i's GDP as follows:

$$y_i = \sum_j x_{ij} = \sum_j \left(\frac{\beta_i p_i \tau_{ij}}{p_j}\right)^{1-\sigma} y_j = (\beta_i p_i)^{1-\sigma} \sum_j \left(\frac{\tau_{ij}}{p_j}\right)^{1-\sigma} y_j \tag{D5}$$

substituting (D5) into (D3) yields

$$x_{ij} = \frac{y_i y_j}{y^w} \frac{\left(\frac{\tau_{ij}}{p_j}\right)^{1-\sigma}}{\sum_j \left(\frac{\tau_{ij}}{p_j}\right)^{1-\sigma} \phi_j} \tag{D6}$$

where $y^w = \sum_j y_j$ world nominal income, and $\frac{y_j}{y^w} = \phi_j$. Now lets define

$$\Pi_i = \left[\sum_j \left(\frac{\tau_{ij}}{p_j}\right)^{1-\sigma} \phi_j\right]^{\frac{1}{1-\sigma}} \tag{D7}$$

substituting (D7) into (D6) yields

$$x_{ij} = \frac{y_i y_j}{y^w} \left(\frac{\tau_{ij}}{\Pi_i p_j}\right)^{1-\sigma} \tag{D8}$$

and substituting (D5) into (D4) yields

$$p_j = \left[\sum_i \left(\frac{\tau_{ij}}{\Pi_i}\right)^{1-\sigma} \phi_i\right]^{\frac{1}{1-\sigma}} \tag{D9}$$

assuming symmetric trade barriers ($\tau_{ij} = \tau_{ji}$), (D7) and (D9) can be solved yielding

$$p_i = \Pi_i \tag{D10}$$

with

$$p_j^{1-\sigma} = \sum_i p_i^{\sigma-1} \phi_i \tau_{ij}^{1-\sigma} \qquad \forall j$$

substituting (D1) in (D8) yields the gravity equation

$$x_{ij} = \frac{y_i y_j}{y^w} \left(\frac{\tau_{ij}}{p_i p_j} \right)^{1-\sigma} \tag{D11}$$

Chapter 3

Unlocking the Value of M&As

3.1 Introduction

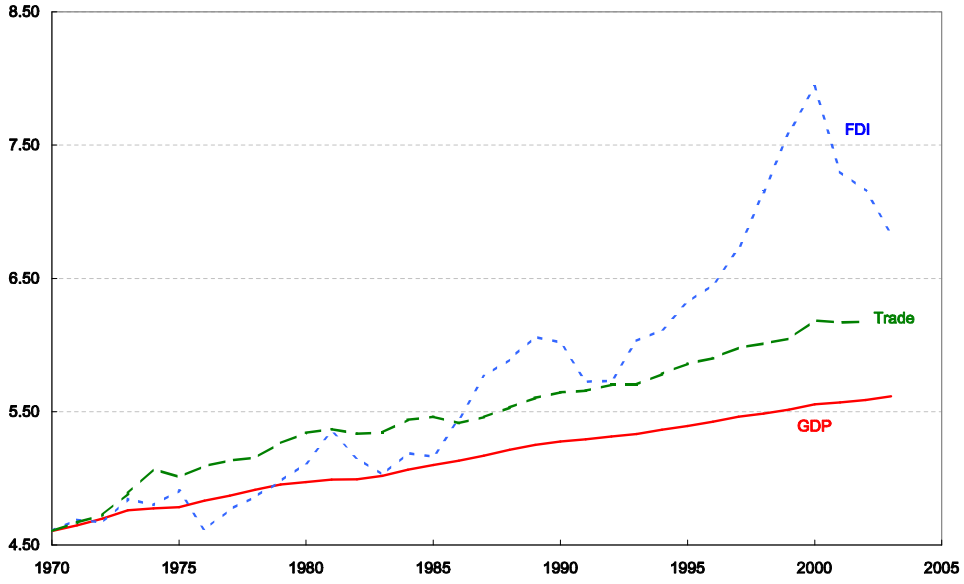
Two[1] waves stand out in the history of globalization. The first wave took place in-between 1850-1913, and the second wave started after WWII and continues until this day (see Bordo et al., 2003); moreover, Baldwin (2006) characterizes globalization in terms of two great unbundlings. In his view, during the first wave and much of the second wave, the fall in transportation costs and the removal of trade barriers enabled international specialization, by spatially unbundling production from consumption[2]. With the second unbundling, the start of which Baldwin (2006) dates at around 1980-1990, production itself is increasingly geographically separated; that is, it is no longer the case that production takes place under a single roof. In this light, new technologies enable firms to relocate certain stages of the production process to other countries.

As Figure 3.1 shows, throughout the past 15 years the growth rate of FDI has surpassed the growth rates of both world GDP and world trade. This increased importance of FDI has led to an enthralling and relatively new research agenda that tries to explain the existence of multinational enterprises or MNEs (see for example Navaretti and Venables, 2004; Helpman, 2006; Brakman and Garretsen, 2008). A key feature of these models is the role of trade barriers or, in general, economic distance in determining FDI, since distance related variables are crucial for understanding FDI patterns. For example, if FDI is mainly market seeking, then larger trade costs will stimulate FDI. If, on the other hand, FDI is factor-cost seeking, then higher trade barriers will reduce FDI, since it would be more expensive to re-import

[1] This chapter is co-authored with Steven Brakman, Harry Garretsen, and Charles van Marrewijk.
[2] This is the standard or textbook view of globalization.

intermediate products. Given that most FDI continues to take place between developed economies, the dominant motive for FDI seems to be the market-seeking motive.[3] This last observation presents us with a puzzle, since the fall in trade barriers during the last two decades (e.g. EU integration) should have led to a reduction of market-seeking FDI (see Neary, 2007, 2008). As we have argued and as Figure 3.1 illustrates, the opposite seems true (i.e. FDI has become more important).

Figure 3.1: Growth of World GDP, FDI and Trade (constant 2000$; index, 1970 = 100; log scale)



Neary (2008) identifies and analyzes possible explanations for this puzzle. His first argument is that FDI might not only be market seeking (in a bilateral sense), but can be of the "export-platform" type; that is, firms are looking for a central location from which to serve a set of closely related and integrated countries. The inclusion of these so-called "third country" effects may explain why increased EU integration stimulates FDI in the EU, especially from the USA (thereby bypassing EU-US trade costs that would be incurred if the goods were to be exported from the USA to the EU). There is evidence that these "third country" effects or spatial linkages are important (Garretsen and Peeters, 2008), but also evidence that they are not (Blonigen et al., 2007). The second explanation, and one that constitutes the starting point for the present paper, follows from an application of Neary's GOLE (General Oligopolistic Equilibrium) model (see Neary, 2007, 2008). This model deals

[3]The share of FDI to developing countries is increasing (see Barba Navaretti and Venables, 2004).

with the aforementioned puzzle, given that it addresses the stylized fact that most FDI flows are in the form of cross-border Mergers & Acquisitions (hereafter, M&As). Therefore, in this paper and using a "new" gravity model approach, we will test the relevance of distance and other determinants for the value of cross-border M&As.[4] Based on the Thomson data set for M&As, we use an extensive data set with firm-specific M&A data for 211 countries during the period 1986-2005.

The goal of the research herein is twofold; first, we want to establish whether our gravity approach can help unlock the value of cross-border M&As. To date, and despite its quantitative importance (see section 2), gravity studies have mainly focused on trade or on FDI in general, and have largely ignored cross-border M&As (for exceptions, see Evenett, 2004; di Giovanni, 2005). Second, and related to the abovementioned observations, by focusing on the distance variable and on financial openness, we seek to find out if our gravity model can help us improve our understanding of the relationship between economic and financial integration on the one hand and the value of cross-border M&As on the other hand. Our main results are that the market-seeking motive is important and that market size variables related to the target increase the value of M&As. Furthermore, the results are consistent with Neary's (2008) prediction, insofar as the distance variable reflects integration. Concerning financial openness, the results are more ambiguous for countries that are already active in M&A activity; however, for the 'passive' group (i.e. countries that do not engage in M&A activity), financial openness seems to be a prerequisite to attract cross-border M&As.

The paper evolves as follows. In section 2 we present several stylized facts on FDI, and in particular on cross-border M&As; furthermore, we outline[5] how the recent rise of FDI, dominated by cross border M&As, can be reconciled with the ostensible increase of economic and financial integration. Section 3 discusses our estimation strategy and introduces our gravity model by focusing on the "zero-gravity" problem. Section 4 presents our estimation results, and section 5 concludes.

3.2 Cross-Border M&As and Neary's model

Looking at FDI as a broad category obscures the fact that most FDI is in the form of cross-border M&As. Figure 5.2 shows a decomposition of FDI and it is clear that M&As constitute the bulk of FDI, whereas Greenfield FDI is considerably less important than M&As. The main difference between these two forms of investments, is that in an M&A "control of

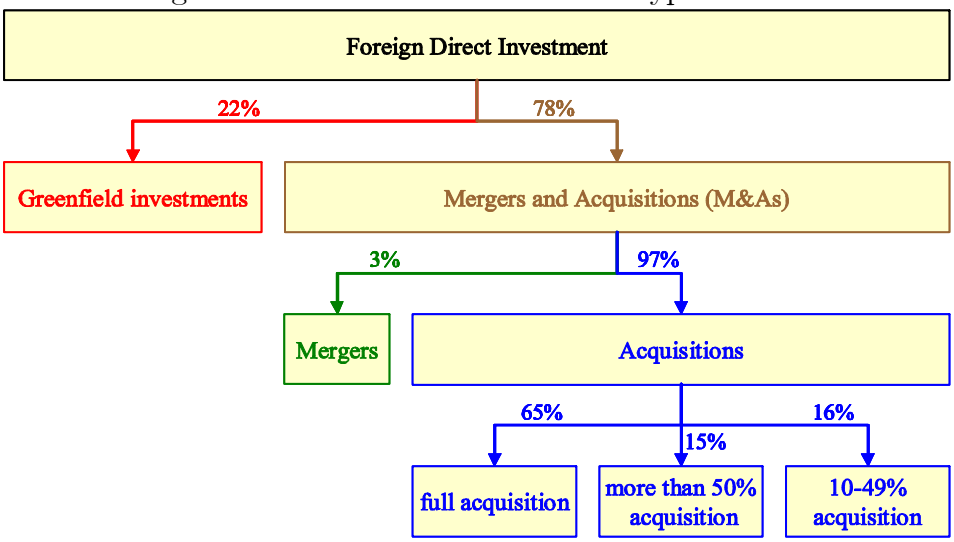
[4] A companion paper Garita and van Marrewijk (2008) analyzes the number of deals.

[5] Using Neary (2007, 2008) as our main point of reference.

assets and operations is transferred from a local to a foreign company, the former becoming an affiliate of the latter" (UNCTAD, 2000). However, it has not been until recently that models in international economics have started to emerge, which enable us to understand M&As. Neary's (2007) model takes the standard partial equilibrium explanations for M&As one step further. In the literature, two motives are mentioned to explain M&As: a strategic motive (reduce competition) and an efficiency motive (cost reductions).

An explanation of cross-border M&As, however, also has to explain the cross-border part of the deals. In this vein, trade theory suggests that comparative advantage could be included in a full or general equilibrium explanation of M&As. A different but equally novel line of research in international economics (see Navaretti and Venables, 2004; Helpman, 2006 for surveys), seeks to understand the conditions under which firms decide to locate (part of) their production abroad (the so-called off-shoring decision).

Figure 3.2: Distribution of different types of FDI



When they decide to offshore, some firms do so under the flag of FDI, while other firms go for outsourcing. However, in this stream of literature, and in contrast to its empirical relevance illustrated in Figure 5.2, the analysis of cross-border M&As is still in its infancy. Our overview of the structure of cross-border M&As is based on Thomson's Global Mergers and Acquisitions Database, which provides the best and most extensive data source for M&As to date. Its main sources of information are financial newspapers and specialized agencies like Bloomberg and Reuters. Our Thomson data set begins in 1979 and ends in August 2006. Initially, the focus in the Thomson data set was on American M&As;

nevertheless, systematic M&A data for almost all countries is available from the mid 1980s onwards. Therefore, in presenting the data we will focus on the period 1986 – 2005.

We collected information on all completed /unconditional cross-border M&As with a deal value of at least $10 million, which means that for the period 1986 – 2005 we have 27,541 cross-border M&As. As Table 3.1 shows, most M&As result in effective ownership; furthermore, about 50% of M&As take place within the same sector (i.e. horizontal M&As). We can only speculate as to why this might be the case; however, as previously mentioned,[6] a likely explanation is that most cross-border M&A are market seeking. That is, taking one of your competitors out of the market reduces competition and raises profits. Furthermore, buying a firm outside one's own sector might be motivated by an efficiency motive, since it can be profitable to control a larger part of the value chain. Nonetheless, and regardless of the strategy, both motives increase profits after the take-over.

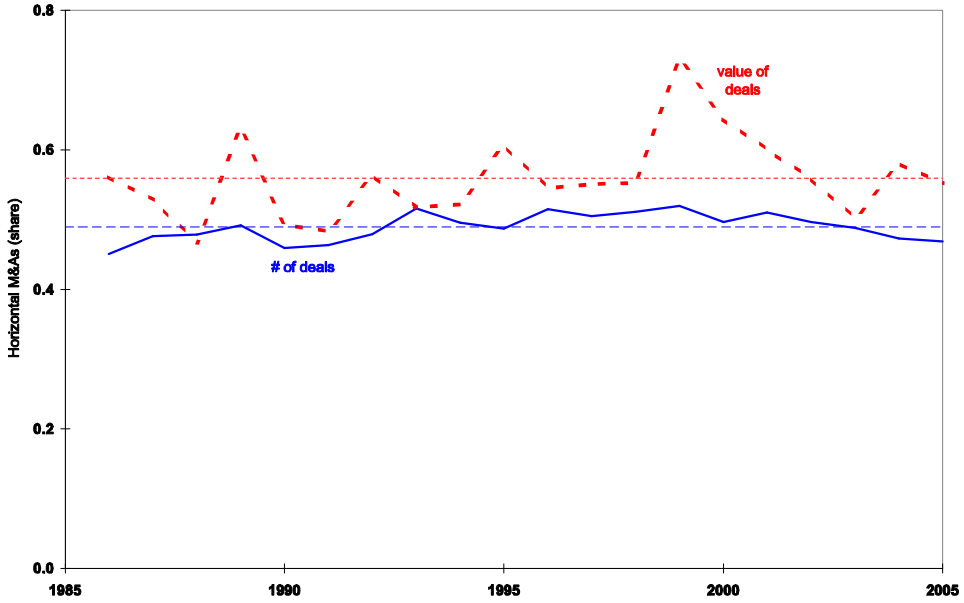
Table 3.1: Overview of Cross-Border Mergers and Acquisitions

	# of deals	per cent
Cross-Border M&As, 1986-2005	27,541	
Effective M&As	27,461	99.7
Avg. % of shares acquired		75.5
Avg. % of shares owned after deal		80.1
# of tender offers	2,476	9.0
# of horizontal M&As (2-digit level)	13,605	49.4

Figure 3.3 illustrates that the share of horizontal M&As is very stable over time when measured by the number of deals; fluctuating around the average of 49 per cent (ranging from a low of 45.1 per cent in 1986 to a high of 51.5 per cent in 1996). Horizontal M&As are substantially more volatile when measured using the value of the deals; fluctuating around the average of 56 per cent, ranging from a low of 46.7 per cent in 1988 to a high of 73.0 per cent in 1999. Those who would argue that the value of horizontal M&As has declined since 1999, are obviously obscuring the fact that the 1999 peak is not representative over a longer time horizon. Moreover, the 2005 value of horizontal M&As of 55.2 per cent is very close to the long run average of 56 per cent. Using either measure we find little support

[6] Of course, strategic motives may (also) be at work here.

Figure 3.3: Horizontal (2-digit) Cross-border M&As; share of total



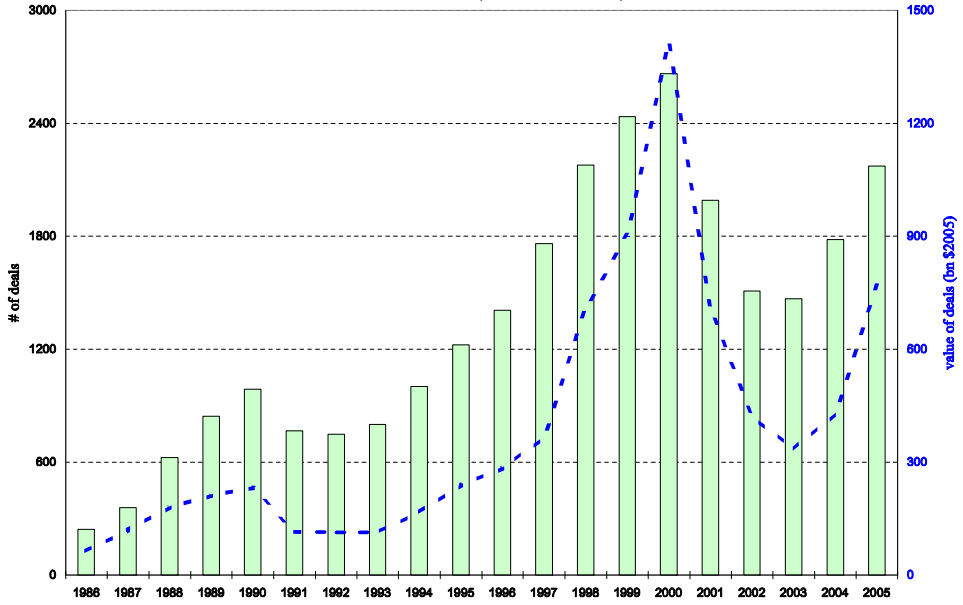
for the argument that the share of horizontal M&As is declining. From an international economics perspective, the question arises whether existing theories of FDI can explain the dominance of horizontal FDI. On the face of it, this is not the case; assuming that during our sample period (1985-2005) trade costs (broadly defined) have decreased, the standard FDI model predicts that horizontal FDI should have become less important. In terms of the proximity-concentration trade-off, a drop in trade costs shifts the trade-off in favor of exporting. That is, with falling trade costs foreign markets might be better served by exporting instead of (horizontal) FDI. However, (Neary, 2008) shows that falling trade costs might nonetheless explain the rise of horizontal FDI, and thus the bulk of cross-border M&As[7] (see Appendix A for a summary of Neary's (2007, 2008) reasoning). The puzzle put forward in this paper depends on whether or not trade integration has indeed taken place. Although the exact measurements of trade costs is difficult (see Anderson and van Wincoop, 2003), the consensus is that transportation costs in the period under consideration have declined in general (Hummels, 2007).

A historical perspective reveals another remarkable characteristic of (cross-border) M&As. Figure 3.4 depicts the evolution of all cross-border M&As over time for our sample period, both measured as the number of deals and the value of deals (in constant 2005 $ bn., using the US GDP deflator). Clearly, even when looking at this relatively short period, there is

[7]Once we allow for an FDI model that explicitly incorporates the possibility of cross-border M&As, instead of merely looking at FDI as a black box (Neary, 2007).

substantial variation over time, with periods of rapid increase followed by periods of rapid decline. This corroborates the more general finding that M&As come in waves. To date, five merger waves have been identified throughout the 20th century, three of which took place after WWII (Andrade et al., 2001). The third wave took place in the late 1960-early 1970s. The fourth wave ran from (about) the mid 1980s until 1990. The fifth wave started around 1995 and ended in 2000 with the collapse of the "new economy". Figure 3.4 also shows that a subsequent sixth (still ongoing) merger wave started in the 21st century around 2003.[8]

Figure 3.4: Cross-Border M&As (1985-2005); # of Deals and Value



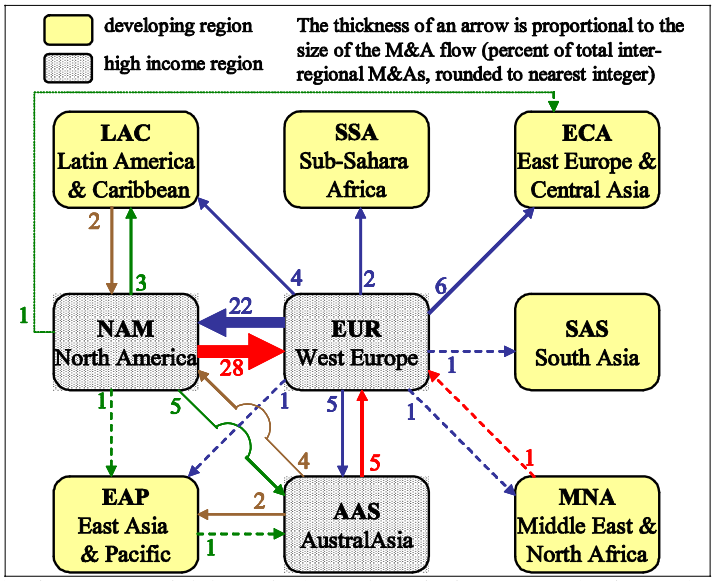
In rounding-up our stylized facts discussion regarding cross-border M&As, we focus on inter-regional M&As in our sample. This gives us an indication of the extent to which different global regions interact with one another by delivering more valuable cross-border M&As. Figure 3.5 depicts the inter-regional cross-border connections for the period 2001-2005, rounded to the nearest integer. Since there are 9 global regions there are 72 different inter-regional connections.[9] First, we note that by far the largest and most valuable inter-regional M&A flows are from North America to Western Europe (28 per cent of the total), and vice versa (22 per cent of the total). Together these two flows account for 50 per cent of

[8] Note the the data used in tis paper covers the fourth and fifth waves.

[9] Only 19 of these flows appear in Figure 3.5, since the remaining 53 flows are rounded to 0 percent. This already indicates that "zero" observations are important in the sample, and are important for the estimates (see section 3.4).

the value of all inter-regional M&As and clearly dwarf all other inter-regional connections. Second, Western Europe is buying substantial amounts of firms in Eastern Europe (6 per cent). Third, the other high-income region connections (between EUR and AAS and between NAM and AAS) are considerable (about 5 per cent each). Fourth, M&A flows toward East Asia and the Pacific are still rather small, certainly compared to the attention this receives in the popular media. Fifth, and finally, Western Europe is the M&A center of gravity *vis-à-vis* creating more value; in other words, it is the only global region with connections to all other regions.[10]

Figure 3.5: Inter-regional Cross-border M&As; % of total (value), 2001-2005



NB: all *intra*-regional M&As are excluded from the figure. The total value of *inter*-regional M&As is 100 per cent; only flows above 0.5 per cent are shown (this excludes 53 of 72 possible arrows).

3.3 Methodology and Estimation Strategy

By now, a standard tool to deal with distance-related cross-border economic interactions like bilateral trade or FDI flows is the gravity model first developed by Tinbergen (1962). After a period in which the gravity model fell out of fashion for its lack of theoretical underpinnings (despite its empirical success), the gravity model has seen a revival as it has become clear that it can be derived from (a wide range of) theoretical models with solid micro-foundations (see Anderson and van Wincoop, 2003, for a trade survey, and Bersgtrand and Egger, 2007

[10] This is reminiscent of the role of Western Europe in inter-regional trade flows (van Marrewijk, 2007).

for an FDI foundation). Notwithstanding this revival, the number of models that produce a gravity-type specification is relatively large, thereby making the gravity model inapt as a tool to discriminate between different theoretical trade models (see Helpman et al., 2008). Our aim, however, is not to discriminate between theoretical trade models but merely to test the relevance of distance and other determinants for the value of bilateral M&A flows, specifically in relation to the hypotheses derived by Neary (2007 and 2008).

Econometrically, the estimations of the gravity model, be it for trade flows or FDI flows, are not without problems, given the "zero gravity problem" (see Anderson and van Wincoop, 2003; Feenstra, 2004; Bosker, 2008; Bosker and Garretsen, 2008). For our purposes this is an important issue, since the percentage of observations with "zero M&As", depending on the precise (sub) sample, is quite high (see next section). The existence of zero M&A flows constitutes a problem because the often-preferred log-linearized gravity specification is undefined for observations with zero flows. A proper handling of these zero observations is therefore important (see Silva and Tenreyro, 2006; Helpman et al., 2008; Garita and van Marrewijk, 2008). Furthermore, OLS estimates of the log-linearized model may be both biased and inefficient in the presence of heteroskedasticity.

A common method of handling the "zero-gravity" problem thus far has been to simply discard the zeros by truncating the sample and using OLS, or simply to add a constant factor to each observation on the dependent variable and then estimate the gravity model through a Tobit estimation. These approaches are correct as long as the zero values are randomly distributed; however, if they are not random, as is often the case, then it introduces selection bias (see Bosker, 2008). Until recently, this problem has been ignored in gravity studies, but it can be handled by means of sample selection correction. In this light, Helpman et al. (2008) propose a theoretical model rationalizing the zero trade flows and propose estimating the gravity equation with a correction for the probability of countries to trade. In order to estimate their model, they apply a two-step estimation technique (similar to sample selection models commonly used in labor economics). To implement the new estimator, one needs to find an appropriate exclusion restriction for identification of the second stage equation, which can be quite difficult.[11]

[11] One could argue that the 2-step estimation procedure used by Helpman et al. (2008) is not introduced for econometric purposes (i.e. to deal with the "zero gravity problem"), but follows directly from their preferred trade-theoretical model (in the tradition of Melitz, 2003). In the latter model, it is crucial to distinguish between the probability of trade and the volume of trade (or in their terminology, between the extensive and intensive margins of trade), which is exactly what their 2-step-estimation procedure does. As to the use of the exclusion restriction (a variable that in the 1st (probit) step is included to influence the probability of trade but is not part of the 2nd step as it is meant not to influence the volume of trade), Helpman et al. (2008) use religion (see also Bosker and Garretsen, 2008).

The above suggestion to distinguish between two groups of observations to adequately deal with the zero-flow problem can be done in an empirically flexible way by using a zero-inflated approach (see Lambert, 1992), which is similar to the Heckman Selection model but does not rely on the associated normality assumptions, and is therefore less restrictive (Heckman, 1974 and Razin and Sadka, 2007 for an application on FDI).[12] The zero-inflated model assumes that there are two latent groups of observations; an observation in the (always 0) Passive Group has an outcome of 0 with a probability of 1; an observation in the (potentially) Active Group might have a zero outcome, but there is a positive probability that there is a non-zero outcome. This process is developed in two stages:

1. model membership into the latent groups (Active or Passive) using a logit model and observed characteristics (so-called "inflation" variables because they "inflate" the number of zeros).

2. model the value of cross-border M&As for observations in the Active Group via a Poisson or negative binomial regression.

The Poisson model imposes the restriction that the conditional mean of the dependent variable is equal to its variance. The negative binomial regression model generalizes the Poisson model by introducing an individual unobserved effect into the conditional mean which allows for over-dispersion in the data (see Blonigen, 1997b; Coughlin and Segev, 2000; Wooldridge, 2002; Barry et al., 2003). The approach can also use it for our non-integer data (the value of M&As; see Santos-Silva and Tenreyro, 2006, for trade flows). The Vuong (1989) test can be used for selection of non-nested models; repeated application provides overwhelming support in favour of the zero-inflated negative binomial (ZINB) model, such that we restrict attention below to reporting the ZINB results.

3.4 Estimation Results

3.4.1 Baseline estimations

To test the model outlined above from the acquirer's perspective, we analyze the value of cross-border M&As undertaken by firms in a specific country for the period 1986-2005. For both the acquiring and target country, and in line with the gravity approach, we include GDP and $GDPpercapita$ as explanatory variables. As with bilateral trade, we expect

[12] This avoids the difficulty of trying to find an appropriate exclusion restriction (Helpman et al., 2008).

$GDP(percapita)$ to have a positive effect on cross border M&A for both the acquiring (exporting) and target (importing) country. The bilateral (geodesic) distance ($Dist_{ij}$) between countries i and j is also included. As previously mentioned, cross-border M&As come in waves. Therefore, in order to deal with this feature we construct two variables $Wave_1$ and $Wave_2$, where the former (latter) denotes the number of cross border M&As in the year (two years) prior to time t.

The variables *common language*, *colony*, and *common border* capture the transaction- or information costs associated with cross border M&As; they are taken from the CEPII database. We also include (de jure) *financial openness* in our baseline specification, since cross border M&As are an example of international capital flows. This variable (measured by the Chinn-Ito index) is thought to have a positive effect on M&As, in particular where it concerns the financial openness of the target country.[13] As we explained in section 2, set against the recent FDI models, the rise of FDI (in casu, cross border M&As) is not easy to reconcile with ongoing economic integration (falling trade or transport costs). Apart from economic integration, and different from gravity models of international trade, we expect that cross border M&As are also (or even mainly) driven by the degree of financial integration and/or other financial variables. When changing our baseline specification we will include various financial variables. In addition, we incorporate regional fixed effects (for the regions introduced in Figure 3.5). Note, that these region fixed effects are different from the country-based distance effects.

Table 3.2 presents the estimation results for our baseline 'gravity' model. The columns related to the active group give estimates for the group for which the observations are not necessarily zero, the columns with respect to the passive group give estimates for the always-zero group of observations. With the exception of the wave variables, we use the same characteristics for both groups. The signs for these variables are often opposite, which makes intuitive sense. Note that we have indeed a very large number of zero observations. The estimation results for the Active Group in Table 3.2 show that typical gravity variables help to explain the value of cross-border M&As between countries. A larger market size as measured by GDP leads to a higher value of M&As both from an acquirer and target perspective. GDP per capita only has a positive effect on the value of M&As from the target perspective, indicating that market size is not the only income effect determining the value of M&As, but also that the distribution of income is important.

[13] See Chinn and Ito (2002, 2005) for more details on this index.

Table 3.2: Baseline Estimates (Zero-Inflated Negative Binomial)

	Active Group (Neg Bin Model)		*Passive Group (Logit Model)*	
	Coef.	irr_A	Coef.	irr_P
LnGDP_{acq}	0.347 ***	100	-0.680 ***	-74
LnGDP_{tar}	0.372 ***	110	-0.708 ***	-76
LnGDPpc_{acq}	0.139		-1.354 ***	-79
LnGDPpc_{tar}	0.342 ***	49	-0.601 ***	-50
LnDist_{ij}	-0.285 ***	-22	0.787 ***	-95
Financial Openness				
Acquirer	0.055 ***	9	-0.161 ***	-23
Target	0.028 *	5	-0.072 ***	-11
wave_1	0.01 **	7		
wave_2	0.02 ***	31		
Common Language‡	0.400 ***	49	-1.143 ***	35
Colony‡	0.454 ***	58	-1.022 ***	10
Common Border‡	-0.136 *	-13	-0.441 ***	-6
# of obs	255,468		Nonzero obs	5290
McFadden adj. R^2	0.241		Reg. dummies	yes

Notes: Dependent variable is value of deals; *, **, *** are 10%, 5%, 1% significant levels. For at least the 10% significance level, the coefficients can be interpreted as elasticities; irr = $100[exp(\beta * StdDev) - 1]$ = % change in expected count for StdDev increase in X; ‡ the irr is calculated as $100[exp(\beta) - 1]$ for a discrete change of 0 to 1; StdDev = standard deviation of X; the wave coefficients are multiplied by 100.

Regarding financial openness, we find that it is a prerequisite for M&As to take place (the variables are strongly significant in the column for the Passive Group), but that it is relatively unimportant in determining the value of M&As. Capital mobility seems to act as a cut-off or hurdle variable; without capital mobility M&As are unlikely to occur at all.

What is the relation between economic integration (here approximated by the distance variable D_{ij}) and M&As? If distance proxies increased economic integration, then we find evidence in favor of Neary's GOLE model. That is, increased economic integration increases competition in the home market, which lowers profits of the target (and acquirer) and makes

a takeover more likely. In addition, increased integration makes profits of the acquirer in foreign markets larger, which also increases the probability of a takeover, but profits of the target also increase, which makes the probability smaller. The balance of all effects is positive (Neary, 2008). The negative sign of the distance variable is consistent with this line of reasoning; that is, the lower the distance, the higher the value of M&As. In addition, the wave variables further validate Neary's model, since initial M&As stimulate further M&As because profits in the market increase with less competitors.

These effects of economic integration are enlarged by the results for common language and colony; if integration takes place in already culturally integrated areas (e.g. areas that share the same jurisprudence), then this further stimulates M&As. In contrast to the standard effect for trade flows, the effect of a common border on M&A activity is negative. This is in line with expectations; that is, given that an M&A takes place, the negative border effect indicates that firms want to create some distance. For nearby economies, alternative modes of entry are available. For example, at close range, exporting might be more profitable than setting up shop in foreign markets.

3.4.2 Baseline estimation sensitivity analysis

We also investigated the robustness of our results, by augmenting our baseline model with several "pull" and "push" factors that are considered important determinants of cross-border M&As (see Appendix B for estimation results). That is, while "push" factors may help explain the timing and magnitude of new capital inflows, "pull" factors may be necessary to explain the regional distribution of new capital flows (Montiel and Reinhart, 1999).

US interest rates

An important "push" factor is the level of interest rates in the home country, which we will proxy by the 10-year US bond yield. In the literature, there is a consensus that high real interest rates hamper FDI, other things being equal. Albuquerque et al. (2005) find a significant and negative relation between the US T-Bill yield and FDI inflows; moreover, Calvo et al. (2001) show that FDI inflows to emerging markets are lower during US monetary tightening. Our results are in line with the literature as far as the Active Group is concerned, since the US yield coefficient is negative and a one standard deviation increase in US interest rate decreases the value of M&A activity by over 10%.

Market structure

Unlike the surge in capital inflows to developing countries in the 1970s and early 1980s, which were almost exclusively driven by commercial bank lending, capital inflows in the 1990s were associated with a stern rise in bond and equity portfolio inflows; much of these inflows have gravitated towards larger equity emerging markets, bypassing many countries (Montiel and Reinhart, 1999). An often given explanation is that markets must overcome a threshold set of requirements (market size, accounting standards, disclosure requirements, transparency, etc.) in order to attract capital flows. Accordingly, we augment our model by including the lagged stock market capitalization as proxy for the size of the domestic capital market (an indirect proxy for the size of the banking sector, see Montiel and Reinhart, 1999); we lag this variable to take care of any endogeneity issues. The results are mixed. For the Active Group only the acquirer seems to benefit from a more developed stock market. For the passive group, the odds of remaining in this group decrease for the acquirer if the capitalization of the stock market increases; however, the odds of remaining inactive in M&As increase for the target as the stock market capitalization increases. We also add the Transparency International corruption index[14] (labeled Transparency) to proxy for the business environment in the local economy. The results are in line with expectations, where a less uncertain business environment will increase the value of M&As for the target country in the Active Group by 28%.[15] For the Passive Group, making the business environment more transparent reduces the odds of remaining in this group for both acquirer and target by about 10%.

Macroeconomic Distortions

We use the black market premium as a measure of expected depreciation of the local currency and an index of distortions. Expected depreciation affects investment through several channels: (1) it is more attractive to hold foreign assets; (2) economic uncertainty is higher; (3) foreign capital goods are cheaper to import at the official rate. The first two points suggest a negative relationship between the black market premium and foreign investment while the third point implies the opposite. As an indicator of distortions, the black market premium should be negatively correlated with the value of M&As. This is in line with our findings as a one standard deviation increase in the black market premium reduces the value of cross-border M&As for the Active Group by 30% and increases the odds of remaining in

[14] The Transparency International corruption index ranges from 0 = highly corrupt, to 10 = highly clean.
[15] The coefficient of the acquirer is not significant.

the Passive Group by 44%. Regarding the link between FDI and exchange rate uncertainty[16] the literature is mixed, as volatility can both discourage FDI (Cushman, 1988) and produce an incentive to hedge against exchange rate shocks through foreign location (Aizenman, 1991). In our comprehensive study we find that these two forces balance as exchange rate volatility does not influence the value of cross-border M&As (in contrast to Blonigen, 1997b; Froot and Stein, 1991).

Table 3.3: Outside Market Potential ZINB estimates

	Active Group (Neg Bin Model)		*Passive Group (Logit Model)*	
	Coef.	irr_A	Coef.	irr_P
LnGDP_{acq}	0.269 ***	67	-0.650 ***	-71
LnGDP_{tar}	0.160 ***	35	-0.668 ***	-72
LnGDPpc_{acq}	0.252 **	33	-1.497 ***	-82
LnGDPpc_{tar}	0.410 ***	60	-0.690 ***	-54
$\text{Ln(out. mrkt pot}_{tar}\text{)}$	-0.284 ***	13	0.784 ***	119
LnDist_{ij}	-0.260 ***	-20	0.915 ***	121
Financial Openness				
Acquirer	0.050 **	8	-0.122 ***	-18
Target	0.009		-0.058 ***	-9
wave_1	0.008			
wave_2	0.024 ***	34		
Common Language‡	0.411 ***	51	-0.831 ***	-57
Colony‡	0.618 ***	5	-1.135 ***	-68
Common Border‡	-0.094 *	-1	-0.289 ***	-25
# of obs	184,702		Nonzero obs	3012
McFadden adj. R^2	0.232		Reg. dummies	yes

Notes: Dependent variable is value of deals; *, **, *** are 10%, 5%, 1% significant levels. For at least the 10% significance level, the coefficients can be interpreted as elasticities; $irr = 100[exp(\beta * StdDev) - 1]$ = % change in expected count for StdDev increase in X; ‡ the irr is calculated as $100[exp(\beta) - 1]$ for a discrete change of 0 to 1; StdDev = standard deviation of X; the wave coefficients are multiplied by 100.

[16] As measured by the coefficient of variation of the bilateral exchange rate.

3.4.3 Market Potential

Following Blonigen et al. (2007), we introduce the market potential of the target country in our model among the set of regressors to analyze the economic platform motive for M&As. This variable is the distance weighted GDP of countries surrounding the target country, where distance is measured in proportion to the distance between Brussels and Amsterdam (173 km, in accordance with Blonigen et al, 2007).[17] We find a negative effect for the market potential variable; this implies that a different market is more attractive as a target destination than as an attractive export platform. We conclude that the export platform FDI motive is not sustained by our data (see Table 3.3), in line with Blonigen et al. (2007). The other variables are consistent with our earlier findings; thereby indicating that GDP of the target is the dominant variable.

3.4.4 The baseline model over time

We are not only interested in the impact of distance (or economic integration) and financial openness on the value of cross border M&As as such, but also on changes in this relation over time. We thus estimated our baseline model in four 5-year periods (1986-1990, 1991-1995, 1996-2000, and 2001-2005). As previously mentioned, our working assumption is that both economic and financial integration have increased in our sample period; therefore, we expect the effect of distance to change over time. Firstly, Table 3.4 shows that the results do not differ markedly from those for the total sample period regarding the impact of GDP (per capita), waves, common border, and common colony. The distance coefficients for both the Active and Passive Groups have increased in absolute value terms (these results are similar to Disdier and Head, 2008), implying that distance has become more important over time. This holds in particular for the Passive Group coefficients. Two observations are important. First, why has the measured impact effect of distance increased over time? To understand this, one must realize that the estimated coefficients are reduced form estimates of equilibrium M&A decisions under changing circumstances. Economic integration is a local phenomenon (EU integration focuses on neighboring European countries, and similarly for NAFTA, ASEAN, etc.) which increases the attractiveness of nearby M&As, to which firms respond by engaging more in local M&A activity.

[17] Distances below 173 Km are set equal to the normalization. Note that GDP of the target country itself is *not* included in this outside measure, as it is already included separately.

Table 3.4: Baseline ZINB estimates, separate periods

	1986-1990	*1991-1995*	*1996-2000*	*2001-2005*
Active				
LnGDP_{acq}	0.354 ***	0.287 ***	0.365 ***	0.368 ***
LnGDP_{tar}	0.423 ***	0.333 ***	0.417 ***	0.302 ***
LnGDPpc_{acq}	0.039	0.078	0.257 ***	-0.066
LnGDPpc_{tar}	-0.354 **	0.300 ***	0.400 ***	0.338 ***
LnDist_{ij}	-0.256 ***	-0.269 ***	-0.361 ***	-0.279 ***
Financial Openness				
Acquirer	0.084	0.064	0.225 ***	-0.023
Target	0.112 *	0.128 ***	0.024	0.000
wave_1	0.03	0.03 *	0.01	0.02
wave_2	0.05	0.05 *	0.03 ***	0.05 **
Common Language‡	0.170	0.223 *	0.587 ***	0.457 ***
Colony‡	0.748 ***	0.341 **	0.574 ***	0.390 **
Common Border‡	-0.213	-0.252 *	-0.165	0.112
Passive				
LnGDP_{acq}	-0.595 ***	-0.649 ***	-0.691 ***	-0.727 ***
LnGDP_{tar}	-0.671 ***	-0.662 ***	-0.718 ***	-0.765 ***
LnGDPpc_{acq}	-1.378 ***	-1.032 ***	-1.365 ***	-1.534 ***
LnGDPpc_{tar}	-1.167 ***	-0.703 ***	-0.497	-0.566 ***
LnDist_{ij}	0.564 ***	0.772 ***	0.793 ***	0.910 ***
Financial Openness				
Acquirer	-0.327 ***	-0.263 ***	-0.116 ***	-0.074 ***
Target	-0.196 ***	-0.124 ***	-0.024	0.006
Common Language‡	-0.716 ***	-1.246 ***	-1.094 ***	-1.244 ***
Colony‡	-1.145 ***	-1.041 ***	-1.018 ***	-1.038 ***
Common Border‡	-0.269	-0.500 ***	-0.399 ***	-0.438 **
# of obs	68,209	67,514	88,972	57,683
Nonzero obs	667	1235	2242	1288
McFadden adj. R^2	0.272	0.254	0.232	0.235
Region Dummies	yes	yes	yes	yes

Notes: Dependent variable is value of deals; *, **, *** are 10%, 5%, 1% significant levels

This, in turn, is reflected in the increased impact of distance on M&As, particularly for the Passive Group. Second, what do the changed coefficients imply? Briefly, the higher impact of distance on M&As indicates that economic integration (reduction of distance, broadly measured) is becoming more important over time. The effects of common language follow a similar pattern as the distance coefficients; that is the coefficients increase over time (in absolute value) for both the Active and Passive Groups. This implies that as countries have moved to reduce transaction (business) costs between them, the value of cross-border M&As has increased accordingly. The effect of colony on the value of M&As decreases over time for the Active Group, whereas it remains relatively stable over time for the Passive Group. Regarding the common border effect, we find that it is relatively stable over time, but only affects the Passive Group. In other words, as economic integration increases, and countries start to 'share' a common border, the odds of remaining in the Passive Group decrease considerably (approximately by 40%).

3.5 Conclusion

Most FDI is between similar (developed) countries, predominantly in the form of M&As. This suggests that the market-seeking motive of FDI dominates the data. At present, this seems to be the consensus in the literature. The empirical puzzle identified by Neary (2008) is that we have witnessed both an increase of cross-border M&As and increased economic integration. If the market-seeking motive indeed dominates the data, then these facts provide us with a puzzle because increased integration should result in less M&As as markets can more easily be served through exports instead of FDI. Neary (2008) suggests two solutions to the puzzle: the export platform motive for FDI, and the profit-seeking motive that follows from his own GOLE model. In the former case, FDI in a specific country gives access to surrounding markets, whereas in the latter case M&As take place through a subtle balancing act between higher profits and higher takeover costs. Using a zero-inflated negative binomial model, we find evidence against the export platform motive; target GDP is more important than distance weighted GDP of surrounding countries (with a negative impact). We also find in favor of Neary's (2008) GOLE model for M&As in a world characterized by increased economic integration. Furthermore, we find evidence in support of financial openness as a necessary condition for M&As to take place; once a threshold level is reached, financial openness has little impact on the value of M&As. Last, but not least, we confirm the impact of ongoing economic integration on M&As, which like trade flows are becoming more local (impact of distance increases over time).

3.6 Appendix Chapter 3

This appendix presents a simple way to look at a cross-border M&A. However, the reader must keep in mind that this box is more of a way of organizing thoughts, rather than a complete model but it illustrates the key issues involved (for a complete model, the reader is referred to Neary, 2007). Let "1" and "0" indicate the post- and pre-merger situation, respectively. Then the gain of taking over a Home firm, by a foreign firm is given by:

$$G_H = [\pi_1^*(n-1, n^* \mid .) - \pi_0^*(n, n^* \mid .)] - \pi_0(n, n^* \mid .) > 0 \tag{3.1}$$

The first term (in square brackets) relates to the gain in profitability from reduced competition by taking over the domestic firm; that is, the number of domestic firms is reduced by 1, from n to $(n-1)$. The number of foreign firms, n^*, does not change. The second term indicates the cost of acquiring the domestic firm. This is a function of profits of the target – the more profitable a target is the higher the take-over costs – and the cost of financing the take-over. If the acquirer has a windfall gain, for example, higher share prices due to the takeover, the finance costs are smaller The $\mid$. indicates that other variables are taken as given (for example cost factors that reflect differences in relative costs). The balance between the change in profits and the costs involved in the M&A determines whether a takeover will take place. The influence of the takeover cost is such that cost differences cannot be too large; otherwise, taking over a firm that is much more efficient than the acquirer is becomes too expensive.

How can economic integration (a fall in trade costs) go along with an increase in M&As? First, as Neary (2008) points out, the export platform argument offers an explanation that is in line with the proximity-concentration models that seek to explain horizontal FDI. Firms gain access to an integrated region by investing in one of its members in order to gain access to the overall region. However, in the context of equation (1), economic integration also leads to more horizontal FDIs, especially M&As, but for a different reason. For example, a reduction in trade barriers increases the profitability of an exporting firm in the foreign market, and this makes a takeover more likely. Moreover, a reduction in trade barriers also increases competition in both markets, since this increases the likelihood of a cross-border M&A (as takeover costs become smaller), but on the other hand, it also reduces profits of the acquirer, and this makes a takeover less likely. The balance is such that more economic integration leads to more M&As (Neary, 2007 and 2008)

Appendix B - Sensitivity Analysis

Table 3.5: Exchange Rate Variability ZINB estimates

	Active Group (Neg Bin Model)		*Passive Group (Logit Model)*	
	Coef.	irr_A	Coef.	irr_P
LnGDP_{acq}	0.309 ***	85	-0.672 ***	-74
LnGDP_{tar}	0.351 ***	101	-0.711 ***	-76
LnGDPpc_{acq}	0.213 **	28	-1.383 ***	-80
LnGDPpc_{tar}	0.339 ***	49	-0.600 ***	-51
LnDist_{ij}	-0.271 ***	21	0.837 ***	104
Financial Openness				
Acquirer	0.024		-0.173 ***	-24
Target	0.045 **	7	-0.097 ***	-14
Exchange rate var.	0.036		0.055	
wave_1	0.015 ***	10		
wave_2	0.019 ***	27		
Common Language‡	0.610 ***	84	-1.050 ***	-65
Colony‡	0.387 ***	47	-1.092 ***	-67
Common Border‡	-0.225 *	-20	-0.311 ***	-27
# of obs	211,256		Nonzero obs	3921
McFadden adj. R^2	0.249		Reg. dummies	yes

Notes: Dependent variable is value of deals; *, **, *** are 10%, 5%, 1% significant levels. For at least the 10% significance level, the coefficients can be interpreted as elasticities; $irr = 100[exp(\beta * StdDev) - 1]$ = % change in expected count for StdDev increase in X; ‡ the irr is calculated as $100[exp(\beta) - 1]$ for a discrete change of 0 to 1; StdDev = standard deviation of X; the wave coefficients are multiplied by 100.

Table 3.6: US yield ZINB estimates

	Active Group (Neg Bin Model)		*Passive Group (Logit Model)*	
	Coef.	irr_A	Coef.	irr_P
LnGDP_{acq}	0.343 ***	99	-0.671 ***	-74
LnGDP_{tar}	0.383 ***	115	-0.710 ***	-76
LnGDPpc_{acq}	0.399 ***	59	-1.333 ***	-79
LnGDPpc_{tar}	0.341 ***	49	-0.587 ***	-50
LnDist_{ij}	-0.290 ***	-22	0.765 ***	92
Financial Openness				
Acquirer	0.078 ***	13	-0.178 ***	-25
Target	0.039 **	6	-0.089 ***	-13
US yield	-11.975 ***	-13	11.858 ***	15
Common Language‡	0.421 ***	52	-1.131 ***	-68
Colony‡	0.493 ***	64	-1.011 ***	-64
Common Border‡	-0.114		-0.366 ***	-31
# of obs	282,378		Nonzero obs	5432
McFadden adj. R^2	0.241		Reg. dummies	yes

Notes: Dependent variable is value of deals; *, **, *** are 10%, 5%, 1% significant levels. For at least the 10% significance level, the coefficients can be interpreted as elasticities; $irr = 100[exp(\beta * StdDev) - 1]$ = % change in expected count for StdDev increase in X; ‡ the irr is calculated as $100[exp(\beta) - 1]$ for a discrete change of 0 to 1; StdDev = standard deviation of X; the wave coefficients are multiplied by 100.

Table 3.7: Black Market Premium ZINB estimates

	Active Group (Neg Bin Model)		*Passive Group (Logit Model)*	
	Coef.	irr_A	Coef.	irr_P
LnGDP_{acq}	0.330 ***	85	-0.638 ***	-70
LnGDP_{tar}	0.379 ***	103	-0.643 ***	-70
LnGDPpc_{acq}	0.424 **	64	-1.386 ***	-80
LnGDPpc_{tar}	0.256 ***	35	-0.579 ***	-49
LnDist_{ij}	-0.289 ***	-23	0.611 ***	73
LnBMP				
Acquirer	-0.160 ***	-26	-0.194 ***	43
Target	0.003		-0.202 ***	45
wave_1	0.054 ***	42		
wave_2	-0.037 ***	-26		
Common Language‡	0.332 ***	39	-0.898 ***	-59
Colony‡	0.556 ***	74	-1.046 ***	-65
Common Border‡	-0.248 **	-22	-0.185 ***	-17
# of obs	94,182		Nonzero obs	2595
McFadden adj. R^2	0.226		Reg. dummies	yes

Notes: Dependent variable is value of deals; *, **, *** are 10%, 5%, 1% significant levels. For at least the 10% significance level, the coefficients can be interpreted as elasticities; $irr = 100[exp(\beta * StdDev) - 1]$ = % change in expected count for StdDev increase in X; ‡ the irr is calculated as $100[exp(\beta) - 1]$ for a discrete change of 0 to 1; StdDev = standard deviation of X; the wave coefficients are multiplied by 100.

Table 3.8: Transparency ZINB estimates

	Active Group (Neg Bin Model)		*Passive Group (Logit Model)*	
	Coef.	irr_A	Coef.	irr_P
LnGDP_{acq}	0.338 ***	98	-0.677 ***	-75
LnGDP_{tar}	0.410 ***	129	-0.694 ***	-75
LnGDPpc_{acq}	0.204 *	27	-0.963 ***	-67
LnGDPpc_{tar}	0.103 *	13	-0.426 ***	-39
LnDist_{ij}	-0.295 ***	-22	0.763 ***	92
Financial Openness				
Acquirer	0.107 ***	19	-0.248 ***	-32
Target	0.042 *	7	-0.104 ***	-15
Transparency				
Acquirer	-0.008		-0.070 ***	-19
Target	0.083 ***	28	-0.062 ***	-17
wave_1	0.002			
wave_2	0.023 ***	31		
Common Language‡	0.408 ***	50	-1.095 ***	-67
Colony‡	0.452 ***	57	-0.981 ***	-63
Common Border‡	-0.199 **	-18	-0.492 ***	-6
# of obs	197,785		Nonzero obs	4002
McFadden adj. R^2	0.246		Reg. dummies	yes

Notes: Dependent variable is value of deals; *, **, *** are 10%, 5%, 1% significant levels. For at least the 10% significance level, the coefficients can be interpreted as elasticities; $irr = 100[exp(\beta * StdDev) - 1]$ = % change in expected count for StdDev increase in X; ‡ the irr is calculated as $100[exp(\beta) - 1]$ for a discrete change of 0 to 1; StdDev = standard deviation of X; the wave coefficients are multiplied by 100.

Table 3.9: Lagged Stock Market Capitalization ZINB estimates

	Active Group (Neg Bin Model)		*Passive Group (Logit Model)*	
	Coef.	irr_A	Coef.	irr_P
LnGDP_{acq}	0.356 ***	106	-0.654 ***	-74
LnGDP_{tar}	0.242 ***	101	-0.739 ***	-78
LnGDPpc_{acq}	-0.144		-0.931 ***	-69
LnGDPpc_{tar}	0.343 ***	49	-0.632 ***	-52
LnDist_{ij}	-0.286 ***	-22	0.769 ***	93
Financial Openness				
Acquirer	0.064 **	11	-0.203 ***	-28
Target	0.030		-0.116 ***	-17
SMC_{t-1}				
Acquirer	0.005 ***	22	-0.008 ***	-28
Target	0.001		0.003 ***	10
Common Language‡	0.252 ***	29	-0.972 ***	-62
Colony‡	0.571 ***	77	-0.972 ***	-62
Common Border‡	-0.279 **	-24	-0.442 ***	-36
# of obs	203,960		Nonzero obs	3608
McFadden adj. R^2	0.252		Reg. dummies	yes

Notes: Dependent variable is value of deals; *, **, *** are 10%, 5%, 1% significant levels. For at least the 10% significance level, the coefficients can be interpreted as elasticities; $irr = 100[exp(\beta * StdDev) - 1]$ = % change in expected count for StdDev increase in X; ‡ the irr is calculated as $100[exp(\beta) - 1]$ for a discrete change of 0 to 1; StdDev = standard deviation of X; the wave coefficients are multiplied by 100.

Chapter 4

Financial Openness and Economic Growth

4.1 Introduction

The[1] nexus between international financial openness and economic growth continues to be one of the most hotly debated issues among international macroeconomists.[2] That is, do financially open economies grow faster than financially closed economies precisely because of their openness to international financial markets? Economic theory suggests that financial openness should foster economic growth; however, empirical work thus far has not found robust evidence for the existence of such a link (Kose et al., 2006). Nevertheless, the extent of financial market liberalization around the world has increased significantly, especially since the 1980's, where a key driver has been the increased movement of capital flows seeking the opportunity to diversify risk, while earning a higher return. At the same time, many economies have stimulated capital inflows by deregulating domestic financial markets, and by introducing market-oriented reforms. In particular, many developing and transition economies have eliminated obstacles on international financial transactions, while at the same time have relaxed regulations on domestic financial markets. In other words, policies have been aimed at increasing financial markets openness to foreign investors Furthermore, the increase in the degree of integration of world capital markets has been accompanied by

[1] This chapter is co-authored with Leon Bettendorf.

[2] The fairly recent exchange between J. Stiglitz and K. Rogoff, through a series of papers and open letters, is perhaps the most clear example of the *hotness* of this debate.

a significant increase in private capital flows to developing countries.[3]

4.1.1 Theoretical Developments

The neoclassical textbook world shows that there are positive impacts on growth of integrating into international capital markets (especially for developing countries). For example, more financial openness and closer financial integration can strengthen the domestic financial system leading to more investment, to a more efficient allocation of capital, and therefore to higher economic growth (Levine, 2001). Furthermore, theoretical arguments supporting financial openness revolve around (a) the benefits of international risk sharing for consumption smoothing; and (b) the beneficial impact of capital flows on investment and growth. These potential benefits can be particularly large for some types of capital inflows, most notably foreign direct investment (FDI). Therefore, it has been suggested by some prominent economists that it is important to differentiate between *short-term* (e.g. portfolio and debt) and *long-term* capital flows (i.e. FDI); where the latter type of investment brings with it not only resources, but also technology, access to markets, and knowledge. As emphasized by Berthélemy and Démurger (2000), Borensztein et al. (1998), and Grossman and Helpman (1991), FDI may smooth the transfer of "know-how" (i.e. managerial and/or technological); furthermore, it can improve the skills composition of the labor force as a result of "learning by doing" effects, investment in formal education, and on-the-job training. In addition, as discussed by Markusen and Venables (1999), although FDI may reduce the profits of local firms due to increased competition in the product and factor markets, spillover effects through linkages to supplier industries may reduce costs, raise profits, and stimulate investment. Moreover, and perhaps more importantly, FDI is also not as volatile, and therefore not as troublesome as short-term flows that can quickly come in and out of a country.[4] However, arguments against the economic wisdom of openness to global capital flows have also been put forward. This side of the debate argues that financial openness is not necessarily welfare enhancing in the presence of distortions such as trade barriers, weak institutions, and/or macroeconomic imbalances; or if information asymmetries affect the proper working of the international financial markets (Bhagwati, 1998; Rodrik, 1998; Rodrik and Subramanian, 2008; Stiglitz, 2000).

Financial openness might not only have an ambiguous effect on the level but also on the volatility of growth rates. On the one hand, access to world capital markets expands

[3]Even though now-a-days the "Lucas Paradox" (i.e. capital flowing up-hill from developing countries to developed countries) seems to be the prominent effect (see Prasad et al., 2007).

[4]see Stiglitz (2000) for a further development of this argument.

investors' opportunities for diversification and provides higher risk-adjusted rates of return. From the point of view of the target country, there are many large benefits as well. For example, it has been argued that access to international financial markets gives countries the opportunity to borrow in order to smooth consumption vis-à-vis adverse shocks, and that international risk sharing can improve growth and welfare gains (Obstfeld, 1994a). On the other hand, the literature recognizes that volatility risk, quick reversals, and sudden stops in capital flows in the context of highly integrated financial systems may represent a significant cost, where concerns associated with such reversals were heightened by the financial crises of the 1990s (Agenor, 2001). In fact, both domestic and international financial liberalization appear to have been associated with costly financial crises as documented by, for example, Williamson and Mahar (1998). Although skewed fundamentals played a major role in all of the abovementioned crises, they have also highlighted the instability of financial markets and the risks that the unhindered movement of capital flows across borders can create for economies with "fragile" financial systems, and for economies that lack the proper "rules of the game".

4.1.2 Empirical Developments

Despite a rich body of contributions, the empirical literature is still lacks convincing power with regard to the financial openness-growth nexus. As is stated by Prasad et al. (2003) "Theoretical models have identified a number of channels through which international financial integration can promote economic growth in developing countries... However, there is as yet no clear and robust empirical proof that the effect is quantitatively significant". Empirical work by Grilli and Milesi-Ferretti (1995), Kraay (1998), Edison et al. (2002), and Fratzscher and Bussiere (2004) have not confirmed a robust long-term impact of financial openness on growth. Their results support Rodrik (1998) who concluded that "capital controls are essentially uncorrelated with long-term economic performance". On the other hand, there are studies that do find a significant positive relationship between financial openness (i.e. openness to the international capital markets) and economic growth such as Quinn (1997) and Edwards (2001). More recent research has aimed to shed more light on the question whether the positive growth impact of financial openness depends on thresholds (or third factors) such as a sound institutional framework and macroeconomic stability, but the results remained mixed at best (Arteta et al., 2001; Edison et al., 2002; Klein, 2005).[5]

[5]Detailed reviews of the literature on financial openness and growth have been given by Eichengreen (2002), Edison *et al.* (2002), Kose *et al.* (2006), and Henry (2007).

The theoretical literature that focuses on FDI identifies a number of channels through which FDI inflows will be beneficial to the target economy; yet, the empirical literature has had difficulties identifying these advantages. Most prominently, a large number of applied papers have looked at the FDI-growth nexus, but their results have been far from conclusive (see Durham, 2004; Li and Liu, 2005). The consensus that is slowly emerging is that FDI is beneficial when compared to other types of capital inflows such as portfolio investment, though there are economists who maintain that even this beneficial effect is limited. Additional research efforts have been devoted to identifying other features unique to FDI, such as the positive externalities it generates, or its relative permanence (see Aitken and Harrison (1999) for a micro-level study, and Fernadez-Arias and Montiel (1996); Sarno and Taylor (1999) for macro-level studies). Notwithstanding these fragile conclusions, most countries continue to vigorously pursue policies aimed at attracting FDI inflows.

One reason why empirical research on the financial openness-growth linkage has remained inconclusive thus far is that different approaches and econometric techniques make it difficult to synthesize the results. That is, although the majority of economists begin the analysis by using cross-country growth models, plenty of noticeable differences linger with regard to the countries in the sample, the period under investigation and the econometric procedure employed (see Henry, 2007 for more evidence). Current research of the effects of financial openness on economic growth have typically employed a neoclassical growth model; where economists regress the growth rate of real per capita GDP on a measure for the degree of international financial openness or integration, in addition to a vector of control variables which proxy fundamental growth drivers.[6] However, the econometric models employed in previous studies differ in two important respects: on the one hand with regard to the measures for the degree of financial openness (eithe *de jure* or *de facto*), and on the other hand with regard to the econometric model (specification).

As previously mentioned, financial integration has also (at times) been proxied by the extent to which legal (or *de jure*) restrictions hinder the free movement of capital (Quinn, 1997; Rodrik, 1998; Chinn and Ito, 2005). However, it has also been argued that financial openness should be measured quantitatively (i.e. *de facto*)[7] (see Kose et al., 2006). The second main issue that needs to be considered, relates to the specification of the empirical model. Some authors like (Edison et al., 2002) have made the case that short-term policy

[6] Such as the investment to GDP ratio, human capital, plus a convergence effect.

[7] Kraay (1998) is one of the first to have used gross capital flows and stocks divided by GDP as a quantitative proxy for the extent of international financial integration. As mentioned by Henry (2007), Eichengreen (2001) and Edison et al. (2002) discuss the advantages of both approaches, where the choice of the econometric model is a question of both convenience and data availability.

variables like the budget deficit and inflation need to be included (Henry, 2007). Others researchers have controlled for a more restrictive set of long-run determinants of economic growth *ala* Levine and Renelt (1992) and Barro and Sala-i-Martin (1995). In particular, the inclusion of the investment ratio has proved problematic. Edison et al. (2002), Eichengreen and Leblang (2003), Klein and Olivei (1999), and Bekaert et al. (2006), did not include it (on grounds of potential endogeneity), although the motivation has not always been discussed in detail[8]. Other authors such as Rodrik (1998), Edwards (2001), Klein (2003) and Arteta et al. (2001) explicitly control for different investment ratios at the beginning of the period under investigation (Henry, 2007). In this respect, a key issue for any development strategy is to identify the fundamentals that may allow economies (especially developing economies) to exploit the upside, while minimizing the downside risks often linked with the openness of their financial markets (i.e. open capital accounts).

4.1.3 The Road Ahead

The point of departure for the research herein, is the link between financial openness and growth, where the empirical literature (thus far) suggests that the link between financial openness and growth is weak. In this light, we employ a bias corrected LSDV (least squares dummy variable) dynamic panel data model. The results indicate that for developing countries, financial openness and FDI have a positive direct effect on economic growth, in addition to an indirect effect through capital accumulation. Furthermore, M&As stimulate economic growth through capital accumulation. The results for developed economies are markedly different; for example, financial openness does not have a significant effect on growth, either directly or indirectly. However, FDI and portfolio inflows, both contribute directly to economic growth. Moreover, portfolio inflows also have an effect on growth through capital accumulation. The one similarity between developed and developing economies is that FDI positively affects TFP in both cases.

The paper is organized as follows: Section 2 describes the data and the econometric methodology. Section 3 explores the link between financial openness and economic growth. Section 4 explores the link between FDI and investment through crowding-in or crowding-out effects. Section 5 decomposes capital flows as has been argued by Stiglitz (2000) and others; while section 6 breaks-down FDI into its largest component (M&As). Section 7 discusses absorptive capacity and "relative backwardness" issues, while section 8 closes the research circle by looking at the effects of financial openness, FDI, and portfolio flows on

[8]For a detailed exposition of this issue, see Bosworth and Collins (2003).

TFP. Last but not least, section 9 summarizes and concludes.

4.2 Data & Econometric Methodology

In order to test the hypothesis that financial openness and different types of capital flows have a positive effect on economic growth, we use a dynamic panel-data methodology to estimate a cross-country growth regression. This methodology makes it possible to control for country-specific effects, and to account for the potential endogeneity of the explanatory variables, in addition to autocorrelation and persistence. This section first describes the variables used in the regressions. Five-year periods are employed, which is typical in the literature, since five years is thought to be long enough to eliminate business-cycle effects, but short enough to capture important changes that occur over time for a particular country (see Henry, 2007). Moreover, we decompose the sample into developing and developed countries (see the list of countries in Appendix A).

In order to estimate the relationship between financial openness, different types of capital flows and economic growth, it is important to control for other determinants of the growth rate. The control variables were selected based on the literature as important determinants of growth rates across countries.[9] Two of the variables employed in the estimation are measured at the beginning of each period, and thus proxy for initial conditions in a neoclassical model. The first variable is log of per capita income, where the neoclassical model suggests that the coefficient on per capita income represents the convergence effect and thus should be negative. The second variable is a measure of the stock of human capital, where growth theory predicts that the coefficient on the stock of human capital should be positive. For the human capital variable we use the secondary school completion rate of people over 25 years of age, taken from the Barro and Lee data set.[10]

4.2.1 LSDVC Dynamic Panel Estimation

Situations in which past decisions impact on current behavior are ubiquitous in economics; that is, a crucial issue in empirical economics, strictly related to the modeling of dynamic relationships, is the presence of unobserved country heterogeneity and characteristics. Panel data sets, where the behavior of N cross-sectional units is observed over T periods, provide

[9] Appendix D describes the variables used in the analysis, while Appendix E gives the summary statistics.

[10] The other control variables are measured as averages over each five-year period, spanning 1970-2005, and are drawn from a number of sources detailed in Appendix D.

a solution to accommodating the joint occurrence of dynamics and unobserved "individual" heterogeneity in the issue of interest. Since Nickell (1981), where it is shown that the Least Square Dummy Variable estimator (LSDV) is not consistent for finite T in autoregressive panel data models, a number of consistent instrumental variable (IV) and Generalized Method of Moments (GMM) estimators have been proposed in the econometric literature as an alternative to LSDV. Anderson and Hsiao (1982) suggest two simple IV estimators that, upon transforming the model in first differences in order to eliminate the unobserved individual heterogeneity, use the second lags of the dependent variable (either differenced or in levels), as an instrument for the differenced one-time lagged dependent variable. Arellano and Bond (1991) propose a GMM estimator for the first differenced model, which, relying on a greater number of internal instruments is more efficient than the Anderson and Hsiao estimator. Moreover, Blundell and Bond (1998) observe that with highly persistent data first-differenced IV or GMM estimators may suffer of a severe small sample bias due to weak instruments. As a solution, they suggest a "system GMM estimator" with first-differenced instruments for the levels-equation and instrument in levels for the first-differenced equation.

A weakness of IV and GMM estimators is that their properties hold for large N, so they can be severely biased and imprecise in panel data consisting of a small number of cross-sectional units (as is often the case in most macro panels). On the other hand, Monte Carlo studies (Arellano and Bond, 1991; Kiviet, 1995; Judson and Owen, 1999) demonstrate that LSDV, although inconsistent, has a relatively small variance compared to IV and GMM estimators. Moving from the foregoing considerations, an alternative approach based upon the bias-correction of LSDV has recently become popular in the econometric literature. Nickell (1981) shows the inconsistency of the LSDV estimator for $N \longrightarrow +\infty$, which is bounded of order T^{-1}. Kiviet (1995) uses more robust techniques to approximate the small sample bias found in the LSDV estimator; he includes expressions in the order of $N^{-1}T^{-1}$. As Bruno (2005) explains, "the approximation terms evaluated at the unobserved true parameter values, are of no direct use for estimation; therefore, to make them operational he suggests replacing the true parameters by the estimates from some consistent estimators". Monte Carlo evidence therein shows that the bias-corrected LSDV estimator (LSDVC) performs better than the IV-GMM estimators in terms of bias and root mean squared error. In addition, Judson and Owen (1999) strongly support the bias-corrected LSDV estimator for macroeconomic panels (i.e. when N is small).

As Bruno (2005) exaplains, in Kiviet (1999), the bias expression is more accurate to include terms of at most order $N^{-1}T^{-2}$. Furthermore, Bun and Kiviet (2003), upon simplifying the approximations in Kiviet (1999), carry out Monte Carlo experiments showing

that the first order term of the approximation evaluated at the true parameter values is already capable of accounting for more than 90% of the actual bias. However, none of the above-mentioned procedures to correct the LSDV estimator is feasible for unbalanced panels. This gap is filled in Bruno (2005), where the bias approximations in Bun and Kiviet (2003) "are extended to accommodate unbalanced panels with a strictly exogenous selection rule" (Bruno, 2005) . Therefore, we will employ the bias corrected LSDV estimator for unbalanced panels as developed by Bruno (2005), where the correction we employ is based on the "system GMM" estimator as developed by Blundell and Bond (1998).

4.3 Financial Openness and Growth Results

The literature has long recognized that it is remarkably difficult to gauge the degree of the openness of the capital account (see Eichengreen, 2001; Edison et al., 2004). As Chinn and Ito (2005) argue, although there has been considerable effort aimed at capturing the extent and intensity of capital account controls, the consensus in the literature is that any such measures fail to capture (in its entirety) the complexity of capital controls for a number of reasons. First, usual measures of measuring capital controls (or financial openness) fail to account for the intensity of capital controls, where the most prominent example of such measures include dummy variables based upon the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). Second, the IMF dummy variables are too aggregated to illustrate the complexity of actual capital controls (see Edison et al. 2004); that is, capital controls can differ depending on the direction of capital flows as well as the type of financial transactions targeted. Thirdly, it is difficult to discriminate between *de jure* and *de facto* capital controls, since these policies are often implemented regardless of whether they actually control the volume and/or type of capital flowing into an economy. On the other hand, the private sector has the incentive to circumvent any capital account controls (and in many occasions they succeed); thereby cancelling out the expected effect of this type of regulation (Edwards, 1999; Chinn and Ito, 2005). Therefore, researchers often talk about financial integration among economies and interpret it as de facto restrictions on capital transactions (Chinn and Ito, 2005).

In here, we rely on the financial openness index developed by Chinn and Ito (2002), which is the first principle component of the four IMF binary variables found in the *AREAER*. One of the qualities of their index is that it measures the intensity of capital controls insofar as the intensity is correlated with the existence of other restrictions on international transactions (Chinn and Ito, 2005).

By the nature of its construction, one may argue that the Chinn-Ito index measures the extensiveness of capital controls, because it may not directly refer to the strictness of restrictions on cross-border transactions, but to the existence of different types of restrictions; however, measuring the extensiveness of capital controls may be a good proxy for the intensity of capital controls[11]. Another merit of this index, is its wide coverage of more than 150 countries and for the period 1970 through 2005 (see Chinn-Ito, 2002, 2005, and 2007 for a description of their index).

Table 4.1 reports the results of *de jure* financial openness on growth for developing economies. The first specification (1.1) shows that the three standard control variables have the expected sign, where growth benefits from a catching-up effect, a higher investment rate and a better educated labor force. The trade openness measure in (1.2) does not contribute significantly to growth; however, the financial openness index in (1.3) has a significant positive effect. In the last two columns we include interaction effects with the (ln) GDP per capita level.[12] The results that include trade openness do not improve after including a threshold effect (1.4). In contrast, the rejection of specification (1.3) against (1.5) means that the effect of financial liberalization is not uniform over the countries. Interestingly, the negative interaction coefficient points at an opposite threshold effect *vis-à-vis* the literature, since the marginal effect of financial openness is the largest for the "less wealthy" developing countries.[13] This argument is better illustrated through Figure 4.1, which depicts the total effect including the 95% confidence intervals.[14] Figure 4.1 also shows that an improvement in financial openness by, for example, easing capital account restrictions, stimulates growth significantly for those countries that have had (or have) an income level lower than 5000 PPP-2000$'s (i.e. $\ln GDPpc = 8.5$).

[11] The Quinn (1997) index as a measure of the intensity of capital controls. The Quinn index is a composite measure of financial regulation that ranges from 0 to 14, with 14 representing the least regulated and most open regime. According to Chin and Ito (2005), the correlation between the Quinn index and their index is 83.7%, suggesting that their index proxies the intensity of capital controls.

[12] Interaction effects with human capital and the black market premium yield similar results and are therefore not reported.

[13] See section 4.7, for more on this seemingly contradictory results *vis-à-vis* the literature.

[14] The total effect is calculated as $\beta_1 + \beta_2 \ln GDPpc$, where β_1 denotes the coefficient of $FinOpen$ and β_2 the interaction coefficient. For the moment $d[I/Y]/dFinOpen = 0$.

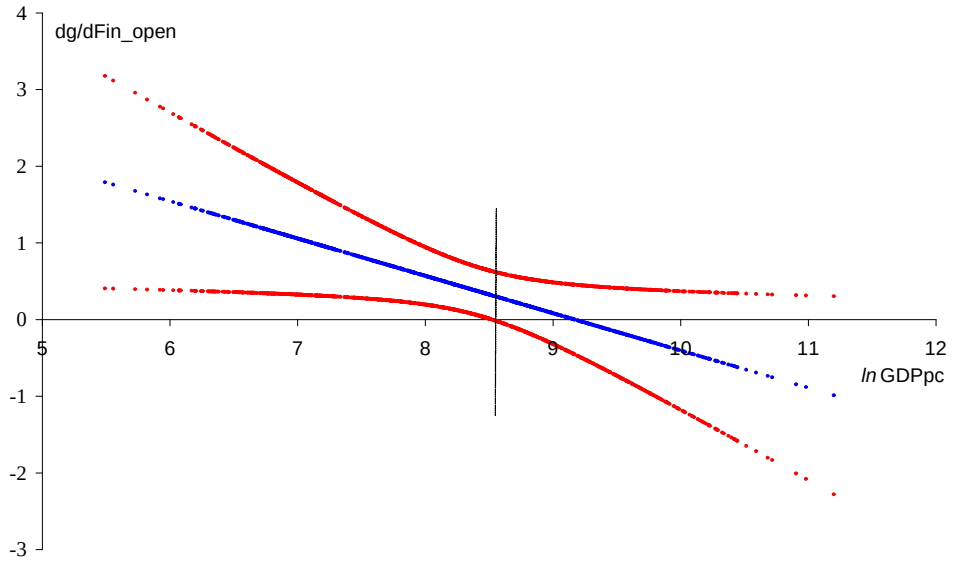
Table 4.1: Financial Openness and Growth for Developing Economies

Dependent variable: ΔlnGDPpc

	1.1	1.2	1.3	1.4	1.5
$\Delta ln\text{GDPpc}_{t-1}$	-0.047	-0.053	-0.055	-0.053	-0.077
	(0.048)	(0.048)	(0.057)	(0.049)	(0.054)
Initial lnGDPpc	-3.174 ***	-3.082 ***	-3.029 ***	-3.181 ***	-2.863 ***
	(0.742)	(0.732)	(0.715)	(0.825)	(0.702)
Investment rate	0.268 ***	0.282 ***	0.245 ***	0.282 ***	0.239 ***
	(0.059)	(0.066)	(0.060)	(0.065)	(0.059)
Human Capital	0.105 **	0.114 **	0.082	0.111 **	0.078
	(0.045)	(0.047)	(0.057)	(0.048)	(0.057)
Trade Openness		-0.008		-0.023	
		(0.010)		(0.063)	
Financial Openness			0.446 **		4.460 **
			(0.235)		(1.934)
Trade Open*lnGDPpc				0.002	
				(0.007)	
Fin Open*lnGDPpc					-0.487 **
					(0.228)
observations	433	433	424	433	424

Notes: bootstrapped standard errors in parenthesis
*,**,*** are 10%, 5%, 1% significance levels respectively

Figure 4.1: Marginal Effect of Financial Openness on Growth for Developing Economies (with 95% confidence interval)



The results are markedly different between developing and developed countries, see Table 4.2. As far as developed economies, the first specification (2.1) shows that for the three standard control variables growth only benefits significantly from a higher investment rate. However, *de jure* financial openness does not affect growth significantly, which is logical in view of the already "efficient" capital markets in developed countries. Furthermore, an increase in financial openness does not improve growth significantly even after taking into account threshold effects (see 2.3 and 2.5). However, for developed economies more trade openness stimulates growth (2.2 and 2.4).

Table 4.2: Financial Openness and Growth for Developed Economies

Dependent variable: ΔlnGDPpc

	2.1	2.2	2.3	2.4	2.5
ΔlnGDPpc$_{t-1}$	0.088	-0.091	0.091	-0.061	0.113 **
	(0.112)	(0.113)	(0.079)	(0.119)	(0.086)
Initial lnGDPpc	-1.551	-2.550 **	-2.331 **	-2.408 **	-2.314 **
	(1.096)	(1.045)	(1.085)	(1.059)	(1.076)
Investment rate	0.175 ***	0.223 ***	0.219 ***	0.213 ***	0.205 ***
	(0.065)	(0.064)	(0.078)	(0.064)	(0.075)
Human Capital	0.033	0.047 **	0.049 **	0.045 **	0.047 *
	(0.023)	(0.022)	(0.028)	(0.022)	(0.028)
Trade Openness		0.055 ***		0.480 **	
		(0.013)		(0.212)	
Financial Openness			0.145		3.781
			(0.182)		(4.904)
Trade Open*lnGDPpc				-0.040 **	
				(0.019)	
Fin. Open*lnGDPpc					-0.378
					(0.507)
observations	132	132	127	126	127

Notes: Bootstrapped standard errors in parenthesis
*,**,*** are 10%, 5%, 1% significant levels respectively.

In the above regressions, we estimated the effect of financial openness while controlling for changes in the investment rate; now lets turn to the impact of financial openness on the investment rate. The results shown in Tables 4.3 and 4.4 indicate that (*de jure*) financial openness has a positive effect on capital accumulation for both developing and developed economies. The estimate is robust to including government expenditures and a political rights index (see columns 3.2(4.2) and 3.3(4.3)). Furthermore, this effect does not significantly interact with human capital (see column 3.4(4.4)). These findings partially contradict Bonfiglioli (2007), who found no effect whatsoever of financial openness on capital accumulation for developing countries. However, she uses a dummy variable to proxy for financial openness and therefore, only allows for the possibility that countries are either completely open or completely closed.

Table 4.3: Effect of Financial Openness on (I/Y) for Developing Economies

Dependent variable: I/Y

	3.1	3.2	3.3	3.4
$(I/Y)_{t-1}$	0.584 ***	0.584 ***	0.567 ***	0.566 ***
	(0.056)	(0.056)	(0.056)	(0.055)
Human Capital	-0.139 ***	-0.139 ***	-0.141 ***	-0.131 ***
	(0.044)	(0.044)	(0.051)	(0.051)
Fin. Openness	0.662 ***	0.666 ***	0.752 ***	1.078 ***
	(0.176)	(0.176)	(0.284)	(0.414)
G/Y		-0.015	-0.001	-0.002
		(0.042)	(0.049)	(0.049)
Political Rights			-0.152	-0.157
			(0.152)	(0.152)
Fin. Openness*HC				-0.019
				(0.017)
observations	471	471	425	425

Notes: bootstrapped standard errors in parenthesis
*, **, *** are 10%, 5%, 1% significant levels respectively

Table 4.4: Effect of Financial Openness on (I/Y) for Developed Economies

Dependent variable: I/Y

	4.1	4.2	4.3	4.4
$(I/Y)_{t-1}$	0.603 ***	0.602 ***	0.593 ***	0.582 ***
	(0.088)	(0.074)	(0.088)	(0.091)
Human Capital	-0.074 ***	-0.068 ***	-0.068 ***	-0.031 ***
	(0.028)	(0.028)	(0.029)	(0.030)
Fin. Openness	0.586 **	0.560 **	0.560 *	1.256 ***
	(0.252)	(0.249)	(0.310)	(0.486)
G/Y		-0.091	-0.101	-0.185
		(0.154)	(0.146)	(0.156)
Political Rights			-0.367	-0.261
			(0.274)	(0.278)
Fin. Openness*HC				-0.022
				(0.014)
observations	127	127	118	118

Notes: bootstrapped standard errors in parenthesis
*, **, *** are 10%, 5%, 1% significant levels respectively

4.4 Capital Inflows and Investment

The following sections measure financial openness by *de facto* capital flows, in particular we distinguish between FDI inflows and portfolio inflows, where theory predicts that the former type of capital flows can simulate economic growth by augmenting capital accumulation and/or by improving total factor productivity (this section focuses on the first channel; see section 8 for the TFP channel). The growth impact of FDI flows has attracted renewed interest in the wake of the "recent" FDI boom; however, while the theoretical literature has pointed out that FDI may boost growth, the empirical literature shows considerable disagreement *vis-à-vis* the relevance of these impacts. On the one hand, firm-level data often find no significant productivity effects of FDI (see for example Fernadez-Arias and Montiel, 1996). On the other hand, macro-level studies tend to conclude that FDI boosts growth via higher productivity and/or physical investment (see World Bank, 2001), while other papers argue that this requires the target economy to satisfy certain thresholds (see Borensztein et al., 1998); moreover, other more recent studies are even less successful in establishing the

connection between FDI and economic growth (see Blonigen and Wang, 2004; Carkovic and Levine, 2005). Despite these ambiguities, private capital flows are generally found to have a significant impact on domestic investment, with the relationship being strongest for FDI and international bank lending, and weaker for portfolio flows (Bosworth and Collins, 1999).

Table 4.5: Effect of Different Capital Flows on (I/Y) for Developing Economies

Dependent variable: I/Y

	5.1	5.2	5.3	5.4	5.5
$(I/Y)_{t-1}$	0.525 ***	0.503 ***	0.502 ***	0.504 ***	0.474 ***
	(0.061)	(0.057)	(0.075)	(0.061)	(0.053)
Initial lnGDPpc	0.353	0.620	0.567	0.524	0.692
	(1.418)	(1.404)	(1.553)	(1.646)	(1.520)
Human Capital	-0.062	-0.037	-0.031	-0.035	-0.023
	(0.072)	(0.083)	(0.079)	(0.088)	(0.086)
lnBMP	-0.523 ***	-0.558 *	-0.567 **	-0.579 *	
	(0.193)	(0.678)	(0.262)	(0.346)	
FDI Inflows	0.559 ***	0.633 ***	0.623 **	0.616	0.628 ***
	(0.195)	(0.221)	(0.267)	(0.423)	(0.250)
Portfolio Inflows		0.145	0.155	0.168	0.199
		(0.315)	(0.345)	(0.323)	(0.327)
G/Y			-0.035	-0.037	-0.013
			(0.085)	(0.101)	(0.101)
Political Rights			-0.089		
			(2.317)		
FDI Inflows*HC				0.0006	
				(0.020)	
FDI Inflows*lnBMP					-0.030
					(0.114)
observations	278	222	221	222	222

Notes: bootstrapped standard errors in parenthesis
*, **, *** are 10%, 5%, 1% significant levels respectively

Table 4.5 shows the results for the investment equation for developing economies, where both the initial GDP-level and the human capital variables do not enter any of the specifications significantly. I also incorporate the (ln)black market premium as an indicator of economic instability, since the black market premium can be interpreted as both a measure of expectations of depreciation of the "local" currency, and as a rudimentary index of distortions. Expectations of depreciation may affect investment through several channels: (1) it is more attractive to hold foreign assets when a depreciation is expected; (2) economic uncertainty is higher under such conditions; (3) for those who can obtain foreign exchange at the official rate, foreign capital goods are cheap to import. While the first two points suggest a negative relationship between the black market premium and economic growth (and investment), the third point implies the opposite. Furthermore, to the extent that the black market premium serves as a general index of distortions, and therefore of an "unsustainable" situation, it is likely to be negatively correlated with investment and GDP per capita growth.

As expected, investment falls with this premium. In the specifications without a threshold $(5.1 - 5.3)$, an increase in FDI inflows of 1% leads to a 0.6% increase in I/Y, indicating that FDI might be crowding out domestic investment in developing economies, which contrasts with Borensztein et al. (1998) who found a (non-robust) crowding in effect for developing countries.[15] Moreover, portfolio inflows do not have a significant effect on the investment rate (5.2). Adding the share of government expenditures (G/Y) and an index of political rights does not change the estimates in (5.3). The last two columns introduce interaction effects with FDI inflows; however, these interaction terms are not significant, and the total effect of FDI inflows on the investment ratio remains stable at around 0.6.

As far as developed economies, once again we find that in comparison to developing economies, the results are markedly different (see Table 4.6). However, one major difference in the specification, is that instead of using the black market premium (which is almost non-existent for developed economies), we use the size of the public sector as a basic control variable. In all specifications, the G/Y-ratio has a significant negative effect, which simply means that fiscal discipline is beneficial for economic growth on average. Interestingly, while FDI inflows do not have a significant effect on investment, portfolio inflows are positively and significantly correlated with the investment ratio.[16]

[15] The hypothesis that the coefficient is larger than one is rejected for the first two specifications.

[16] Investment in the rich, homogenous countries does seem to depend only on capital inflows that do not aim at controlling a firm. Furthermore, this results confirms the "financial development" argument, since financial markets in developed economies are highly developed.

Table 4.6: Effect of Different Capital Flows on (I/Y) for Developed Economies

Dependent variable: I/Y

	6.1	6.2	6.3	6.4
$(I/Y)_{t-1}$	0.576 ***	0.568 ***	0.560 ***	0.666 ***
	(0.101)	(0.103)	(0.107)	(0.069)
Initial GDPpc	2.699	2.066	1.950	0.659
	(1.710)	(1.752)	(1.767)	(1.439)
Human Capital	-0.067 *	-0.060	-0.035	-0.061
	(0.037)	(0.041)	(0.047)	(0.556)
G/Y	-0.321 **	-0.360 **	-0.407 **	-0.478 ***
	(0.167)	(0.178)	(0.175)	(0.156)
FDI Inflows	0.025	0.041	0.587	0.136
	(0.166)	(0.161)	(0.642)	(0.154)
Portfolio Inflows	0.140 **	0.148 **	0.138 *	1.024 ***
	(0.061)	(0.071)	(0.075)	(0.236)
Political Rights		-0.496	-0.442	-0.382
		(0.326)	(0.337)	(0.325)
FDI*HC			-0.011	
			(0.013)	
Portfolio*HC				-0.022 ***
				(0.007)
observations	120	111	111	111

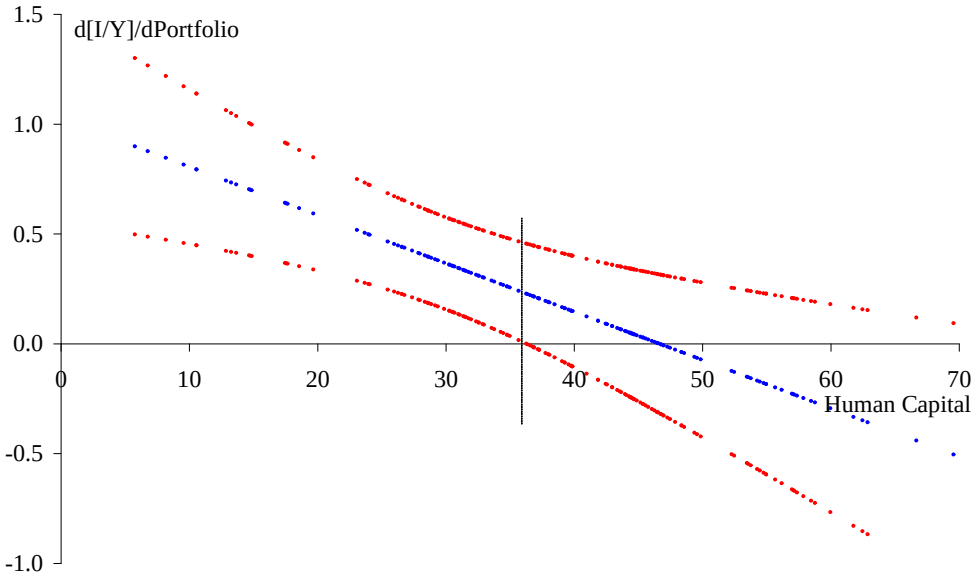
Notes: bootstrapped standard errors in parenthesis
*, **, *** are 10%, 5%, 1% significant levels respectively

Moreover, FDI-inflows remain insignificant when an interaction effect with human capital is included (6.3); however, the effect of portfolio inflows does vary with the education level of the labor force (6.4). Figure 4.2 illustrates this point, where the total effect of portfolio inflows on the investment ratio is significantly positive as long as the secondary school rate is less than 36%.[17] Moreover, crowding-in effects can not be rejected for countries with lower

[17] These results might seem odd at first sight, since they do not appear to be in line with the absorption capacity approach that claims that countries must have a minimum level of human capital for attracting foreign capital. However, "relative backwardness" (Findlay, 1978) has been shown to play a major role *vis-à-vis* spillovers having a major impact on the (further) development of economies. See section 4.7 for a further discussion.

levels of human capital.[18]

Figure 4.2: Marginal Effect of Portfolio Inflows on the Investment rate for Developed Economies (with 95% confidence interval)



4.5 Decomposing Capital Flows

An alternative avenue of analysis into the outcome of financial openness, which we pursue in this section, is based on the view that capital flows are not all the same. For example, Stiglitz (2000) has argued that countries should pursue long-term capital flows, while controlling the short-term flows.[19] Capital flows that are characterized by "equity-like" features are not only believed to be more stable and less prone to reversals (see Wei, 2006), but are also believed to carry with them many indirect benefits of financial globalization, such as transfers of managerial and technological expertise.[20]

While we realize that it is difficult to state unequivocally that private capital flows drive growth (since it could be that domestic growth drives capital flows), the evidence does seem

[18] The upper bound of the confidence interval exceeds one for Greece (1970-1980), Portugal (1970-2000) and Spain (1970-1985).

[19] Stiglitz's argument is based on the serious repercussions to an economy from attracting short-term flows.

[20] In the literature, it is argued that FDI can help decrease a firms' financing constraints. For example, Blalock and Gertler (2005) find that FDI can alleviate the unfavorable effects of financial crisis by helping firms maintain uninterrupted access to credit through their parent companies.

to point to the idea that private capital flows can, at the very least, reinforce the growth process. Although economic theory and empirical investigations have much to say about where international capital flows may gravitate,[21] both theory and evidence are less precise about the impact of such flows on the "local" economy. For example, once in a country, private capital flows may increase domestic consumption, investment, and/or TFP, or they may principally increase a country's foreign exchange reserves. However, if flows are driven merely by incentives to evade taxes or jump other legal barriers, money may flow out of a country as quickly as it flows in.

Table 4.7: Growth and the Decomposition of Capital Flows for Developing Economies

Dependent variable: ΔlnGDPpc

	7.1	7.2	7.3	7.4
$\Delta ln\text{GDPpc}_{t-1}$	0.156 **	0.135 **	0.113 *	0.032
	(0.075)	(0.064)	(0.064)	(0.065)
Initial GDPpc	-3.043 ***	-3.025 ***	-2.702 ***	-2.447 **
	(0.832)	(0.921)	(0.893)	(1.159)
Human Capital	0.125 **	0.101 *	0.148 **	0.124 *
	(0.050)	(0.058)	(0.067)	(0.067)
(G/Y)	-0.044	-0.086 *	-0.085 *	-0.025
	(0.059)	(0.050)	(0.049)	(0.077)
FDI Inflows	0.290 **	0.266 **	0.555 **	0.335 ***
	(0.104)	(0.121)	(0.252)	(0.114)
Portfolio Inflows		-0.064	0.014	0.174
		(0.136)	(0.147)	(0.248)
FDI Inflows*HC			-0.013	
			(0.010)	
FDI Inflows*lnBMP				-0.011
				(0.087)
observations	294	289	289	222

Notes: bootstrapped standard errors in parenthesis
*, **, *** are 10%, 5%, 1% significance levels respectively

[21] For the macroeconomic drivers of long-term (M&A) capital flows, see Garita and van Marrewijk (2008) and/or Chapter 2 of this book.

Table 4.7 shows that FDI inflows are indeed beneficial to an emerging markets' growth prospects. However, while most of the burgeoning literature analyzing portfolio flows into emerging markets suggests that portfolio equity flows should have a positive and significant impact on economic growth, the results in Table 4.7 do not confirm this positive association. FDI inflows stimulate economic growth, independent of interactions with human capital or the (ln)black market premium (columns 7.3 and 7.4).

Table 4.8: Growth and the Decomposition of Capital Flows for Developed Economies

Dependent variable: ΔlnGDPpc

	8.1	8.2	8.3	8.4	8.5
$\Delta ln\text{GDPpc}_{t-1}$	-0.064	-0.048	-0.074	-0.064	-0.077
	(0.086)	(0.099)	(0.087)	(0.091)	(0.090)
Initial GDPpc	-1.775	-1.747 **	-1.894 *	-2.269 **	-2.354 **
	(1.133)	(1.124)	(1.125)	(1.142)	(1.137)
Human Capital	0.023	0.022	0.024	0.066 **	0.036 **
	(0.019)	(0.022)	(0.019)	(0.025)	(0.018)
(G/Y)	-0.294 ***	-0.314 ***	-0.293 ***	-0.367 ***	-0.376 ***
	(0.098)	(0.089)	(0.102)	(0.098)	(0.098)
FDI Inflows	0.212 ***		0.189 **	1.075 ***	0.237 **
	(0.072)		(0.099)	(0.383)	(0.098)
Portfolio Inflows		0.036 *	0.009	-0.004	0.423 **
		(0.021)	(0.024)	(0.025)	(0.166)
FDI Inflows*HC				-0.018 **	
				(0.008)	
Portfolio_Inflows*HC					-0.009 **
					(0.004)
observations	126	127	126	126	126

Notes:bootstrapped standard errors in parenthesis
*, **, *** are 10%, 5%, 1% significance levels respectively

Figure 4.3: Marginal Effects of Portfolio Inflows on Economic Growth for Developed Economies (with 95% confidence interval)

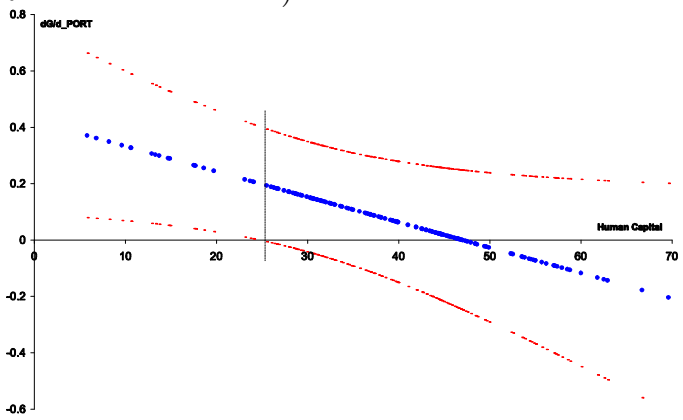
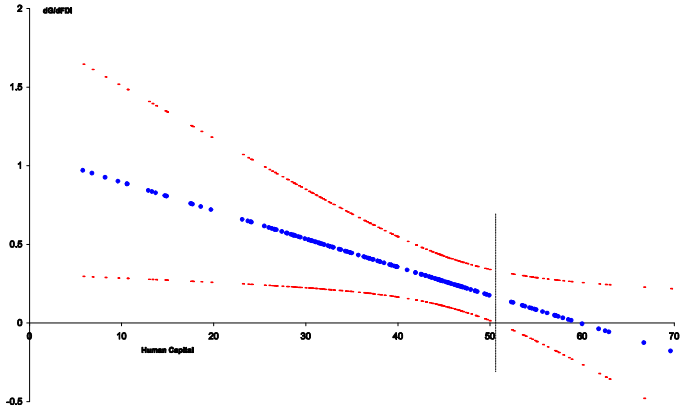


Figure 4.4: Marginal Effects of FDI inflows on Economic Growth for Developed Economies (with 95% confidence interval)



As far as developed economies, Table 4.8 shows that both FDI and portfolio investment have a positive and significant effect on economic growth, and it can be certainly argued that this is because of the highly developed financial and institutional systems in these economies. These results are in line with Reisen and Soto (2001) and Durham (2004) who find that both capital flows can have growth-promoting effects. As far as the total effects of portfolio flows, we see (in Figure 4.3, based on specification 8.5) that countries with "lower" (initial) human capital benefit the most from portfolio flows *vis-à-vis* economic growth.[22] For example, even though the United States has a human capital level (in the period 2001-2005) of almost 46%, we cannot reject that there is no effect (or even a negative effect) of portfolio flows on growth. A similar Figure (see Figure 4.4, based on specification 8.4) is obtained for the marginal effect of FDI. This effect is not significantly positive for countries with a human capital level exceeding 50% (i.e. Austria, Germany, New Zealand, Norway, Sweden, Switzerland and the US).

4.6 Decomposing FDI and the Effects on Growth

As has been previously mentioned, the theoretical literature argues that FDI can boost growth; however, the empirical literature shows considerable disagreement about the relevance of these impacts. For example, macroeconomic studies tend to conclude that FDI boosts growth[23], although some papers argue that this requires the destination economy to satisfy certain conditions (see for example Borensztein et al., 1998); however, firm-level analysis often find no significant effects of FDI.[24]

However, there are two major difficulties with the interpretation of many of these results. First, both macro and micro studies face problems of bidirectional causality; that is, high-productivity and high growth firms and countries are more likely to attract FDI than the rest. The other difficulty, and the one that we analyze in this section, is the use of "total" FDI in the estimation process.[25]

However, as shown in Figure 4.5, MNC's can undertake FDI either through greenfield investments or through M&As; where the main difference between these two forms of in-

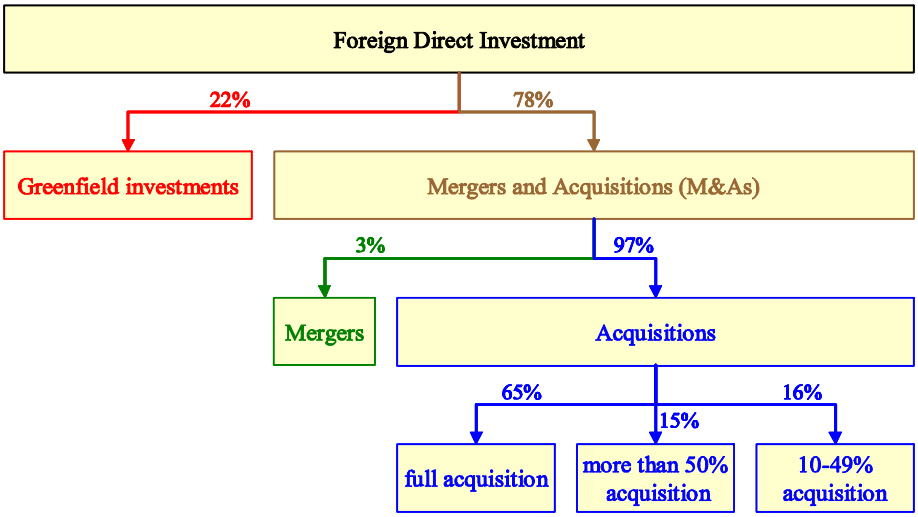
[22] Examples for which the marginal effect is significantly positive include Greece (1970-1990), Portugal (1970-2005) and Spain (1970-1990).

[23] See World Bank (2001) and/or Kose *et al* (2006), and the references therein.

[24] See the discussion in Section 4.8.

[25] Another possible reason as argued by Blonigen and Wang (2005) is the pooling of countries (i.e. combining developed and developing countries) in regression frameworks.

Figure 4.5: Distribution of Different types of FDI (in 2000-2001)



vestments is that in an M&A "control of assets and operations is transferred from a local to a foreign company, the former becoming an affiliate of the latter" (UNCTAD, 2000).[26]

In Section 4.4, we found that the investment rate depends on FDI inflows for developing economies and on portfolio inflows for developed economies; interestingly, the same conclusion holds when FDI inflows are replaced by M&A inflows. Tables 4.9 and 4.10 show that M&A inflows only have a significant positive impact on capital accumulation in developing economies. As far as developed economies, portfolio inflows remain significant when interacted with human capital or GDP per capita (columns 3 and 5). Whereas the previous section found that FDI inflows were significant in explaining growth for both country types, significance is lost when the M&A variable is used (See Tables 4.15 and 4.16 in Appendix D). However, this "non-significance" can be attributed to the limited number of available observations.

[26] The $M\&A$ variable spans the period 1986-2005 based on all completed/uncoditional cross-border M&As with a deal value of at least $10 million (the source of the M&A variable is Thomson's Global Merger and Acquisitions database). For a detailed description of the M&A variable, see Garita and van Marrewijk (2008) and/or Chapters 2 and 3 of this book.

Table 4.9: Effect of Mergers and Acquisitions on Investment for Developing Economies

Dependent variable: (I/Y)					
	9.1	9.2	9.3	9.4	9.5
$(I/Y)_{t-1}$	0.516 ***	0.645 ***	0.427 ***	0.375 ***	0.406 ***
	(0.095)	(0.094)	(0.127)	(0.126)	(0.122)
Initial GDPpc	-2.216 *	-1.959	-2.068	-2.199	-2.011
	(1.337)	(1.632)	(1.724)	(1.726)	(2.348)
Human Capital	-0.025	-0.811	0.092	0.098	0.096
	(0.092)	(9.459)	(0.096)	(0.097)	(0.089)
MA Inflows	0.474 **	0.567 ***	1.010 ***	1.424 ***	1.210 *
	(0.209)	(0.210)	(0.324)	(0.500)	(0.696)
Portfolio Inflows	-0.136	-0.071	0.261	0.288	0.233
	(0.190)	(0.190)	(0.271)	(0.257)	(0.354)
(G/Y)		-0.176 ***	-0.043	-0.026	-0.036
		(0.060)	(0.108)	(0.106)	(0.107)
LnBMP			-0.459		-0.338
			(0.361)		(0.423)
MA_inflows*LnBMP				-0.302	-0.161
				(0.291)	(0.324)
Political Rights					-0.255
					(0.318)
observations	199	196	135	135	135

Notes: bootstrapped standard errors in parenthesis
*, **, *** are 10%, 5%, 1% significant levels respectively

Table 4.10: Effect of Mergers and Acquisitions on Investment for Developed Economies

Dependent variable: (I/Y)					
	10.1	10.2	10.3	10.4	10.5
$(I/Y)_{t-1}$	0.645 ***	0.624 ***	0.511 ***	0.622 ***	0.647 ***
	(0.115)	(0.110)	(0.112)	(0.119)	(0.116)
Initial GDPpc	0.728	1.555	0.789	0.184	1.359
	(2.522)	(2.739)	(2.522)	(2.539)	(2.484)
Human Capital	-0.054	-0.033	-0.044	-0.060	-0.067
	(0.046)	(0.059)	(0.047)	(0.046)	(0.046)
(G/Y)	-0.722***	-0.710***	-0.840***	-0.801 ***	-0.717***
	(0.229)	(0.234)	(0.231)	(0.249)	(0.226)
MA Inflows	-0.253	0.426	-0.168	9.102	-0.193
	(0.257)	(0.823)	(0.256)	(10.073)	(0.257)
Portfolio Inflows	0.044	0.040	0.946 ***	0.052 *	3.555 ***
	(0.031)	(0.031)	(0.306)	(0.031)	(1.629)
MA_inflows*HC		-0.013			
		(0.015)			
Portfolio*HC			-0.020***		
			(0.007)		
MA_in*GDPpc				-0.927	
				(1.001)	
Portfolio*GDPpc					-0.332**
					(0.159)
observations	85	85	85	85	85

Notes: bootstrapped standard errors in parenthesis
*, **, *** are 10%, 5%, 1% significant levels respectively

4.7 Absorptive Capacity & "Relative Backwardness"

The literature, in particular Kose et al. (2006), stresses that financial openness only leads to better outcomes when certain initial conditions are met. In contrast, the estimation results (as illustrated in Figures 4.1-4.3) point to negative interaction effects, implying that countries that operate before the threshold seem to benefit the most from financial globalization. This section elaborates on an explanation of this finding.

International economists have long argued that along with international trade, the most

important medium for international technology transfer is FDI. Furthermore, it is well known that multinational companies carry out most of the world's private research and development endeavors; this implies that they produce and control the latest advancements of technology. When MNCs set up a foreign affiliate, the affiliate receives some amount of the proprietary technology that comprises the parent's firm-specific advantage and allows it to compete successfully with local firms that (might) have better-quality knowledge of local markets, consumer preferences, and business practices. This leads to a diffusion of technology, but not necessarily to any formal transmission of "know-how" outside the boundary of the firm. According to Blomstrom and Kokko (2003), this stems from the fact that the establishment of a foreign affiliate is a decision to internalize (the use of) technology. However, MNC technology can nonetheless spillover into the surrounding economy that increase the level of human capital in the host country and create productivity increases in local firms (Blomstrom and Kokko, 2003).

Since multinationals offer training and technical support to their local suppliers and customers, the effects work through forward and/or backward linkages. Moreover, the labor market is another important channel for spillovers, since MNCs tend to train their workforce, who may end up taking a job in a local firm or through "creative destruction" establish their own company (Blomstrom and Kokko, 2003). Therefore, long-term capital flows (i.e. FDI) can be a precious starting place of spillovers, since these spillovers strengthen "the human capital base" in an economy needed to adapt "new" ideas to the local market. However, FDI does not automatically lead to productivity and technology spillovers. Instead, "FDI and human capital interact in a complex manner, where FDI inflows create a potential for knowledge spillovers to the local workforce, and at the same time, as the host country's level of human capital determines how much FDI it can attract and whether local firms are able to absorb the potential benefits. Therefore, it is likely that the relationship is non-linear and that multiple equilibria are possible" (Blomstrom and Kokko, 2003). For example, host economies with relatively high levels of human capital may be able to attract large amounts of "technology intensive" foreign MNCs that contribute significantly to the further development of labor skills. At the same time, economies with weaker initial conditions may experience relatively smaller inflows of FDI, and those foreign firms that enter are likely to use "simpler" technologies that none-the-less contribute to local learning and skill development.

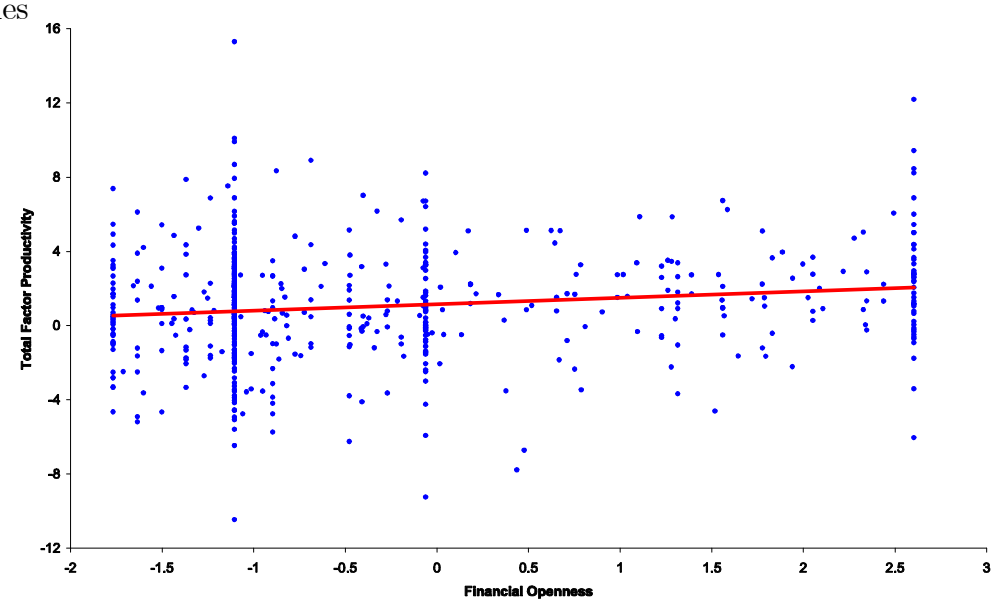
As far as the results of the paper thus far, one clear trend that has emerged is that countries with "lower" levels of human capital are the ones that benefit the most from *de jure* or *de facto* financial openness. This "relative backwardness" between economies was first

emphasized by Findlay (1978), who highlighted the importance of "relative backwardness" for the speed of adoption of new technologies and spillover benefits from MNCs. Findlay's model suggests that the greater the technological distance between (the less advanced) host country and the (advanced) home country, the greater the available opportunities to exploit in the host country, and therefore, the more rapidly new technologies are adopted. Hence, the potential for positive spillovers is higher the larger the absorptive capacity gap between host and home countries. In the next section, we probe deeper into this effect by looking at how different types of *de jure* (*de facto)* financial openness affect TFP.

4.8 Closing the Circle - TFP results

There is a widely held belief that financial openness is beneficial to growth, because as a group, developed and emerging markets have experienced far higher cumulative growth than developing economies. First, lets begin by looking at the unconditional relationship between TFP and financial openness, Figure 4.6[27] shows that there is a weak positive correlation, consistent with the general wisdom that economies that have integrated into global financial markets grow faster (albeit indirectly through an increase in TFP).

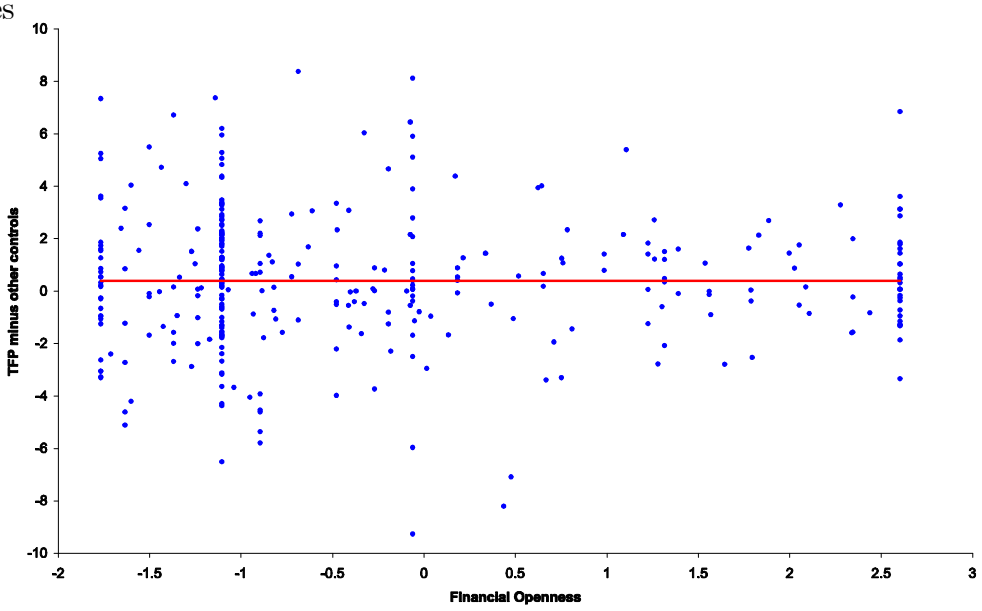
Figure 4.6: Unconditional Relationship between Financial Openness and TFP for Developing Economies



[27] OLS equation is $TFP = 1.157(0.137) + 0.350(0.095) * Financial\_Openness$. Robust standard errors in parenthesis.

However, once other growth determinants are controlled for[28], the relationship disappears (see Figure 4.7). Obviously, there is considerable endogeneity in this type of analysis, but it does clarify the point in the literature (see for example Kose et al., 2006) that financial openness by itself, may not be the key to higher growth. The "collateral benefits" of financial openness as identified by Kose et al. (2006) should boost efficiency, and in addition, total factor productivity. The approach that we follow in this last section ties in well with the literature identified by Kose et al. (2006), who emphasize the importance of TFP growth as the main driver of long-term growth. At the end of the day, if financial openness (*de jure* or *de facto*) is to have permanent effects on growth, it must push up the production possibility frontier. Surprisingly enough, research on whether financial openness (integration) raises TFP is scarce. Recent exceptions are Edwards (2001) who concludes that the evidence is not robust; and Bonfiglioli (2007), who shows that financial integration has a positive direct effect on productivity, albeit with the use of a dummy variable for financial integration.

Figure 4.7: Conditional Relationship between Financial Openness and TFP for Developing Economies



[28]These controls are the investment rate, initial GDP per capita, human capital, and time fixed effects (specification 11.1 in Table 4.11).

Table 4.11: Effects of Financial Openness, FDI, and Portfolio flows on TFP

Dependent variable: TFP growth

	Developing			Developed		
	11.1	11.2	11.3	11.4	11.5	11.6
TFP growth$_{t-1}$	0.181 ***	0.165 **	0.140 *	-0.045	-0.061	-0.053
	(0.071)	(0.079)	(0.082)	(0.079)	(0.085)	(0.088)
Investment rate	0.106 **			0.162 ***		
	(0.053)			(0.072)		
Initial GDPpc	-3.379***	-2.239**	-1.973**	-2.770***	-2.237**	-2.720**
	(0.803)	(0.957)	(0.961)	(1.015)	(1.073)	(1.107)
Human Capital	0.027	0.028	0.078	0.067 ***	0.033 *	0.066 ***
	(0.046)	(0.058)	(0.077)	(0.026)	(0.017)	(0.024)
Fin. Openness	0.093			0.130		
	(0.198)			(0.165)		
(G/Y)	-0.037	-0.076	-0.053	-0.328***	-0.286***	-0.376***
	0.058	(0.068)	(0.073)	(0.110)	(0.099)	(0.095)
FDI Inflows		0.239 **	0.572 **		0.195 **	0.698 *
		(0.120)	(0.292)		(0.100)	(0.387)
Portfolio Inflows		-0.037	-0.004		0.006	0.231
		(0.129)	(0.009)		(0.023)	(0.171)
FDI*HC			-0.016			-0.011
			(0.013)			(0.008)
Portfolio*HC			-0.004			-0.005
			(0.010)			(0.004)
observations	285	210	210	127	126	126

Notes: bootstrapped standard errors in parenthesis
*, **, *** are 10%, 5%, 1% significant levels respectively

In addition, the empirical literature on the spillover effects of FDI also gives mixed results. For example, some studies argue that foreign ownership has a positive effect on productivity for domestic firms and industries (see Barrell and Pain, 1997); while other studies find little or no evidence of spillover effects stemming from FDI (see Aitken and Harrison, 1999).[29] The literature has also argued that "total" foreign direct investment may bring new technology and management techniques that increase the efficiency of "acquired" firms and generate economy-wide spillovers. For example, Mishkin (2006) has argued that developing countries can import greater efficiency by allowing foreign investors to take controlling stakes in domestic financial firms, and thereby bring in state-of-the-art financial intermediation practices. Recently, Henry (2007) has even stated that "these stories are plausible but empirically unsubstantiated". The results of the TFP-regressions in Table 4.11 support the story. First, TFP growth does not depend on *de jure* measures of financial openness for both developed and developing economies (columns 11.1 and 11.4). Second, FDI inflows do contribute to TFP growth but portfolio inflows do not have a significant effect (11.2 and 11.5). Third, threshold effects in terms of human capital do not improve the explanation of TFP growth.

4.9 Conclusions

It is well known that the evidence linking financial openness (e.g. capital account openness) to economic growth has been weak at best; nonetheless, a large amount of literature has been devoted to the analysis on the effect of financial liberalization on GDP growth. However, to understand the total effect of financial liberalization, it is important to know the channels and the directionality through which it affects an economy. Furthermore, it is important to take into account the possibility that different policies affect countries differently (this is especially true for developed and developing economies). In this light, the research herein has probed deeper into the aforementioned relationship by studying separately the impact of financial openness (*de jure* and *de facto*) on economic growth, capital accumulation, and total factor productivity. By using a new econometric approach to study the direct and indirect channels of financial openness for 186 developing and 25 developed economies from 1970-2005, we find positive and encouraging results (see appendix G for a graphical representation of the results).

[29] Tansani and Zejan (1996), and Haddad and Harrison (1993) find no evidence of productivity spillovers; Blomstrom and Sjoholn (1999) find no evidence of technology spillovers, but do find some evidence of productivity improvements stemming from greater competitive pressure.

As far as developing economies, we find that *de jure* financial openness has a positive direct effect on economic growth, and an indirect on growth through capital accumulation; however, *de jure* financial openness does not affect TFP. When it comes to FDI, the results show that it affects economic growth directly, and that FDI also affects capital accumulation positively. As far as developed economies, the results show that *de jure* financial openness does not affect economic growth; however, it does stimulate capital accumulation. Furthermore, for developed economies FDI and portfolio flows both play a significant and positive role in stimulating economic growth; moreover, portfolio inflows positively influence capital accumulation.

Another clear trend that emerged throughout the paper, is that countries with "lower" levels of human capital are the ones that benefit the most from *de jure* or *de facto* financial openness. The importance of "relative backwardness" for the speed of adoption of new technologies and spillover benefits from MNCs suggests that the greater the technological distance between (the less advanced) host country and the (advanced) home country, the greater the available opportunities to exploit in the host country, and therefore, the more rapidly "new technologies" are adopted. Hence, the potential for positive spillovers is higher the larger the absorptive capacity gap between host and home countries. Accordingly, the TFP regression results show that there is a significant and positive correlation between FDI and total factor productivity, which is the one similarity *vis-à-vis* the results between developing and developed economies.

From a policy perspective, while the literature suggests that transitional risks are associated with financial openness, the results herein show that resisting liberalization over an extended period may prove counterproductive; especially since as the pace, rhythm, and scope of globalization advances, it becomes harder and perhaps even riskier for countries to be "financially repressive". In practice, the proper response to “large” capital inflows depends on a myriad of country-specific circumstances, including the nature of the inflows, the stage of the business cycle, and the fiscal policy situation, for example. Accordingly, one of the key areas of future research, especially given the findings herein, is to look at the consequences of *de jure* and/or *de facto* financial openness *vis-à-vis* countries with “substantial” current account deficits, or countries with “inflexible” exchange rates (see Chapter 5 for a further elaboration of this last point).

Another area of future research that we are particularly interested in, relates to a recent working paper by Rodrik and Subramanian (2008), who argue that countries ought to be classified into *saving-constrained* and *investment-constrained* economies (instead of the standard developing, emerging, and developed economies classification). That is, after

liberalizing their capital accounts (by allowing the free movement of capital flows), only saving-constrained economies will respond as predicted by theory. In contrast, the problem for investment-constrained economies is not the lack of savings but the lack of profitable investment opportunities; once this latter type of economies get access to (cheaper) loans from foreign investors, capital inflows will simply substitute for domestic savings without stimulating domestic investment and thereby economic growth.[30] Therefore, they argue that their new categorization explains the mixed evidence found *vis-à-vis* financial openness and economic growth. We have already begun to incorporate this new classification into our future research agenda, in order to check whether the results are indeed sensitive to this alternative decomposition.

[30] These arguments are supported by regression outcomes in (Prasad et al., 2003), who show that non-industrial countries running current account surpluses tend to grow faster.

4.10 Appendix Chapter 4

Developed Economies				
AUSTRALIA	FINLAND	IRELAND	MONACO	SPAIN
AUSTRIA	FRANCE	ITALY	NETHERLANDS	SWEDEN
BELGIUM	GERMANY	JAPAN	NEW ZEALAND	SWITZERLAND
CANADA	GREECE	LIECHTENSTEIN	NORWAY	UK
DENMARK	ICELAND	LUXEMBOURG	PORTUGAL	USA
Developing (Emerging) Economies				
AFGHANISTAN	BELIZE	CENTRAL A. REP.	DOMINICAN REP.	GUATEMALA
ALBANIA	BENIN	CHAD	ECUADOR	GUINEA
ALGERIA	BERMUDA	CHILE	EGYPT	GUINEA BISSAU
ANDORRA	BHUTAN	CHINA	EL SALVADOR	GUYANA
ANGOLA	BOLIVIA	COLOMBIA	EQUATORIAL GUINEA	GREENLAND
ANTIGUA AND BAR.	BOSNIA-HERZ.	COMOROS	ERITREA	HAITI
ARGENTINA	BOTSWANA	CONGO	ESTONIA	HONDURAS
ARMENIA	BRAZIL	COSTA RICA	ETHIOPIA	HONG KONG
AZERBAIJAN	BRUNEI	COTE D'IVOIRE	FIJI	HUNGARY
AMERICAN SAMOA	BULGARIA	CROATIA	FAEROE ISLANDS	INDIA
ARUBA	BURKINA FASO	CUBA	GABON	INDONESIA
BAHAMAS	BURUNDI	CYPRUS	GAMBIA	IRAN
BAHRAIN	CAMBODIA	CZECH REP.	GEORGIA	IRAQ
BANGLADESH	CAMEROON	CHANNEL ISL.	GHANA	ISRAEL
BARBADOS	CAPE VERDE	CONGO D. R. (ZAIRE)	GRENADA	ISLE OF MAN
BELARUS	CAYMAN ISLANDS	DJIBOUTI	GUAM	JAMAICA

Developing Countries (continued)

JORDAN	MALTA	OMAN	SLOVAK REPUBLIC	TUNISIA
KAZAKHSTAN	MARSHALL ISL.	PAKISTAN	SLOVENIA	TURKEY
KENYA	MARTINIQUE	PALAU	SOLOMON ISLANDS	TURKMENISTAN
KIRIBATI	MAURITANIA	PANAMA	SOMALIA	TUVALU
KOREA NORTH	MAURITIUS	PAPUA N. G.	SOUTH AFRICA	UGANDA
KOREA SOUTH	MEXICO	PARAGUAY	SRI LANKA	UKRAINE
KUWAIT	MICRONESIA	PERU	ST KITTS AND NEVIS	UNITED ARAB E.
KYRGYZ REP.	MOLDOVA	PHILIPPINES	ST LUCIA	URUGUAY
LAOS	MONGOLIA	POLAND	ST VINCENT AND THE G.	UZBEKISTAN
LATVIA	MOROCCO	PUERTO RICO	SUDAN	VANUATU
LEBANON	MOZAMBIQUE	QATAR	SURINAME	VENEZUELA
LESOTHO	MYANMAR	ROMANIA	SWAZILAND	VIETNAM
LIBERIA	MAYOTTE	RUSSIA	SYRIA	VIRGIN ISLANDS(US)
LIBYA	NAMIBIA	RWANDA	SERBIA AND MONT.	WEST BANK
LITHUANIA	NAURU	SAMOA	TAIWAN	YEMEN
MACAO	NEPAL	SAN MARINO	TAJIKISTAN	YUGOSLAVIA
MACEDONIA	NETHERLANDS A.	SAO TOME AND P.	TANZANIA	ZAMBIA
MADAGASCAR	NICARAGUA	SAUDI ARABIA	THAILAND	ZIMBABWE
MALAWI	NIGER	SENEGAL	TIMOR EAST	
MALAYSIA	NIGERIA	SEYCHELLES	TOGO	
MALDIVES	NEW CALEDONIA	SIERRA LEONE	TONGA	
MALI	N. MARIANA ISL.	SINGAPORE	TRINIDAD AND T.	

Appendix B - Sources and Definitions of Variables

Table 4.12: Variable Description

GDPpc	Logarithm of GDP per capita from the PWT 6.2
Financial Openness	Chinn-Ito index (2007)
LnBMP	Logarithm of the black market premium from the Global Development Network Growth Database of NYU
GDPpc_growth	GDP per capita growth rate from the PWT 6.2
TFP growth	Total Factor Productivity, calculated (authors calculation) as $(GDPpc\ growth - 0.3 * Capital\ percapita\ growth)$
M&A inflows	Value of Mergers and Acquisitions (in constant 2000 $ bn, using GDP deflator) divided by GDP; Source of M&As is Thompson's Global M&A Database
FDI inflows	FDI Inflows divided by GDP from UNCTAD
Portfolio inflows	IMF International Financial Statistics
Human Capital	Secondary school completion rate as percentage of labor force over 25 years of age from Barro and Lee dataset
Political Rights	1=highest degree of freedom; 7=lowest; from the Freedom House
Trade Openness	Imports plus Exports divided by GDP from the PWT 6.2
I/Y	Investment divided by GDP from the PWT 6.2
G/Y	Government spending divided by GDP from the PWT 6.2

Appendix C - Descriptive Statistics

Table 4.13: Descriptive Statistics for 186 Developing Economies

Variable	Mean	Std. Dev.	Min.	Max.	N
GDPpc growth	1.66	5.03	-30.60	49.38	998
LnGDPpc	8.14	1.05	5.50	11.21	1015
Financial Openness	-0.23	1.38	-1.78	2.60	888
Trade Openness	81.31	50.74	2.21	410.33	1017
G/Y	23.59	11.05	2.48	89.22	1026
I/Y	13.68	8.13	1.13	58.82	1026
Human Capital	15.91	12.15	0.30	63.90	580
TFP	0.74	3.96	-29.49	15.31	604
Political Rights	4.21	2.11	1	7	1056
Portfolio Inflows	0.21	4.15	-94.07	20.83	589
FDI Inflows	4.47	61.29	-5.55	1660.54	735
MA Inflows	0.61	1.46	0	18.59	630
LnBMP	2.55	1.91	-1.10	12.92	584

Table 4.14: Descriptive Statistics for 25 Developed Economies

Variable	Mean	Std. Dev.	Min.	Max.	N
GDPpc growth	2.23	1.51	-1.73	8.70	161
LnGDPpc	9.85	0.31	8.99	10.80	161
Financial Openness	1.33	1.35	-1.77	2.60	148
Trade Openness	62.84	45.20	10.76	279.58	161
G/Y	17.03	4.16	6.83	26.50	161
I/Y	25.25	4.26	17.50	38.91	161
Human Capital	38.28	13.24	5.8	69.60	154
TFP	1.42	1.28	-1.53	6.84	161
Political Rights	1.88	1.55	1	6.60	158
Portfolio Inflows	6.01	31.49	-0.53	370.05	145
FDI Inflows	1.83	2.49	-0.01	15.30	147
MA Inflows	2.26	2.80	0	19.05	92

Appendix D - FDI Decomposition and (I/Y) Results

Table 4.15: Growth and the Decomposition of FDI for Developing Economies

Dependent variable: Δ lnGDPpc

	15.1	15.2	15.3
ΔGDPpc$_{t-1}$	0.034	0.031	0.045
	(0.116)	(0.114)	(0.117)
Initial GDPpc	-7.672 ***	-7.532 ***	-8.055 ***
	(2.576)	(2.576)	(2.618)
Human Capital	0.027	0.017	-0.036
	(0.096)	(0.095)	(0.115)
(G/Y)	-0.049	-0.095	-0.061
	(0.112)	(0.110)	(0.116)
Political Rights	0.022	-0.028	0.103
	(0.329)	(0.326)	(0.329)
LnBMP	-0.028	-0.066	0.041
	(0.387)	(0.431)	(0.388)
MA Inflows	0.559	0.200	-0.040
	(0.530)	(0.692)	(0.762)
Portfolio inflows	0.270	0.278	0.239
	(0.365)	(0.363)	(0.374)
MA_inflows*LnBMP		0.280	
		(0.326)	
MA_inflows*HC			0.034
			(0.041)
observations	134	134	134

Notes: bootstrapped standard errors in parenthesis
*, **, *** are 10%, 5%, 1% significant levels respectively

Table 4.16: Growth and the Decomposition of FDI for Developed Economies

Dependent variable: Δ lnGDPpc

	16.1	16.2	16.3	16.4	16.5
ΔGDPpc$_{t-1}$	-0.071	-0.079	-0.069	-0.048	-0.093
	(0.188)	(0.154)	(0.157)	(0.156)	(0.155)
Initial GDPpc	-5.967 ***	-5.778 ***	-6.109 ***	-6.359 ***	-5.539 ***
	(2.003)	(2.124)	(2.025)	(2.021)	(1.885)
Human Capital	0.069 **	0.075 *	0.074 **	0.065 *	0.060 *
	(0.035)	(0.042)	(0.035)	(0.035)	(0.033)
(G/Y)	-0.809 ***	-0.817 ***	-0.861 ***	-0.848 ***	-0.809 ***
	(0.179)	(0.177)	(0.185)	(0.196)	(0.168)
MA Inflows	-0.135	0.035	-0.112	5.279	-0.092
	(0.191)	(0.579)	(0.193)	(7.359)	(0.180)
Portfolio inflows	0.037 *	0.037 *	0.261	0.040 *	2.420 **
	(0.022)	(0.022)	(0.222)	(0.023)	(1.056)
MA_inflows*HC		-0.003			
		(0.011)			
Portfolio*HC			-0.005		
			(0.005)		
MA_in*GDPpc				-0.537	
				(0.731)	
Port*GDPpc					-0.234 **
					(0.103)
observations	85	85	85	85	85

Notes: bootstrapped standard errors in parenthesis
*, **, *** are 10%, 5%, 1% significant levels respectively

Appendix E - Graphical Representation of Results

Figure 4.8: Graphical representation of results from different types of capital flows for developing countries; + = positive and significant effect; solid lines represent a direct effect on growth; dashed lines represent indirect effects on growth.

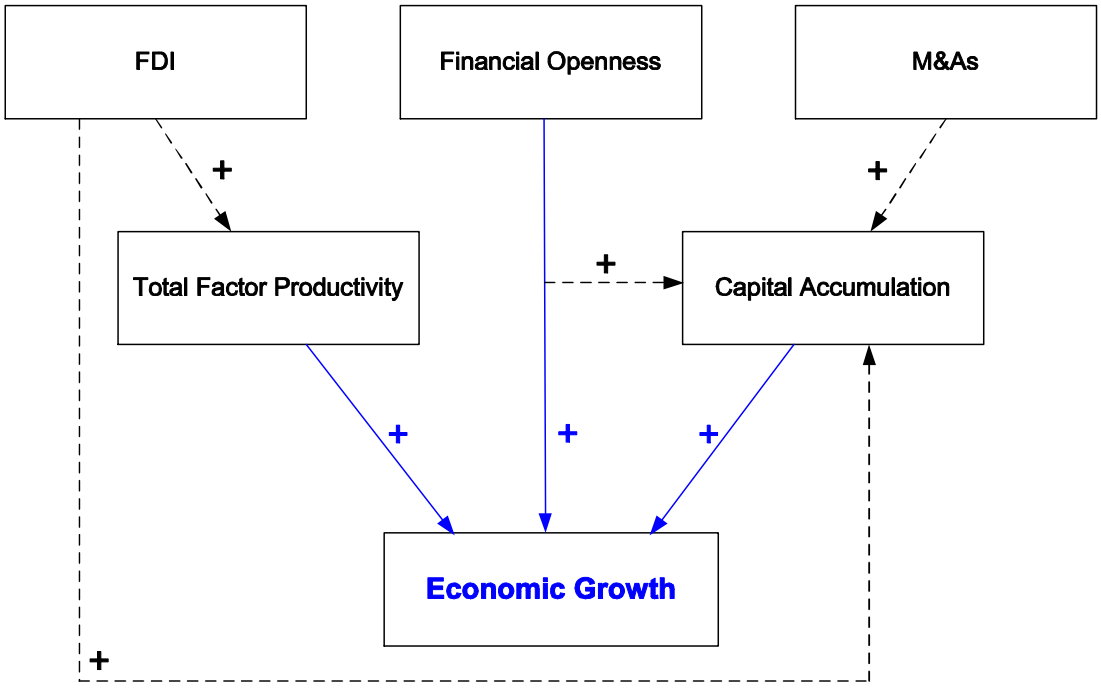
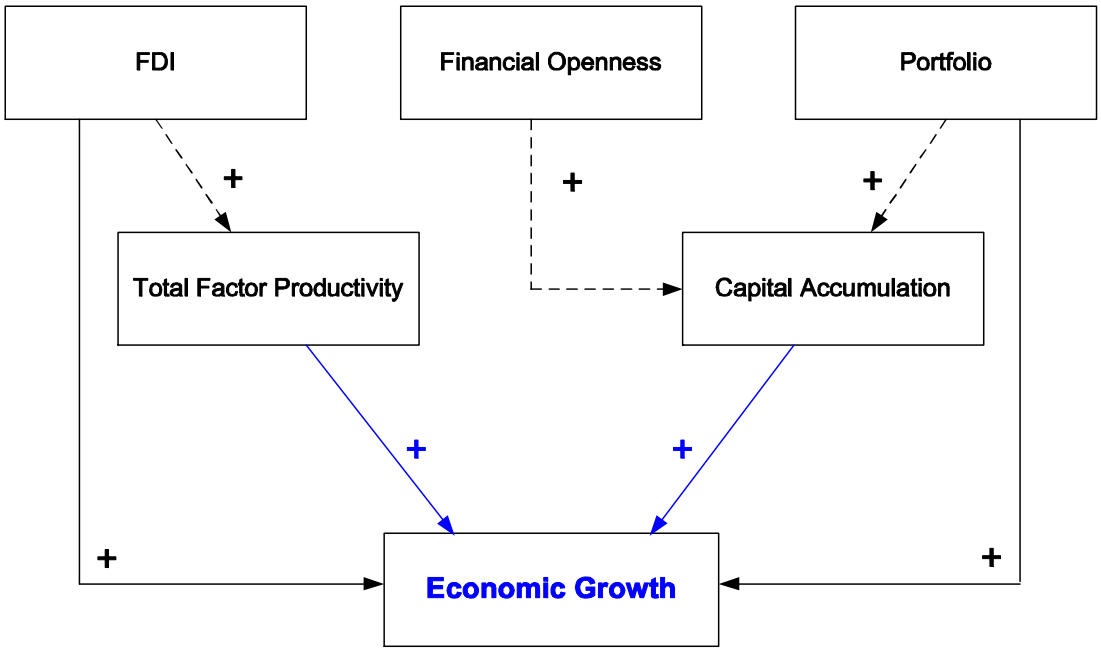


Figure 4.9: Graphical representation of results from different types of capital flows for developed economies; + = positive and significant effect; solid lines represent a direct effect on growth; dashed lines represent indirect effects on growth.



Chapter 5

Joint Currency Crisis and Contagion

5.1 Introduction

In economics, it has long been argued that systemic risk is a particular feature of financial systems. That is, while contagion can occur in other areas of an economy, the likelihood and harshness in financial systems is often regarded as considerably higher since a full crisis in the financial system can have strong adverse consequences for general economic welfare. However, while "systemic risk" is now widely accepted as the fundamental concept for the study of financial instability, most work thus far only tackles a few aspects of that risk, and there is no clear understanding of the overall concept of contagion and the linkages between its different features.

In "first-generation" interpretations of currency crises[1], the viability (or lack thereof), of a fixed exchange rate is determined by exogenous fundamentals unalike to the behavior of economic agents. For instance, in these types of models, market participants base their expectations on the conjecture that their actions will not affect fiscal imbalances or domestic credit policies. By contrast, the interaction between expectations and actual outcomes is at the core of the second-generation models of crises, in which market expectations unswervingly influence macroeconomic policy decisions.[2]

The key point emphasized in second-generation models is that the interaction between investors' expectations and actual policy outcomes can lead to self-fulfilling crises. For example, in a country whose monetary authorities are committed to maintaining a fixed exchange rate but are prepared to float their currency under "extraordinary circumstances"

[1] The approach was forged by Krugman (1979), who adapted the Salant and Henderson (1978) model to the analysis of currency crises, and was further refined by Flood and Garber (1984).

[2] The standard studies on self-fulfilling crises are Obstfeld (1986, 1994b).

then foreign investors might face the possibility of a devaluation of that currency. This in turn would reduce the value of their claims if the country's loans from abroad were denominated in the borrowing nation's domestic currency. Moreover, if foreign investors see the likelihood of devaluation as very likely, they would have little choice but to charge a high risk-premium on any loan. This implies that the economies' borrowing costs would rise significantly, thereby reducing credit opportunities and restraining output growth. Given this scenario, the country's authorities would feel the costs of maintaining "the fix" to be too high and choose to devalue their currency in order to boost aggregate demand. Interestingly, the devaluation would validate the initial investors' expectations, which leads to a "self-fulfilling prophecy", in that the prospect of devaluation leads to events (an increase in the risk premium) that elevates the opportunity cost of defending the fixed exchange rate. Therefore, the forecasts force a policy response (the abandonment of the peg) that validates the original expectations. Note that the crisis scenario described above is not the only possible outcome of second-generation models. That is, if investors do not foresee any devaluation and do not charge any risk premium, then borrowing costs will be low and the "authorities" will be able to maintain the exchange rate peg, which will validate the expectations of no devaluation. As discussed by Pesenti and Tille (2000), the main advantage of resorting to such an interpretation of currency crises is the ability to differentiate between two kinds of volatility: one related to financial markets and one related to macroeconomic fundamentals.

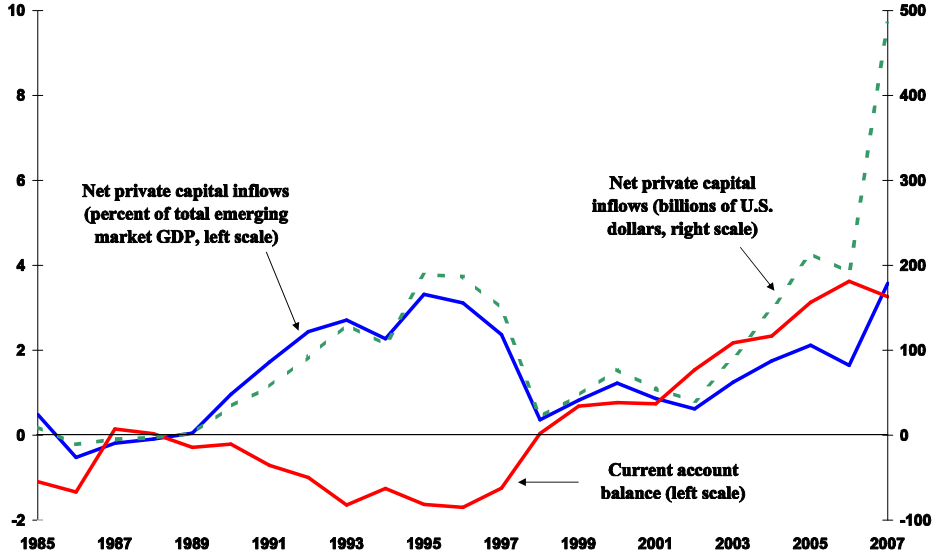
Market sentiment, in the form of sudden changes in market participants' expectations then plays an important role in the determination of a crisis. We know that exchange rates (and other asset prices) are less predictable than they are in models with a unique outcome, as a result, second generation models are deemed to "square better with the stylized facts of global financial markets" (Masson, 1999). However, when speculators expect the occurrence of a crisis across countries, they have an incentive to engage in financial market transactions that create links between otherwise "separate" markets (what Kodres and Pritsker (2002) call "cross-market rebalancing"[3]). That is, if speculators expect that a crisis in country i will be immediately followed by a crisis in country j, they have an incentive to be active in both currency markets in order to "benefit" from this joint correlation. If a crisis then occurs in country i, it will change the wealth levels of these speculators and, therefore, change their actions in country j's currency market in a way that increases the probability of a crisis in the latter. The belief that contagion will occur is entirely "self-fulfilling"; that is, if investors

[3]In our case, "cross-market rebalancing" only occurs within the same region, since as shown in section 4.4, currency crisis contagion is not very likely to jump across regions.

expect there to be no correlation between the outcomes of the two markets, they will have no incentive to rebalance their portfolios, and contagion will not occur. Needless to say, this view is a simple theory of contagion in which a devaluation of one currency acts as a signal that coordinates expectations on the crisis equilibrium in another currency market.[4] The immediate source of equilibrium contagion (when it occurs) in this simple setting, is the fact that the same investors *can* be active in both markets, which generates (at the very least) a wealth channel through which crises are transmitted. In this way, the analysis herein relates to a number of papers that study how financial interdependence can lead to contagion (see Kodres and Pritsker, 2002).

Moreover, because open economies cannot insulate themselves fully from their "surrounding environment", then economies may need (in the long-run) to take on more synchronized measures in order to mitigate any contagion effects. However, despite the "burst" of contagion models, consensus does not exist *vis-à-vis* the relevant contagion channels and the implications for policy.

Figure 5.1: Waves of Capital Flows to Emerging Markets and Current Account Balances

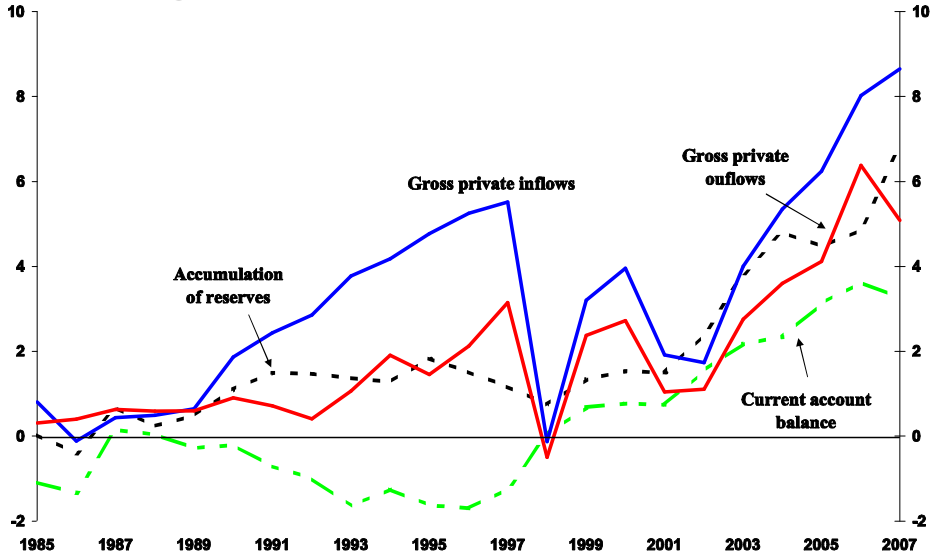


For example, if the trade channel is relevant then countries may need to diversify their trade portfolio, and/or fix their exchange rates in order to steer clear of speculative attacks stemming from a fall in international competitiveness[5]. If, on the other hand, the "finan-

[4] If two countries are highly integrated, of course, (through trade, etc.) it is not entirely surprising that a crisis in one would have strong effects on the other. The importance of expectations is most often stressed in cases where the two currencies are, at least in principle, not closely related.

[5] Where international cooperation of the affected economies may lead to the establishment of a single

Figure 5.2: Waves of Capital Flows to Emerging Markets and the Accumulation of Reserves



cial contagion" channel is relevant, then countries may need to impose capital controls on (short-term) capital flows. Moreover, some economists view increasing financial openness and unregulated capital flows as a grave obstruction to global financial stability (see Bhagwati, 1998; Rodrik, 1998; Stiglitz, 2000; Rodrik and Subramanian, 2008), leading to calls for capital controls (such as "Tobin taxes") on international asset trade. Other economists have argued that increased openness to capital flows has, in general, proven vital for countries aiming to leapfrog from lower- to middle-income status, while considerably enhancing stability among industrialized countries (e.g., Fischer, 1998; Summers, 2000). This is evidently a matter of substantial policy significance, especially with economies like China and India taking steps to open up their capital accounts.

The wave of capital flows running through many emerging market economies since the early 2000s and has brought renewed attention on how macroeconomic policies should respond to these flows, especially in light of current account balance positions (see Figure 5.1) and the degree of reserves accumulation (see Figure 5.2). Although these capital flows are associated with ample global liquidity and favorable worldwide economic conditions according to the IMF (2007), in many cases they are a manifestation of improved macroeconomic frameworks and growth-enhancing structural reforms (IMF, 2007). However, the inflows also generate important challenges because of their potential to generate overheating, loss of competitiveness, and increased vulnerability to crises; accordingly, significant concerns

currency like in the USA or the EU.

about the stability of national and international financial systems (stemming from the crises that occurred throughout the 1990s) have been voiced throughout the last few years. Moreover, the fear remains that in an environment of relatively free international capital markets such crises are becoming more frequent and that such developments may easily spill over to other economies.

Interestingly, there is little empirical evidence supporting the view that financial openness by itself increases vulnerability to crises. However, while crisis episodes receive most of the attention, they are just (for the most part) spiky expressions of the more general phenomenon of macroeconomic volatility. As the abovementioned argument highlights, the strength and the recurring nature of the crises has forced both practitioners and academics to focus on contagion as the guilty party. For example, during the 1990s developed and developing countries experienced severe financial difficulties, including balance-of-payments crises and systemic banking failures. Accordingly, the scale and impact of these events renewed interest in the existing "crisis and contagion" literature and stimulated a large volume of new theoretical and empirical work to explain and/or predict crises in order to provide countries with appropriate policy advice needed to avert any impending crises. In response to these events, several different theoretical models were developed showing how crises end up spreading across countries. For example, some of the major models of contagion are based on trade linkages and macroeconomic similarities (Gerlach and Smets, 1995; Eichengreen et al., 1996; Glick and Rose, 1999; van Rijckeghem and Weder, 2001), while other models are based on financial linkages, neighborhood effects, and exogenous shifts in investors' beliefs (Masson, 1999; Calvo and Mendoza, 2000; Kaminsky and Reinhart, 2000; Kodres and Pritsker, 2002).

Accordingly, this paper addresses three interrelated questions: (*i*) is the probability that a country faces a speculative attack affected by a crisis elsewhere? (*ii*) How does the joint probability of a crisis affect the degree of contagion? (*iii*) Does "financial integration" into world capital markets increase the probability of a crisis? To address these questions, the paper follows a three-step approach. First, we employ an alternative statistical method known as extreme value theory (EVT) to identify "large" values of an EMP index. This statistical technique is particularly well designed to address the occurrence of financial market crises, which are rare events located far out in the tails of empirical distributions. In an univariate setting, this approach has been used to study the frequency of currency market (Koedijk et al., 1990; Hols and de Vries, 1991), stock market (Jansen and de Vries, 1991; Longin, 1996) and bond market (Hartman et al., 2004) crashes in industrial countries. However, in contrast to the literature, we only focus on emerging and developing markets (Asia, Africa,

and the Western Hemisphere). Perhaps more importantly, we extend the analysis of extreme exchange rate fluctuations to a bivariate setting, measuring the joint occurrence of currency market crashes.

The "crises elsewhere" variable that is often constructed in the contagion literature only considers whether at least one of the other (neighboring) countries is suffering a crisis. However, by construction, this procedure gives the same weight (i.e. the same importance) to (all) other countries. Intuitively, however, countries may have different links during crises (non-normal) periods. Therefore, to specify a "crisis elsewhere" or contagion measure without considering the differences in the linkages, can at the very least lead to misleading results. Accordingly, our second step is to incorporate the different levels of connections between countries by taking into account the conditional probability of joint failure (CPJF) to weight our contagion variable.

Third, we estimate a panel probit model as in Eichengreen et al. (1996), to test for the existence of contagion, while also empirically identifying the true likelihood of contagion. Moreover, the research herein differs from Eichengreen et al. (1996) in at least two ways. First, we use extreme value theory the test for contagion. This corresponds to a more accurate measure of contagion, which is a noteworthy divergence from prior research in this area. The normal procedure in the literature has been to pick a threshold based on the mean and standard deviations of an exchange market pressure index, where values of the index above the threshold are coded to indicate a currency crisis. However, there is no consensus on the specification of the threshold.[6] Second, we construct a new estimator (as previously mentioned) and an expanded data set representing many different regions of the world. On a broader basis, we can test for contagion, while also allowing contagion to operate through "cross-market rebalancing" and the so-called "neighborhood channel".

Overall, our conditional probability of joint failure analysis (CPJF) indicates that currency crises are only regionally contagious. For example, economies within Asia and some economies within Africa display significant tail-dependence. The western hemisphere economies are tail-independent, indicating that currency crisis do not spread from one economy to another within the western hemisphere. As far as "global" contagion, we do not find much evidence that contagion spreads from region to region. Empirically, our probit results point out that currency crises can be attributed to lack of macroeconomic discipline (i.e. monetary and fiscal). Moreover, the estimation results reveal that higher levels of financial integration into world financial markets lowers the probability of a crises. Our results also indicate that

[6]For example, global mean plus 1.5 standard deviations as in Eichengreen et al. (1996); or country specific mean plus 3 standard deviations as in Kaminsky and Reinhart (2000).

the sudden stop of capital flows and their quick reversal exacerbates the probability of a crisis

5.2 Methodology and Data

As has been previously stated, the main objective of this paper is to answer three questions: (*i*) is the probability that a country faces a speculative attack affected by a crisis elsewhere? (*ii*) How does the joint probability of a crisis affect the degree of contagion? (*iii*) Does "financial integration" into world capital markets increase the probability of a crisis? Before answering these questions, this section explains our methodological approach.

5.2.1 Exchange Market Pressure Index

Following Girton and Roper (1977) and Eichengreen et al. (1996), we construct an index of exchange market pressure (EMP) as a weighted average of changes of the nominal exchange rate, changes in international reserves, and changes in nominal interest rates, in order to capture speculative pressure on a country and its currency (see Eichengreen, Rose and Wyplosz, 1995, and/or Kaminsky and Reinhart, 2000). This EMP index is an adequate proxy for currency crises, since it capture speculative attacks, whether successful or not. The reasoning following this index is that a central bank can allow the domestic currency to depreciate as a reaction to speculative attacks against its currency. On the other hand, the central bank has the ability to shield its currency by using its foreign reserves or by increasing interest rates. Accordingly, the calculation of the exchange market pressure for country i at time t is as follows (see Appendix E, F, and G for a graphical representation):

$$EMP_{it} = \frac{1}{\sigma_e}\frac{\Delta e_{it}}{e_{it}} - \frac{1}{\sigma_r}\left(\frac{\Delta rm_{it}}{rm_{it}} - \frac{\Delta rm_{us,t}}{rm_{us,t}}\right) + \frac{1}{\sigma_{it}}\left(\Delta\left(i_{it} - i_{us,t}\right)\right) \tag{5.1}$$

where e_{it} are the units of country $i\prime s$ currency per U.S. dollar in period t; σ_e is the standard deviation of the relative change in the exchange rate ($\frac{\Delta e_{it}}{e_{it}}$); rm_{it} is the ratio of gross foreign reserves to money stock or monetary base for country i in period t; σ_r is the standard deviation of the difference between the relative changes in the ratio of foreign reserves and money (money base) in country i and the USA $\left(\frac{\Delta rm_{it}}{rm_{it}} - \frac{\Delta rm_{us,t}}{rm_{us,t}}\right)$; i_{it} is the nominal interest rate for country i in period t; $i_{us,t}$ is the nominal interest rate for the USA in period t;

σ_{it} is the standard deviation of the nominal interest rate differential $(\Delta(i_{it} - i_{us,t}))$.[7] By definition, a currency crisis occurs when the realized exchange market pressure is "unusually large". The main problem with this terminology is in defining the threshold that determines the largeness of the index, and therefore, the approach used varies from study to study.

A common feature of studies that try to comprehend the fundamental determinants of currency crises is the construction of a single composite index; that is, an index of exchange market pressure (EMP) that will systematically identify the presence and harshness of currency crises or speculative attacks on a currency. In this light, studies such as Eichengreen et al. (1995, 1996), Sachs et al. (1996), and Kaminsky et al. (1998), have proposed different approaches to the construction of the EMP index. Once a decision has been made on how to construct the EMP index, then it is eventually employed directly to either construct a binary dependent index variable in logit/probit models, in which case a speculative attack episode is identified once the index is above a certain threshold, or instead as a continuous dependent variable in a more "structural" empirical model of currency crises. The problem with the literature when it comes to the classification of speculative attacks on a currency is largely its arbitrary process. More specifically, the customary manner of choice for the statistical threshold previously mentioned has involved arbitrary multiples of the standard deviation of the EMP above its mean (i.e. 1.5, 2, or 3 standard deviations are commonly used). This procedure relies on the existence of finite variance in the EMP index. By considering the EMP as a normally distributed variable, the threshold (which is arbitrarily chosen), in fact corresponds to a quantile with a certain probability level,[8] and as shown below, the assumption of normality *vis-à-vis* the EMP index is far from satisfactory. Furthermore, the existence of infinite variance cannot be ruled out for the EMP index. Therefore, the conventional method of defining currency crises is statistically flawed or inaccurate in capturing the "true" dispersion of any given EMP series. In other words, the conventional method of employing the mean and standard deviation underestimates the frequency of speculative attacks.

In order to define a crisis, we use a quantile of the EMP series as our threshold choice without *a priori* specifying the distribution of the EMP. Moreover, given the existence of

[7] In theory, for a pure float, the change in the exchange rate would correspond exactly to the index of exchange market pressures. At the other extreme, for a peg, the exchange rate would be constant, and fluctuations in the EMP would be driven entirely by changes in reserves and/or interest rates through intervention.

[8] In finance, the high quantile is the so-called Value-at-Risk (VaR). That is, for a risk factor X, its VaR at a given level p is defined as $VaR(p)$, which satisfies $P(X > VaR(p)) = p$. Therefore, by assuming a normally distributed EMP, the mean plus 1.5 standard deviation threshold corresponds to a VaR at probability level 6.7%.

finite variance, we consider "extreme value analysis" as the proper instrument. We use monthly data ranging from $1978 - 2007$ in order to calculate the probability of a crisis in country i at time t. Similar to de Haan and de Ronde (1998), we choose the threshold by using a Hill plot (see Hill, 1975). That is, we first calculate the Hill estimators against the number of high order statistics k. We then choose a level k around which the estimate (in the Hill Plot) is stable. For all countries in our sample, we choose $k = 45$; this level corresponds to a quantile with probability level $45/337 = 13.3\%$.[9] Formally, this means that for a certain country i, lets denote the EMP series as EMP_{it} at time t. Now suppose that the VaR at probability level 13.3% is VaR_i.[10] Then the crisis variable for country i at time t is defined as

$$\begin{aligned} Crisis_{it} &= 1 \; if \; EMP_{it} \geq VaR_i \\ &= 0 \;\; otherwise. \end{aligned} \tag{5.2}$$

5.2.2 Econometric Approach

This section specifies the model that is used to test whether the probability of a crisis in an individual country is affected by a "crises elsewhere", while controlling for initial macroeconomic conditions in the country under question. According to a number of theoretical models reviewed in section 5.2, currency crises may be contagious through trade, may also be contagious for countries that have similar macroeconomic fundamentals, for countries that are more financially integrated into the world capital markets, and for countries that are neighbors. Therefore, following Eichengreen et al. (1996) we estimate a panel probit model using monthly data for 23 emerging and developing economies (see Appendix A, B, and C for the list of sample countries, data descriptions, and descriptive statistics respectively) as follows:

$$Crisis_{it} = \theta D(Crisis_{jt}) + \lambda I(L)_{it} + \varepsilon_{it} \tag{5.3}$$

where

[9] Given our time period, we have 348 months at our disposal. However, due to missing data for some months, at the end we can only work with 337 months.

[10] As previously mentioned, these are the 45th order statistics from the top.

$$\begin{aligned} D(Crisis) &= 1 \; if \; (Crisis) = 1 \; for \; any \; i \neq j \; and \; i \; \& \; j \in (same \; region) \\ &= 0 \; otherwise \end{aligned}$$

In this model, the vector $\lambda I(L)_{it}$ is an information set of macroeconomic control variables. This information set includes (see appendix B for a full description) the growth rate of money ($M2$) as a percentage of international reserves, CPI inflation, domestic credit as a percentage of GDP, the growth rate of real GDP, the percentage of government budget (net) balance relative to GDP, and the percentage of the current account relative to GDP.[11] These fundamental controls are included in line with the arguments of the first generation models of speculative attacks, which was first brought to light by Krugman (1979) and was later modified by Flood and Garber (1984). A number of papers have extended the Krugman-Flood-Garber model in other directions (see for example Agénor et al., 1992). As was discussed in section 5.2, in this type of models, expansionary fiscal and monetary policies[12] led to higher domestic demand for both traded and non-traded goods. The former causes a deterioration of the trade balance while the latter causes a real appreciation of the currency. Thus, external variables such as trade and current account balances, and the evolution of the real exchange rate can also be used as leading indicators of currency crises under the first-generation approach. Therefore, these models predict co-movements between speculative attacks and adverse developments in the fundamental determinants of the exchange rates. In these models, diverging fundamentals are viewed as being inconsistent with a given parity and are interpreted by market participants as a signal that realignment will occur eventually. This expectation leads to an immediate speculative attack against the currency resulting in crisis in country i independently of the contagious spread of crises from other countries. We also include variables that capture the different channels by which crisis may take place (or can be exacerbated). That is, we include several *de facto* measures, such as "trade openness", "financial openness",[13] FDI inflows, portfolio inflows and debt inflows, in order to provide a better picture of the extent of a country's integration into global (financial) markets.

[11] Each variable enters as deviation from the corresponding variable of the center country, which in our case it is the United States.

[12] Proxied by the government budget deficit as a percentage of GDP and the growth rate of domestic credit, respectively.

[13] *Trade openness* is the sum of exports and imports over GDP; *financial openness* is the sum of financial assets and liabilities divided by GDP.

5.2.3 Weighting Contagion

The "crises elsewhere" variable constructed in Section 5.3.2 only considers whether at least one of the other countries in the same region is suffering a crisis. However, by construction, this procedure gives the same weight (i.e. the same importance) to (all) other countries. Intuitively, however, countries may have different links during crises (non-normal) periods. Therefore to specify a "crisis elsewhere" or contagion measure without considering the differences in the linkages, can at the very least lead to misleading results. Therefore, in order to incorporate the different levels of connections between countries, we need as a first measure, the dependence of the EMPs between different countries during periods of extreme values (or crises). Note that a regular dependence measure, such as the correlation coefficient, does not serve this purpose since the correlation coefficient measures dependence given "moderate levels" (i.e. during normal times). Therefore, we are looking for a measure for the tail dependence (i.e. a measure during non-normal times).

Luckily for us, we have at our disposal a few indicators that capture tail-dependence (see Hartman et al., 2004), stemming from multivariate extreme value analysis. Among them, we choose the conditional probability of joint failure (CPJF)(see Embrechts et al., 2000).[14] Therefore, given that at least one of two countries is in a crisis, the CPJF is defined as the conditional probability that the other country is also in a crisis. Suppose EMP_i and EMP_j are the EMPs of countries i and j, then the corresponding VaR at probability level p of these two variables are $VaR_i(p)$ and $VaR_j(p)$. We then define:

$$CPJF_{i,j} = \lim_{p \to 0} P(EMP_i > VaR_i(p) \text{ and } EMP_j > VaR_j(p) | EMP_i > VaR_i(p) \text{ or } EMP_j > VaR_j(p)) \tag{5.4}$$

Notice that under the multivariate extreme value analysis framework, this limit exists (see de Haan and Ferreira, 2006, Ch. 7)[15]. Hence, even for a finite level of p, as soon as p is at a low level, the conditional probability is already close to its asymptotic value.[16] To estimate $CPJF_{i,j}$, we use the following estimator (see de Haan and Ferreira, 2006, Ch. 7)[17]:

[14] This measure is reminiscent of the correlation coefficient, in the sense that the asymptotic independence case corresponds to 0, while full dependence corresponds to 1.

[15] The $CPJF_{ij} + 1$ is the κ mentioned in section 7.4 on pg 258.

[16] Therefore, the choice of p for defining a crisis is insensitive when it is at a low level.

[17] The $\widehat{CPJF}$ estimator is the H-measure found in section 7.4. Since this measure is asymptotic normal, we can test its significance from its asymptotic distribution (see section 5.4).

$$\widehat{CPJF}_{i,j} = \frac{\sum_t Crisis_{it} Crisis_{jt}}{\sum_t Crisis_{it} + \sum_t Crisis_{jt} - \sum_t Crisis_{it} Crisis_{jt}} \tag{5.5}$$

It is clear that a higher CPJF between two countries indicates that a financial crisis in these two countries is more likely to occur at the same time. In other words, when one of these two countries is in a crisis, it is more likely for the other country to be in a crisis. Moreover, for a given country, the CPJFs between country (A) and other countries (e.g. B, C, D) in the same region may vary, which highlights (as previously mentioned) the different linkages during crisis periods. Therefore, when constructing the "crises elsewhere" or contagion variable, it is necessary to consider the CPJFs between this country and the others as weights. In this manner we downweight those countries who are less connected, while giving a higher weight to those countries that are highly connected. Therefore, our newly constructed "weighted crises elsewhere" variable is given as:

$$W_{it}(Crisis) = \sum_{j \neq i} CPJF_{ij} Crisis_{jt}. \tag{5.6}$$

Using this new measure, we will run a probit model (see section 5.6) as:

$$Crisis_{it} = \gamma W_{it}(Crisis) + \lambda I(L)_{it} + \varepsilon_{it}. \tag{5.7}$$

5.3 Tail Dependence or Independence?

The traditional method employed to study interdependencies between different random events is the (pearson) correlation between such events, since correlations fully characterize all interdependencies (but only if the random variables are multivariate normally distributed). However, there are two drawbacks to this measure for the purposes of this chapter. First, the distribution of asset returns (e.g. exchange rates) is not (multivariate) normally distributed. That is, the tails of the return distributions are "fat". Second, the correlation concept is a global measure, and it empirically under-weights the dependency in the tail region. Therefore, the (pearson) correlation measure is inadequate for our purposes.

Accordingly, and as shown in section 5.3.3, we measure systemic risk in a bivariate setting through the conditional probability of joint failure (CPJF). The CPJF always lies between 0 and 1; if it is zero, then the probability of a joint crash is negligible. However, if it is 1,

then a crisis in one country always goes hand in hand with the downfall of the other country. Therefore, our first step, is to test $H_0 : CPJF = 0$[18] from the asymptotic distribution of the $CPJF$ estimator (for details of this test, see de Haan and Ferreira, 2006). The results (available upon request) confirm that for $CPJF \preceq 0.2$, we cannot reject the null hypothesis, and can only conclude that these countries are tail independent. For $CPJF \succ 0.2$, we accept the alternative $H_1 : CPJF = 1$, and conclude that these countries are tail dependent (see appendix D for CPJF tables).

5.3.1 Asia

Table 5.15 (see Appendix D), shows the regular dependence among Asian countries, and although a few negative numbers appear, they are quite close to zero. That is, the correlation coefficient between Asian economies is moderate at best, indicating a certain degree of independence. For example, Pakistan in general, can be considered as independent from the other countries, while Thailand can only also be considered independent from all other countries, except with Malaysia. Some other bilateral relationships worth highlighting, Singapore-Malaysia ($\rho = 0.51$), and Australia-Japan ($\rho = 0.40$).

Table 5.16 shows the tail dependence for the Asian economies. Compared to Table 5.15, we can immediately detect quite some different results. For example, the afore-mentioned relationship between Australia and Japan, now exhibits a much lower dependence (non-significant) level ($CPJF = 0.15$), indicating that these countries tend to be independent during crisis periods. As far as Singapore-Malaysia, we can once again see a strong (highly significant) link during crisis periods ($CPJF = 0.27$); moreover, Thailand-India are actually more dependent during crisis periods ($CPJF = 0.27$) than a standard correlation analysis would indicate.

Therefore, if we solely relied on the standard correlation coefficient, we would tend to conclude that (on average) Asian economies would experience the same event with a high probability. However, when we consider the conditional probability of joint failure, which is a more precise measure of tail-dependence, then we see that some countries are more dependent during crises times than others (and certainly when compared to the results in Table 5.15). Therefore, what this analysis shows is that regular-dependence and tail-dependence are independent.

[18] The significance of the test is indicated in bold (see Tables 5.14, 5.16, 5.18, 5.19-5.21). We chose a significance level at better than 10%, since we do not want to underestimate the tail dependence.

5.3.2 Western Hemisphere

The regular dependence measure (see Table 5.17) among western hemisphere economies, indicates low level of dependence. For example, Brazil-Canada have a correlation of 0.11, Brazil-Mexico have a correlation of 0.08, while Brazil-Venezuela have a 0.05 correlation coefficient. The only exceptions are Argentina-Brazil ($\rho = 0.40$), followed by Argentina-Mexico ($\rho = 0.18$).

Table 5.18 exhibits the tail dependence in the western-hemisphere region. First of all, compared to the Asia results, tail dependence is weaker in this region, and while these economies continue to show (on average) a low level of dependence, these levels of tail dependence are not significantly different from zero. Some notable decreases in dependence are Argentina-Brazil, who now experience a $CPJF = 0.18$. The pair Brazil-Canada now shows a much lower level of dependence with a $CPJF = 0.08$, indicating that these two economies are not very likely to experience extreme events at the same time (for all other comparisons, the reader is referred to Appendix D). Therefore, statistically speaking, we can only conclude that economies in this region are independent from one another.

5.3.3 Africa

Table 5.19 (in Appendix D), shows a very high regular dependence among African economies. For example, Niger-Senegal have a correlation of 0.99, while Burkina Faso-Mali have a $\rho = 0.92$. Moreover, Burkina Faso-Ivory Coast and Mali-Ivory Coast experience a correlation of over 0.70. Table 5.20 shows the tail dependence, with the CPJFs remaining extremely high. For example, Burkina Faso, Côte d'Ivoire, Mauritius and Mali are highly dependent. Niger and Senegal show the highest tail dependence in this region ($CPJF = 0.91$), while the lowest CPJF (0.08) between South Africa, Mali and Burkina Faso. It is also wroth pointing out that South Africa is in general independent from African countries in periods of crises.

Given the above observations, we can categorize the African economies into three groups: group 1: Burkina Faso, Côte d'Ivoire, Mauritius and Mali; group 2: Niger and Senegal; group 3: South Africa. This classification shows that dependence during a crisis is (in general) observed within groups; however, these groups can be considered independent from each other.

5.3.4 Global (in)dependence

One of the claims that is most often voiced in the literature (in the media) is that contagion occurs across regions. That is, the crisis of the 1990s spread from Mexico to Asia during the Mexican crisis in 1994, and from Asia to Latin America during the 1997-1998 Asian crisis. Moreover, that market turbulence was transmitted to Latin America following the 1998 Russian default. Tables 5.21 - 5.23 show the tail dependence across the three regions (Africa, Asia, and the Western Hemisphere), and the message stemming from these tables is quite clear; in general, we observe high levels of independence across regions vis-à-vis currency crisis, since all the CPJFs are rather low. Therefore, and contrary to popular belief, we can only conclude that (currency) crisis are not very likely to spread from region to region. In other words, currency crisis exhibit a "local" flavor.[19]

5.4 Probit Estimation Results

5.4.1 Asia Sample

Results for Asia are presented in Table 5.1, and since probit coefficients are not easily interpretable, we also include the effects of a one standard deviation percentage change in the regressors on the probability of a crisis (mfx). The results for Asia are consistent with the existence of a regional contagion effect (as captured by the neighborhood dummy), which is economically important and statistically significant. That is, a speculative attack elsewhere in Asia is associated with an increased probability of a domestic currency crisis of around 9 percentage points. Moreover, the results support some of the predictions of the first generation models of speculative attacks. As was previously mentioned, according to this type of models, a currency crisis stems from inconsistencies between macroeconomic fundamentals and the exchange rate commitment. According to the results reported in Table 5.1, the probability of a currency crisis increases with an increase in CPI inflation, and the government budget deficit as a percentage of GDP (both significant at the 1%), all measured relative to the United States.

[19] However, a few exceptions can be discerned. For example, African economies found in group 1 (see section 5.4.3) have a moderate level of tail dependence with Japan and Korea.

Table 5.1: Asian Sample Panel Probit Results; 1978M1 - 2006M12

	I	mfx	II	mfx	III	mfx	IV	mfx	V	mfx
Diff in Dom. Credit	1.17		1.24		1.16		0.58		-0.53	
	(1.12)		(1.15)		(1.11)		(1.26)		(0.95)	
Diff in Liquidity	0.97		0.83		0.99		0.88		1.00	
	(0.62)		(0.61)		(0.62)		(0.58)		(0.64)	
Diff in GDP growth	0.91	0.7	1.18	0.8	0.94	0.7	0.93	0.6	0.57	
	(0.51) *		(0.50) ***		(0.52) *		(0.55) *		(0.60)	
Diff in Gov. Budget	-3.51	-0.7								
	(1.24) ***									
Diff CPI Inflation	0.09	1.4	0.07	1.1	0.10	1.4	0.09	1.2	0.09	1.2
	(0.02) ***		(0.02) ***		(0.02) ***		(0.02) ***		(0.03) ***	
Diff Fin. Open.			-0.02							
			(0.01)							
Diff Trade Open.					0.02					
					(0.02)					
Diff C.A.							-0.43	-3.3		
							(0.12) ***			
FDI inflows									-0.03	-2.9
									(0.01) **	
Portfolio inflows									-0.03	-1.5
									(0.006) ***	
Debt inflows									0.001	
									(0.005)	
Neighbor Dummy	0.58	9.6	0.58	9.5	0.59	9.7	0.51	8.2	0.48	7.5
	(0.12) ***		(0.13) ***		(0.12) ***		(0.12) ***		(0.12) ***	
Observations	2854		2809		2861		2822		2402	
McFadden R^2	0.25		0.27		0.26		0.27		0.40	

Notes: Dependent variable is a crisis dummy; model includes a constant

*, **, *** are 10%, 5%, 1% significant levels; robust standard errors in parenthesis

Diff in liquidity = diff in M2/Int. Reserves

mfx = (marginal effect*standard deviation)*100; not for dummy

This latter result shows that countercyclical fiscal policy[20] in the form of slower growth in government expenditure is strongly associated with lower exchange market pressure. Moreover, the current account variable enters negatively (also significant at the 1%), implying that an increase in the current account deficit (i.e. lower reserves) increases the probability of a currency crisis as predicted by theory. This latter result is interesting, because studies previously mentioned were unsuccessful in linking current account deficits to currency crisis (see for example Eichengreen, Rose and Wyplozs, 1996).

The IMF (2007) has argued that episodes of very large capital inflows are associated with an acceleration of GDP growth. This suggests that for episodes of large capital inflows ending abruptly, it may take some time to recover fully from the economic slowdown associated with a "hard landing". Our results also show that Asian economies, which have enjoyed a tremendous and steady growth in GDP should be careful of the upside risk (e.g. overheating) associated with such prosperity. That is, our results show that as GDP growth increases, then the odds of a speculative attack increase by 1%. As far as "financial integration" and the free movement of capital flows, Stiglitz (2000) for example, has argued in favor of the "capital inflows problem"; that is, that capital market liberalization is associated with greater instability. One of his arguments (and he is not the only critic) is that not all capital flows are created equal. That is, most critics of capital market liberalization are not as concerned with FDI inflows, as they are about short-term financial flows (i.e. debt flows), and they argue that it is the latter that many fear as particularly destabilizing. When we look at "financial integration" and at "trade openness", we do not find any particular effect *vis-à-vis* currency crises. However, when we discriminate between capital flows (i.e. between FDI, portfolio and debt), the results found in column V of Table 5.1, show that higher (and sustained) levels of FDI and portfolio inflows are associated with a lower probability of a crisis (of about 2.5% given a one standard deviation shock), and that debt inflows have no effect. This suggests that capital inflows in-and-of-themselves do not seem to have insidious side effects; rather it is the sudden stop and quick reversals (see Montiel, 1999) that can exacerbate the problem.

As far as the effects for individual Asian economies, Table 5.2 shows that, for example, a one standard deviation shock to the difference in CPI inflation will affect Indonesia the most, since it will increase the probability of a currency crisis for this economy by 2.3%. When it comes to improvements in the current account balance, Singapore and Malaysia benefit the most from improvements in the current account balance *vis-à-vis* reducing the probability of a speculative attack. We can also discern the importance of capital flows for

[20] Countercyclical in the sense of fiscal restraint during boom.

some countries in reducing the probability of a crisis. When it comes to FDI inflows, the main beneficiaries are Australia, Japan, and Singapore; while Japan and Australia benefit the most from portfolio inflows.

Table 5.2: Effects to the probability of a currency crisis of a one standard deviation shock to respective variables for Asian economies

	diff $(M2/Int.R)$ growth	diff GDP growth	diff CPI inflation	diff Gov. budget	diff in C.A	FDI inflows	Portf. inflows
Australia	1.4%	0.2%	n.a	-0.7%	-1.7%	-7.3%	-1.1%
India	1.4%	1.5%	1.4%	-0.1%	-1.5%	-1.4%	-0.2%
Indonesia	1.6%	1.2%	2.3%	-0.1%	-0.8%	-1.0%	-0.2%
Japan	11.7%	0.3%	0.8%	-0.1%	-1.5%	-3.0%	-4.4%
Korea	1.4%	0.8%	1.1%	-0.1%	-1.5%	-1.2%	-0.4%
Malaysia	1.2%	0.7%	0.8%	-0.7%	-3.8%	-0.7%	-0.2%
New Zea.	2.7%	0.5%	n.a	-1.5%	-1.8%	-0.8%	-0.2%
Pakistan	3.7%	0.8%	1.5%	-0.1%	-2.0%	-0.3%	-0.03%
Philippines	2.7%	0.8%	1.7%	-0.1%	-1.9%	-0.3%	-0.1%
Singapore	0.8%	0.7%	0.8%	-1.5%	-6.8%	-2.5%	-0.2%
Thailand	1.9%	0.7%	1.0%	-0.1%	-2.0%	-0.9%	-0.1%

5.4.2 Western Hemisphere Results

The results for the western hemisphere (see Table 5.3) also show that a speculative attack elsewhere in the region is associated with an increased probability of a domestic currency crisis of around 5 percentage points. Moreover, according to the results reported in Table 5.3, the probability of a currency crisis increases with an increase in CPI inflation, and a higher growth rate of M2-to-international-reserves ratio.[21] Since this latter ratio captures the extent to which the liabilities of the banking system are backed by international reserves; then in the event of a currency crisis, individuals will start rushing to convert their domestic currency deposits into foreign currency. Therefore, this latter result shows that a higher ability of a central bank to withstand this demand pressure (i.e. a lower ratio) reduces the probability of a crisis.

[21] When we exclude Canada from the sample and consider only the Latin American countries, the results do not change. These are available upon request.

Table 5.3: Western Hemisphere Sample Panel Probit Results; 1978M1 - 2006M12

	I	mfx	II	mfx	III	mfx	IV	mfx	V	mfx
Diff in Dom. Credit	0.95		0.92		0.76		0.89		1.85	
	(1.75)		(1.73)		(1.67)		(1.73)		(1.60)	
Diff in Liquidity	3.91	8.3	3.87	8.2	3.92	8.3	3.94	8.4	5.42	9.6
	(2.29) *		(2.27) *		(2.28) *		(2.28) *		(2.02) ***	
Diff in GDP growth	-0.60	-2.0	-0.65	-2.1	-0.58	-1.8	-0.62	-2.0	-0.60	-1.6
	(0.18) ***		(0.15) ***		(0.15) ***		(0.16) ***		(0.18) ***	
Diff in Gov. Budget	-0.23		-0.27		-0.21		-0.23		-0.22	
	(0.19)		(0.18)		(0.20)		(0.19)		(0.26)	
Diff CPI Inflation	0.06	8.8	0.06	9.5	0.06	8.8	0.06	9.3	0.04	5.9
	(0.01) ***		(0.01) ***		(0.01) ***		(0.001) ***		(0.007) ***	
Diff Fin. Open‡.			-0.004	-1.7						
			(0.002)							
Diff Trade Open.					0.002					
					(0.02)					
Diff C.A.							0.01			
							(0.009)			
FDI inflows									-0.03	-4.3
									(0.008) ***	
Portfolio inflows									-0.003	
									(0.003)	
Debt inflows									0.0001	
									(0.003)	
Neighbor Dummy	0.31	5.2	0.30	5.1	0.32	5.4	0.31	5.3	0.19	2.6
	(0.03) ***		(0.04) ***		(0.03) ***		(0.03) ***		(0.00) ***	
Observations	1409		1409		1403		1409		1232	
McFadden R^2	0.38		0.38		0.39		0.38		0.51	

Notes: Dependent variable is a crisis dummy; model includes a constant
*, **, *** are 10%, 5%, 1% significant levels; Diff in liquidity = diff in (M2/Int. Reserves)
Robust standard errors in parenthesis; ‡ = coefficient not significant, but mfx is significant
mfx = (marginal effect*standard deviation)*100; not for dummy

Furthermore, this effect can be associated with greater exchange market pressure, because higher returns on domestic assets end up attracting more capital inflows and fueling upward pressures on the currency (ceteris paribus). In contrast to the Asian economies, Western hemisphere countries have had a more turbulent time creating (sustained) GDP growth, and accordingly, our results show that these economies need to grow in a more steady and sustained fashion in order to decrease the probability of a crisis. That is, a one standard deviation increase in GDP growth will decrease the probability of a crisis by 2% on average for these economies.

Table 5.4: Effects to the probability of a currency crisis of a one standard deviation shock to respective variables for WH economies

	Argentina	Brazil	Canada	Mexico	Venezuela
Diff (M2/Int.R) growth	12.3%	7.3%	8.7%	10.9%	7.9%
Diff in CPI inflation	35.1%	7.3%	0.2%	2.7%	6.1%
Diff in GDP Growth	-2.5%	-2.9%	-0.05%	-0.7%	-0.6%
FDI inflows	-2.2%	-3.7%	-7.1%	-3.1%	-0.9%

As far as "financial integration", we find that the marginal effect on the probability of a currency crisis is negative, implying a decrease of almost 2% (this runs counter to what the "financial Globalization" critics have long argued). Moreover, when we discriminate between capital flows (i.e. between FDI, portfolio and debt), the results found in column V of Table 5.3, show that higher (and sustained) levels of FDI are associated with a lower probability of a crisis (of about 5% given a one standard deviation shock), and that portfolio and debt inflows have no effect. Table 5.4 shows the effects of a one standard deviation shock for each individual country. For example, a one standard deviation shock to the difference in M2 to international reserves growth between the various western hemisphere economies and the USA will increase the probability of a crisis by around 10% on average, with Argentina experiencing the largest effect.

A similar one standard deviation shock to the difference in CPI inflation will increase the probability by a dramatic 35% for Argentina and by less that one percent for Canada, while the probability will only increase (for the remaining countries) by around 6% on average. Once again, and similarly as to the Asian economies, the "more advanced" economies in the region benefit the most from capital inflows. For example, Canada experiences the

largest reduction in the probability of a crisis, given a one standard deviation increase in FDI inflows, followed by Brazil and Mexico. When it comes to GDP growth, Brazil and Argentina benefit the most from higher and sustained GDP growth, while the other three countries experience a less that 1% reduction in the probability of a crisis.

5.4.3 Africa Results

As far as the African economies, the results in Table 5.5 once again confirm the "neighborhood" effect, which is associated with an increased probability of a domestic currency crisis of around 20 percentage points (which is quite a dramatic and significant effect). Moreover, the results show that the probability of a currency crisis increases with an increase in CPI inflation, and a higher growth rate of M2-to-international-reserves ratio. This latter result (similar to the Western Hemisphere economies) shows that a higher ability of a central bank to withstand excess demand pressure for foreign exchange reduces the probability of a crisis. In other words, international reserve inadequacies can trigger a crisis. Interestingly, the current account variable enters negatively and significantly at the 1% (mirroring the Asian experience), implying that increases in current account deficits increase the probability of a crisis.

As far as fiscal policy, African countries can certainly benefit *vis-à-vis* currency crisis from slower growth in government expenditures (the probability of a crisis decreases by around 5% on average, given a one standard deviation shock). However, in contrast to the Asian and Latin American results, countries in Africa do not seem to suffer (nor benefit) from an increase in GDP growth *vis-à-vis* a currency crises. As far as the different types of capital flows, only FDI inflows are associated with a reduction in the likelihood of a speculative attack by about 3% (see column V of Table 5.5), which is a recurring theme among the three regions that we have analyzed.

Table 5.5: Africa Sample Panel Probit Results; 1979M2 - 2007M9

	I	mfx	II	mfx	III	mfx	IV	mfx	V	mfx
Diff in Dom. Credit	1.29		1.40		-2.59		1.37		1.14	
	(1.16)		(1.21)		(2.69)		(1.08)		(1.41)	
Diff in Liquidity	0.91	4.2	0.91	4.2	1.50	8.5	0.91	4.1	0.89	4.2
	(0.22) ***		(0.22) ***		(0.43) ***		(0.21) ***		(0.21) ***	
Diff in GDP growth	2.80		2.83		-5.49		2.53		3.20	
	(1.92)		(1.87)		(6.43)		(1.89)		(3.29)	
Diff in Gov. Budget	-0.91	-3.9	-0.88	-3.9	-3.40	-18.1			-0.96	-4.3
	(0.24) ***		(0.27) ***		(0.54) ***				(0.25) ***	
Diff CPI Inflation	0.04	1.1	0.04	1.1	0.12	3.7	0.04	0.9	0.05	5.9
	(0.02) **		(0.01) **		(0.05) *		(0.01) **		(0.02) ***	
Diff Fin. Open			-0.06							
			(0.04)							
Diff Trade Open.					0.000					
					(0.49)					
Diff C.A.							-0.95	3.2		
							(0.17) ***			
FDI inflows									-0.03	-2.7
									(0.007) ***	
Portfolio inflows									-0.002	
									(0.006)	
Debt inflows									0.001	
									(0.002)	
Neighbor Dummy	1.34	24.6	1.34	24.6	0.72	13.5	1.32	23.8	1.30	23.9
	(0.24) ***		(0.24) ***		(0.33) ***		(0.23) ***		(0.23) ***	
Observations	1859		1859		400		1859		1724	
McFadden R^2	0.40		0.40		0.86		0.40		0.43	

Notes: Dependent variable is a crisis dummy; model includes a constant
*, **, *** are 10%, 5%, 1% significant levels; Diff in liquidity = diff in (M2/Int. Reserves)
mfx = (marginal effect*standard deviation)*100; not for dummy

Table 5.6: Effects to the probability of a currency crisis of a one standard deviation shock to respective variables for African economies

	diff $(M2/Int.R)$ growth	diff CPI inflation	diff Gov. budget	diff in C.A	FDI inflows
Burkina Faso	1.2%	1.4%	-2.0%	-2.3%	-0.03%
Cote d'Ivoire	7.9%	0.9%	-1.6%	-2.9%	-0.5%
Mali	2.9%	0.8%	-1.7%	-2.7%	-0.2%
Mauritius	3.3%	0.7%	-1.9%	-3.4%	-0.2%
Niger	2.4%	1.5%	-1.7%	-2.7%	-0.07%
Senegal	5.0%	1.0%	-1.6%	-2.5%	-0.2%
South Africa	1.8%	0.4%	-9.3%	-4.6%	-6.2%

Table 5.6 analyses the effects of a one standard deviation shock for each individual country. A one standard deviation shock to the difference in M2 to international reserves growth between the various (individual) African countries and the USA will increase the probability of a crisis; ranging from a minimum of 1.2% for Burkina Faso, to a maximum of almost 8% for Cote d'Ivoire. Moreover, the same shock applied to the difference in CPI inflation will increase the probability of a crisis by around 1% across the board. The results also point out that those countries in Africa with current account deficits are more vulnerable to currency crisis; in other words, a one standard deviation improvement in the current account balance will decrease the probability of a speculative attack by 2.3% for Burkina Faso (the smallest decrease), and by 4.6% for South Africa. Finally yet importantly, there is a clear message for policy makers in Africa that public expenditure restraint can contribute positively to the reduction of crisis (especially for South Africa). Lastly, out the African countries that we have analyzed, only South Africa seems to benefit the most from FDI inflows, experiencing a 6.2% reduction in the probability of a currency crisis for a one standard deviation increase in FDI inflows.

5.5 Weighting Contagion

As discussed in Section 5.3.3, our weight captures the different links between economies during crisis periods. Therefore, it can be argued that it also captures the expectations that investors form *vis-à-vis* the value of their assets, given that there is a crisis elsewhere in their (investment) region. In this view, our measure summarizes the macroeconomic risk factor structure of asset values to the "global" economy. That is, it proxies for systematic

macroeconomic risks such as regional business cycles, changes in discount factors, or in the terms of trade, or changes in the price of vital inputs such as oil. For example, when speculators expect the occurrence of a crisis across countries, they have an incentive to engage in financial market transactions that create links between otherwise "separate" markets (what Kodres and Pritsker (2002) call "cross-market rebalancing"[22]). As these authors explain, if investors expect that a crisis in a country (say country A) will be immediately followed by a crisis in another country (country B), they have an incentive to be active in both currency markets in order to "benefit" from this joint correlation. If a crisis then occurs in A, it will change the wealth levels of these speculators and, therefore, change their actions in country B's market in a way that increases the probability of a crisis there. The belief that contagion will occur is entirely "self-fulfilling"; that is, if speculators expect there to be no correlation between the outcomes of the two markets, they will have no incentive to rebalance their portfolios, and therefore, contagion will not occur. This view leads naturally to a simple theory of contagion in which a devaluation of one currency acts as a signal that coordinates expectations on the crisis equilibrium in another currency market.[23] The immediate source of equilibrium contagion when it occurs in their model, is the fact that the same agents can be active in both markets, which generates (at the very least) a wealth channel through which crises are transmitted. In this way, the analysis herein relates to a number of papers that study how financial interdependence can lead to contagion (see Kodres and Pritsker, 2002).

5.5.1 Asia

Table 5.7 shows the results of substituting our new expectations weighted variable for the unweighted (contagion) dummy variable. Weighting the contagion variable improves the fit of the equation. For example, while most results remain consistent with the previous discussion, the contagion effect remains strong and highly significant. The positive sign of the coefficient on the contagion variable indicates that when a neighboring country experiences

[22] In our case, "cross-market rebalancing" only occurs within the same region, since as shown in section 5.4.4, currency crisis contagion is not very likely to jump across regions.

[23] If two countries are highly integrated, of course, (through trade, etc.) it is not entirely surprising that a crisis in one would have strong effects on the other. The importance of expectations is most often stressed in cases where the two currencies are, at least in principle, not closely related.

Table 5.7: Weighted Asian Sample Panel Probit Results; 1978M1 - 2006M12

	I	mfx	II	mfx	III	mfx	IV	mfx	V	mfx
Diff in Dom. Credit	0.80		0.86		0.83		0.41		-0.75	
	(1.15)		(1.20)		(1.13)		(1.33)		(1.03)	
Diff in Liquidity	1.01	4.0	0.87		1.02	4.0	0.96	3.7	1.02	3.8
	(0.59) *		(0.59)		(0.62) *		(0.58) *		(0.64) *	
Diff in GDP growth	0.62		0.92	0.6	0.63		0.74		0.34	
	(0.51)		(0.48) ***		(0.51)		(0.57)		(0.60)	
Diff in Gov. Budget	-4.22	-0.8								
	(0.87) ***									
Diff CPI Inflation	0.12	1.7	0.11	1.4	0.12	1.7	0.12	1.7	0.11	1.5
	(0.03) ***		(0.02) ***		(0.03) ***		(0.03) ***		(0.03) ***	
Diff Fin. Open.			-0.03	-1.0						
			(0.01) ***							
Diff Trade Open.					-0.07	-0.4				
					(0.02) **					
Diff C.A.							-0.28	-1.9		
							(0.08) ***			
FDI inflows									-0.02	
									(0.01)	
Portfolio inflows									-0.003	-1.6
									(0.0005) ***	
Debt inflows									0.0007	0.3
									(0.0004) *	
W. Neighbor Dummy	1.59	6.7	1.60	6.6	1.61	6.7	1.51	6.2	1.42	5.7
	(0.13) ***		(0.13) ***		(0.13) ***		(0.14) ***		(0.14) ***	
Observations	2854		2809		2861		2822		2402	
McFadden R^2	0.32		0.34		0.33		0.33		0.44	

Notes: Dependent variable is a crisis dummy; model includes a constant
*, **, *** are 10%, 5%, 1% significant levels; robust standard errors in parenthesis
Diff in liquidity = diff in M2/Int. Reserves
mfx = (marginal effect*standard deviation)*100

a currency crisis, then the probability that the domestic economy will also experience a crisis increases by 6% for a one standard deviation shock to the joint probability of a crisis. This indicates that contagion seems to occur through cross-market rebalancing; that is, when market participants are hit by an idiosyncratic shock in one country, they transmit the shock abroad by "optimally" rebalancing their portfolio's exposure to macroeconomic risks through other countries' markets. Per individual country, this probability increase by 8.2% for Malaysia, followed by Singapore (7.9%) and Japan (7.4%), with Pakistan experiencing the lowest increase (5%).

Furthermore, the growth rate of M2-to-international-reserves ratio now enters with a positive and significant coefficient, suggesting that countries with low reserves relative to a broad measure of money are more likely to experience a currency crisis. This result is consistent with the view, expressed in traditional models of currency crises, that reserve inadequacy triggers a crisis. Referring back to Table 5.2, we see that a one standard deviation shock to the difference in M2 to international reserves growth between Japan and the USA will increase the probability of a crisis for Japan by almost 12%. However, other economies can also suffer extensively with an increase in this difference. Another improvement in the equation relates to the "financial integration" and "trade openness" results, since they now enter significantly with the expected sign. For example, Singapore and the Philippines benefit the most from a higher degree of *de facto* "financial integration" into world capital markets, while Singapore and New Zealand enjoy a lower probability of a currency crisis, due to further "trade openness".

5.5.2 Western Hemisphere

When we weight the contagion dummy by the joint probability of a crisis for western hemisphere economies, the results remain relatively similar to Table 5.3. Nonetheless, Table 5.8 indicates that when a neighboring country experiences a currency crisis in the western hemisphere, then the probability that the domestic economy will also experience a crisis is around 2.5% (for a standard deviation shock). Therefore, the occurrence of contagion through cross-market rebalancing in the Western Hemisphere, while still present, is certainly more subdued as compared to Asia. However, this is not surprising to us, since earlier (see Section 6.4.2) we found that western hemisphere economies are rather independent *vis-à-vis* currency crises. That is, the conditional probability of joint failure does not add any additional information to investors. Per individual country, this probability increase by 3% for Brazil, followed by Argentina and Mexico (both experience an increase of 7.4%). Moreover, CPI inflation and

the lack of central bank liquidity still remain the largest contributors to an increase in the probability of a currency crisis. FDI inflows remain robust to this new specification, and still contribute to a reduction in the probability of a speculative attack on the currency by over 4%.

Table 5.8: Western Hemisphere Sample Panel Probit Results; 1978M1 - 2006M12

	I	mfx	II	mfx	III	mfx	IV	mfx	V	mfx
Diff in Dom. Credit	0.93		0.90		0.77		0.89		1.83	
	(1.75)		(1.74)		(1.67)		(1.74)		(1.60)	
Diff in Liquidity	3.86	8.2	3.81	8.1	3.87	8.2	3.88	8.3	5.41	9.6
	(2.30) *		(2.28) *		(2.30) *		(2.30) *		(2.03) ***	
Diff in GDP growth	-0.60	-1.9	-0.66	-2.1	-0.59	-1.9	-0.62	-2.0	-0.60	-1.6
	(0.18) ***		(0.15) ***		(0.16) ***		(0.17) ***		(0.19) ***	
Diff in Gov. Budget	-0.24		-0.29		-0.23		-0.25		-0.23	
	(0.19)		(0.18)		(0.19)		(0.19)		(0.25)	
Diff CPI Inflation	0.06	8.8	0.06	9.5	0.06	8.8	0.06	8.8	0.04	5.9
	(0.01) ***		(0.01) ***		(0.01) ***		(0.01) ***		(0.007) ***	
Diff Fin. Open.			-0.003							
			(0.002)							
Diff Trade Open.					0.004					
					(0.02)					
Diff C.A.							0.00			
							(0.000)			
FDI inflows									-0.03	-4.3
									(0.008) ***	
Portfolio inflows									-0.003	
									(0.004)	
Debt inflows									0.001	
									(0.003)	
W. Neighbor Dummy	1.63	2.5	1.59	2.4	1.70	2.5	1.63	2.4	0.94	1.2
	(0.34) ***		(0.33) ***		(0.00) ***		(0.18) ***		(0.00) ***	
Observations	1409		1409		1403		1409		1232	
McFadden R^2	0.38		0.38		0.39		0.38		0.51	

Notes: Dependent variable is a crisis dummy; model includes a constant
*, **, *** are 10%, 5%, 1% significant levels; Diff in liquidity = diff in (M2/Int. Reserves)
Robust standard errors in parenthesis; mfx = (marginal effect*standard deviation)*100

5.5.3 Africa

As far as African economies are concerned, our new weight not only does it improve the fit of the equation, but it also continues to show strong tail dependence in relation to currency crises.

Table 5.9: Weighted Africa Sample Panel Probit Results; 1979M2 - 2007M9

	I	mfx	II	mfx	III	mfx	IV	mfx	V	mfx
Diff in Dom. Credit	1.94		1.88		-2.62		1.94		2.00	
	(1.49)		(1.39)		(2.12)		(1.52)		(1.68)	
Diff in Liquidity	1.45	5.1	1.46	5.1	1.94	9.2	1.45	5.1	1.45	5.2
	(0.22) ***		(0.24) ***		(0.43) ***		(0.23) ***		(0.21) ***	
Diff in GDP growth	3.29		3.28		-0.84		3.26		4.23	
	(2.10)		(2.13)		(3.40)		(2.06)		(2.42)	
Diff in Gov. Budget	-0.08		-0.10		-1.77	-7.8			-0.21	
	(0.40)		(0.42)		(0.90) ***				(0.37)	
Diff CPI Inflation	0.05	0.9	0.06	0.9	0.11	2.8	0.05	0.9	0.05	1.1
	(0.02) **		(0.02) **		(0.06) *		(0.01) ***		(0.02) ***	
Diff Fin. Open			-0.003							
			(0.10)							
Diff Trade Open.					0.16					
					(0.42)					
Diff C.A.							-0.08			
							(0.13)			
FDI inflows									-0.002	-1.3
									(0.0004) ***	
Portfolio inflows									0.0004	
									(0.0003)	
Debt inflows									0.000	
									(0.0009)	
W. Neighbor Dummy	2.78	11.1	2.78	11.1	2.29	12.5	2.77	11.1	2.76	11.4
	(0.39) ***		(0.39) ***		(0.56) ***		(0.38) ***		(0.38) ***	
Observations	1859		1859		400		1859		1724	
McFadden R^2	0.64		0.64		0.90		0.64		0.66	

Notes: Dependent variable is a crisis dummy; model includes a constant
*, **, *** are 10%, 5%, 1% significant levels; Diff in liquidity = diff in (M2/Int. Reserves)
mfx = (marginal effect*standard deviation)*100

With our new weight, this probability increases by over 11%, indicating that the increased level of information available to investors, helps in creating a contagion effect through "cross-market rebalancing". As was shown in Section 5.4.3, African economies are highly dependent, and therefore the occurrence of contagion is very likely to occur in this region. Therefore, for African economies, when market participants experience an idiosyncratic shock in one country, they transmit the shock abroad by "optimally" rebalancing their portfolio's exposure to macroeconomic risks through other countries' markets.

Individually, Mali experiences the largest increase (16%) in its probability of a crisis, given a one standard deviation shock to our new contagion variable; while South Africa's probability only increase by 5.8%. However, the contagion effect continues to be present; that is, when a neighboring country in Africa experiences a currency crisis, then the probability that the domestic economy will also experience a crisis now increases by 12%.

5.6 Conclusion

The paper has made two major contributions. First, it identifies crises using a relatively more objective method based on the extreme value theory. Secondly, we include the neighborhood effects channel using a new approach that takes into account the conditional probability of joint failure (CPJF) of a crisis. By using monthly data for 23 emerging and developing economies for the period 1978-2007, a battery of statistical and empirical tests fail to reject, at high levels of confidence, the hypothesis of contagion at the regional level. However, at the global level (i.e. contagion across regions), we can only conclude tail independence. The degree of within region dependency can be ranked, in the sense that Africa shows the most dependence, followed by Asia. Interestingly, we show that the Western Hemisphere economies are the most independent when it comes to the transmission of currency crisis.

Our probit estimation results confirm the above-mentioned story, in that the probability of a currency crisis in a given country increases significantly by a crisis elsewhere in its own region. As far as Asia, we have seen that higher exchange market pressure is associated with a stronger acceleration of CPI inflation, and expansionary fiscal policy. Moreover, these economies tend to experience high levels of exchange market pressure stemming from "too much of a good thing"; that is they experience high levels of pressure from high levels of GDP. This indicates that Asian economies should really be wary of "overheating". Western Hemisphere economies, behave slightly different from Asian economies in relation to the impact of GDP growth. These economies can reduce the probability of a currency crisis by actually increasing their GDP growth in a more stable fashion. Furthermore, lack of

international reserves and higher levels of CPI inflation can have quite damaging effects as far as excessive pressure in their respective currencies. As far as African countries, we find that when it comes to inflation, the government budget balance and international reserves, African economies can certainly benefit from improvements in these policy areas. The major difference between Africa the other two regions, is that GDP growth does not affect the probability of a currency crisis. When it comes to capital flows, we find that all regions benefit from "persistent" FDI inflows, and that Asia is the only region that benefits from a steady increase in portfolio inflows.

This paper addressed three interrelated questions: (*i*) is the probability that a country faces a speculative attack affected by a crisis elsewhere? (*ii*) How does the conditional probability of joint failure affect the degree of contagion? (*iii*) Does "financial integration" into world capital markets increase the probability of a crisis? The answers to which are: (*i*) yes it is, but only from neighbors; (*ii*) the CPJF helps in improving our understanding of contagion. Furthermore, there is evidence that it helps to reduce contagion, by providing more information (to investors), and thereby reducing "cross-market rebalancing"; (*iii*) No it does not, financial integration into world capital markets helps reduce the probability of a currency crisis.

5.7 Appendix Chapter 5

Table 5.10: Regions and Countries in Sample

Region	Country	Region	Country
Africa	Burkina Faso	Asia	Australia
	Cote d'Ivoire		India
	Mali		Indonesia
	Mauritius		Japan
	Niger		Korea
	Senegal		Malaysia
	South Africa		New Zealand
Western Hemisphere	Argentina		Pakistan
	Brazil		Philippines
	Canada		Singapore
	Mexico		Thailand
	Venezuela		

Appendix B - Data Sources and Variables

- Period-average exchange rate: Local Currency Unit per US dollar (IFS line rf)
- Short-term interest rate given by money market rate (IFS line 60r) if available, or the discount rate (IFS line 60) otherwise. However, for India we use the call money rate (IFS line60b) and supplemented with the inter-bank lending rate (IFS line60p). For New Zealand, we supplemented with the T-bill rate (IFS line60c). For Indonesia, we use the call money rate (IFS line60b) and supplemented with the 3-month deposit rate (IFS line60l). For Morocco, we supplemented with the discount rate (IFS line60).
- Total non-gold International Reserves in US dollars (IFS line 1L.D)
- Domestic credit in national currency (IFS line 32)
- M1 in national currency (IFS line 34)
- M2 in national currency (IFS, M1 plus line 35)
- GDP in national currency (IFS line 99b)
- CPI (IFS line 64)
- Current Account Balance (net) in national currency (IFS, line 78ALD) – is the sum of the balance on goods, services, and income, plus current transfers, credit
- Overall Budget Balance in US dollars (IFS line 78CBD) – is the sum of the balances on the current account, the capital account, the financial account, and net errors and omissions.
- Financial Assets (IFS line11) in national currency
- Financial Liabilities (IFS line16c) in national currency
- Merchandise Exports (IFS line70) & Merchandise Imports (IFS line71); both in US dollars
- FDI Inflows (IFS line78BED) – this category includes equity capital, reinvested earnings, other capital and financial derivatives associated with various inter-company transactions between affiliated enterprises.

- Portfolio Inflows (IFS line 78BGD) – includes transactions with non-residents in financial securities of any maturity such as corporate securities, bonds, notes, and money market instruments, other than those included in direct investment, exceptional financing, and reserve assets.
- Debt Inflows (IFS line 78BID) – include all transactions not included in direct investment, portfolio investment, financial derivatives, or other assets. Major categories are trade credits, loans, transactions in currency and deposits, and other assets.

Table 5.11: Construction of Variables (in millions of USA dollars)

Variables		Construction
Annual growth rate of domestic credit	=	Difference in logs from IFS line32
Government Budget as % of GDP	=	(IFS line 78cbd) / (IFS line 99b/IFS line rf)
Current Account as % of GDP	=	(IFS line 78ald/IFS line rf) / (IFS line 99b/IFS line rf)
Ratio M2 to international reserves	=	((IFS line 34+35)/IFS line rf) / (IFS line .1ld)
CPI Inflation	=	Difference in logs from IFS line64
Financial Openness	=	[(assets + liab.)/IFS line rf] / (IFS line 99b/IFS line rf)
Trade Openness	=	(exports + imports) / (IFS line 99b/IFS line rf)

Appendix C - Descriptive Statistics

Table 5.12: Descriptive Statistics for Asian Economies

Variable	Obs	Mean	Std. Dev.	Min	Max
Diff in DomesticCredit Growth	3810	0.00	0.04	-0.73	0.71
Diff in MoneyGrowth	3804	0.01	0.25	-0.98	13.63
Diff in GDP growth	3660	0.00	0.04	-0.12	0.91
Diff in Current Account	3626	0.27	0.47	-0.76	2.81
Diff Government Budget	3658	0.00	0.01	-0.07	0.05
Diff CPI Inflation	3122	0.14	0.88	-4.50	12.82
Diff in Financial Integration	3609	2.05	2.51	-0.02	12.18
Diff in Trade Openness	3703	0.25	0.49	0.00	2.61
FDI Inflows	3305	232.47	723.85	-15344.37	10431.80
Portfolio Inflows	3305	740.64	3225.17	-25597.57	40980.33
Debt Inflows	3305	177.73	3492.77	-46444.67	21014.17
Neighborhood Dummy	3685	0.52	0.50	0	1.00
Weighted Neighbor Dummy	3685	0.21	0.27	0	1.95

Table 5.13: Descriptive Statistics for West. Hemisphere Economies

Variable	Obs	Mean	Std. Dev.	Min	Max
Diff in DomesticCredit Growth	1599	0.029	0.072	-0.231	0.818
Diff in MoneyGrowth	1658	-0.001	0.132	-0.975	0.807
Diff in GDP growth	1473	0.024	0.198	-0.111	3.303
Diff in Current Account	1470	-3844.09	32708.37	-359279.70	1367.98
Diff Government Budget	1470	-0.008	0.445	-5.220	1.252
Diff in Financial Integration	1463	15.014	28.014	-1.052	429.477
Trade Openness	1469	4.576	2.977	0.064	38.522
Diff CPI Inflation	1671	3.787	9.795	-2.194	196.388
FDI Inflows	1503	697.492	1106.335	-2230.440	10685.630
Portfolio Inflows	1503	523.534	1301.050	-2985.433	13276.000
Debt Inflows	1503	97.254	1365.877	-11040.330	8952.633
Neighborhood Dummy	1680	0.393	0.489	0	1
Weighted Neighbor Dummy	1680	0.062	0.093	0	0.477

Table 5.14: Descriptive Statistics for African Economies

Variable	Obs	Mean	Std. Dev.	Min	Max
Diff in DomesticCredit Growth	2399	0.00	0.05	-0.38	0.36
Diff in MoneyGrowth	2209	0.00	0.32	-3.07	3.22
Diff in GDP growth	2345	0.00	0.02	-0.18	0.33
Diff in Current Account	2177	0.27	0.24	-0.84	0.76
Diff Government Budget	2177	-0.02	0.30	-2.81	2.30
Diff in Financial Integration	2352	1.50	0.74	0.13	3.78
Diff CPI Inflation	2294	0.14	1.75	-17.04	15.18
FDI Inflows	2177	15.02	66.40	-37.72	605.86
Portfolio Inflows	2033	40.80	201.77	-247.60	1817.85
Debt Inflows	2177	11.46	80.07	-157.01	750.65
Neighborhood Dummy	2359	0.39	0.49	0.00	1.00
Weighted Neighbor Dummy	2359	0.20	0.37	0.00	1.94

Appendix D - Conditional Probability of Joint Failure

Table 5.15: Correlation within Asia; 1978M1-2006M12

	Aus	India	Indo	Jap	Kor	Malay	New Z.	Pak	Philip	Sing	Thai
Australia	1	0.13	0.15	0.40	0.19	0.27	0.25	0.13	-0.02	0.30	0.12
India	0.13	1	0.11	0.18	0.16	0.26	0.05	0.00	0.15	0.24	0.19
Indon	0.15	0.11	1	0.22	0.29	0.32	0.10	0.00	0.16	0.19	0.18
Japan	0.40	0.18	0.22	1	0.37	0.32	0.24	0.15	0.08	0.39	0.09
Korea	0.19	0.16	0.29	0.37	1	0.38	0.13	0.17	0.16	0.40	0.11
Malaysia	0.27	0.26	0.32	0.32	0.38	1	0.20	0.13	0.29	0.51	0.33
New Z.	0.25	0.05	0.10	0.24	0.13	0.20	1	0.05	0.12	0.14	0.15
Pakistan	0.13	0.00	0.00	0.15	0.17	0.13	0.05	1	0.05	0.15	-0.01
Philip	-0.02	0.15	0.16	0.08	0.16	0.29	0.12	0.05	1	0.15	0.06
Singap	0.30	0.24	0.19	0.39	0.40	0.51	0.14	0.15	0.15	1	0.11
Thailand	0.12	0.19	0.18	0.09	0.11	0.33	0.15	-0.01	0.06	0.11	1

Table 5.16: CPJF in Asia; 1978M1-2006M12

	Aus	India	Indo	Jap	Kor	Malay	New Z.	Pak	Philip	Sing	Thai
Australia	1	0.10	0.18	0.15	0.14	0.17	0.20	0.13	0.08	0.17	0.13
India	0.10	1	0.10	0.15	0.15	0.18	0.11	0.07	0.14	**0.23**	**0.27**
Indonesia	0.18	0.10	1	**0.22**	0.15	0.11	**0.22**	0.11	0.08	0.15	0.08
Japan	0.15	0.15	**0.22**	1	**0.22**	**0.25**	0.15	0.14	0.13	**0.22**	0.18
Korea	0.14	0.15	0.15	**0.22**	1	0.18	0.10	0.08	0.14	0.15	0.14
Malaysia	0.17	0.18	0.11	**0.25**	0.18	1	0.17	0.13	0.18	**0.30**	**0.27**
New Z.	0.20	0.11	**0.22**	0.15	0.10	0.17	1	0.14	0.08	0.18	0.11
Pakistan	0.13	0.07	0.11	0.14	0.08	0.13	0.14	1	0.15	0.10	0.11
Philip	0.08	0.14	0.08	0.13	0.14	0.18	0.08	0.15	1	0.15	0.10
Singap	0.17	**0.23**	0.15	**0.22**	0.15	**0.30**	0.18	0.10	0.15	1	0.20
Thailand	0.13	**0.27**	0.08	0.18	0.14	**0.27**	0.11	0.11	0.10	0.20	1

Bold indicates tail dependence is significant at better than 10%

Table 5.17: Correlation in West. Hemisphere; 1978M1-2006M12

	Argentina	Brazil	Canada	Mexico	Venezuela
Argentina	1	0.40	0.10	0.18	0.11
Brazil	0.40	1	0.11	0.08	0.05
Canada	0.10	0.11	1	0.08	0.05
Mexico	0.18	0.08	0.08	1	0.06
Venezuela	0.11	0.05	0.05	0.06	1

Table 5.18: CPJF in West. Hemisphere; 1978M1-2006M12

	Argentina	Brazil	Canada	Mexico	Venezuela
Argentina	1	0.15	0.10	0.17	0.07
Brazil	0.15	1	0.08	0.18	0.14
Canada	0.10	0.08	1	0.11	0.08
Mexico	0.17	0.18	0.11	1	0.06
Venezuela	0.07	0.14	0.08	0.06	1

Table 5.19: Correlation in Africa; 1979M2-2007M9

	Burkina F.	Côte d'Ivoire	Mali	Maurit	Niger	Senegal	S. Africa
Burkina Faso	1	0.73	0.92	0.35	0.08	0.09	0.01
Côte d'Ivoire	0.73	1	0.78	0.30	0.06	0.06	0.01
Mali	0.92	0.78	1	0.37	0.04	0.04	0.02
Mauritius	0.35	0.30	0.37	1	0.06	0.05	0.07
Niger	0.08	0.06	0.04	0.06	1	0.99	0.25
Senegal	0.09	0.61	0.04	0.05	0.99	1	0.25
South Africa	0.01	0.01	0.02	0.07	0.25	0.25	1

Table 5.20: CPJF in Africa; 1979M2-2007M9

	Burkina F.	Côte d'Ivoire	Mali	Maurit	Niger	Senegal	S. Africa
Burkina Faso	1	**0.50**	**0.76**	**0.25**	0.13	0.11	0.08
Côte d'Ivoire	**0.50**	1	**0.58**	**0.23**	0.13	0.11	0.11
Mali	**0.76**	**0.58**	1	**0.25**	0.14	0.13	0.08
Mauritius	**0.25**	**0.23**	**0.25**	1	0.11	0.11	0.10
Niger	0.13	0.13	0.14	0.11	1	**0.91**	0.20
Senegal	0.11	0.11	0.13	0.11	**0.91**	1	0.18
South Africa	0.08	0.11	0.08	0.10	0.20	0.18	1

Bold indicates tail dependence is significant at better than 10%

Table 5.21: CPJF between Asia and Africa

	Burkina F.	Côte d'Ivoire	Mali	Maurit	Niger	Senegal	S. Africa
Australia	0.14	0.18	0.18	0.17	0.10	0.10	0.13
India	0.14	0.17	0.17	0.15	0.06	0.07	0.11
Indonesia	0.18	0.17	0.14	0.08	0.08	0.08	0.10
Japan	**0.29**	**0.23**	**0.25**	0.18	0.15	0.13	0.10
Korea	0.17	**0.22**	0.20	0.14	0.13	0.11	0.10
Malaysia	0.17	0.15	0.15	0.15	0.14	0.11	0.10
New. Z.	0.14	0.15	0.11	0.17	0.14	0.14	0.13
Pakistan	0.10	0.10	0.10	0.14	0.05	0.05	0.03
Philippines	0.11	0.13	0.10	0.07	0.10	0.10	0.07
Singapore	0.15	0.18	0.17	0.13	0.11	0.10	0.08
Thailand	0.17	0.15	0.18	0.05	0.06	0.06	0.06

Bold indicates tail dependence is significant at better than 10%

Table 5.22: CPJF between Asia and West. Hemisphere

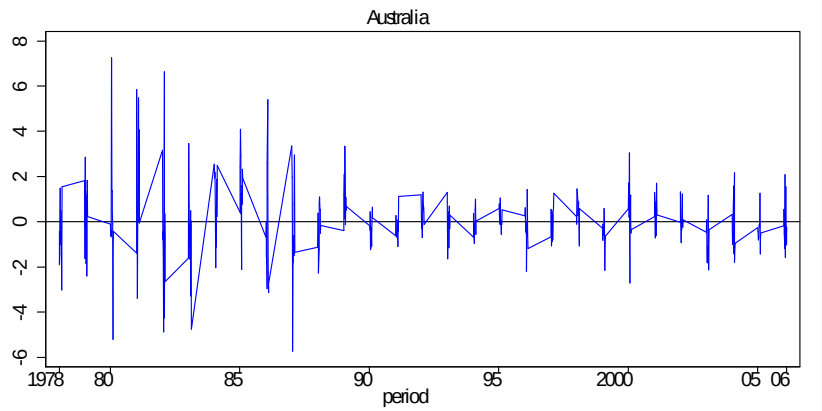
	Argentina	Brazil	Canada	Mexico	Venezuela
Australia	0.10	0.06	0.13	0.18	0.08
India	0.15	0.13	0.15	0.17	0.07
Indonesia	0.13	0.08	0.05	0.17	0.10
Japan	0.17	0.10	0.15	0.18	0.10
Korea	0.11	0.14	0.08	0.13	0.08
Malaysia	0.10	0.13	**0.22**	0.17	0.08
New. Z.	0.13	0.06	0.13	0.14	0.05
Pakistan	0.05	0.08	0.08	0.08	0.07
Philippines	0.13	0.11	0.11	0.11	0.03
Singapore	0.11	0.11	0.20	0.14	0.13
Thailand	0.10	0.11	0.13	0.17	0.10

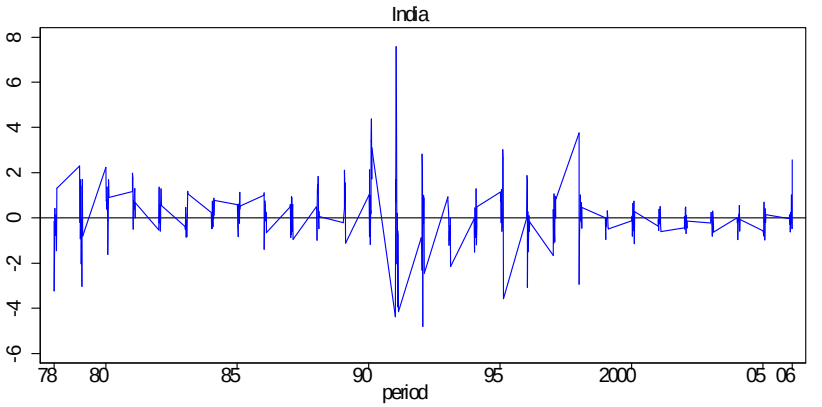
Bold indicates tail dependence is significant at better than 10%

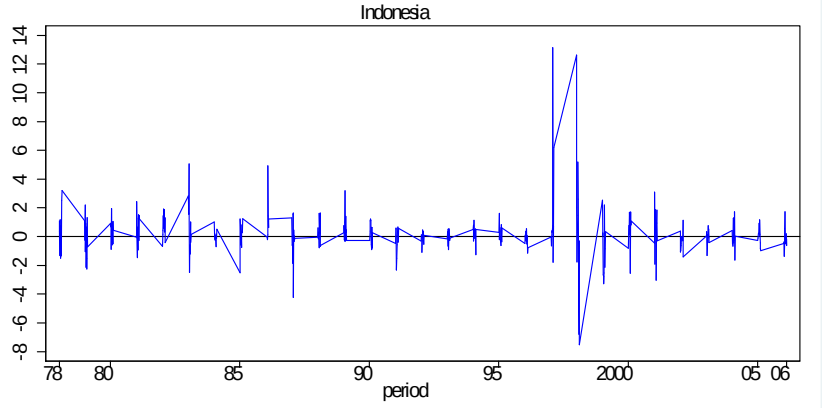
Table 5.23: CPJF between West. Hemisphere and Africa

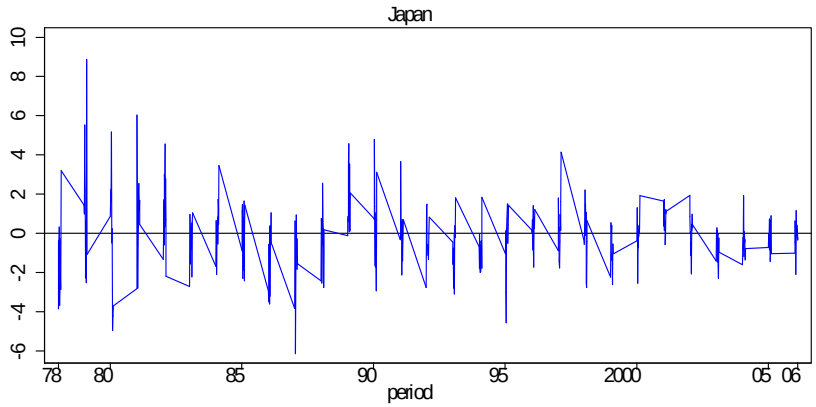
	Burkina F.	Côte d'Ivoire	Mali	Maurit	Niger	Senegal	S. Africa
Argentina	0.10	0.18	0.11	0.11	0.11	0.13	0.20
Brazil	0.03	0.08	0.06	0.05	0.07	0.08	0.10
Canada	0.10	0.13	0.11	0.13	0.08	0.07	0.06
Mexico	0.10	0.14	0.10	0.13	0.08	0.10	0.17
Venezuela	0.05	0.03	0.05	0.05	0.10	0.10	0.05

Appendix E - Asia EMP Graphs





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2000
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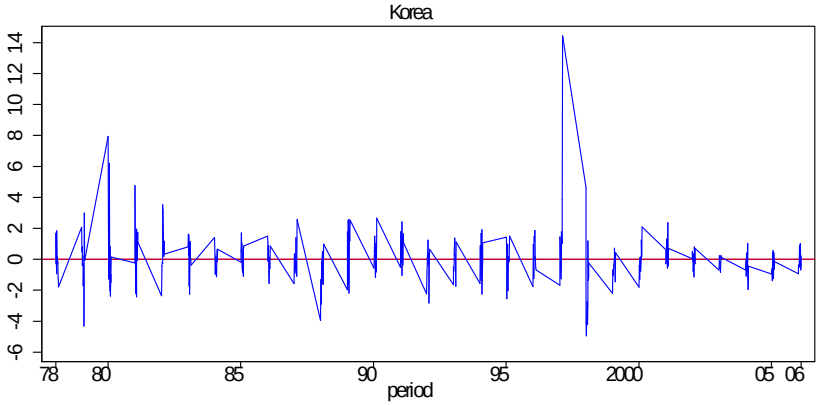
period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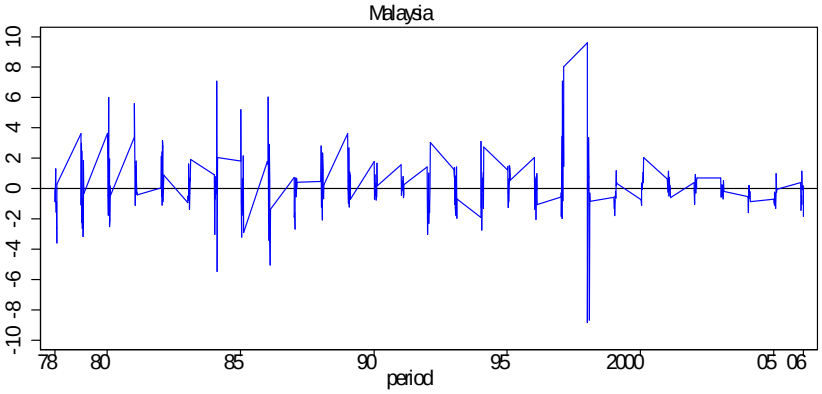
period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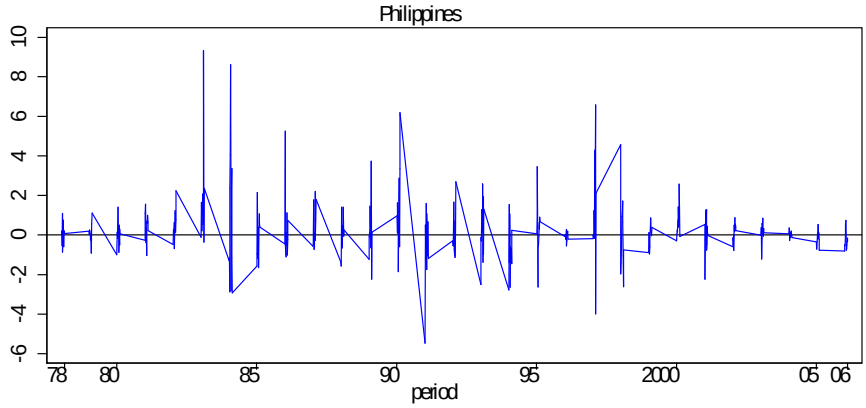
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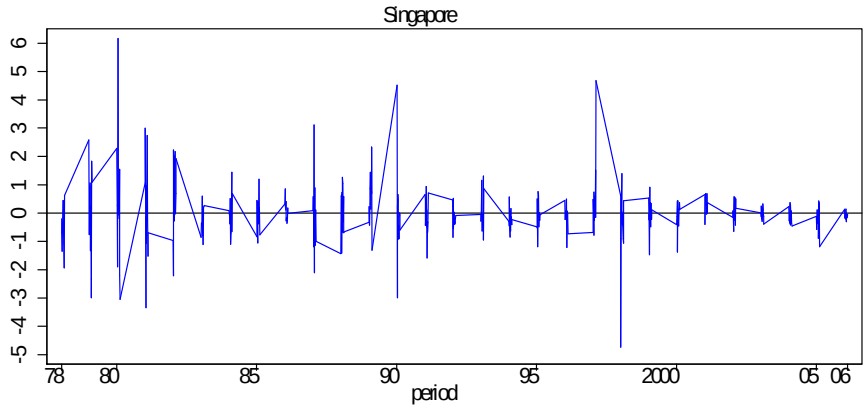
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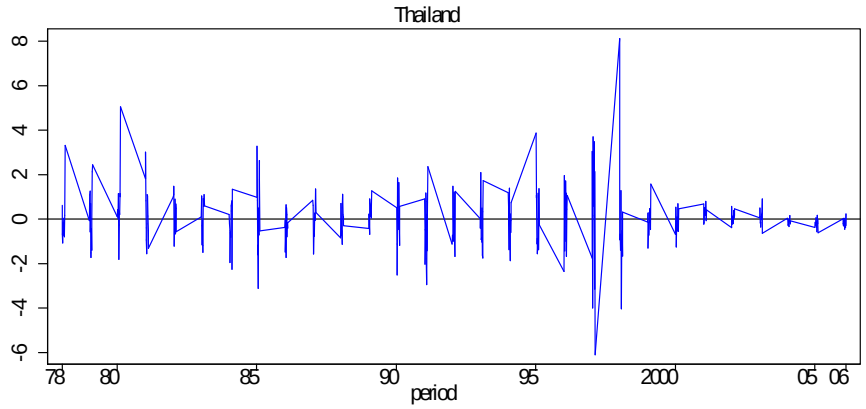
period


Thailand
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-6
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2000
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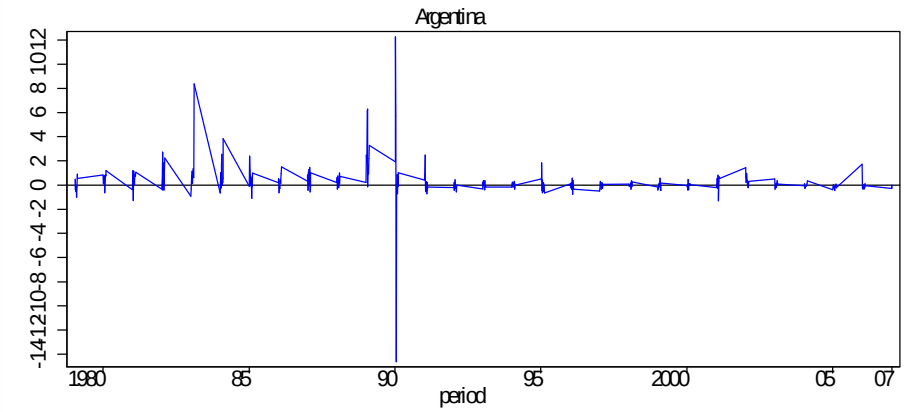
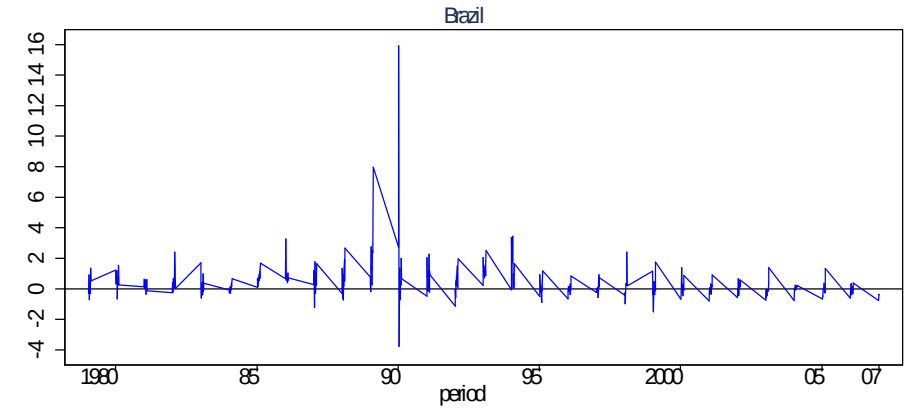
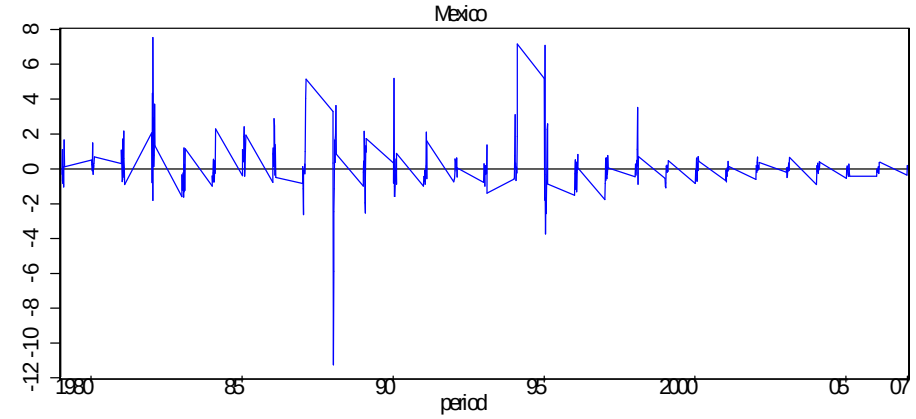
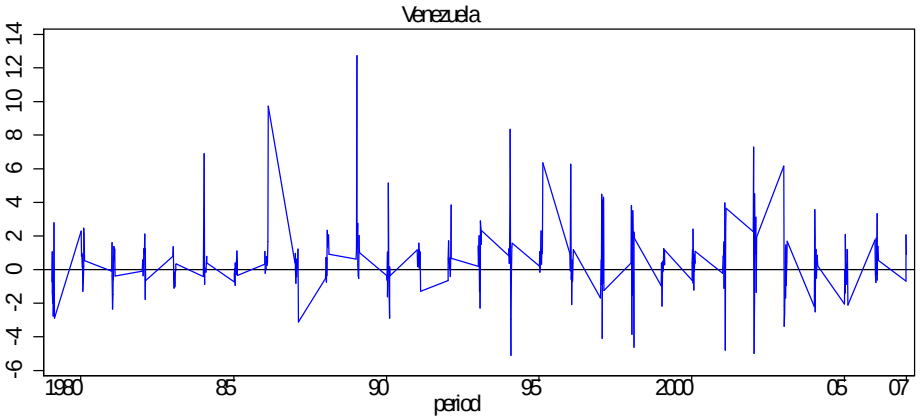
06
period

Appendix F - Western Hemisphere EMP Graphs





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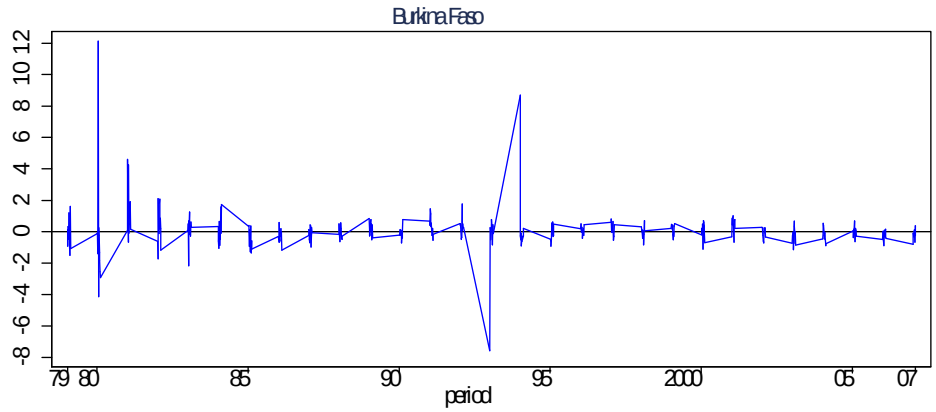
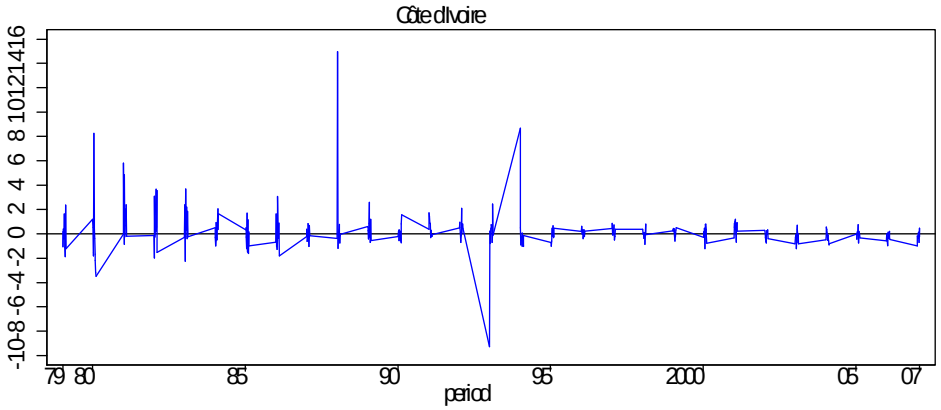
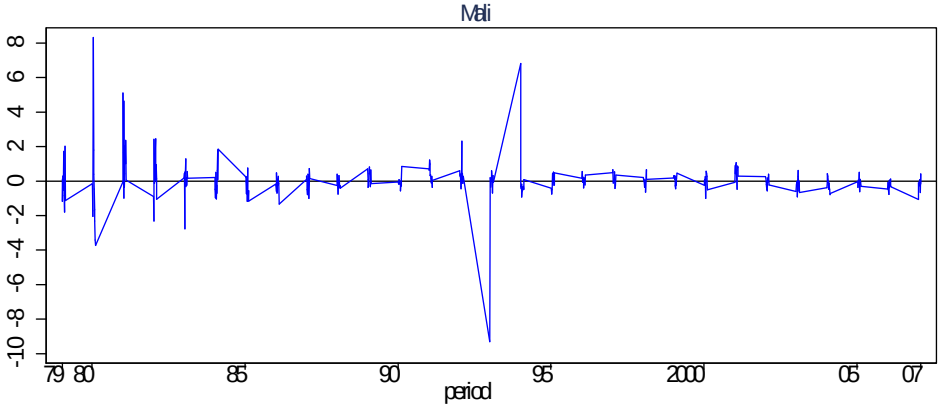
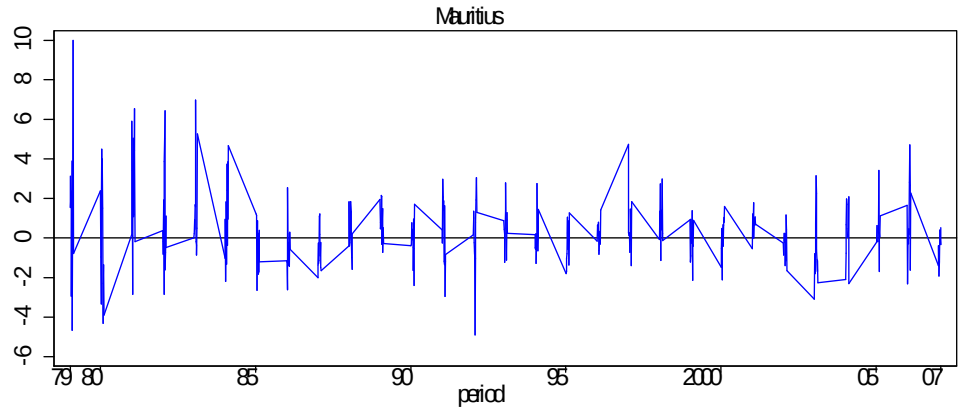
period

Appendix G - Africa EMP Graphs





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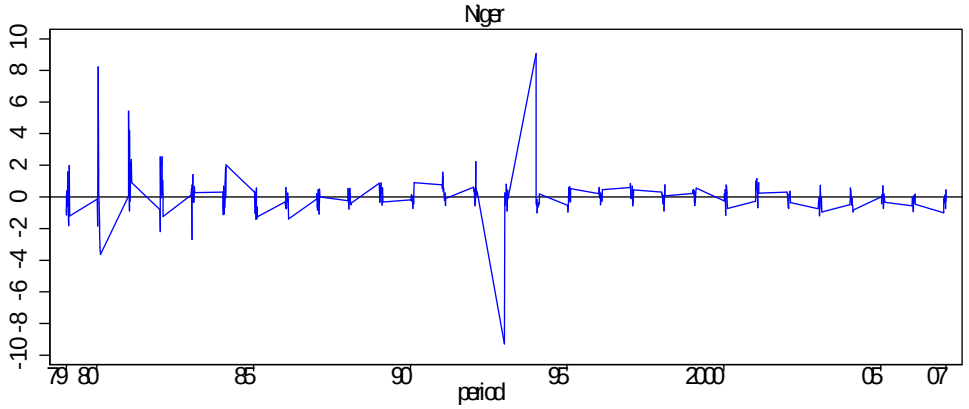
period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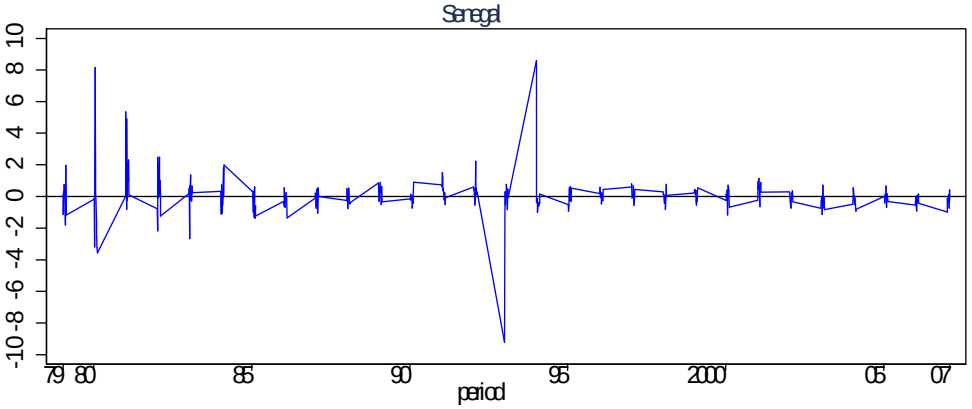
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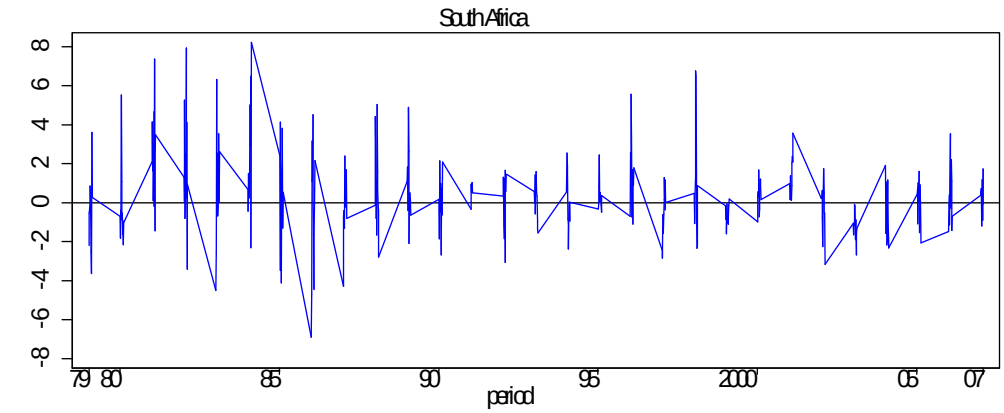
SouthAfrica
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period

Chapter 6

Conclusion

The literature has shown that it is hard to find unambiguous evidence that financial openness yields an improvement in economic performance, particularly at the macro level. One of the major problems in empirical work is the bundling of financial openness with a potential host of other growth-friendly reforms, and the endogeneity of the liberalization decision itself. Nonetheless, policymakers (in emerging and developing economies) have displayed a remarkable revealed preference for financial openness, and the trend is likely to continue (Obstfeld, 2007). Accordingly, the underlying question this book has aimed to answer, is why this revealed preference?

Regarding the appropriate macro-monetary framework, the World Bank (2006) puts it as follows (see pg 140):

> "As developing countries become more open to international financial markets, designing and building a sound regime of external financial policy making and regulation presents an urgent challenge. A consensus has formed around the three core components of such a regime – membership in a credible currency union, such as the [euro zone], or an exchange rate that reflects market forces; gradual opening of the capital account; and a monetary policy framework that favors price stability."

As this book has shown, and as Obstfeld (2007) writes

> "Domestic financial development is attractive from several perspectives; it promotes growth, it can enhance welfare, allows easier government borrowing, and eases the conduct of a domestically oriented monetary policy. Such domestic financial deepening, along with merchandise trade expansion, makes capital

> controls ever costlier to enforce. Furthermore, financial openness is likely to promote a more competitive and resilient domestic financial system, and ultimately economic growth, through several channels. Domestic financial development itself is likely to make external financial liberalization easier to live with, but there are other institutional reforms that ultimately are also helpful – relating to the rule of law, corruption, contract enforcement, corporate governance, and the like. These reforms cannot be accomplished overnight, and in the process, a phased and cautious piecemeal approach to financial liberalization is in order".

It is important, though, that the approach does not exacerbate existing economic distortions or creates new ones, by for example, liberalizing short-term debt flows ahead of long-term flows. The empirical record herein suggests that the benefits arising from "free" capital movements are most likely to appear when economies complement policies in order to enhance financial stability and growth.

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