How development threshold drives capital flows : a cross-country study

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2010

Ding, D. (2010). How development threshold drives capital flows : a cross-country study.
Doctoral thesis, Nanyang Technological University, Singapore.

<https://hdl.handle.net/10356/21191>

<https://doi.org/10.32657/10356/21191>

HOW DEVELOPMENT THRESHOLD DRIVES CAPITAL FLOWS: A CROSS-COUNTRY STUDY

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A thesis submitted to the Nanyang Technological University
in fulfillment of the requirement for the degree of
Doctor of Philosophy

2010

ACKNOWLEDGEMENT

First and foremost I would like to thank my supervisor, Assistant Professor Yothin Jinjarak, for his rigorous comments and enlightening guidance on my thesis, as well as for his help and support throughout my four years of research. Gratitude also goes to my committee members, Professor David Alexander Reisman, Associate Professor Chen Kang, and Associate Professor Joseph D. Alba, for their invaluable suggestions and constructive comments on my thesis. Furthermore, I am also grateful to the Division of Economics, Nanyang Technological University for supporting my PhD study and for giving me the chance to work with and learn from so many brilliant people. Last but not least, thanks to my family and friends, without their love and support I would not have completed my research. To them I dedicate this thesis.

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ABSTRACT

This thesis provides an empirical study on four measures of capital flows---total capital inflows and outflows, net capital outflows and capital flight--- from a panel of 130 countries over 24 years. The purpose of this thesis is to compare these types of capital flows to see their different patterns and relationship with economic fundamentals for countries of various stages of development. According to both cross-sectional and panel regression estimation results, the three types of capital flows are all positively correlated with income levels, except for capital flight which demonstrates a non-linear relationship with economic development. In general, rich countries experience high capital flows in both directions and high net capital outflows, while poor countries experience lower capital flows but suffer from high outward capital flight. Using the Hansen threshold estimation method, I identify a three-stage threshold effect of economic development on capital flight: for low-income countries, capital flight increases as the economy grows; only after the economy passes a certain threshold level, capital flight will decrease as the economy grows. The regression results also suggest that financial openness may stimulate overall capital flows but does not have strong effects on shaping capital flight. Moreover, high growth rate and net capital inflows are also positively correlated.

Why is it that when an American puts money abroad it is called “foreign investment” and when an Argentinean does the same it is called “capital flight”? Why is it that when an American company puts 30 percent of its equity abroad it is called “strategic diversification” and when a Bolivian businessman puts only 4 percent abroad it is called “lack of confidence”?

---Stephen Charles Kanitz in the Wall Street Journal, September 21, 1984, p.

45.

Chapter 1 Introduction

Globalization in both trade and financial sectors has been growing fast in recent years. Increasing number of countries are getting involved in this huge global network, with large volumes of trade and financial capital flowing across borders. In the financial sector alone, it is apparent that not only are the flows sizable, but there are also large flows in all directions at the same time, taking different forms such as foreign direct investment (FDI), portfolio equity investment, debt investment and so on. This seemingly sophisticated perversity in the direction and size of capital flows has been a most puzzling and interesting question for economists for many years.

Why does capital flow from one country to another? Why are large volumes of capital flowing among the rich countries but are reluctant to flow to the capital-scarce developing countries? Why do poor countries need to borrow while at the same time have large volume of capital fleeing out of their borders? What prevents capital from flowing into the less developed countries? Studies on capital flows, both theoretical as well as empirical, have been trying to answer these questions for a long time.

The standard neoclassical models assume that capital flows are driven by scarcity, and therefore capital should flow from rich to poor countries. However, in the real world, economists find many examples opposite to what is predicted by the standard neoclassical theory. In his classic example, Lucas (1990) compares data on the United States and India in 1988 and points out an obvious paradox to the

standard theory: capital flows from rich to poor countries are not as much as, or even close to, the level predicted by the standard theory. Lucas questions the validity of the assumptions that give rise to these differences in the marginal product of capital and asks what assumptions should replace these and provides some possible explanations. This famous Lucas Paradox has generated an extensive theoretical literature on international capital flows.

As observed by Lucas and many other economists, capital is reluctant to fly from rich to poor countries. Despite the rapid growth of international capital markets and financial integration, investors still have a preference to invest in the more developed markets. Capital inflows to developing countries remain very low compared with the investment among OECD countries. Like Lucas himself, some researchers conduct theoretical and empirical studies to find out what is wrong with the standard neoclassical theory and why capital does not move to the low income countries (Alfaro 2008). On the other hand, some economists also look at the destinations of those capital flows from rich to poor countries, and observe the “Allocation Puzzle”---capital flows more to countries that invest less and grow less (Gourinchas 2007).

Capital inflows to developing economies, that is, the extent to which developing countries capture capital from non-residents, have been studied extensively in the recent literature. But the literature on capital outflows, i.e. the capital flows deriving from residents, remains relatively small. Nevertheless, there is no doubt that capital outflows from developing countries have also been growing rapidly in the last two decades. Growing outflows are to be expected, and should

perhaps even be welcomed, in a world that is becoming more integrated --- as evidenced by their counterpart in growing inflows.

The interaction between inflows and outflows needs to be considered more carefully. Since the literature tends to focus primarily on private inflows, important elements regarding the role of outflows in the availability of private capital to developing countries have not been studied. For example, higher capital inflows in the form of acquiring existing companies in emerging countries (a form of FDI) may in themselves create higher outflows as the beneficiaries of the sales place part of the proceeds abroad, reducing the actual inflow. Similarly, inflows may be 'caused' by previous outflows or through 'round tripping' as residents attempt to circumvent domestic regulations or taxes. Until now there is no comprehensive study that has attempted to focus more on outflows from developing countries to get estimations on the magnitude of capital outflows and analyze the driving forces behind those outflows. This thesis attempts to fill this gap in the literature by providing a comprehensive estimation of the capital outflows from developing countries as a whole as well as individually, and analyse the fundamental factors driving these outflows.

The issue of capital outflows from developing countries is especially important for policy makers from these governments. Capital, as the scarce resources, is essential for economic growth and macro-economic stability of poor countries. High capital outflows have adverse effects on the economy because if the funds are held at home they can be utilized to reduce the level of external indebtedness and promote productivity. High capital outflows lead to low levels of

domestic investment, which are attributable to the apparent scarcity of domestic savings, weak and shallow financial systems, and high country risks due to unstable macroeconomic and political conditions. Compared with capital inflow, capital outflow from the poor countries may be a better indicator for problems that lie in a country's economic or financial systems, and therefore, deserves more attention and investigation.

Another reason for greater attention on capital outflow is that most developing countries experience heavy external sovereign debts and high private capital outflows at the same time. Actually in the aftermath of 1982 international debt crisis economists were surprised to learn that a large part of the borrowing of developing countries from international commercial banks was not matched by net imports of good and services but instead was matched by unrecorded private capital outflows. Until today, many of these heavily-indebted developing countries are still struggling with the huge burden of debt service. For example, debt service today absorbs a sum equivalent to more than 6% of Sub-Saharan's GDP (Ndikumana and Boyce 2001). As long as the proceeds of external borrowing were used not to the benefit of the public but rather to finance the accumulation of private external assets by the ruling elites, the moral and legal legitimacy of these debt-service obligations is open to challenge.

Although these questions are receiving increasing attentions, economic research does not provide us with much insight to understand the situation. In recent years, much of the discussion on private capital flows are related to capital *inflows*, such as bond, equity, FDI and external debt, into developing countries. Resident

private capital **outflows** from poor countries are not widely discussed. The reason for fewer studies on this topic might be the difficulty of obtaining direct information on the figures about developing countries' assets abroad or people believe the volume of capital outflows are almost negligible compared with capital inflows.

On recognizing the current progress and limitation in the research on international capital movements, this thesis will provide a detailed investigation the overall capital flows, especially capital outflows, from a panel of 130 countries (including advanced, emerging and less developed countries) over the past two decades. The objective is to compare the different patterns and characteristics of capital outflow from countries of different level of income, and understand how economic fundamental affect those different types of capital flows. Moreover, together with figures on both capital inflow and outflow, it allows us to obtain a more complete and objective view on the characteristics of international capital movements.

Specifically, to capture the level of capital outflow more thoroughly, I look at three different measures:

1. **Total capital outflow:** This is the one-way total capital outflow as reported in each individual country's balance of payment. This measure includes all funds flowing abroad such as FDI abroad and portfolio investment abroad without worrying about the inflow of capital; therefore it is defined as total capital outflow.

2. **Net capital outflow:** The second measure on outflow is a net measure, which is calculated by deducting the capital inflow from the total outflow. For this measure, I follow Eswar S. Prasad (2007) and use the current account balance to provide a summary measure on the net amount of capital flowing out of a country.

3. **Capital flight:** The third measure is unrecorded capital outflows, or capital flight, which is a more sophisticated concept on private capital outflow. In general, it measures the secret capital outflow from the private sector or residents in order to avoid losses for various reasons (In the next chapter I will provide further detailed explanation on its definition and measurement and its significance for economic development.).

In short, this thesis provides an empirical investigation on four types of capital flows (three types on capital outflow and one on capital inflow) of a panel of 130 countries spanning twenty-four years from 1980 to 2003. In this thesis, the different characteristics of capital flight, net capital outflow, total capital outflow and total capital inflow will be thoroughly examined for countries of different income levels. The objective of this thesis is to analyze empirically the pattern of four types of capital flows so as to understand the role of economic fundamentals in shaping the direction of those flows. Several dimensions on the issues of capital movements are explored, and the major findings are as follows:

Firstly, I update the estimates on the four types of capital flows for the 130 countries (including 22 industrial countries) spanning 24 years from 1980 to 2003. This is the first attempt to include both industrial and developing countries in the sample, and therefore the coverage of the sample size is the largest in capital flow

literature. The estimation results show that there are great differences in the patterns of each type of capital flows as well as flows from developing and industrial countries. In general, rich countries experience higher volumes of total capital inflows and outflows, and also have higher net capital outflows. Poor countries, which are less open in trade and financial sectors, receive less total capital inflow and experience higher outward capital flight during certain stages of development, especially when they are growing slowly.

Secondly, from both cross-sectional and panel regression estimation results, I find that there is a non-linear relationship between capital flight and economic development. There is actually an inverse U-shape relationship between capital flight and income. Using the Hansen threshold estimation method, I identify a three-stage threshold effect of economic development on capital flight: below the threshold, capital flight increases as economy grows; and after passing the threshold level of income, capital flight decreases as the economy grows. However, this threshold effect is unique between capital flight and economic development. Similar threshold effect in terms of other types of capital flows could not be identified through this method. In fact, other three types of capital flows are all positively correlated with economic development.

Thirdly, I also try to identify the effect of openness on the pattern of capital flows. Not surprisingly, higher trade and financial openness are related with higher level of total capital flows in both directions. The regression results also suggest that there is a positive correlation between openness and net capital outflow, although the results are not very significant. However, trade and financial openness

does not play an important role in reducing capital flight, which is opposite to previous studies by other authors arguing that financial liberalization could reduce capital flight.

In addition, I choose the largest two developing countries---China and India--- as a case study to provide some policy implications for developing countries in tackling with capital flight and issues on financial openness. Although both countries have similar economic background and take similar reform and open-up policies, the volume and pattern of capital flight from these two countries are rather different. It is interesting to find that China, with higher income and FDI inflow, experience much higher capital flight than that of India.

The rest of the paper is structured as follows. Chapter 2 is a review of economic literature on capital flows and capital flight. Different models on capital flows are presented and comparisons on the various definitions and methodologies for measuring capital outflows and capital flight are discussed. Chapter 3 discusses the estimates on the volumes of four measures on capital inflow and outflow for a sample of 130 countries over the period 1980-2003. With this large size of data, time-series and average figures are presented for both individual and groups of countries, and comparisons between the unrecorded and normal capital outflow are conducted. In this chapter a case study on two largest developing countries---China and India---is provided so as to compare their different patterns of capital flows and how their economic performances affect their capital flows. Chapter 4 provides statistical analysis on these measures, across countries and over time. An interesting observation from both cross-sectional and panel data regressions is that

capital flight, unlike other types of capital flows, shows a distinct non-linear relationship with a country's income level. In order to test the robustness of this finding, I also test the non-linear relationship using the Hansen Threshold model. Finally, Chapter 5 provides the conclusion.

Chapter 2 Theoretical Overview on Capital Movements

This thesis is related to a number of different strands of economic literature. The first set of literature explores the driving forces of international capital movements. Many of these papers attempt to establish theoretical models to explain how different factors such as wealth, investment return and risks affect capital flows from one country to another. Section 2.2 provides a detailed summary of theoretical studies on capital flows. The second set of literature focuses on the study of capital flight, including both theoretical and empirical studies on the definition, measurement and determinants of capital flight. Being a special category of capital outflows, capital flight has first draw attention from researcher since the 1980s following the debt crisis in some developing countries. Owing to its “secret” nature, the measurements and determinants of capita flight are different from “normal” capital flows. Section 2.1 compares capital flight with normal capital flows and 2.3 and 2.4 provides further explanations on the measurement and determinants of capital flights. The third set of literature examines the link between financial openness and liberalization with international capital movements. Most of these papers attempt to set up measurements for financial openness and explore the effects of financial openness on capita flows, economic growth, and in some cases, financial crisis.

International capital movements involve the flows of both long-term and short-term capital. Although there is no consensus on the exact definition on the long-term and short-term capital, a common method to distinguish long-term capital from short-term capital is through the nature of the financial instrument,

with long-term capital operating through equities and debt instruments of more than one year's maturity. The determinants of long-term and short-term capital movements are explained using different economic theories and models. In this study, the main focus falls on the *long-term capital movements*, as annual data are used for all the analysis.

The main categories of capital flows are foreign direct investment (FDI), portfolio equity investment, and debt flows. Foreign direct investments include greenfield investments (construction of new factories), merger and acquisitions, equity capital, reinvested earnings, other capital and financial derivatives associated with various intercompany transactions between affiliated enterprises. Portfolio equity investments include shares, stock participations, and similar documents that usually denote ownership of equity. When a foreign investor purchases a local firm's securities without a controlling stake, the investment is regarded as a portfolio investment. FDI is equity participation giving a controlling stake. In the regression analysis, I do not distinguish between minority and majority shareholders, as this distinction is not important to this analysis. In addition, because of missing portfolio data (some countries do not have portfolio flows, in part due to lack of functioning stock markets), I prefer to use total foreign equity flows in the analysis, which is the sum of direct and portfolio equity investment.

Debt flows include bonds, debentures, notes, and money market or negotiable debt instruments. I prefer to abstract most of our analysis from debt flows since they tend to be shaped by government decisions to a greater extent than

flows of equity. This thesis, on the other hand, is focused more on capturing market decisions. Ideally, I would like to use all of the private capital flows and abstract the public part of debt flows. These data, however, is not available. The IMF, IFS data include both private and public issuers and holders of debt securities. Although the data are further divided by monetary authorities, general government, banks and other sectors, this information is unfortunately not available for most countries for long periods of time. In addition, it is difficult to divide the available data by private/public creditor and debtor.

The behavior of these three forms of long-term capital flows differ at time and places, and may require different modes of analysis, such as flow models and portfolio models. However, these models tend to converge over time. In addition, since different forms of capital outflow have similar effects on the economy, I prefer not to distinguish among those different forms in the measurement of total capital flow. Hence, in the following sections I only present the standard models that attempt to explain international long-term capital flows as measured by annual data.

2.1 Normal Capital flows vs. Capital Flight

In the following chapters, three different measures of capital outflow are examined: the *total capital outflow*, the *net capital outflow* and the *capital flight*. The total capital outflow is defined as the sum of short-and long-term capital outflows as reported in the balance of payments. It consists of foreign direct investment (FDI) abroad and portfolio investment abroad. It is an overall measure of financial capital flowing out of country from all sectors, including public sector,

private sector and banks. It includes both short-run and long-run capital outflow, and therefore it is the most general and broad measure on capital outflow.

Net capital outflow is measured by current account balance because it is equivalent to a country's saving minus its investment (Prasad 2007). A current account surplus has to equal the sum of the following: net private and official outflows of financial capital (this includes debt and non-grant aid, but not remittances, which should properly be reflected in the current account itself); net errors and omissions (a positive number could, for instance, represent capital flight through unofficial channels); and net accumulation of international reserves by the government (typically the central bank). Thus the current account surplus summarizes the net amount of capital flowing out of the country in a given period or, equivalently, the excess of domestic saving over domestic investment in that period; correspondingly, a current account deficit summarizes net capital flowing in or, equivalently, the excess of domestic investment over domestic saving.

As for the definition of capital flight, the concept of capital flight itself is somewhat complicated and controversial. Domestic residents in an open economy may engage in many international transactions through which they acquire financial claims against non-residents. Hence, which of these transactions ought to be classified as domestic capital flight rather than normal capital outflows? One of the earliest uses of this phrase is by Kindleberger (1937) who defines capital flight as "abnormal flows propelled from a country...by...one or more complex list of fears and suspicions". According to him, a capital outflow should be exceptional, sudden, and arise from adverse, almost pathological expectations for it to qualify as

capital flight. Every capital outflow from a country, therefore, may not qualify as capital flight. The definition of 'capital flight' was updated by a number of economists including Dooley (1986), Cuddington (1986), Lessard and Williamson (1987), Dornbush (1990) and many others.

Capital flight is often viewed as a subset of capital outflows. Sometimes researchers mistakenly use capital outflow to refer to capital flight. In essence, capital flight is distinct from normal capital outflows in the following respects:

i) Motivation: Capital flows represent portfolio decisions typically undertaken to exploit favourable returns to capital, among other advantages (for example, in terms of portfolio or direct investment and trade credit or activities of domestic commercial banks aiming at acquiring or extending foreign deposit holdings). Furthermore, normal capital flows are like two-way streets, where the traffic of capital goes in both directions and is presumably recorded in official statistics (i.e., balance of payments). Capital flight, on the other hand, represents a decision to take capital out and take refuge in another country in order to avoid social controls. Capital flight is more like a one-way street, in which the traffic of capital is moving out and typically remains unrecorded.

ii) Source: Capital flight only involves domestic capital outflow from private sectors, recorded or unrecorded, but not those from public sectors. Domestic residents take their assets and put them abroad for a number of reasons: to avoid extremely high losses on their domestic asset holdings, to avoid taxation; to avoid confiscation; in search of better treatment, or of higher returns somewhere else. Sometimes, capital flight is financed by capital inflows, such as external debts.

At other times, capital flight itself finances the capital inflows, returning in the guise of foreign investments to avail of the incentives extended to overseas investors. Hence, it is possible to have large volumes of capital flows across countries without any capital flight involved. It is also possible that even without capital inflows to a country, there are still huge amounts of capital flight.

iii) Impact on the economy: Since capital outflow is based on portfolio diversifications and in search of higher returns in foreign markets, it is beneficial to the domestic economy. In contrast, capital flight is an undesirable phenomenon, which reflects important problems in domestic economic and financial systems, and if not handled properly, may lead to even worse problems such as financial crisis. Usually the phenomenon of capital flight is related to the existence of high uncertainty and risk with respect to returns on domestically held assets.

Capital flight is a particularly important concern for developing countries for at least three reasons:

i) Capital scarcity. Basically, capital flight aggravates the capital scarcity problem, but more importantly, it restricts the capacity and ability of the affected country to mobilize its domestic assets and access foreign resources. Consequently, capital flight retards economic growth and development and contributes to underdevelopment.

ii) Capital flight may induce a negative feedback process, especially during periods of crisis and uncertainty. As resource constraints become binding, economic growth is further limited. Then more capital flight could occur. There is also the possibility of being cut off from external sources of funds. Consequently, it

becomes more difficult to implement economic policies, and improving the social conditions of people also becomes more difficult.

iii) Economic justice, particularly the distributive impacts of external indebtedness and capital flight, and the legitimacy of external debts. When the elite squander external debts, or external borrowings are inappropriately used to benefit only a few, it is the rest of society that suffers. More importantly, the economic and social costs of external indebtedness and capital flight are imposed on the majority. In addition, capital flight represents lost resources that could have been utilized in the domestic economy to generate additional output and jobs. Thus, ultimately, it represents lost opportunities. Therefore, when society as a whole does not benefit from external debts, questioning the legitimacy of such debts and the rationale for continuing to honour them becomes imperative.

The recent interest in capital flight was triggered by the Latin American debt crisis in the 1980s. Economists try to understand the relationship between capital flight and external debt, as capital flight undermined the ability of highly indebted countries to repay or service their mounting external debts (Lessard and Williamson, 1987); and scholars wanting to examine whether or not external borrowing in fact propels capital flight, and vice versa (Boyce, 1992). After the debt crisis of the 1980s, capital flight became less of an issue, and capital started to flow back to developing countries, with the possible exception of Africa (Boyce and Ndikumana, 2001; Collier et al., 2001). Thus scholars stopped paying attention to capital flight. By the latter half of the 1990s, however, there was a resurgence of

capital flight, as developing countries faced a greater number of intense financial and economic crises, making scholars interested in re-examining the issues.

At least three arguments point to the need to study capital flight in the current international context. External debts constitute the first reason. Country indebtedness has been a problem for developing countries for years which has made developing countries vulnerable to debt-related crises. Leung (2003), for example, presents empirical evidence that the increased indebtedness of developing countries is positively linked to the increased intensity and frequency of debt-related economic cycles, a problem especially significant in Africa and, to some extent, in Asia. The 1997–1998 Asian crises, for instance, were partly rooted in the accumulation of external debts, although they were private external debts.

The second reason relates to changes in the economic policies adopted by or, in some cases, forced upon developing countries. In particular, neo-liberal policies led to wide-scale and aggressive deregulation and financial liberalization without ensuring, or in some cases, neglecting the provision of appropriate governance structures and administrative capacity. Consequently, the economic environment has become more vulnerable to financial swings, crashes, crises, contagions, and economic stagnation. In fact, some scholars argue that financial and economic crises are inevitable under such conditions (Palma, 2003), and moreover, they become more frequent and can lead to capital flight (Epstein, G. A. 2005). The longer a country is in such a situation, and also the longer it postpones the re-introduction of governance structures and administrative capacity, the greater are the chances that financial and economic crises will occur. Also, when

crises occur, they will be more intense and their social and economic costs will be significant. Neo-liberal policies have therefore made developing countries even more vulnerable to capital flight. Furthermore, given these developments, large and volatile capital flights will be common occurrences.

A third reason for reconsideration is that capital flight means lost resources to the domestic economy, and therefore, lost opportunities. It is paradoxical that resources are flowing out of developing countries rather than to them, although it is in developing countries that resources are most needed to generate economic growth and development. Even very poor countries have become net lenders to the rest of the world (Boyce and Ndikumana, 2001). Such lost resources do not contribute to the expansion of domestic economic activities or to the improvement of the social welfare of domestic residents. On the contrary, they imply foregone goods and services essential to sustaining economic growth. Moreover, capital flight can also mean lost resources for debt servicing, thus making the social burden of external debt heavier. Because institutions in most developing countries are weak, fragile or missing, the social and economic costs can be large and can affect many in society. As capital flight is often undertaken by the elite, the rest of society carries a disproportionate burden of the external debt. In fact, the elite are often able to avoid these costs because they are able to transfer their wealth abroad.

In summary, capital flight is associated with the abnormal or illegal nature of certain capital outflows because capital flight is motivated by the fear of losing wealth due to various reasons. In practice it is difficult to empirically distinguish between normal and abnormal or illegal capital outflows simply by the motivation.

Some economists even argue that capital flight should not be distinguished from normal capital outflows (Erbe 1985; World Bank 1985; Morgan Guaranty 1986 and 1988), especially for countries struggling with large current account deficits and external debt payments—and which are thus in need of foreign capital. Any type of capital outflow increases the problems of financing their net imports and debt payments and thus adversely affects the economy. Therefore, a better way to capture the magnitude of capital flight is to use the broadest method and take accounts of the entire unreported capital outflow, short-term and long-term, from what is reported in the balance of payment sheet.

Based on this perspective, I try to investigate all these three different measures of capital outflow so as to obtain a deeper and more comprehensive understanding of the capital outflows from different countries. Moreover, I will attach more importance to the analysis of capital flight because these unreported capital outflows provide more insights into the potential problems rooted in the economy and thus may help the capital-scarce countries finding useful policy implications.

2.2 Why does Capital Flow? --- Theoretical Models

Since the 1960s with the expanding of global markets and the steady growth of international trade and factor flows, capital movements has drawn universal attention in economics and finance. There is a wide range of studies trying to explain the determinants of capital from different framework, which could be classified into three lines: the earlier portfolio model, the famous neoclassical model and its paradox, and the most recent dynamic stochastic general equilibrium

(DSGE) model. Although no single theoretical model can capture the entire range of empirical relationships that are analyzed in this paper; it is nevertheless useful to understand these different models on capital flows so as to find out the fundamental determinants of international capital movements.

2.2.1 The Portfolio Model

The portfolio theory concerning international capital flows relates capital flows to levels of interest rate differentials. According to many economists (Mundell 1962, Miller 1968), capital will tend to flow from the country with the lower to the country with higher marginal efficiency of capital and interest rate. Uninhibited capital flows will equalize world interest rates and marginal efficiency of capital. Since the mid-1960s, a number of researchers have attempted to bring the theory of international capital flows into line with the theories of capital accumulation and portfolio distribution. In general, this view of international capital movements makes the fraction of total assets held a broad a function of the level of interest rates and estimates of risk both at home and abroad. The stock of assets held abroad depends on the level of interest rates, the stock of total assets, and the level of other variables.

As this thesis is focused on the empirical study of the size and direction of long-term capital flows, I will just review a simple portfolio distribution approach to the explanation of international capital flows (Branson 1970). In this paper, the modelling of the capital outflow is based on the idea of partial adjustment whereby the actual stock of foreign assets is adjusted slowly toward an optimal level because of the existence of a variety of adjustment costs such as costs of obtaining

information, transactions costs, and capital controls by monetary authorities.

Let us consider a world where the movements of capital are dominated by purchases and sales of foreign assets by domestic residents. Domestic residents hold domestic and, if allowed, foreign bonds. The rate of return on the domestic asset is the domestic interest rate r , and that of the foreign asset, the foreign interest rate r^* plus the expected rate of change in the value of foreign currency in terms of domestic currency, E^* .

For simplicity, let us assume that those who are allowed to purchase foreign assets carry out mean-variance optimization in deciding their optimal (long-run) portfolio. For investor i with the stock of wealth W_i , and the degree of relative risk aversion a_i , the optimal stock of foreign assets B_i^* is written as

$$B_i^* = (C_0 + d / (a_i V)) W_i \quad (1)$$

where d is the return differential ($= r^* + E^* - r$), V is the variance of the return differential (conditional on information at the point of optimization), and C_0 is a minimum-variance portfolio (see, for example, Frankel 1983).

By adding equation (1) over all investors who can participate in foreign bonds trading (the set of which is denoted as N), the following equation could be obtained:

$$B^* = \sum_{i=N} B_i^* = (C_0 + d / (AV)) W \quad (2)$$

$$\text{with } I/A = \sum_{i=N} W_i / a_i \text{ and } W = \sum_{i=N} W_i$$

where I assume that d and V are the same for all investors.

Let us also assume that, because of the presence of adjustment costs, the actual stock of foreign assets B is adjusted slowly toward B^* . There are various ways of formulating a partial adjustment scheme. I assume specifically that adjustment is slow in terms of the ratio of foreign stocks to total assets, x . Then,

$$x - x(-1) = s[x^* - x(-1)] \quad (3)$$

where $x^* = B^*/W$ and s is the speed of adjustment. Changes in x are related to capital flows by

$$-CF/W = [x - x(-1)] + x(-1)[W - W(-1)]/W - B(-1)[e - e(-1)]/[e(-1)W] \quad (4)$$

where $-CF$ is the net capital outflow. The second term on the right-hand side of equation (4) represents the amount of capital flows necessary to keep x unchanged when the stock of wealth changes. In a similar way an exchange rate change will cause a change in the value of domestic currency and hence the share of foreign assets in total wealth. The amount of capital outflows required to keep x unchanged due to exchange rate fluctuation is shown in the third term.

Equations (3) and (4) imply that there are three groups of factors driving capital outflows: an increase in wealth W , exchange rate appreciation, and increase in x^* ---the optimal ratio of foreign assets holding. Increases in x^* may come from a number of sources, such as a change in expected return differential in favour of foreign assets, a change in the expected risk of foreign assets, and a change in the degree of risk aversion. In addition, there could be relaxations of capital controls, leading to increased number of investors in foreign assets.

2.2.2 The Standard Neoclassical Model and the Lucas Paradox

The standard neoclassical models on trade and growth for open economy predict that capital should flow from rich to poor countries. Under the assumptions of countries producing the same goods with the same constant returns to scale production function, using capital and labour as factors of input, differences in income per capita are the result of differences in capital per capita. Then the law of diminishing returns implies that the marginal product of capital is higher in the poorer economy. Thus, if capital were allowed to flow freely, new investments would occur only in the poorer economy, and this would continue to be true until the return to investments were equalized in all the countries.

In many empirical studies on capital flows, researchers find that the actual capital flows from rich to poor countries are far below what is predicted by the standard economic theory. In his classic example, Lucas (1990) compares the U.S. and India in 1988 and demonstrates that, if the neoclassical model were true, the marginal product of capital in India should be about 58 times that of the U.S. In the face of return differentials of this magnitude, all capital should flow rapidly from the U.S. and other wealthy countries to India and other poor countries. However, in the real world, we did not observe such flows happening, at least not until the most recent decade. Even now while cross-border capital flows worldwide have risen substantially to about \$6 trillion in 2004, less than 10% of them go to developing countries.

The theoretical and empirical literature on capital flows has often framed the question of why flows are smaller than predicted by asking whether it is an

inherent failure of the neoclassical growth model or the results of market frictions. A number of solutions to the Lucas Paradox have been proposed. Lucas questions the validity of the assumptions that give rise to these differences in the marginal product of capital and asks what assumptions should replace these and provides some possible explanations. Some researchers suggest that the neoclassical model, or factor accumulation, cannot explain income variations across countries and therefore cannot be used to explain capital flows, while others suggest adjustment costs to human capital or institutional barriers to technology adoption.

In a recent study by Ju and Wei (2006), an innovative non-neo-classical model featuring financial contracts and firm heterogeneity is introduced to resolve the Lucas Paradox. In this model, free trade in goods does not imply equal returns to capital across countries. A key assumption is that the return to financial investment is generally not the same as the return to physical capital. In addition, rich patterns of gross capital flows emerge as a function of financial and property rights institutions. A poor country with an inefficient financial system may simultaneously experience outflows of financial capital but meanwhile receive inflows of FDI, resulting in small net flows. This explains the current situation in many developing countries where large volumes of FDI inflow and outward capital flight co-exists. In comparison, countries with a low capital-to-labor ratio but a high risk of expropriation may experience outflows of financial capital without compensating FDI inflows. This model provides a new perspective to understand the two-way capital flows (simultaneous outflows and inflows) and the role of financial and property rights institutions in determining patterns of capital flows.

From this model, it is found that besides the traditional factors on rate of return to capitals, development of financial markets and property rights are important determinants of capital flows.

2.2.3 The Dynamic Stochastic General Equilibrium (DSGE) Model

Since the 1990s international capital flows have increased dramatically and led to a renewed interest in understanding the driving forces behind capital flows and their macroeconomic implications. Most of earlier studies on capital flows are within settings where only one risk-free bond is traded. These models only have implications for net capital flows, not gross flows. Capital flows are not driven by differences in expected returns or risk characteristics of assets since there is only one risk-free asset and therefore no portfolio choice. Moreover, since these are generally one-period bonds there is no role for valuation effects. At the other extreme are models where financial markets are complete (for example the neo-classical model). Based on these concerns, researchers proposed the general equilibrium models of portfolio choice in which financial markets are not restricted to be complete to better understand cross-boarder capital flows. Such models feature a limited number of assets, such as stocks and bonds, with both gross and net capital flows. Portfolio choice is the key in these models and leads to capital flows associated with changes in expected returns and risk characteristics of assets.

Several studies have independently developed solution methods for DSGE model with portfolio choices to understand the driving forces behind capital movements. There are many related literature both in finance and macroeconomics areas to explore this line of research (Brennan and Cao 1997, Evans and

Hnatkovska 2005, 2006a,b, Devereux and Sutherland 2007, 2009, Wincoop and Tille 2007).

For example, Wincoop and Tille developed a tractable method for solving DSGE open-economy models with portfolio choice that can be implemented both when asset markets are complete and incomplete. The method is applied to a particular two-country, two-good, two-asset model to both illustrate the solution technique and to show that it can lead to a much richer understanding of both gross and net capital flows and positions, and corresponding adjustments of goods and asset prices. The approach highlights a potential key source of international capital flows, associated with changes over time in portfolio allocation. It is shown that capital flows can be broken down into a component associated with portfolio growth through savings and a component associated with the optimal re-allocation of portfolios across various assets due to changing expected returns and risk-characteristics of assets. Without any changes in portfolio shares, an increase in national savings leads to capital outflows equal to the rise in national savings times the portfolio share of foreign assets. This portfolio growth represents the long-term source of capital flows. The second source, portfolio reallocation, is associated with an active reallocation of wealth across assets, which is driven by expected return and risk considerations in relatively shorter terms.

2.3 The Determinants of Capital Outflows and Capital Flight

2.3.1 The Determinants of Capital Outflows

Although theoretical models on capital movements do not distinguish between capital inflows and capital outflows, they are nevertheless helpful in understanding the driving forces behind the capital outflows as most of the factors will simultaneously affect both capital inflows and outflows. Since this study mainly focuses on capital outflows, the factors that affect capital outflows will be analyzed separately. Based on theoretical models on capital flows, the determinants behind capital outflows are fairly clear-cut and can be summarized and grouped into the following two categories: investment climate that affects portfolio reallocation and income and integration effects that affect portfolio growth.

Investment climate

Variables affecting the ‘investment climate’ operate directly on the risk-return trade-off and portfolio re-allocation. Several macroeconomic variables have a direct impact on expectations of risks and returns. Factors affecting the expected returns include the domestic and foreign interest rate, domestic economic growth rate, institutional development, maturity of financial markets, and exchange rate stability. For example, a slowdown in the growth rate may decrease expected returns and stimulate capital outflows. Large fiscal deficits raise risks of future taxation and may increase perceptions of macroeconomic risk more generally and also may lead to higher borrowing costs in future; it may also result in overvaluation of the currency and raise devaluation risks. A high debt-GDP ratio

raises the risks of future taxation, and also the risk of default, especially on sovereign liabilities to the residents. All these factors may then encourage outflows.

A second set of variables that may increase risk perceptions of residents, reflect property rights and risks of expropriation in one form or another. Countries that have high levels of corruption, a weak rule of law and possibly lower levels of accountability may be expected to have higher levels of capital outflows (Tornell and Velasco, 1992, Collier et al., 2000, and others). More extreme cases where the risks of potential confiscation are highest include countries at war or with internal violent conflicts. Countries with weak property rights, may also suffer higher outflows, as these countries are unlikely to have deep domestic financial markets. Several authors also argue that capital outflows may be the cause as well as an effect of financial or fiscal crises (Lessard and Williamson 1987, Collier and others 2001). Outflows may increase in anticipation of future tax or a financial crisis, and may end up increasing taxes or aggravating the probability of a crisis.

Wealth and integration

As countries' GDP per capita rise, it is reasonable to suppose that the size of their portfolios of foreign liquid assets will also rise, leading to higher outflows. Therefore capital outflow should be positively related to a country's income level, which could be well captured by the GDP per capita.

Moreover, as countries become more integrated into the world trading system (through trade in goods and services including financial services), it is also reasonable to suppose that both inflows and outflows will rise. A country's level of

integration could be measured through international trade and financial openness. Theoretically, higher levels of trade and financial openness will lead to higher levels of capital outflows.

Many of the issues that are thought to drive capital outflows will in general also affect capital inflows. This implies that an analysis of capital inflows without taking into account the effect of outflows will, in general, lead to biased results. As these common driving factors are also likely to vary over time, this will also not be corrected by a fixed effect in a typical panel analysis.

2.3.2 The Determinants of Capital Flight

In economic literature there are much less theoretical works modeling capital flight than empirical studies doing capital flight accounting. Since factors driving normal capital outflows will in general also drive capital flight, most researchers doing empirical study of capital flight follow the same portfolio models used in analyzing normal capital outflow only with an emphasis on a variety of risks. Therefore, in addition to the above-mentioned factors that driving capital outflows, the following types of risks are also important determinants affecting capital flight.

In summary, the major determinants of capital flight include: (i) macroeconomic instability; (ii) political risks; (iii) rate of return differentials; (iv) capital inflows; and (v) stock of capital flight, and (vi) discrimination between resident and foreign capital. These determinants have direct influences on portfolio decisions of individuals. As will be shown, in some cases the determinants are closely connected with each other.

Macroeconomic Instability

Macroeconomic factors that are often found in studies on the determinants of capital flight include exchange rate overvaluation, inflation, and budget deficits.

An overvalued exchange rate leads to increasing expectations of depreciation in the near future. This in turn will lead to rising prices of foreign goods relative to those of domestic goods and thus to loss of real income. To avoid welfare losses, residents hold at least part of their assets abroad.

High inflation directly erodes the real value of domestic assets, stimulating residents to hold assets outside the country. Moreover, inflation rates and the exchange rate are closely connected, since high inflation may lead to increasing expectations of depreciation in the future.

High current account deficits may have a similar impact on exchange rate expectations, and may thus be a stimulus for capital flight. Government budget deficit may stimulate capital flight, since it raises expectations of residents with respect to future tax increases or increases in inflation tax, since it is anticipated that the government needs to repay its debt. In both cases, the real value of domestic assets is eroded, leading to capital flight.

Macroeconomic instability also leads to (indirectly) increasing taxes and tax-like distortions. This will lower returns and increase risk and uncertainty of domestically held wealth (Collier *et al.* 2001) and thus increase the incentives for capital flight. The large outflows of capital at the beginning of the debt crisis in the early 1980s and at the outbreak of the Asian crisis in 1997-98 support this

argument. The macroeconomic situation of these countries was highly unstable during these years.

Political Instability and Policy Uncertainty

Perceived political instability may generate capital flight because in an unstable political environment, residents may decide to hold their assets abroad based on lack of confidence in the domestic political situation, perceived high levels of corruption, and the consequences of these factors for the future value of the assets. Models that illustrate the impact of political instability on capital flight can be found in Alesina and Tabellini (1989), Lensink, Hermes et al. (2000), and Le and Zak (2006).

It is shown that when different governments with different interest groups supporting them come into office, uncertainty increases with respect to future fiscal policies. Such an unstable political situation may, for example, lead to a political business cycle. Political instability may also turn into political unrest, leading to strikes, riots, assassinations, etc. Moreover, different forms of the regime type (democracy, autocracy, etc.) may have a different impact on the degree of uncertainty about future policy and their outcomes. Political instability may thus have an influence on the possibility that the government may in one way or another erode the future value of asset holdings. The erosion of future wealth is based on the expectation that domestic political instability causes rising macroeconomic instability, leading to rising budget deficits, current account deficits, exchange rate uncertainty and high inflation.

Several studies on the determinants of capital flight take into account one or more variables that measure the degree of political uncertainty. According to the studies that focus on analysis of political instability, different measures on political risks have been used. In some cases, the empirical investigations focus on the regime type as measurement of political instability, using different dummy variables that proxy for the degree of democracy of a country. Other studies use dummy variables to measure issues related to the policy regime, such as indexes of civil rights and liberties. There are also studies using more direct measures for political instability, such as the number of assassinations and revolts, dummies for the fact that a country has been involved in a war situation. In general, the results of the empirical investigations support the view that political instability and capital flight are positively related.

Rate of Return Differentials

Naturally, capital flight may occur simply because the returns on assets are higher abroad as compared to assets held domestically. Most studies on the determinants of capital flight take this into account by adding a variable that measures the (after tax) real interest rate differential.

Meanwhile, domestic and foreign investors may be subjected to different level of risks for their investment in domestic country. Some authors stress the importance of differences in perceived risk of investing in the domestic economy to explain the simultaneous inflow and outflow of capital (Dooley 1988; Diwan 1989). Residents face a higher risk of a reduction in the value of their domestically

held assets as compared to foreign investors. This may lead to a situation where domestic investors buy foreign assets while foreign investors buy domestic assets at the same time. Unlike domestic investors, foreign investors are not hurt by the inflation tax, since they lend in foreign currency. A similar asymmetry in perceived risks holds with respect to currency depreciation following the accumulation of debt obligations. Domestic investors will experience a reduction of the real value of their assets, whereas foreign investors are not hurt by such exchange rate changes.

Proxies of the interest rate differential are used in some studies to measure the relative attractiveness of domestic as compared to foreign assets. In most cases, researchers have calculated some kind of exchange rate differential between the domestic interest rate on deposits and a foreign deposit rate, normally the US deposit rate. Another measure proxying for the attractiveness of different assets used is the growth rate of GDP or GNP. Measures of the interest rate differential do not always have a statistically significant relation to capital flight. This may indicate that other determinants, such as macroeconomic and political instability, are more important to explain capital flight.

Capital Inflows

The role played by foreign borrowing as a determinant of capital flight has been thoroughly discussed in literature. There are several models dealing with the issue of the simultaneous occurrence of capital flight and capital inflows. Moreover, most empirical studies emphasize the role played by capital inflows in explaining

capital flight. Easton (1986) presents a theoretical model that explains why the increase of foreign borrowing may stimulate capital flight. In his model, residents may borrow on international capital markets and then use the loans to buy foreign assets. The key assumption in his model is the moral hazard behavior of residents, who expect their government to nationalize debt repayments at some point in time. If it is true, current foreign borrowing increases future repayment obligations of the government when it actually nationalizes debt repayments. As residents perceive that the government will pass the costs of these repayments on them, for example by using the inflation tax, they may choose to convert their domestic assets into foreign assets. In the early 1980s the moral hazard behavior of domestic borrowers was indeed rewarded when governments of several developing countries actually nationalized foreign debt repayments. Boyce (1992) and Ndikumana and Boyce (2001) refer to this as the 'revolving door syndrome'. Similar models by Ize and Ortiz (1987) show that capital flight is stimulated when the public sector itself borrows in the international capital markets to finance its current expenditures. Fry (1993) stresses that growing government guaranteed foreign debt may increase expectations about exchange rate devaluations, which provides a stimulus to hold foreign assets.

It has also been argued that in practice the domestic debt obligations of the government are junior to foreign debt obligations (Ize and Ortiz 1987; Kant 1996), which reduces the willingness of residents to lend to their own government. Foreigners, instead, are not reluctant to lend to the government due to the seniority of their claims. Razin and Sadka (1991), Dooley and Kletzer (1994), and Bjerksund

and Schjelderup (1995) present models that emphasize differences in tax treatments for domestic and foreign investors lead to simultaneous capital inflows and capital outflows.

Finally, simultaneous capital inflow and outflow may also be due to asymmetric information about expected returns on domestic assets between domestic and foreign investors. In many studies, these capital flows have been split into one or more forms of inflows. In particular, research has focused on investigating the impact of long-term versus short-term foreign debt. A few studies have also investigated the role played by aid flows. It is shown that especially long-term debt inflows have a statistically significant influence on capital flight.

The Stock of Capital Flight

Another determinant of capital flight is the stock of capital flight itself. The argument to take the stock of capital flight as a determinant of capital flight stresses the spillover effect of large assets holdings abroad on the expected losses on domestically held assets. When residents hold large amounts of foreign assets, the tax base is reduced considerably. Under these circumstances, the tax burden due to increased public expenditures and foreign borrowing has to be shared by a smaller tax base, increasing the burden per unit of domestically held asset. Consequently, this will further stimulate residents to take their money and run. Thus, the larger the stock of capital flight, the higher the incentive to flee (Collier *et al.* 2001).

Discrimination between Resident and Foreign Capital

This group of variables includes a set of subsidies or other forms of preferential treatment of foreign capital including tax breaks, preferential access to prime land and other inputs, explicit and implicit guarantees on foreign liabilities, and exchange controls for residents. These factors may drive residents to invest abroad and non-residents to invest domestically or create incentives for “round tripping” of resident flows. Discriminatory treatment of resident capital can take the form of tax incentives to foreign investors, capital account restrictions, and subordination to nonresident claims in the event of financial crisis. Capital account opening may therefore actually reduce the incentives for capital flight in the long run, especially if it allows residents to hold foreign currency deposits onshore (Rojas-Suarez 1990). Some authors have argued that exchange controls aimed at reducing capital flight are positively associated with corruption, and thus, end up being ineffective (Loungani and Mauro 2000).

Moreover, implicit guarantees on and bailing out of external debt may raise the risks of future taxation or expropriation of residents’ wealth (Khan and Haque 1985). Presence of such discriminatory treatment of resident capital relative to nonresident capital may encourage investors to deposit their wealth in a foreign bank, and then raise debt financing from the same bank for their domestic investments. Such recycling of funds need not always be in foreign currency terms, and may take the form of local currency denominated equities and bonds, since such securities may also carry implicit and explicit government guarantees, such as credit guarantees for government securities, commercial bank deposits and

government-supported projects, and exchange rate guarantees in the form of pegged exchange rates (Dooley and Kletzer 1994).

2.4 Measuring Capital Flight

The measurement of capital flight is not straightforward, given that there is no consensus on the definition of capital flight. In fact, different definitions and measurement methods for capital flight were used in the literature. As a result, there could be great variances in the capital flight estimations using different methods. In summary, the following measures of capital flight are most often used in the literature: (i) the residual (or World Bank) method; (ii) the Dooley method; (iii) the hot money method; (iv) the asset method. In the following pages, I will briefly describe these different methods of measurement for capital flight.

i) The Residual Method

This method measures capital flight indirectly by comparing the *sources* of capital inflows with the *uses* of these inflows. Sources of funds include all net official inflows (increases in net external indebtedness of the public sector) and the net flow of foreign direct investment. Uses of funds include the current-account deficit and additions to foreign reserves. Outward capital flight exists when sources of funds exceed uses of funds, and vice-versa for inward capital flight. The residual method acknowledges the difficulties of separating abnormal from normal capital outflows and, therefore, measures all unrecorded private capital outflows as being capital flight. According to the residual method, capital flight is calculated as follows:

$$CF = \Delta Debt + FI - CAD - \Delta FR \quad (5)$$

where CF is capital flight according to the residual method, Δ denotes change, $Debt$ is stock of gross external debt reported in the World Bank data, FI is the net foreign investment inflows, CAD is the current account deficit and FR is the stock of official foreign reserves. The residual method does not rely only on balance-of-payments data. For some items, other sources are used to get a better estimate of private capital flows. Most notable is item of gross external debt, for which the year-to-year change in external debt according to World Bank data may be more accurate.

In previous studies, the residual method is the most widely used method, in some cases with minor modifications. For example, Morgan Guaranty (1986) takes into account an additional item, i.e. the change in the short-term foreign assets of the domestic banking system (ΔB). This modification is introduced to focus on non-bank capital flight. Thus, capital flight according to the Morgan Guaranty variant of the residual method (CF_m) can be calculated as:

$$CF_m = \Delta Debt + FI - CAD - \Delta FR - \Delta B \quad (6)$$

Other authors include the amount of trade misinvoicing as a component in the measure of capital flight using residue method (Claessens and Naudé 1993). Trade mis-invoicing is determined by comparing trade data from both the importing and exporting country. Importers are assumed to be involved in capital flight when they report higher values of imported goods as compared to the reported value of the same goods by exporters. In turn, exporters are involved in capital flight when they report lower values of exported goods as compared to the reported value of the same goods by importers. Proponents of this measure stress

the fact that abnormal capital outflows of residents may be included in *export under-invoicing* and/or *import over-invoicing*, since both these malpractices provide channels to siphon domestically accumulated wealth outside the country.

Cumby and Levich (1987) also uses the residual method, but proposes to exclude the following items from the current account balances: travel (credit), reinvested earnings on direct investment abroad, reinvested earnings on direct investment domestically, and other investment income (credit). Claessens and Naudé (1993), in contrast to most others, take into account net acquisitions of corporate equities in their measure of foreign direct investment. Brown (1989) proposes to take into account the unrecorded remittances of workers abroad. Finally, Pastor (1990), Ndikumana and Boyce (2001, 2002) add interest earnings on the stock of assets held abroad, taking a representative international market interest rate to compute these earnings.

ii) The Dooley Method

This method aims at distinguishing normal from abnormal or illegal capital flows. Dooley (1986) sees capital flight as the total amount of externally held assets of the private sector that do not generate income recorded in the balance of payments statistics of a country. Or, in other words, capital flight is all capital outflows based on the desire to place wealth beyond the control of the domestic authorities. The Dooley method of measuring capital flight starts by computing total capital outflows as reported in the balance of payments statistics, but then makes a number of modifications. First, errors and omissions are taken into account to measure total capital outflows. Second, the Dooley method takes into

account the difference between the World Bank data on the change in the stock of external debt and the amount of external borrowing as reported in the balance of payments statistics. If the first is larger than the second, this difference is assumed to be part of capital flight. Third, the stock of external assets is computed that correspond to the reported interest rate earnings in the balance of payments by using a representative market interest rate (i.e. the US deposit rate). The difference between total capital outflows and the change in the stock of external assets corresponding to reported interest income is measured as capital flight.

According to the Dooley method, capital flight is measured as follows. First, the amount of total capital outflows is calculated:

$$TKO = FB + FI - CAD - \Delta FR - EO - \Delta WBIMF \quad (7)$$

where TKO is total capital outflows, FB is foreign borrowing as reported in the balance of payments statistics, EO is net errors and omissions (debit entry), and $WBIMF$ is the difference between the change in the stock of external debt reported by the World Bank and foreign borrowing reported in the balance of payments statistics published by the IMF. The stock of external assets corresponding to reported interest earnings is:

$$ES = INTEAR / Rus \quad (8)$$

where ES is external assets, Rus is the US deposit rate (assumed to be a representative international market interest rate), and $INTEAR$ is reported interest earnings. Capital flight according to the Dooley method is then measured as:

$$CFd = TKO - \Delta ES \quad (9)$$

The Dooley method is conceptually different from the residual method. Yet, Claessens and Naudé (1993) show that in practice capital flight measured according to the Dooley method and the residual method are actually similar, since most of the data used for calculation are the same in both cases.

iii) The Hot Money Method

According to this method, capital flight is measured by adding up net errors and omissions and non-bank private short-term capital outflows. Cuddington (1986, 1987) and Gibson and Tsakalotos (1993) are examples of authors who have used this method of measuring capital flight. Like the Dooley method, this method corresponds to the idea that capital flight goes unrecorded, due to the illegal nature of these capital movements. The unrecorded capital movements are believed to appear in net errors and omissions. Moreover, by concentrating on short-term flows, medium and long-term outflows are excluded, which are viewed as being normal in character (Gibson and Tsakalotos 1993). Thus, the hot money method (CF_h) can be calculated as follows:

$$CF_h = SCO + EO \quad (10)$$

where SCO is the total amount of short-term capital outflows.

iv) The Asset Method

Some authors take the total stock of assets of non-bank residents held at foreign banks as a measure of capital flight. This is the so-called asset method (Hermes and Lensink 1992; Collier *et al.* 2001). The asset method is a short-cut measure of capital flight. This measure may be seen as an indication of the minimum amount of assets held abroad, since residents may hold their assets in

other forms next to bank accounts, for example, in foreign equity holdings. The IMF provides data on these bank assets until 1994. For recent years, however, no information is available to apply this measure. Another problem of using asset method is that it may suffer from being too narrow a measure of total capital flight and may leave out potentially large parts of capital flight. Moreover, assets held at foreign banks are not always specified by ownership.

Taking into consideration of the advantages and drawbacks of the various methods of calculating capital flight discussed above, I will adopt the residue method in this paper to estimate the magnitude of capital flight for all the countries. There are three reasons for using the residue method: First, it is the most often used method in capital flight literature since the 1990s. In order to be consistent and comparable with other empirical research on capital flight, residue method is used for the calculation of capital flight. Secondly, among all the definition and measures for capital flight, residue method is the broadest measure. It covers all unreported capital outflow so as to minimize potential biases in narrower terms. Lastly, the data for this method provide the largest sample size for this study. Therefore it would be easier to make comparison between those countries and learn some lessons.

2.5 Contributions of This Paper

On reviewing the past literature on capital flows and capital flight, I find that some aspects of previous studies could be further extended. This thesis contributes to capital flow and flight literature in the following three aspects:

i) A comprehensive estimation on capital flows and capital flight

In economic literature, there are very few empirical studies on capital outflow, especially with panel data analysis. This paper is the first attempt to analyze different types of capital flows together with capital flight for a large sample size and a long time period. The existing empirical studies on capital flight are limited in the sample size, therefore their conclusions on issues related with capital flows are often geographically oriented or restricted to a number of countries, and cannot provide us with a general view of the capital flight patterns. In this study, I extend the sample size to 130 countries, including 22 industrial countries and 108 developing countries, for the period of 1980-2003. Furthermore, by including the industrial countries in the sample, this paper provides a more complete picture of the capital outflow and capital flight patterns for countries of all income levels.

ii) Economic fundamentals and threshold effect

Another point calling for interest is how economic fundamental factors, such as income and growth rate, affect the patterns of capital flows. Owing to small sample size, previous studies focus on the determinants of capital outflow and capital flight without thorough investigations on the deep-rooted economic fundamentals. Empirical works often study a single country or a group of countries with similar economic background so as to find the determinants of capital flight from these countries. However, they lack a systematic and comprehensive view of the fundamental factors which are the basics of the economy. In this paper, by studying the basic economic indicators such as income and institution development, I find a non-linear relationship between capital flight and the income levels.

Moreover, I use the Hansen threshold estimation method to test the non-linear relationship between capital flight and income, and identify a three-stage threshold effect of economic development on capital flight: below the threshold, capital flight increases as economy grows, however, after the economy develops into a stage beyond the threshold level, capital flight will begin to decrease as the economy grows. This new finding on the patterns of capital flight is especially important for the policy makers in the developing countries because it helps them understand the general trend of capital flight at different stages of development and thus make appropriate policies in controlling their financial sectors accordingly.

iii) Financial liberalization

This thesis also tries to answer the question on how financial liberalization affect international capital flows. Ever since the 1990s when a number of emerging countries embark on their financial liberalization process, intense debates have been going on concerning the effects of financial openness on the growth of economy. Coincidentally, this period also observed the happening of a series of dramatic financial crisis throughout the world. Is financial liberalization the cause of crisis? Should poor countries open their financial markets to the outside world? Unfortunately, previous literature does not provide us with enough insights on this global trend of financial liberalization and its effects on capital outflow, especially in terms of capital flight. Intuitively, capital controls may (perhaps for a limited time) be successful in reducing flight because capital flows are strictly restricted under this system. On the other hand, the imposition of control itself may signal a deteriorating external financing situation, raise the prospect of a devaluation and

induce domestic residents intensify their efforts to get their money out of the country. This controversy raises the important question to be addressed in the thesis, i.e. the real effect of financial openness on capital flows and capital flight. The advantage of the current study is that it uses a large sample size to examine the relations between of financial liberalization and capital flows. According to the statistical analysis in Chapter 4, financial liberalization may lead to higher total capital flows in both directions as well as net capital outflow. However, it does not play an important role in shaping the patterns of capital flight.

Chapter 3 The Evidence: Magnitude of Capital Outflow

3.1 Methodology and Data

This paper investigates three types of capital outflow, namely the total capital outflow, net capital outflow and capital flight. *Total capital outflow* is defined as the sum of short-and long-term capital outflows as reported in the balance of payments. It consists of foreign direct investment (FDI) abroad and portfolio investment outflow. In order to make comparisons, I also examine the *total capital inflow*, which is the sum of short- and long-term capital inflows as reported under FDI inflow and portfolio inflow in the balance of payment. Data on FDI and portfolio investment flows are obtained from the International Financial Statistics (Lines 78bdd and 78bfd for outflow and Lines 78bed and 78bgd for inflow). The dataset covers 119 countries over the period of 1980-2004. Annual data in terms of current US dollars as well as ratios to GDP are both taken so as to make it comparable with other capital flow measures.

Data on *net capital outflow*, which is represented by a current account surplus, are obtained from the World Development Indicators. Current account balance is the sum of net exports of goods, services, net income, and net current transfers. A positive figure, or a surplus, implies net capital outflow from and country, and a negative figure implies net capital inflow. Data are in terms of current U.S. dollars, and ratios to GDP are also used in the analysis.

As for *capital flight*, I use the broadest measure --- the World Bank (or the residual) method --- to minimize potential biases in narrower measures. The World

Bank method compares the sources of capital (the change in external debt and net foreign direct investment), with the uses of capital (a current account deficit and the change in official reserves). Capital flight occurs when sources of capital exceed uses of finance, hence, the residual. The formula for estimation is the baseline capital flight measure without modification:

$$CF = \Delta Debt + FI - CAD - \Delta FR. \quad (11)$$

where CF is capital flight according to the residual method, Δ denotes change, $Debt$ is stock of gross external debt reported in the World Bank data, FI is the net foreign investment inflows, CAD is the current account deficit and FR is the stock of official foreign reserves. This measure covers all unreported capital outflow, including assets of both the banking and non-banking sectors.

The data used for the calculation of capital flight are taken from various sources. Data on capital flight from developing countries are taken from the World Development Indicators 2005 (WDI), while data from the Source OECD are used for computing capital flight from all the industrial countries and a number of developing countries.¹ Data on other variables used to estimate capital flight determination come from various datasets, including the International Country Risk Guide (ICRG), and Polity IV, International Financial Statistics (IFS) and dataset established by other authors. Please refer to Appendix A for a complete and more specific description of the data used in our study.

Owing to the availability of data, this study finally results in a panel estimation of annual capital flight for 130 countries for the period of 1980-2003

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¹ Only data on External Debt for industrial countries and a few developing countries are from Source OECD, and the rest of data used for capital flight calculation are all from WDI.

(small variations in years occur due to limits on data availability). To get a more clear view of the capital flows of countries with different income levels, capital flows in volume as well as ratios to GDP are used to indicate the magnitude of each type of capital flows for the countries. For some developing countries, consistent data are not always available, therefore I did not restrict the sample to those developing countries for which data are consistently available but rather used the largest possible set of all countries. The minimum number of observation for each country is 15 years and the maximum 24 years.

3.2 Magnitude of Capital Flows and Capital Flight

The sample size in this research is very large, covering 130 countries of all income levels, from various regions, and spanning a long time period. Therefore, it is difficult to make presentations of the figures for different types of capital flows in one single picture. In order to get a more profound understanding of the questions related with capital flows, I group the countries by different criteria and look at those flow figures from various dimensions: by region, by income, by growth rates, and by level of openness. Since each group include different number of countries, the magnitude of overall capital flows in volume from each group vary substantially and thus make it difficult to compare group-wise. Therefore, I use the ratios of capital flows to GDP to make it comparable between the groups and across countries. Moreover, I divide the whole sample period, i.e. 24 years from 1980-2003, into five intervals and use the five-year average data instead of the annual data to reduce the business-cycle effects and measurement error. This is because annual data on capital flows may fluctuate greatly year-by-year due to

various exogenous factors, therefore average data may better describe the long-run trend and characteristics for a given period.

3.2.1 Capital Flows by Regions

According to geographical distribution, I classify the 130 countries into 6 regions: Latin America and Caribbean (LAC), Middle East and North Africa (MNA), Africa (AFC), South Asia (SAS), East Asia and Pacific (EAP), and Europe and Central Asia (ECA). A notable contribution to the estimation of capital flows in this study is the inclusion of 22 industrial countries in the sample. I group all the 22 industrial countries together regardless of their geographical origin and study capital flows from them in this separate group. The rest of the 108 developing countries come from six regions in the world, as listed in Appendix B. Based on my estimation results, capital flows and capital flight from industrial countries show a clearly different pattern from the developing countries.

Figure 1 presents the magnitude of four types of capital flows from the six regions as well as from the 22 industrial countries. Five-year average flow figures (as ratios to GDP) are plotted in the bars. The first column is capital flight, the second column is total capital outflow, the third column is total capital inflow and the last column is the current account balance, or net capital outflow. According to the graphs, industrial countries show distinct patterns in all the four types of capital flows. They have the lowest capital flight in average, the capital flight to GDP ratios were less than 0.5% throughout the whole period, and after late 1990s, capital flight figures become negative, which indicates there were in fact unreported capital inflow to those economies. Similar conclusion could be reached

for net capital outflows from these countries. According to Figure 1B, during the observation period, the industrial countries' current account balances are always negative, which implies there could net capital inflow entering to these industrial countries. This is in line with the observation in the real world that capital investment has a preference to the developed countries, as shown in the Lucas Paradox. Total capital inflow to and total capital outflow from industrial countries are rather large compared with the net flows, and on a steadily increasing trend. However, inflows and outflows are of roughly the same magnitude and therefore make the net flows fairly moderate¹.

On the other hand, the developing countries in the six regions show some similarities as well as huge differences in their capital flows patterns. The following paragraphs discuss each type of capital flows respectively.

1) Capital Flight

From graph A in Figure 1, five out of the six regions experience high burdens of capital flight. Among the developing countries from the six regions, the East Asia and Pacific region has comparatively high capital flight ratios to GDP all through the years and in an increasing trend. Especially in the 1990s, average capital flight was between 3% and 5% of GDP. It peaked at almost 5% in the late 1990s, which coincided with the 1997-1998 Asian financial crisis occurred in that region.

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¹ The observation from Figure 1 is contradicting with later empirical estimation on the relationship between net capital outflow and income. According to various estimation results, net capital outflow is positively correlated with income, therefore, rich countries should have higher net capital outflow. However, this figure shows that rich countries on average have net capital inflows. The reason behind this difference is that Figure 1 plots the average of net capital outflow from the 22 industrial countries, therefore, economies with large current account deficit such as the US may dominate the results.

Figure 1 Capital Flows and Capital Flight by Region

A. 6 Groups of Developing Countries

Graphs by region

B. 22 Industrial Countries

Notes: Figure 1 shows the level of capital flight, net capital outflow, total capital inflow and outflow from six regions in the world as well as a group of industrial countries. See appendix B for a complete list of countries for the different regions. OECD refers to the 22 industrial countries that are not included in other regions. 5-year average data are presented for the period 1980-2003. Y-axis is capital flight as ratio to GDP.

Countries in the AFC, ECA and MNA regions also experienced high burdens of capital flight. While it was not always high during the entire period as compared to East Asia and Pacific region, it was very high in some years over the period, e.g. in early 1980s and post 2000. Especially for MNA, during the first 5 years of 1980s, average capital flight amounted to 8 percent of GDP, and after 2000, it shot up again to nearly 5% to GDP. On the other hand, countries in these regions seem not to have been affected by the Asian crisis in 1997-98: capital flight from these countries was very low in the 1990s and in fact some regions even had capital reversal during this period.

For South Asia, the graph shows a mixed picture of capital flight as well as its reversal. Compare with other regions, average capital flight from SAS was the lowest, around 1% in the 1980s and even followed by reversals after 1990s. On the other hand, although Latin America and the Caribbean area has been the focus of attention for capital flight problem in many studies, surprisingly, for this region capital flight has been rather modest as compared to EAP, MNA, AFC and ECA. Average capital flight to GDP ratio was between 1% and 3% for the entire period. There is even capital reversal during the early 1990s to this region.

2) Total Capital Outflows

A common trend among the developing countries in these six regions is that total outward going flows are very small compared with other types of capital flows. Except for EAP and MNA, which have capital outflows in certain period exceeding 2%, the rest of the four regions almost have zero capital outflows. This is not surprising since total outflows are the sum of total FDI and portfolio

investment abroad. As most developing countries are still in lack of capital, therefore, total capital outflow from them will be minimal. MNA and EAP regions are exceptional because there are several high income countries in these regions, e.g. oil-exporting countries in MNA such as Kuwait, Saudi Arabia and fast growing countries in EAP such China, Korea, and Singapore.

3) Total Capital Inflows

Total capital inflows to these developing countries vary greatly across regions, however, in general, all of the regions are receiving increasing amount of capital inflow in recent years except MNA and SAS. Especially in EAP and LAC, capital inflows have been growing steadily since the 1990s, reaching 5% of GDP in certain years. This is the result of sudden increase in the private lending, partly in the form of bank loans and partly in the form of corporate bonds, to the developing countries in the 1990s. This period also saw mutual funds in the US and UK increasingly buying equities in some developing countries. With the improvement of economic and political environment in some of the developing countries, increasing number of foreign investors are willing to move their investment into those newly emerging industrial countries such as China, India, and Malaysia. For example, China, as the largest FDI recipient in the world, received US\$63 billion FDI inflow in 2006, which is a 5% increase from previous year. Capital inflows to developing countries are on an upward growing trend as those poor countries are getting richer and richer, with better institutions, infrastructure and political environment. On the other hand, capital inflows to SAS and MNA are relatively

low compared with other regions, even though the figures are also gradually increasing.

4) Net Capital Outflows

Current account balance is used to represent net capital flows, as shown in the last bar in each graph, with a positive figure indicating net capital outflow and negative figure indicating net capital inflow. It is obvious that different regions show distinct characteristics in their net capital flows. The outstanding region is the East Asia and Pacific, which has maintained a growing net capital outflow most of the time, while countries in other regions, such as ECA, AFC and LAC, experienced net capital inflow throughout the period. In MNA and SAS, countries saw their current account gradually improving, changing from deficit to surplus in recent years. As explained earlier, a current account surplus means net capital outflow, therefore, developing countries in EAP, SAS and MNA has become the new supplier of net capital outflows. In fact, the countries turning into exporters of financial capital are also the ones that grow at very fast speed in recent year, e.g. China and India.

3.2.2 Capital Flows by Income

Figure 2 presents the graphs on four types of capital flows to GDP ratios by income levels. All the 130 countries are classified into four groups, namely high income, low income, lower middle income and upper middle income countries,

according to the World Bank list of economies 2006.¹ From these graphs, it is apparent that countries of similar income levels do have some common patterns in their capital flows.

Figure 2 Capital Flows and Capital Flight by Income

Graphs by income

Note: Figure 2 shows the level of capital flight, net capital outflow, total capital inflow and outflow for countries with different level of income. For analytical purposes, economies are divided among income groups according to 2005 gross national income (GNI) per capita, calculated using the World Bank Atlas method. The groups are: low income, \$875 or less; lower middle income, \$876-3,465; upper middle income, \$3,466-10,725; and high income, \$10,726 or more. 5-year average data are presented for the period 1980-2003. Y-axis is capital flight as ratio to GDP.

High Income Counties(31): Australia, Finland, Iceland, New Zealand, Norway, Spain, Sweden, Switzerland, United Kingdom, United States, Austria, Canada, Italy, Korea Rep., Malta, Portugal, Saudi Arabia, Bahamas, Bahrain, Belgium, Cyprus, Denmark, France, Germany, Greece, Ireland, Israel, Japan, Kuwait, Netherlands, Singapore

¹ This table classifies all World Bank member economies and all other economies with populations of more than 30,000. For analytical purposes, economies are divided among income groups according to 2005 gross national income (GNI) per capita, calculated using the World Bank Atlas method. The groups are: low income, \$875 or less; lower middle income, \$876-3,465; upper middle income, \$3,466-10,725; and high income, \$10,726 or more.

Low Income Counties(35): Burkina Faso, Central African Republic, Mali, Mauritania, Mozambique, Nicaragua, Niger, Zimbabwe, Burundi, Congo Rep., Cote d'Ivoire, Haiti, India, Kenya, Lao PDR, Madagascar, Nepal, Nigeria, Pakistan, Rwanda, Sudan, Tanzania, Uganda, Zambia, Bangladesh, Benin, Ghana, Senegal, Sierra Leone, Togo, Bhutan, Comoros, Papua New Guinea, Sao Tome and Principe, Solomon Islands

Lower-middle Income Counties(37): Albania, Angola, Bolivia, Brazil, Bulgaria, Chad, China, Fiji, Honduras, Indonesia, Paraguay, Peru, Romania, Dominican Republic, El Salvador, Guatemala, Iran Islamic Rep., Philippines, Thailand, Cameroon, Colombia, Ecuador, Egypt, Jamaica, Jordan, Morocco, Sri Lanka, Syrian Arab Republic, Tunisia, Cape Verde, Lesotho, Maldives, Namibia, Samoa, Suriname, Swaziland, Vanuatu

Upper-Middle Income Counties(27): Belize, Hungary, Lebanon, Mexico, Poland, Uruguay, Argentina, Chile, Costa Rica, Gabon, Malaysia, Panama, South Africa, Venezuela, Barbados, Mauritius, Oman, Seychelles, St. Kitts and Nevis, Trinidad and Tobago, Turkey, Antigua and Barbuda, Botswana, Dominica, Grenada, Libya, St. Lucia

First, total capital inflows and outflows are steadily increasing overtime for all the four groups of counties, although those of high income countries increase faster than those of the other three groups. At the same time, total capital flows are also positively related with income, i.e., higher income countries experience higher levels of total capital inflows and outflows. One apparent difference between high income countries and lower income countries is that for high income countries, the capital outflow and inflow are of roughly equal amount, while for lower income countries, total capital inflow exceed total capital outflow by large extend. This may be due to the reason that capital is still a scarce resource in the developing countries, and therefore outward FDI and portfolio investment is still low. Another reason could be that higher income countries may be more financially open so that both ways of capital flows occurred in large size while lower income countries may still have some form of control in regulating capital outflows.

As for the net capital flows, an interesting trend is that for non-industrial countries the net capital inflows are steadily decreasing while net capital inflows to industrial countries are increasing over the period. It is observed that current

account balance in developing countries is gradually moving toward surplus while that of high income industrial countries remains or is moving toward larger deficit.

In terms of capital flight, high-income countries have the lowest capital flight to GDP ratios while lower middle-income countries have the highest figures. Surprisingly, it is not the low-income countries but rather the lower and upper middle-income countries which have the most intense capital flight. This raises an interesting question: Is there a relationship between capital flight and economic development? If there is a relationship, what is it? Are capital flight and economic development linearly correlated? Figure 3 and Figure 4 plot the four types of capital flows as percentage of GDP by GDP per capita PPP, which give us a clearer picture of the relationships between those capital flows and income levels.

Figure 3 Capital Flows and Income

Notes: Figure 3 provides a scatter plot of the relationship between the three types of capital flows (net capital outflow, total capital inflow and total outflow) and the level of economic development for each country. In graph (a) the Y-axis is estimated total capital inflow to GDP ratios, in graph (b) the Y-axis is total capital outflow to GDP ratios, graph (c) net capital outflow and graph (d) net capital outflow without outlier respectively. In each graph, the X-axis is GDP per capita, PPP in US dollar. Average data over the period of 1980-2003 are used for 130 countries.

Figure 4 Capital Flight and Income

Notes: Figure 4 provides a scatter plot of the relationship between capital flight and the level of economic development for each country. Graph (A) plots average capital flight for 130 countries. Graph (B) is for 129 countries after drop the outlier Kuwait. Graph (C) shows countries with positive capital flight. In each graph, the X-axis is GDP per capita, PPP in US dollar and the Y-axis is estimated total capital inflow to GDP ratios. Average data over the period of 1980-2003 are used for 130 countries.

As shown in Figure 3, three types of flows, i.e., total capital inflow, total outflow and net capital outflow are all positively correlated with a country's income level. This observation confirms with economic intuition that increase in wealth will lead to higher capital outflow. However, as shown in Figure 4, there seems to be a non-linear relationship between capital flight and economic development. Actually we can see more clearly from Figure 4 panel (b) (after dropping the outlier Kuwait) the inverse U-shape between capital flight and GDP per capital for 123 countries in the sample.¹ This inversed U-shape may imply that there is a threshold effect of economic development on capital flight: below the threshold level of economic development, capital flight will increase as economy grows; until sometime when the economy grows into a stage beyond the threshold level, capital flight will begin to drop. This hypothesis also helps to explain the graphs in Figure 2. For the low-income countries, capital flight is moderate, but for lower and upper middle-income countries, capital flight is the most intense. Only after when the economies enter into certain stage, then the capital flight will gradually drop to a healthy level. The next chapter will provide more profound discussions on this hypothesis by supplementing statistical and econometrical analysis.

Table 1 provides a detailed comparison in figures between capital flight and normal capital outflow from developing and industrial countries respectively. Average annual capital flight in volume does not differ much between industrial and developing economies; however, when taken as ratios to GDP, capital flight

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¹ Data on GDP per capita are not available for all of the 130 countries, so I only plot 123 countries which have consistent data over the period..

from developing countries is almost twenty times of that from industrial countries. On the other hand, normal capital outflow shows an opposite pattern from capital flight: In volume alone, capital outflow from industrial countries is more than 100 times of that from developing countries. When we consider the effect of size of economy, capital outflow as ratio to GDP from industrial countries is still more than 5 times of that from developing countries. In summary, capital flight and normal capital outflow show opposite patterns for industrial and developing countries: developing countries suffer from high levels of capital flight but have low capital outflow, while industrial countries experience large volume of capital outflow and almost no capital flight or even negative capital flight. This difference can be further demonstrated by Figure 7 and Figure 8, which show the capital flight and outflow for 12 major developing countries and industrial countries respectively. For developing countries, net capital outflows are small and stable while capital flight fluctuates dramatically and most of the time exceeds net capital outflow. For industrial countries, however, capital outflow often exceeds capital flight by large extend, while capital flight from most of the industrial countries are negative, indicating unreported capital inflows to these countries.

Table 1 Capital Flight and Other Types of Capital Flows

	Industrial Countries (Obs: 22)		Developing Countries (Obs: 108)	
	Mean	Std. Dev.	Mean	Std. Dev.
Capital Flight Volume (US \$ in Millions)	701	10400	642	2250
CF/GDP (%)	0.089%	1.643%	1.663%	4.378%
Net Capital Outflow (US \$ in Millions)	-3520	39000	-289	2050
Current Acc/GDP (%)	-0.434%	2.989%	-4.320%	6.039%
Total Capital Inflow Vol. (US \$ in Millions)	36200	53000	1170	3250
Inflow/GDP (%)	6.597%	6.378%	2.494%	2.931%
Total Capital Outflow Vol. (US \$ in Millions)	35400	37600	332	1030
Outflow/GDP (%)	4.539%	7.261%	0.860%	1.765%

Notes: Capital flight is estimated using the World Bank residue method, while total outflow is the sum of annual FDI outflow and portfolio outflow for each country. More explanation on the calculation of capital flight and capital outflow could be found in Chapter 3. See Appendix C for the detailed explanations of the variables. Average data for the period 1980-2003 are used for each country. Due to data availability, the sample size and observation period are slightly different for each variable. See Appendix B for the list of industrial countries and developing countries.

3.2.3 Capital Flows by Financial Openness

Another important question this thesis addresses, as mentioned earlier, is the role played by financial liberalization on shaping capital flows. It is well known that it is extremely difficult to measure the extent of openness in capital account transactions (e.g., Eichengreen, 2002 and Edison et al., 2002). Measures on financial openness in previous studies can be grouped into two types: i.e. the *de jure* measure and the *de facto* measure of controls on capital transactions. The former focuses on the effects of capital account liberalization and uses a measure based on the official restrictions on capital flows as reported to the IMF by national

authorities. The most prominent examples of such measures are the binary variables based upon the IMF's categorical enumeration reported in *Annual Report on Exchange Arrangements and Exchange Restrictions* (AREAER). However, this binary indicator directly measures capital controls but does not capture differences in the intensity of these controls (Shang-Jin Wei, 2003).

On the other hand, the *de facto* measure of financial openness, based on the estimated gross stocks of foreign assets and liabilities as a share of GDP, is a more direct measure of financial openness and a better indication of financial integration in terms of realized capital flows.¹ However, data on gross stocks of foreign assets and liabilities are often inaccurate and difficult to obtain for most of the developing countries.

Two commonly used methods for measuring financial integration are considered: the first one is the capital account openness index (KAOPEN) developed by Chinn and Ito (2006). This index is the first principle component of the four IMF binary variables in the *Annual Report on Exchange Arrangements and Exchange Restrictions*. It has a wide coverage (more than 100 countries) for a long time period (1970–2003). The second measure of financial openness is the *Capital Mobility* index (Cap_Inx) constructed by Edwards (2007), which combines information from Quinn (2003) and Mody and Murshid (2002), and with information from country-specific sources. In fact, these two measures are highly

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¹ These stock data were constructed by Lane and Milesi-Ferretti (2001). Operationally, this measure involves calculating the gross levels of FDI and portfolio assets and liabilities via the accumulation of the corresponding inflows and outflows, and making relevant valuation adjustments. A similar measure using the same underlying stock data has been considered by Chanda (2000) and O'Donnell (2001).

correlated with each other, with a correlation of 0.88. In the following estimations and regressions the capital account openness index, KAOPEN, developed by Chinn and Ito (2006) is used as a main regressor. One of the merits of the KAOPEN index is that it attempts to measure the intensity of capital controls, insofar as the intensity is correlated with the existence of other restrictions on international transactions. Another merit of this index is its wide coverage (more than 100 countries) for a long time period (1980–2003).

Figure 5 shows the scattered plots of the four types of capital flows to GDP ratio by financial openness for the 130 countries. The X-axis is the KAOPEN (Edwards 2007) measure of capital account openness. According to this graph, all of the four types of capital flows are positively correlated with openness except capital flight. Surprisingly, there seems to be no clear relationship between capital flight and financial openness. Countries scatter along the horizontal axis randomly, which implies that countries with high openness and low openness basically experience the same burden of capital flight. The same can be found using the other financial openness measure (Cap_Inx). It implies that capital account openness and financial liberalization may increase capital flows by stimulating FDI and portfolio investment, however, financial openness may not have strong effects on reducing capital flight. The reason could be that capital flight is driven by different determinants compared with other types of capital flows. Based on graphical evidence, we cannot find any clear conclusions on the relationship between capital flight and financial openness. Therefore in Chapter 4, statistical methods are used to test the relationships between them.

Figure 5 Capital Flows and Openness

Notes: Figure 5 provides a scatter plot of the relationship between four types of capital flows (capital flight, net capital outflow, total capital inflow and outflow) and the level of financial openness for each country. In graph (a) the Y-axis is estimated total capital inflow to GDP ratios, in graph (b) the Y-axis is total capital outflow to GDP ratios, graph (c) net capital outflow and graph (d) capital flight to GDP ratios respectively. In each graph, the X-axis is the Chinn-Ito measure of capital account openness. Average data are used for 130 countries over the period of 1980-2003.

3.2.4 Capital Flows by Economic Growth Rate

Figure 6 shows the scatter plots of the four types of flows in terms of GDP per capita growth. It is interesting to see how different the countries are scattered in the four graphs. In graphs featuring total capital inflow and outflow, most of the countries lie in the upper-right section, which implies that higher levels of total

capital inflows and outflows are correlated with higher economic growth rate. In the graph of net capital outflow, a large number of countries lie in the lower-right section, implying that there are net capital inflows entering those fast growing countries. This graph actually is consistent with traditional wisdom: foreign capital does flow to these rapid growing countries which have higher marginal productivity of capital. Finally, in the graph of capital flight, countries seem to scatter along the horizontal axis, and more countries lie in the right half of the graph. This indicates that capital flight may occur to all countries, regardless of their growth rate, and the magnitude of capital flight is not related to the growth rate, either.

Figure 6 Capital Flows and Economic Growth

Notes: Figure 6 provides a scatter plot of the relationship between four types of capital flows (capital flight, net capital outflow, total capital inflow and outflow) and the rate of economic growth. In graph (a) the Y-axis is estimated total capital inflow to GDP ratios, in graph (b) the Y-axis is total capital outflow to GDP ratios, graph (c) net capital outflow and graph (d) capital flight to GDP ratios respectively. In each graph, the X-axis is the GDP per capita growth rate. Average data are used for 119 countries over the period of 1980-2003.

3.3 Capital Flight and Net Capital Outflow from 12 Developing Countries

As explained previously, capital flight and normal capital outflow show opposite patterns for industrial and developing countries: developing countries suffer from high levels of capital flight but have low capital outflow, while industrial countries experience large volume of capital outflow and almost no capital flight or even negative capital flight. This difference can be found in Figure 7 and Figure 8, which show the capital flight and outflow for 12 major developing countries and industrial countries respectively. For developing countries, net capital outflows are small and stable while capital flight fluctuates dramatically and most of the time exceeds net capital outflow. For industrial countries, however, capital outflow often exceeds capital flight by large extend, while capital flight from most of the industrial countries are negative, indicating unreported capital inflows to these countries.

Argentina

Capital flight from Argentina attracted universal attention in the early 1980s. Like many Latin American countries, capital movements in Argentina are associated with political instability. Figure 7 presents annual capital flights for Argentina relative to GDP ratios. See from the graph in Figure 7, there are some similarities in the trend of capital flight and net capital outflow from Argentina.

There are two periods of high levels of capital outflow---in early 1980s and late 1990s. In 1981 General Jorge Rafael Videla became President, but by December was ousted by Field Marshal Roberto Viola. In 1985 a state of siege was

declared to halt right-wing violence, and in 1987 President Raul Alfonsin quelled a military revolt. Throughout the 1980s, inflation was unchecked and the economy deteriorated. In May 1989, President Carlos Saul Menem imposed an austerity program that sparked nationwide unrest. Therefore there was a sudden increase in capital flight in later 1980s. Between 1980 and 1991, capital flight in Argentina averaged 3.4% of GDP per year. This situation was not improved after 1990s, Argentina still experience high levels of capital flight in recent years, peaking at 16% of GDP in 2003.

A peculiar Argentine feature is that the ratio between public debt and deposits of Argentineans abroad is almost 1:1. This means that instead of financing Argentina development, foreign debt financed capital flight. The Argentine Government defaulted in 2001 on about US\$100 billion of sovereign debt, the largest sovereign debt default ever. Furthermore, the IMF, in the study by its Independent Evaluation Office of the Role of the IMF in Argentina 1991-2001 and the Response of the IMF Staff, admitted that the US\$9 billion that the IMF lent to Argentina in September 2001 “largely financed capital flight”.

Figure 7 Capital Flight and Net Capital Outflow for 12 Major Developing Countries

Figure 8 Capital Flight and Net Capital Outflow for 12 Industrial Countries

Mexico

Capital flight from Mexico was high in the 1980s and shot up again around 1995, both driven by economic and political instabilities. Sporadic economic crises, political reforms, and uprisings by Zapatista rebels in Chiapas were among the problems faced by the Mexican government in the 1980s and 1990s. After nearly a decade of stagnant economic activity and high inflation in Mexico, the Mexican government liberalized the trade sector in 1985, adopted an economic stabilization plan at the end of 1987, and gradually introduced market-oriented institutions. Those reforms led to the resumption of economic growth, which averaged 3.1 percent per year between 1989 and 1994, and during this period capital flight was reduced to a minimal level. In 1993 inflation was brought down to single-digit levels for the first time in more than two decades. As its economic reforms advanced, Mexico began to attract more foreign investment, a development helped by the absence of major restrictions on capital inflows, especially in the context of low U.S. interest rates. Indeed, large capital inflows began in 1990, when a successful foreign-debt renegotiation was formalized. The devaluation of the peso in December 1994 put an abrupt end to these capital inflows and precipitated the financial crisis. The devaluation prompted several damaging effects as inflation and interest rates skyrocketed, economic activity collapsed, the burden of servicing debts denominated in domestic and foreign currency increased, and banks' capitalization ratios fell.

These turbulent events are associated with capital flight from Mexico as shown in Figure 7. Capital flight in Mexico was relatively high in the 1980s,

averaged about 4% of GDP in ten years. After falling down for a couple of years in early 1990s, capital flight again increased to a maximum of 12.6% of GDP in 1995, the year after the financial crisis.

Chile

The general picture of capital flight from Chile is, as demonstrated in Fig 7, one of a relatively low average (especially compared with some of the other countries covered in this graph), punctuated by a few short-lived spikes. Capital flight is low throughout the period, except around the debt crisis of 1982 and the late 1990s during Asian crisis, as well as for a short period of time during the mid-1980s.

Chile, during the last three decades of the twentieth century, stands out as an interesting case study. For the greater part of that period (from 1973—1990), the country was under a dictatorship. It received sizeable capital inflows and had fairly strict capital controls for many of those years. These are all factors that have traditionally been employed as explanations and justifications for the occurrence of low capital flight. On the other hand, Chile has been considered as a successful example of neo-liberal macroeconomic policies. It is cited for its sound fundamentals and the sympathy it seems to elicit from international investors, both of which suggest a fairly clean and open investment environment scarcely conducive to capital flight. At the outset, Chile therefore seemed to be a good experimental subject from which information could be garnered on the relative strength of these different influences.

South Africa

In South Africa, the protracted period of political and economic instability which prevailed during the 1970s and 1980s, increased the probability of substantial capital flight. It is thus plausible that the lower average growth rate attained by South Africa during the course of these decades was due at least in part to capital flight. In 1994 South Africa has undergone the dramatic political transformation from white domination under the apartheid system to democratic rule, which leads to the change in the trend of capital flight. As seen in Fig 7, during the apartheid period capital flight as a percentage of GDP was, on average, 3.2 percent annually. In contrast, during the post-apartheid period, capital flight was reduced and stabled at 0.5 percent a year on average. This may result from the relatively more stable political and economic environment after the transformation. However, in the last few years after 2000, capital flight started to increase again and peaked at 10.7 percent of GDP in 2001.

Indonesia

According to Fig 7, the level of capital flight from Indonesia was relatively high during 1980 and the 1990s, while since 2000, capital flight dropped to negative which indicates a reversal. The share of capital flight to GDP was slowly increasing in the 1980s, hovering between 2 and 5 per cent between 1980 and 1985. In the second half of the 1980s, the shares reached at least 9% in 1987. Around the mid 1990s, the shares fluctuated significantly from a low of -0.6% in 1996 to a high of 23% in 1998. Also 1994 had a high share at 9%.

The results for Indonesia suggest that the intensity of capital flight varies from year to year, and high levels in capital flight coincide with the difficult periods in the country (i.e., periods with high inflation, external debt problems, large devaluations, and a monetary crisis). For instance, the economic crises in the 1980s appear to be important in intensifying capital flight. In the 1990s, the swings in capital flight are rather obvious, especially during the Asian financial crises. An important issue to note is that during this period, Indonesia reached full financial liberalization and received large capital inflows. This probably is the most important reason that could explain the huge capital flight occurred during that period, a figure exceeding 20% of GDP.

Thailand

Thailand provides an example of capital flight induced by economic crises and financial liberalization. During our study period, 1980-2003, there are two major economic crises, namely the 1982-87 Banking Crisis and 1997-98 Asian Financial Crisis. Comparing the two crises, we can see from the graph that in the 1983-87 Banking Crisis, Thailand experienced relatively lower capital flight than in the 1997-98 Asian Financial Crisis. In the latter period, there were larger swings in capital flight, ranging from a lowest of -2.9% to a highest of 13% of GDP in 1998. It is argued that the significant difference in the levels of capital flight was the result of financial liberalization, which created high volatility and unpredictability and dependence on foreign capital (Beja, Jr., Edsel 2006). In 1993, Thailand pursued full financial liberalization, with liberalized financial flows there were sudden and large swings in the capital flight from Thailand. Figures 7 also

illustrates that movements in capital flight are different before and after 1992. Before 1992, capital flight was relatively low. In fact, the levels were below the two-decade period average. After 1992, capital flight was more significant in size and fluctuating greatly, especially in 1995 and 1998 capital flight was 17% and 15% of GDP respectively. This led to the questioning of the institutional changes in the country's financial system.

To a large extent, Thailand's financial governance was limited and weak. The 1983-1984 banking crisis and the 1984-1987 economic crisis did not lead to the introduction of financial prudential controls. In fact, Satitniramai (2002) argues that financial governance and prudential controls before the 1990s were consistently undermined by the economic and political elites, who were only interested in enhancing their wealth and power. Moreover, capital inflows were greatly encouraged and indeed facilitated with the introduction of the Bangkok International Banking Facility (BIBF) in 1993. While some macroeconomic indicators revealed fundamental weaknesses as early as 1995, no adjustment was made on the economy (see, e.g., Siamwalla, forthcoming). For instance, the Thai baht remained overvalued. The economy was also over-exposed in short-term debts. Thus when the financial crisis finally exploded in 1997, massive capital flight was not a surprise, and it continued until 1999. By 2000, significant amounts of capital had left, and therefore little capital flight occurred since. While there was a strong recovery after 1997, concerns on Thailand's weak financial governance and prudential controls remain; but investors have been confident on the Thai economy thus far.

Malaysia

In terms of the share of capital flight to GDP, the figures are relatively high and appear to be fluctuating over time for Malaysia. The 1980s had average annual capita flight of 3% to GDP, and the figure dropped to 2.5 % for the 1990s. Since 2000, capital flight has increased to 9% of GDP on average. Although the average figure on capital flight was not very high, there are large swings in capital flight during the whole period of 1980s and 1990s. As a small economy, Malaysia has to adjust to external factors, but domestic policies are more important in explaining its high and fluctuating capital flight. For instance, the National Economic Policy (NEP) between 1971 and 1990 discouraged Chinese capital holders in keeping investments in Malaysia, thus resulting in capital flight (see, e.g., Jomo 1990, 1997). While it can be argued that the NEP was achieving its goals, the spikes in the latter part of the 1980s may be due to increasing fears of a repeat of the 1969 ethnic riots. In addition, the economic recessions in 1985-1986 resulted in capital flight. Interestingly, between 1988 and 1990, there was negative capital flight, which coincided with the privatization of state enterprises. It is may be that some of the capital inflows during this period were repatriated capital flight.

In the 1990s, the introduction of capital controls in 1994 had some role in reducing capital flight through the reduction in capital inflows. The impact of the 1994 controls was clear in 1995 when capital flight declined significantly. However, the 1997-1998 Asian financial crises did affect Malaysia significantly, capital flight recovered dramatically in 1998 and 1999, and even until recently. The

steady level of capital flight may be due to the slow or unimpressive economic recovery after the crisis.

The Philippines

The average shares of capital flight to Philippines were 1.7% in the 1980s, 1.8% in the 1990s, and 7.8% since 2000. Moreover, the shares were around 6% during 1985-1987 and 13% during 1999-2000. These results are consistent with the earlier studies on the Philippines that document significant capital flight in the 1980s (see, e.g., Boyce 1993; Vos 1992). High levels of capital flight occurred during periods of domestic economic crises: in the 1980s and early 1990s. In the early 1980s, the Latin American debt crisis was one trigger for the Philippine BOP crisis in 1983-84. The assassination of Senator Benigno Aquino in 1983 and the following political and social unrest in the mid 1980s made the economic environment insecure. In addition, between 1986 and 1989, a series of coup d'états undermined economic and political stability. Capital flight was thus a constant feature for the Philippines in the 1980s. Interestingly, what happened in the 1990s was a similar story as in the earlier decade; that is, domestic economic and political problems induced capital flight. For example, the electricity supply crisis in 1991-92 practically halted the economic recovery of the country. It was only around the mid-1990s that the Philippines actually experienced significant economic recovery.

With the 1997-98 Asian financial crises, economic recovery was again interrupted. Again, there was capital flight. But because the Philippines had a shorter period for capital accumulation, capital flight in the late 1990s was not as large as in Thailand or Indonesia. After 1998, concerns about the domestic

economy reemerged, especially after Joseph Estrada was elected President. Mr. Estrada's impeachment in 2000, two People Power Revolutions in 2001, plus the insecurity of President Arroyo's government reinforced doubts about the sustainability of economic growth in the country. Thus capital flight has been large and rising since 1998.

3.4 Case Study: Capital Outflows from China and India

China and India are the two largest developing countries in the world, and both have been growing rapidly since the 1980s. In recent years, these two countries have become the focus of attention, as a pair or separately, and triggered heated debates on their economic development and reforms. As the star performers in the last 20 years, they share many similarities in the path towards economic and political development. However, the volume and pattern of capital flows from these two countries showed quite different features. This is the major reason that drives me to focus on these two countries and examine the fundamental factors that leads to their differences in the capital flows.

Since their respective independence in the 1940s, China and India have chosen similar development strategies that involved deliberate insulation from the world economy, industrialization and state-dominance of the economy. Both countries began reforming their economy around 1980, and have been enjoying fast economic growth ever since, although China seems to be performing better than India. China's average growth rate during 1980-2003 was around 10%, and it

slowed down to around 7%-8% in recent years. In India, the average annual rate of growth of GDP was close to 6% during the same period. Currently both countries are taking significant steps in financial liberalization and integration with the world market. Usually liberalization measures in financial repressed economies often leads to a period of rapid capital inflows and outflows. Capital flight could also rise to formidable levels if the liberalization process is not properly handled. Therefore, I decide to conduct more detailed investigations into these two countries' financial sector to obtain a better understanding of the characteristics associated with capital flows to and from China and India.

3.4.1 Measuring Capital flows from China and India

The estimation methods for capital flows to and from China and India are the same as discussed previously. Figure 9 plots the four types of capital flows from China and India as ratios to GDP respectively. Due to data availability constraint, the sample period covers 22 years from 1982 to 2003. Both countries have equal number of observations so that it is easier to make comparisons between the two countries.

1) Capital Flight

In recent years, the issue of capital flight from China has attracted a lot of attention both in the mass media and among researchers. Using a variety of methods, a number of authors have made different estimates of the scale of China's capital flight, e.g. Gunter(1996, 2004), Sicular(1998), Wu and Tang (2000), Ljungwall and Wang(2007). It is important to note that although the levels of capital flight estimated by these authors may be different, all the computations

Figure 9 Capital Flows from China and India (1982-2003)

Note: Data for Figure 9 are all obtained from WDI dataset.

show very similar patterns in the movement of capital. It can be seen from graph A in Figure 9 that during the 1980s, China's capital flight was relatively low. However, after 1990, capital flight occurred in a much larger scale, with annual capital flight around 6 percent of its GDP in several years. The first sudden increase in capital flight happened in the 1992. After a relatively stable period during 1992-1996, it shot up again in 1997, and reached an all time high of 63 billion US\$ in 1998, followed by three years of successively high volume until

2000. Since then, capital flight gradually dropped to a low level similar to the early 1980s.

Capital flight from India shows a totally different picture from China. As shown in graph (a) in Figure 9, capital flight from India was fairly moderate throughout the period of 1982-2003. From the graph it can be found that the two economies experienced roughly the same level of capital flight in the 1980s. However, after 1990, India did not experience any more capital flight; instead, there was unreported capital inflow to India. China, on the contrary, experienced large increases in capital, with capital flight to GDP ratio exceeding 4% of GDP in several years.

This huge difference raises an interesting question: these two countries started to develop their economy almost at the same period, and experienced similar reforms as to open their trade and financial sectors, then why were their patterns and level of capital flight so different? In the following sections, I try to explain the difference through some major economic indicators such as economic development, trade openness, and foreign direct investment.

2) Net Capital Outflow

Again current account balance is used to represent the net capital outflow from these two countries. Graph (b) in Figure 9 gives us a clear presentation of the huge difference between China and India in terms of current account balance. In general, China has maintained a current account surplus throughout the period, except for a few years in the late 1980s. Since the 1990s, China began to enjoy a high current account surplus, at around 2% to GDP in average. On the other hand,

China's current has been fluctuating greatly during this period, changing from surplus to deficit from year to year. This may be due to the unstable economic and political environment caused by the drastic reforms which took place during that period.

In comparison, India did not perform so well as China in this respect. Although relatively stable, India's current account was in deficit almost for the whole period of 1980s and 1990s. Only after 2000 did India begin to see their current account move towards the surplus.

3) Total Capital Inflows and Outflows

From graph (c) in Figure 9, both countries has experienced large increases in the total capital inflow since the early 1990s. However, China's inward FDI and portfolio investment still exceeded India by large amount. The official statistics showed that China reported FDI net inflows from a mere \$0.4 billion in 1982 to \$55.7billion in 2003. Those to India increased from \$0.07 billion to \$2.6 billion during the same time period. Since the early 1990s, annual FDI inflow into China was at least 3.6% of its GDP, and 10% of its gross capital formation. For India, however, the figures were merely 1% and 4% respectively. China ranked 54th and India 122nd in 1999–2001 in the FDI Performance Index by UNCTAD, which is measured by the ratio of a country's share in global FDI flows to its share on global GDP (UNCTAD, 2004). China ranked 1st in 2002 and 2003 (India 15th in 2002 and 6th in 2003) in the FDI Confidence Index, which is based on surveys of executives at the world's 1000 biggest companies that contribute about 70% of FDI flows and generates \$18 trillion in annual sales (2002; A.T. Kearney, 2003).

However, comparing capital flight from China with the foreign investment inflow (Figure 8), it is astonishing to find that the magnitude of capital flight is almost equivalent to capital inflow in the 1990s, and in some years it is even larger than the foreign capital inflow. In other words, FDI and portfolio inflows may just provide the resource for the capital flight from China!

On the other hand, total capital outflow from China was also much higher than that from India. Throughout the period, India's total FDI and portfolio investment abroad was almost zero, while that of China has gradually increasing.

3.4.2 Macroeconomic Background Analysis

1) Basic Economic and Political Indicators

China and India were the star performers in aggregate GDP growth in the 1980s and 1990s. China's average growth of 10% per year during 1980-2001 had slowed to a range of 7-8% per year during 1998-2003. Growth continues to be fuelled by a rising ratio of fixed investment to GDP and increasing export. In India, the average annual rate of growth of GDP was close to 6% during 1980-2001. It reached a peak of 7.8% in 1996-97 from the low of 1.3% in the crisis year of 1991-92. Since then, it has fluctuated between a low of 4.0% to a high of 6.5%. As shown in Figure 10, GDP per capita (PPP) for China was far below that of in the early 1980s, however, with an annual growth rate as high as 10%, China soon caught up with India and almost doubled India's GDP per capital in 2003. With a GDP per capita (PPP) more than 5000 US\$ in 2003, China now is classified among the lower-middle income countries, while India is still one of the low income countries with annual GDP per capita below 3000 US\$ in 2003.

Figure 10 Economic Fundamentals for China and India (1982-2003)

a) GDP Per Capita, 1982-2003

b) GDP Per Capita Growth Rate

c) International Reserve, 1982-2003

d) Trade Openness, 1982-2003

Note: Data for Figure 10 are all obtained from WDI dataset.

On the other hand, China appears to be in a much better fiscal position as compared to India, with a very modest fiscal deficit of 3.3% of GDP and a debt/GDP ratio of only 26.3% in 2002 (World Bank 2003b). In contrast, the central government's fiscal deficit in India in 2002-03 was 5.9% of GDP with the deficits of states adding another 4.6% of GDP. The overall debt/GDP ratio was 75.3% (RBI 2003a, Tables 223 and 224). In addition, inflation rate in China is also lower than that of India during 1980-2003. India had an average inflation rate of 10% during 1980-1998, only until after 1999 did it drop down to normal level between

3%-4% (WDI). Inflation rate China has been kept under healthy level of 3% through out the same period except for a few years in 1987-89 and 1993-96 when reforms and some drastic events happened.

According to the above indicators, China seems to outperform India in basic economic background. However, this cannot explain why capital flight from China is so much higher than that from India. The only reason that could explain this dilemma from macroeconomic prospects is the difference in return of capital. The average real interest rate in India during 1980-2003 is 7.04% (WDI), which is much higher compared with the real interest rate in China with an average of 2.4% for the same period.

There is also some evidence supporting the difference in capital flight patterns from the political point of view. According to the Polity IV index which measures the level of democracy and autocracy of a country, India is an open, participatory, multiparty democracy, while China is still an authoritarian with one party regime. India has an average score of 8.375, which implies a high level of democracy, while the score for China is only -7. Since political stability and property rights are major concerns for residents' confidence in holding domestic assets, this difference in political regime may help to explain the huge difference in capital flight from China and India.

2) Capital Control and Financial Liberalization

China's financial liberalization began in the late 1970s, with direct investment inflows, gradual liberalization of the foreign trade regime and some opening up of credit markets. Since then, China's integration with the world

economy has advanced rapidly and its transition to a market economy has been unique for its combination of experimentation and incremental reforms which have led to rapid progress in external sectors.

In 1994, substantial reform measures were introduced to restructure China's foreign exchange control system which resulted in the establishment of a nationwide foreign exchange inter-bank market, the unification of dual exchange rates and the managed floating exchange rate regime. In December 1996, China made the Renminbi (RMB) convertible for current account transactions, removing both quantitative and regulatory restrictions on the use of foreign exchange for current account transactions. China's WTO accession in 2001 has also been seen as a catalyst for capital account liberalization and currency convertibility. However, substantial controls remain, for example, discretionary control of capital flows and approval and verification of both current and capital account transactions. The present status of the Chinese balance of payments is that current account transactions are regulated primarily for verification purposes. For trade in goods and services, existing exchange controls are mainly to verify that foreign exchange is being used for a valid and legal underlying transaction. In 1997, the Chinese government announced the goal of achieving capital account convertibility by 2000. Until now, that goal has yet to be achieved and while Chinese leaders acknowledge the ultimate goal of achieving liberalization of China's capital account, no firm timetable has been provided.

As for case of India, with the start of economic reforms in 1985, the government began to reduce financial controls by partially deregulating bank

deposit rates. In 1988, these controls were reinstated and the government began to relax ceilings on lending rates of interest. The gradual reduction in interest rate controls and directed lending proceeded throughout the 1990s. Until reforms began in the late 1980s, international capital inflows and outflows were restricted by administrative controls or outright prohibition on the purchase of foreign assets by residents, direct investment by foreigners and private external borrowing. After the balance of payments difficulties in 1991, authorities began to gradually relax restrictions on inward capital flows and on currency convertibility for current account transactions. The rupee was made fully convertible for current account transactions in August 1994 when the government agreed to the obligations of Article VIII of the Articles of Agreement of the International Monetary Fund. Trade liberalization has also proceeded during the 1990s as tariff rates have been reduced substantially.

Although economic liberalization and reform have allowed the relaxation of restrictions on foreign direct investment and inward portfolio capital flows, India retains tight controls on outward portfolio capital flows, and restricts the access of residents to foreign capital markets and domestic markets in foreign currency securities. Effective restrictions continue on the acquisition of foreign financial assets by residents and on currency convertibility for capital account transactions. Recently, these restrictions have been slightly eased to allow domestic residents to invest in foreign equities. It is also apparent that some domestic investment, notably in equity, by domestic residents is intermediated through Mauritius to take advantage of favourable tax treatment under the reciprocal tax agreement. Direct

deposits and equity and bond holdings by non-resident Indians are subject to favourable treatment, but remain small relative to the size of the financial sector.

Based on the measures in financial liberalization in both countries, it is hard to compare the level of capital control since both of them are still on the way to open up their capital account. The two indexes in our dataset, namely *capital control index* and *capital account openness* could not provide us with better comparisons, either. According to the figures, both countries have roughly the same level of financial openness, however, capital control in India seems to be even more tightened after 1980, with the index falling from 37.5 to 25. China, on the other hand, improved from 25 to 37.5 in the middle 1980s. Unfortunately, these measures on financial opens could not provide us with good reasons which may help to explain the difference in capital flight from these two countries. Therefore, we need to look at the *de facto* level of financial openness, or the real financial integration of the two economies with the international markets to find more explanations.

3) International Integration

China continues to outpace India in global integration. In 2002, it was the world's fifth largest exporter of merchandise, with a share of 5% of world exports (WTO 2003a). China is tenth in commercial service exports, with a share of 2.5% (ibid, Table 1.7). Its growth in the share of merchandise exports is phenomenal, more than quadrupling during 1983-2002 (ibid, Table II.5). India is a distant 30th in world merchandise trade, with a share of 0.8% in 2002, which represents a growth of only 60% during 1983-2002. In almost every commodity and market, China's

share has grown rapidly since 1978, whereas India's share has grown much less, if at all. We could also find this comparison in the total volume of trade (Export plus Import) to GDP ratio, which is often used as a measure for trade openness. As shown in Figure 13, starting from roughly the same level, international trade as a ratio to GDP for China outperforms India dramatically in the 1980-2003 period.

According to World Investment Report 2003 (UNCTAD, 2003), FDI also helps in driving China's economic growth. FDI, it finds, has contributed to the rapid growth of China's merchandise exports at an annual rate of 15% between 1989 and 2001. In 1989 foreign affiliates account for less than 9% of total Chinese exports, but by 2002 they provided half. In some high-tech industries in 2000, the share of foreign affiliates in total exports was as high as 91% in electronic circuits and 96 per cent in mobile phones. About two-thirds of FDI flows to China went to the manufacturing sector in 200–2001. In India, by contrast, FDI has been much less important in driving export growth except in information technology. Sharma (2003) found that “foreign investment appears to have statistically no significant impact on export performance although its coefficient has a positive sign”. FDI in Indian manufacturing has been and remains domestic market seeking. FDI accounted for only 3% of India's export in early 1990s and even today, it is estimated to account for less than 10% of India's manufacturing exports. For China, the report says, its share of FDI inflows in 2000–2001 went to a broad range of manufacturing industries. For India, most went to services, electronic and computer industries.

In short, as Luce and Kynge (2003) succinctly point out, “whether it is China’s cheaper, more reliable power supply or the more rapid turn around at its ports, China remains an incalculably better environment for most manufacturing than India, which is slowly waking up to this.” This environment and the bureaucratic obstacles at all levels of government in India in large part explain the huge flow of FDI to China relative to India. The Indian government has recognized FDI as key for achieving the Tenth Plan target of 8% annual growth and appointed a steering committee on FDI in 2001. It reported in 2002 with several recommendations for making India more attractive as a destination for FDI.

From these figures in international trade and foreign direct investment, it is clear that China has a much higher trade and financial openness in terms of real flows of goods and capital. This could be the major reason for the high capital flight from China and the low capital flight from India. The large volumes of current account surplus and foreign investment capital inflow just provide sufficient source of capital flight from China.

4) Exchange Rate Regime and Foreign Reserves

Although China’s trade surplus with the United States has been growing, its overall trade surplus is modest since it is running a growing trade deficit with Asia-Pacific countries that offsets in large part its trade surplus with the US. In recent years, China has been accumulating substantial foreign exchange reserves (more than US\$400 billion in 2003) at an accelerating rate, exceeding the import. India has done the same—its reserves, around US\$92 billion at the end of 2003, exceed by a substantial margin the likely imports of \$60 billion (Figure 12). This raises the

debates on what is the appropriate level of reserves, and whether both countries have accumulated far too much relative to what would be needed (to smooth volatility in export earnings and import expenditures and to contain any potential financial crisis like the one experienced by East Asia in 1997). Since neither the Renminbi nor the Rupee is convertible on capital account and capital controls are in place in both countries, the probability of an exchange rate crisis of the type experienced by countries with open capital account and fully convertible currencies is very low. Given that partial insurance from other sources of external funds (e.g., from the IMF) is in principle available, should self-insurance through reserves be pushed as far as the current level of reserves in China and India seem to have done?

Any attempt to determine the appropriate level of reserves has to be based on an analysis of the appropriate exchange rate regime for either country, and the related issue of whether the benefits from integration with the global financial markets outweigh the costs. As Rogoff (2003) points out, by continuing to accumulate reserves in terms of US dollar assets, China, India and other Asian countries are financing US current account deficits. On the other hand, Alan Beattie (2003) points out: “In theory, Asians’ role in financing the US current account deficit could give them enormous economic or even political leverage, since a sudden shortfall in capital inflows would spark a slide in the dollar and possibly a sharp rise in interest rates.” Kletzer (2004) also finds: “The accumulation of official reserves from capital inflows will reduce the impact of a capital account reversal if it should occur. Imposing selective capital controls is another but costly way to reduce the probability of crises. Selective capital controls

distort financial intermediation if effective and are often ineffective for inhibiting capital flight.” Therefore, based on the current exchange regime of China and India, reserve accumulation has served as a safeguard to maintain the economic and political stability in both countries.

Another important determinant for capital flight from developing countries is the exchange rate over-valuation. One common practice for emerging market economies is the tendency to peg the exchange rate. Banking crises and fiscal crises can occur under floating exchange rates, but exchange rate pegs can exacerbate these significantly by diminishing the incentives of banks and corporations to hedge foreign currency risk. The risk of eventual large devaluations rather than of daily exchange rate fluctuations could also affect the incentives of foreign creditors to hedge risk and the maturity of the assets they acquire. There has been a strong tendency for China and India to resist exchange rate movements. A managed float removes the implicit guarantees of a fixed exchange rate regime, but resistance to fluctuations could still induce incentives in integrated capital markets to take on currency risk that creates contingent liabilities for the government. Exchange rate over-valuation has been a big problem for China, especially in the 1980s and early 1990s. After the unification of official exchange rate and market exchange rate in 1994, over-valuation has been brought under control and in recent years there are even concerns on the under-valuation of Yuan. By comparison, India’s exchange rate has been stable and properly valued during the same period. This could partially explain the difference in capital flight pattern from China and India before mid-1990s.

3.4.3 Why Does Capital Flee from China?

As shown in graph (a) in Figure 9, capital flight from India was fairly moderate throughout the period compared with that of China. Especially in the 1990s, India did not experience any more capital flight; instead, there was unreported capital inflow to India. China, on the contrary, experienced large increases in capital, with capital flight to GDP ratio exceeding 4% of GDP in several years. This huge difference raised an interesting question for researchers: these two countries started to develop their economy almost at the same period, and experienced similar reforms as to open their trade and financial sectors, then why were their patterns and level of capital flight so different?

The Chinese experience in which large scale of capital flight being accompanied by fast growth of inflows of foreign investment has drawn a lot of attention in recent years. Why in a setting where the economy is experiencing dynamic growth and attracting foreign investors, residents still seek to send their savings abroad? It is argued that corruption, privatization and liberalization are the most important factors that provide the sources and channels of capital flight from China.

Gunter (1996) estimates capital flight from the PRC for the period 1984–1994 and discusses various explanations including high domestic financial transactions costs, inappropriate exchange rates, and political uncertainty. Sicular (1998) uses the Gunter (1996) capital flight estimates in her study of capital flight and foreign investment in China. She focuses on the mystery of why China is simultaneously experiencing large amounts of inward foreign capital investment

and outward capital flight. She concludes that an important component of an explanation is the different incentives faced by foreign and domestic investors. Cai, in his 1999 study of outward foreign direct investment, notes that the growing amount of corruption might be an important determinant of capital flight (Cai 1999). More recently, Wu and Tang (2000), Gunter (2003) provide several estimates on Chinese capital flight based on three different estimates of China's external debt and examine the implications of capital flight for the value of the Yuan and the Chinese economy in general.

Liberalization and Corruption

The most straightforward explanation for these surges in capital flight is the serious official corruption of the Chinese Communist Party (CCP). It is no secret that public corruption in China is extensive. Opinion surveys of government officials and ordinary citizens in China in recent years identify corruption as one of the top public concerns. Illicit activities such as bribery, kickbacks, theft, and misspending of public funds cost at least 3 percent of GDP each year (Pei 2007). Evidence on the pervasiveness of such corruption can be seen by frequent press reports of high-profile scandals and large number of government officials disciplined and punished for wrong-doings. The amount of money stolen by perpetrators has risen exponentially since the 1980s. Based on the statistics supplied by the Chinese agency, an average of 130,000-190,000 party members were punished and disciplined each year since the early 1980s. Corruption in China

is concentrated in sectors with extensive state involvement, such as infrastructure projects, real estate, government procurement, and financial services.

In 1992, the 14th Congress of the Chinese Communist Party set the establishment of a ‘Socialist Market Economy System’ as its goal and accelerated its economic reform towards liberalization. These developments hastened the spread of corruption and made it rampant in the 1990s. Unheard of in the 1980s, *maiguan-maiguan* (buying and selling appointments in the government) has become common, particularly in less developed regions, since the mid-1990s. Like *maiguan maiguan*, collusion among local ruling elites (corruption cases involving groups of officials who cooperate and protect each other) is another sign of political decay, and is also a post-1990 phenomenon. Sample surveys suggest that 20–65 percent of all corruption cases could be classified as collusive. In the worst instance, collusion has transformed entire jurisdictions into local mafia states.

The prevalence of corruption in China is rooted in the country’s partially reformed economy and absence of political reform. Endemic corruption in China originates in the country’s partially reformed economic structure, lax enforcement efforts by the government, and the CCP’s reluctance to adopt substantive political reforms. Endemic corruption steadily increases a country’s systemic risks. As a result, its financial system is fragile, its environment degraded and vulnerable, its law enforcement establishment tainted and ineffective, its infrastructure insecure, its public health system irresponsible, and its regulatory system creaky. Obviously, the accumulation of systemic risks caused by corruption only increases the

likelihood of a major crisis. This may help to explain, at least in part, the upward trend in capital flight and the doubling of the scale of capital flight after 1992.

In January 1994, the Chinese government made a major adjustment in the exchange rate of yuan---unifying the official exchange rate with the prevailing secondary market price. A related factor was the wave of privatization that began in 1995 and which offered much opportunity for corruption. The liberalization of the economy, especially the foreign sector, offered both opportunities for corruption and also channels for capital flight. In fact, the liberalization of the current account, together with the privatization wave and the unification of the exchange rate, may account for a large part of the sudden surge of the capital flight after 1994.

Capital flight from China again accelerated in 1997. The major cause for this surge can be attributed to the financial crisis which severely hit several economies across Asia. The 1997 Asian financial crisis have led to the concern that a further devaluation would shake foreign confidence in the China's economy. Therefore, authorities turned to capital controls. Since the beginning of the economic liberalization through 1998, there was a gradual weakening of PRC capital and exchange controls. The ability of Chinese residents to deal in foreign currency and instruments was liberalized as was the ability of foreigners to deal in yuan and yuan-denominated instruments. However, significant restrictions on such transactions remained and, beginning in late 1998, China imposed new ones. A series of regulations were announced by the People's Bank of China, the Ministry of Foreign Trade and Economic Cooperation, the National People's Congress, and

the State Administration of Foreign Exchange with the intention of strengthening State control over the international movement of capital. The imposition of these capital controls was followed by a sharp drop in estimated capital flight, as can be seen in Figure 9. The volume of capital flight fell from US\$63 billion in 1997 to US\$ 5 billion in 2001. If these measures provide an accurate picture then the capital controls have successfully dealt with the 1997 acceleration in capital flight and provided a breathing space for policy makers. Ever since then, capital flight is not a big problem for China and the capital control policies was a successful example for other countries to learn from in dealing with capital flight.

“Round-Tripping” Capital Flows

In studies of China’s capital flight and inflows of foreign investment, many researchers find an interesting relationship the two---a large part of capital originally created in China has managed to go and stayed abroad, waiting for opportunities to return back in other forms. There is no doubt that part of China’s FDI inflows belongs to the return of the Chinese capital that has gone aboard escaping the foreign exchange control. The World Bank and other agencies and researchers have estimated that the scale of this round tripping could be as high as a quarter of the total FDI inflows into China (World Bank 2002). On average the round tripping is about 20% to 30% of the capital flight of various estimations. When a developing economy like China is creating new capital, a significant part of the new capital is likely to find its way abroad through mis-invoicing in international trade, smuggling, and other channels of capital flight since the people who are creating the new capital have strong incentives to diversify domestic risks

and to seek better protection of property rights. The accumulated capital flight then forms the base for sustained round tripping FDI back home when the opportunities to make profits and create new capital at home continue to exist.

What are the incentives for capital to make round trip, leaving China first and then coming back? It is not only about profit-making but also related to the different risks that are faced by foreign and domestic investors. The incentives for round tripping FDI can be indentified and grouped into the following categories:

1. Discrimination between Resident and Foreign Capital

China provide many preferential policies to attract foreign direct investment, including low tax rates, favorable land use rights, convenient administrative supports, and even favorable financial services from domestic and foreign financial institutions. In order to received these preferential treatment, private enterprises have to find foreign investors who are willing to invest or just bring capital aboard by themselves and come back as FDI.

2. Property Rights Protection

China has different legal and institutional settings from other economies for investment and capital flows. Its basic infrastructure for property rights delineation and enforcement is still very weak. Many private enterprises operate in the environment of very restrictive regulation with loose and ad hoc enforcement. In most cases they have to break the formal rules to make profits. Hence, they have incentives to move their profits out of PRC first and then move them back in the form of FDI when they see profit opportunities as the Chinese governments tend to give better protection of property rights to foreign investors.

3. Expectations on Exchange Control and Exchange Rate

Exchange control and exchange rate fluctuations have been one of the most important consideration for business people as well as speculators. This factor is playing an increasingly important role in recent years as China relaxes its control on capital account and the international pressure on PRC to revalue RMB intensifies. Activities associated with speculation on exchange rates are not easy to identify directly as they are buried in the large volumes of normal investment. But the changes in PRC's Balance of Payment account, including the level of official reserves and the level of errors and omissions term in the balance of payment account (a rough estimate of capital flight) would reflect partly the trend in speculative movement of cross-border capital flow.

4. Competitiveness of Hong Kong and Overseas Financial Services

Hong Kong is an international financial centre and has the closest business ties with Mainland China. The local and Mainland companies in Hong Kong become the best intermediation for FDI flows between Hong Kong and the Mainland. A significant part of the round tripping FDI in China is related to Hong Kong companies with close ties to the Mainland entities. But there is another important reason for making round tripping FDI: the listing of the Mainland companies in Hong Kong's stock markets. In the case of China, Hong Kong plays an important role in each of the three stages of capital's journey: (1) the original creation of new capital in China, (2) capital flight out of China and (3) the round tripping FDI back to PRC. In the past two decades, about 40% to 60% of China's FDI inflows were from Hong Kong according to the official report. However about

half of the reported Hong Kong FDI to China can not be verified or confirmed from the related statistics collected in Hong Kong. Clearly Hong Kong is crucial in understanding China's round tripping capital flows.

In fact, Hong Kong is not alone in facilitating capital creation, capital flight, and the return of flight capital through round tripping FDI. The offshore financial centers, such as British Virgin Islands, Bermuda, and Cayman Islands, have been playing an increasingly important role, particularly in facilitating legitimate round tripping capital flows for the purpose of listing the Mainland China companies in Hong Kong and other overseas stock markets. The U.S., EU and other Asian economies are also important in facilitating capital flows across borders through their close trade and investment relations with China.

3.4.4 Conclusion on the Case of China and India

The issue of capital flight has received considerable attention in India and even more so in China. The magnitude of capital flight from China in terms of volume and ratio to GDP appears to be noticeably higher than that of India, even though China's overall economic performance is better than that of India. This raises the question of why capital flees from China but not from India, as both countries are going through similar social and economic reforms and share many similarities in their economic development.

One explanation may lie in the social and political factors. India is an open, participatory, multiparty democracy, while China is still an authoritarian with one party regime. Since political stability and property rights are major reasons leading to capital flight, this difference in political and social climate may help to explain

the huge difference in capital flight from these two countries. Other explanations could be that China also receives a larger capital inflow and has a higher level of integration to the global trade and financial network. Finally, the stringent control over exchange rate and the over-valuation and under-valuation of yuan also help to explain the large capital flight from China.

Comparison of China and India yields interesting lessons. First, it provides perspective on magnitude of the problem of capital flight. The estimates on capital flight suggest that relative to other macroeconomic indicators and relative to the case of China, India capital flight is not so large. Second, China's experience reveals that improving the overall investment climate may be a necessary condition for attracting capital inflows, but it is not sufficient in stemming capital flight. Capital flight will persist if, due to discriminatory policies or limited portfolio options, residents can achieve higher returns at lower levels of risks by investing abroad. Indeed, as long as such conditions persist, growth in GDP and personal incomes would likely lead to even greater capital flight. Efforts to reduce capital flight must therefore reduce the differences between treatments to domestic and foreign investors, and develop a wider range of domestic investment options such as real estate, equity and commodities.

Chapter 4 Empirical Estimations and Findings

Since there are so many types of capital flows driven by various economic forces, an interesting question is whether there are some common characteristics in capital flows from the developing and industrial countries. Since previous studies have provided some insight on this question by identifying major determinants for capital inflows (as discussed in Chapter 2), this paper will answer this question from another perspective, that is, to find out how basic economic fundamentals affect the pattern of capital outflows.

The purpose of this study is not to identify new factors that affect capital outflows, but rather to dig further into the economic fundamentals that affect the production structure of the economy and try to search for the ultimate reasons behind all the factors leading to capital outflows. These fundamentals include some important economic indicators such as income, institutional development, and openness. I believe that these fundamental factors can explain a large part of capital outflows and their roles in shaping capital flows are more important than people think. Here are some specific questions that this thesis tries to answer:

- 1) Does capital fly from the rich countries to poor countries, or from poor to rich countries? Which group of countries have the highest net capital outflows? Does net capital outflow show the same pattern as capital flight?
- 2) Is capital flight linearly related with a country's economic development? Does higher income lead to more capital flight or does it reduce capital flight? Is it possible that there could be a threshold effect of economic development on capital flight?

- 3) How does financial liberalization or capital account openness affect the movement of capital? Does financial openness stimulate large size of both capital inflows and outflows?

With these questions in mind, I conduct a series of statistical analysis and present the following empirical estimations and regression results.

4.1 Data and Estimation Methodology

The benchmark sample for my analysis includes annual observations for 22 industrial and 108 developing countries, covering the period 1980-2003. Owing to data availability, there might be slight differences in the number of countries and time period for different models of regressions. Appendix A summarizes the past empirical studies on capital flight, indicating their sample sizes and variables inspected, as well as the methodologies used for estimations. I try to follow the main methodology used by previous studies, and increase the sample size by to a large extent. The baseline regression models include cross-country ordinary least square estimations using averaged data, panel data analysis using annual data and reduced panel data analysis using five-year average data. To test the robustness of the non-linear relationships between dependent variables and explanatory variables, the Hansen threshold regression methods are used in addition to other regression. Finally, there are several robustness checks using different regression forms or data samples. A complete list of countries and regions in the sample is presented in Appendix B, and definitions on all the variables and data sources are listed in Appendix C.

The dependent variables in my estimations are the four types of capital flows: capital flight, net capital outflow, total capital inflow and total capital outflow, all in ratios to GDP. As mentioned in previous chapters, capital flight is calculated by the World Bank residue method for 130 countries for the period 1980-2003 to have the largest sample size (small variations in years may occur due data availability). Total capital inflow and outflow are calculated by adding up the annual flows in FDI and portfolio investment respectively. Net capital outflow is the current account balance from the Balance of Payment.

As for explanatory variables, a wide range of economic factors are tested to capture the fundamentals together with other important variables suggested by previous theoretical studies. These variables come from the earlier-mentioned three strands of theoretical literature on capital flows, capital flight and financial integration. Factors affecting capital flows include wealth, exchange rate fluctuations, rate of investment return and risks. Factors affecting capital flight overlap with that of capital flows, besides income, exchange rates fluctuations and rate of return differentials, additional factors such as political and economic risks, institutional development, financial repression and capital control also play important roles in shaping capital flight. Further more, since this thesis tries to find out the role of financial openness on capital flows, variables measuring financial openness are also included in the explanatory variables.

A detailed explanation on these variables and their sources could be found in Appendix C and descriptive statistics on all the variables are listed in Table 2.

Table 2 Descriptive Statistics on all Variables (cross-country)

Abr.	Variable	Obs.	Mean	Std. Dev	Min	Max
CF	Capital flight (US\$ in millions)	130	652	4660	-21300	28200
CF/GDP	Capital flight to GDP ratio , 1980-2003	130	0.007	0.041	-0.169	0.262
Outflow	Total outflow (US\$ in Millions)	119	6820	21000	-51.3	134000
Out/GDP	Total outflow to GDP ratio , 1980-2003	119	0.018	0.042	-0.004	0.2889
Inflow	Total Inflow (US\$ in millions)	119	7650	26400	-140	247000
Inf/GDP	Total inflow to GDP ratio , 1980-2003	119	0.033	0.041	-0.064	0.261
CurrAc	Current Acc Balance (US\$ in millions)	130	836	15900	-158000	78000
CA/GDP	Current Acc to GDP ratio , 1980-2003	130	-0.037	0.058	-0.244	0.242
GDPPC	GDP per capita (PPP) , 1980-2003	124	7915	7760	518	28691
Cap_Inx	Capital control index , 1980-2000	129	56.052	20.317	19.792	100
Kaopen	Capital account openness , 1970-2004	130	0.017	1.291	-1.739	2.602
FDI	FDI inflow , 1980-2003	126	2.308	2.43	-0.56	13.719
INF	Inflation , 1980-2003	126	45.265	150.01	0.372	1145.999
Growth	GDP per capita growth , 1980-2003	130	1.297	1.926	-5.788	8.195
RIR	Real interest rate , 1980-2003	124	6.569	8.862	-39.233	56.863
Trade	Trade openness , 1980-2003	129	73.845	36.434	19.285	178.85
Polity	Polity IV , 1980-2003	112	2.107	6.359	-10	10
Openf	Gravity fitted trade openness ,1980-2000	111	4.147	3.579	0	20.089
Oval	Exchange rate overvaluation , 1980-1998	87	68.63	172.01	-0.47	1195.17
Corr	Corruption , 1984-2003	99	3.336	1.198	1.113	6
Po. risk	Political risk , 1984-2003	99	63.38	13.44	28.92	90.28
Inst.	Level of institutions , 1984-2003	99	71.15	16.98	28.52	104.31
School	Aver years of schooling , 1980-2000	100	5.43	2.82	0.574	12.01

Notes: See Appendix C for the detailed explanations of the variables. Average data for the period 1980-2003 are used for each country. Due to data availability, the sample size and observation period are slightly different for each variable.

Table 3 Correlation Matrix between Dependent and Explanatory Variables

	CF/GDP	Net Out/GDP	Inflow/GDP	Outflow/GDP
Net Out/GDP	0.5480*	1	-0.0828	0.3483*
Inflow/GDP	-0.0037	-0.0828	1	0.7537*
Outflow/GDP	0.0737	0.3483*	0.7537*	1
GDPPC	0.0517	0.3816*	0.4074*	0.5984*
Cap Inx.	0.0350	0.2079*	0.4330*	0.5150*
Kaopen	0.0758	0.2431*	0.3588*	0.4627*
School	0.1079	0.3337*	0.4028*	0.4002*
INF	0.0671	-0.2661*	0.0089	-0.1069
Growth	-0.1684*	-0.0972	0.3589*	0.1454
RIR	-0.1237	-0.1226	-0.0045	-0.0147
Polity	-0.0705	0.1275	0.3714*	0.3119*
Oval	-0.0440	-0.3536*	-0.2261*	-0.1751
Corr.	-0.0945	0.1740*	0.4556*	0.5026*
Pol.Risk	0.0079	0.3496*	0.5385*	0.5719*
Inst.	-0.0192	0.3141*	0.5301*	0.5545*
Openf	0.2579*	0.2009*	0.4348*	0.4559*

Notes: Table 3 presents the pair-wise correlations between the four dependant variables CF/GDP, Net Out/GDP, Inflow/GDP and Outflow/GDP as well as with the other explanatory variables. See Appendix C for the detailed explanations of the variables. Average data for the period 1980-2003 are used for each country. Due to data availability, the sample size and observation period are slightly different for each variable.

* indicate 10 % significance level.

Table 3 shows the correlation matrix between dependent and explanatory variables, while Table 4 shows the correlations between all the explanatory

variables¹. As shown in Table 3, the four dependent variables are correlated with each other and form two close pairs. Total capital inflow and outflow are highly correlated, with a correlation coefficient of 0.75. Meanwhile, net capital outflow and capital flight are also highly correlated, with a correlation of 0.55. Another interesting finding from Table 3 is that variables that affect capital flight are quite different from those affect other three types of capital flows. Based on Table 3, net capital outflow, total capital inflow and total outflow are all positively correlated with many fundamental factors such as income, trade and financial openness, education, political development and other institutional variables. The determinants for capital flight, however, could not be clearly identified through the correlation matrix.

According to Table 4, it is likely that multi-collinearity could be a problem for the empirical specifications since the major explanatory variable GDP per capita is highly correlated with a number of other explanatory variables. In order to avoid this problem, some variables that have correlation with GDP per capita higher than 0.7 are dropped out for regressions. As a result, variables that represent years of schooling (School) and several institutional variables are eliminated from the estimations. Consequently, the explanatory variables in the regressions fall into four categories: income, openness, political development, and other risk-return variables on portfolio considerations. (The expected signs and regression estimated signs for all the variables tested in the later regressions are presented in Table 5.)

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¹ The correlation coefficients in both Table 3 and Table 4 are based on bivariate analysis only. When controlling for other factors, the significance on some partial correlations may increase.

Table 4 Correlation Matrix between Explanatory Variables

	GDP PC	Cap Inx.	Kaopen	School	INF	Growth	RIR	TRADE	Polity	Oval	Corr.	Pol.Risk	Inst.
Cap Inx	0.67*												
Kaopen	0.67*	0.88*											
School	0.83*	0.56*	0.59*										
INF	-0.13	-0.16*	-0.09	-0.05									
Growth	0.20*	0.13	0.11	0.29*	-0.20*								
RIR	0.00	0.12	0.12	-0.06	0.12	-0.02							
TRADE	0.08	0.18*	0.19*	0.16	-0.12	0.18*	-0.11						
Polity	0.59*	0.44*	0.36*	0.62*	0.02	0.21*	0.17*	-0.03					
Oval	-0.24*	-0.30*	-0.27*	-0.23*	0.55*	-0.26*	0.08	-0.14	-0.24*				
Corr.	0.82*	0.48*	0.46*	0.75*	-0.04	0.23*	0.03	0.08	0.59*	-0.11			
Pol.Risk	0.87*	0.62*	0.60*	0.82*	-0.21*	0.34*	0.03	0.17*	0.61*	-0.32*	0.85*		
Inst.	0.87*	0.60*	0.58*	0.82*	-0.18*	0.31*	0.04	0.14	0.64*	-0.30*	0.88*	0.99*	
Openf	0.18*	0.17*	0.17*	0.01	-0.15	0.13	0.00	0.50*	-0.04	-0.11	-0.04	0.00	-0.03

Notes: Table 4 presents the pair-wise correlations between all other explanatory variables except the main regressor GDP per capita, which is reviewed in Table 2. See Appendix C for the detailed explanations of the variables. Average data for the period 1980-2003 are used for each country. Due to data availability, the sample size and observation period are slightly different for each variable.

* indicate 10 % significance level.

i) Level of Income

The first group of explanatory variables represent economic development, which include GDP per capita levels, institutional levels, and educational levels. As shown in Table 4, these factors are closely correlated, with correlation coefficient over 0.80. To avoid multi-collinearity, only GDP per capita (PPP) is used as a basic regressor in all the models of regressions, as it is the most direct measure of the income and general welfare of the people living in a country. By looking at this variable alone, we can understand how a country's economic development and people's income may affect the pattern and magnitude of capital flows. In fact, the relationship between capital flows and economic development is the major concern and the most important question to answer in this study. Based on standard neoclassical theory concerning capital movements, higher income countries should have high capital outflow, therefore, in regressions on outflows, the sign on the coefficient of GDP per capita is expected to be positive while for inflow it is expected to be negative.

Intuitively, higher GDP should be a good sign for the economic performance and therefore should be negatively related with capital flight. However, owing to the distinct characteristics of capital flight, it is difficult to define the relationship theoretically, and according to preliminary studies with the data in Chapter 3, I assume a non-linear relationship between capital flight and income, while other three flows may be linearly related with income.

ii) Openness

The second important group of fundamental variables I want to test is the

level of trade and financial openness. In general, deregulation and financial liberalization in developed countries have unleashed large amounts of capital seeking new investment areas with attractive returns. The consequent increase in competition in the capital markets and the tendency towards short-term and rapid investments have created an economic environment prone to financial swings, crises, contagions, and economic stagnation. While it may be true that some developing countries have benefited from increased capital inflows (i.e., availability of external savings), they have also found it more difficult to manage their economies, as capital comes in and leaves rather quickly. In fact, developing countries experienced frequent and severe financial and economic crises after financial liberalization, as demonstrated in the 1990s. Thus I hypothesize that: deregulation and financial liberalization increase capital flight and external borrowing.

In the following estimations, the capital account openness index, KAOPEN developed by Chinn and Ito (2006) is used in all the regressions as the second major regressor. This index is the first principle component of the four IMF binary variables discussed in Chapter 3. One of the merits of the KAOPEN index is that it attempts to measure the intensity of capital controls, insofar as the intensity is correlated with the existence of other restrictions on international transactions. Another merit of this index is its wide coverage (more than 100 countries) for a long time period (1980–2003).

Measure on trade openness is also included in the estimations so as to control for the effects of international trade flows on capital movements. Two

measures on trade openness are considered: The first one is the most commonly accepted “trade openness”, which is the sum of a country’s total import and export divided by GDP. Data on this trade openness measure is taken from the World Development Indicators, which have annual data from 1980 to 2004. The other measure is the fitted value of gravity trade openness by Jeffrey Frankel and Andrew Rose (2002). It models the flow of international trade between a pair of countries as being proportional to their economic “mass” (“national income”) and inversely proportional to the distance between them (literally interpreted). The gravity model of international trade has a remarkably consistent history of success as an empirical tool. I use the fitted value of trade openness in the later regressions as the proxy variable so as to eliminate the possible problems of multi-collinearity and endogeneity between trade openness and other factors. The signs on financial openness and trade openness are both expected to be positive for all types of capital flows.

iii) Political Development

Although political variables are not identified as major factors affect normal capital flows across borders, it can affect capital inflow into a country and it is a major determinant for capital flight. Perceived political instability may generate capital flight because in an unstable political environment, residents may decide to hold their assets abroad based on lack of confidence in the domestic political situation, perceived high levels of corruption, and the consequences of these factors for the future value of the assets.

According to the studies that focus on analysis of political instability as determinants of capital flight, several different measures on political risks have been used. In some cases, the empirical investigations focus on the regime type as measurement of political instability, using different dummy variables that proxy for the degree of democracy of a country. Other studies use dummy variables to measure issues related to the policy regime, such as indexes of civil rights and liberties. There are also studies using more direct measures for political instability, such as the number of assassinations and revolts, dummies for the fact that a country has been involved in a war situation. In general, the results of the empirical investigations support the view that political instability, measured in various ways, and capital flight are positively related.

To capture political fundamentals I also include a group of variables indicating political development, such as level of democracy, rating on corruption, and rating of political stability. As the later two variables are significantly correlated with GDP per capita, they are dropped out for the regressions. Therefore, only political openness, an index variable as indicator of democracy and autocracy of a country, is used to capture the development of political fundamentals.¹ This variable is a combined polity score index with ranging from -10 to 10 (-10=high autocracy, 10=high democracy), indicating the general openness of political institutions. Although this variable is mainly a determinant for capital flight, to some extent it may also have effects on other types of capital flows.

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¹ I follow the Alfaro, Kalemli-Ozcan and Volosovych (2008) for this measure of institution.

iv) Other Portfolio Considerations

Besides these fundamental variables, other capital movement determinants that have been pointed out in earlier studies are also taken into consideration in my empirical specifications. These variables are generally based on portfolio considerations for risk-return of capital. Proxies of the interest rate differential are used in some studies to measure the relative attractiveness of domestic as compared to foreign assets. In most cases, researchers have calculated some kind of exchange rate differential between the domestic interest rate on deposits and a foreign deposit rate, normally the US deposit rate. Another proxy for the attractiveness of different assets used is the growth rate of GDP or GNP. Measures of the interest rate differential do not always have a statistically significant relation to capital flight. As a result, additional factors such as exchange rate over-valuation, inflation rate, GDP growth rate, development of domestic financial markets are also included in the explanatory variables. Expected signs on these variables are presented in Table 5.

Table 5 Explanatory Variable and Expected Signs

Explanatory Variable	Capital Flight		Net Capital Outflow		Total Inflow		Total Outflow	
	Expected	Estimated	Expected	Estimated	Expected	Estimated	Expected	Estimated
GDPPC	-	Inverse U	+	+	-	+	+	+
Kaopen	+	+	+	+	+	+	+	+
INF	+	+	0	0	0	0	0	0
Growth	-	-	-	-	+	+	+	+
RIR	-	-	-	-	+	+, -	-	-
Polity	-	-	-	+, -	+	+	-	-
Oval	+	+, -	+	+	0	0	0	0
Openf	+	+, -	+	+, -	+	+, -	+	+, -

Notes: “+” indicates a positive relationship while “-” indicates a negative relationship. “0” means the variable does not have any impact on the dependent variable *GDPPC* is GDP per capita, PPP. *GDPPC2* is the square term of *GDPPC*. *Openf* is the gravity model fitted trade openness. *Polity* is the political rating of democracy(10) and autocracy (-10). *RIR* is the annual domestic real interest rate. *INF*: Annual domestic inflation rate, consumer prices (annual %). *Kaopen* is the Chinn measure for capital account openness. *Oval* is exchange rate over-valuation. *Growth* is the annual GDP per capita growth rate. See Appendix C for the detailed explanations on all variables.

4.2 Ordinary Least Squares Regressions

Both cross-country OLS regressions and “adjusted” panel regressions have been performed to test the significance of various explanatory variables. One potential problem with developing country data is the possibility of significant measurement error in annual data. To mitigate these concerns, and since the interest of this paper is primarily on fundamental factors rather than short-term fluctuations in capital flows, I construct a panel that contains non-overlapping 5-year averages data for each country. Using this 5-year average data on all the variables for the period 1980 to 2003 reduces the 24 annual observations to 5 time-series observations for each country. Another reason to use 5-year average data is that most of the explanatory variables are slowly changing over time while the dependent variable may fluctuate dramatically year by year. To better understand the long-run effects of fundamentals on capital flows, it is preferable to smooth out the high fluctuation in the dependent variables to eliminate unrelated noises.

As I assume a non-linear relationship between capital flight and economic development, the standard linear regression model is not used. Instead, to capture stage of development effects, I include both GDP per capita and its squared term in the main regression models to allow for possible non-linear relationship. The equation that I use for the baseline cross-sectional regression is:

$$CF_i = \alpha_i + \beta_1 Y_i + \beta_2 Y_i^2 + \beta_3 Z_i' + \varepsilon_i \quad (12)$$

where CF_i is average capital flows as ratios to GDP, α_i is a constant (subscript i indicates that it may be different for each group of countries), Y_i is the average GDP per capita PPP, indicating economic development, and Y_i^2 is the quadratic form. Z_i' is a vector of all other explanatory variables and ε_i is a random error term.

4.2.1 Cross-country Regression Results

Firstly, OLS regressions are conducted using the average data over the entire period (1980-2003) on the dependent and explanatory variables for each country. Table 6 provides the cross-country regression results. Owing to data availability, the sample size for different models of regression may vary slightly.

The purpose of the regressions is to examine the cross-section relationship between different types of capital flows and the economics fundamentals, e.g. income, openness and level of institutions. A result that appears to be fairly robust across countries is that for the four types of capital flows I test, the coefficients of the major regressors, GDP per capita and its squared terms, are only simultaneously significant in the regressions on capital flight. For the other three types of capital flows, only the coefficients of the GDP per capita terms are significant, but not the squared terms, indicating that these types of flows are linearly correlated with income. Moreover, for regressions on capita flight, the coefficient on the GDP per capita term is significantly positive and the coefficient on the quadratic term is significantly negative. This suggests that the relationship

between capital flight and economic development is not linear, but rather inverse U-shaped.

Table 6 Cross-country Regression Results

	Capital Flight	Net Outflow	Total Inflow	Total Outflow
gdppc	0.889 (0.214)***	0.599 (0.255)**	0.107 (0.092)	0.271 (0.097)***
gdppc2	-0.031 (0.007)***	-0.012 (0.009)	- -	- -
RIR	-0.009 (0.047)	0.014 (0.056)	-0.041 (0.053)	-0.033 (0.056)
INF	-0.001 (0.004)	-0.003 (0.004)	0.005 (0.004)	0.002 (0.004)
polity	-0.359 (0.088)***	-0.385 (0.104)***	0.119 (0.099)	-0.002 (0.104)
openf	0.182 (0.111)	0.223 (0.132)*	0.532 (0.121)***	0.62 (0.127)***
Growth	-0.496 (0.194)**	-0.33 (0.231)	0.483 (0.222)**	0.162 (0.235)
kaopen	0.555 (0.432)	0.659 (0.513)	0.614 (0.479)	0.707 (0.506)
oval	0 (0.004)	-0.013 (0.004)***	-0.001 (0.004)	0.001 (0.004)
Constant	-1.016 (0.959)	-4.429 (1.140)***	-1.189 (0.972)	-3.122 (1.026)***
Observations	75	75	71	71
R-squared	0.42	0.56	0.48	0.57

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Notes: This is a report on cross-country regressions using the average data for all the variables over the period 1980-2003. Dependent variables are the capital flight, net capital outflow, total capital inflow and total capital outflow to GDP ratios. Explanatory variables include: **GDPPC** is GDP per capita, PPP. **GDPPC2** is the square term of **GDPPC**. **Openf** is the gravity model fitted trade openness. **Polity** is the political rating of democracy(10) and autocracy (-10). **RIR** is the annual domestic real interest rate. **INF**: Annual domestic inflation rate, consumer prices (annual %). **Kaopen** is the Chinn measure for capital account openness. **Oval** is exchange rate over-valuation. **Growth** is the annual GDP per capita growth rate. See Appendix C for the detailed explanations of all variables.

An intuitive explanation for this inverse U-shaped correlation may be that during the initial stage of economic development, residents are gradually

accumulating wealth which is the source for outgoing flight capital. Meanwhile, due to unstable domestic economic and political environment, residents choose to take their wealth aboard in other safer places. At this stage, inward foreign investment and foreign lending may lead to higher capital flight. As the economy continues to grow, economic and political conditions improve and better institutions are established, residents will have more confidence in domestic economy, and to a certain point they may change their investment preferences. Foreign assets are not attractive compared to domestic assets under the new circumstances, and residents no longer need to put their assets abroad to avoid government control or potential losses. Consequently, capital flight may decrease as people's income increases.

The coefficient on trade openness is positively significant for other three types of capital flows, but not for capital flight. This indicates that openness may stimulate the size of normal capital flows across borders, but it does not play an important role in shaping capital flight. I also test the possibility of a non-linear relationship between trade openness and capital flight, however, the coefficient on the squared term is not significantly different from zero. Therefore, the assumption of a non-linear relationship between trade openness and capital flight could not be identified by the test result. In fact, this ambiguous role played by openness on capital flight is not surprising because theoretically, there are explanations for two conflicting point of views. On one hand, openness may lead to higher capital flight because it provides easier access to foreign markets and therefore private capital could flow more freely. On the other hand, higher openness also indicates a higher

level of development in the domestic financial markets, or even better institutions and investment environment. In that sense, higher openness may actually reduce capital flight as domestic assets become more attractive. The statistical result by cross-sectional test cannot provide us with sufficient confidence in either of the opinions, therefore, I will further investigate this ambiguous role played by trade and financial openness on capital flight by the panel data analysis.

The coefficients of political development are negative for regressions on capital flight and net capital outflows. It implies that capital flight may decrease as a country become more politically open to public or more democratic. This result verifies the economic intuition as dictatorship or autocracy may stimulate residents to place their wealth abroad to avoid the control from their government. The signs and significance of this variable confirm with the theoretical hypothesis.

Additional variables are also tested one by one together with the main regressors. As mentioned earlier, another important focus of this study is on institutional development. However, according to the summary statistics shown in Table 4 Correlation Matrix, institutional variables are highly correlated with GDP per capita. Therefore, when they are included in the regressions, their coefficients are not statistically significant. Among all the other additional variables, the regression results show that there is one important factor affecting all types of capital flows, that is, the economic growth rate. In the regression on capital flight, the coefficient of growth rate is significantly negative, indicating that higher economic growth rate could reduce capital flight. Moreover, in the regression on total capital inflow, the coefficient of growth rate is significantly positive,

indicating higher growth rate may attract more capital inflows. These results are consistent with the theoretical hypothesis as well as economic intuitions.

4.2.2 Panel Estimations

The best way to avoid dispersing information on cross sectional units observed over time is to employ pooled data and panel techniques. The use of pooled data and a panel estimation technique has the advantage of capturing a larger portion of the variability in the data; it also reduces the importance of a key econometric problem that often arises in empirical studies, namely, the omitted variables that are correlated with explanatory variables. Pooling of the data increases the sample size and the efficiency of the parameters because it adjusts for any heteroskedasticity of error terms and autocorrelation in time series data. Furthermore, the pooled data and panel technique reduces the problems generated by multicollinearity among the explanatory variables in the model. Pooling data on a panel gives more information, more variability, more degrees of freedom and more efficiency in the parameter estimates produced.

A common way of analyzing panel data with a large time series is to use five-year or 10-year averages of the data in order to reduce business-cycle effects and measurement error.

Following the cross-sectional regressions, the same variables are tested using panel data approach, which allows us to characterize time variations in the variables. As discussed earlier, the reduced panel containing non-overlapping 5 year averages of data are used for each country. Therefore, the panel regressions have 5 time series for each country, and the number of countries in different

regression models may vary slightly owing to data availability. I also include time dummy and country dummy variables in the regressions to control for time effect and country specific effect. At the end, I test the robustness of the results to this compression of data and to the choice of empirical specification.

The equation that I use for the panel regressions is as follows:

$$CF_{it} = \alpha_i + \beta_1 Y_{it} + \beta_2 Y_{it}^2 + \beta_3 Z_{it}' + \lambda_t + \varepsilon_{it} \quad (13)$$

where the subscript i represents country i and subscript t represents time. CF_{it} is average capital flows as ratios to GDP, α_i is a constant and may be different for each country, Y_{it} is the average GDP per capita PPP, indicating economic development, and Y_{it}^2 is the quadratic form. Z_{it}' is a vector of all other explanatory variables, λ_t is the time effect, and ε_{it} is a random error term.

Table 7 shows results from panel regression with time dummy variables, and Table 8 with both time and country dummies. Basically the panel regression results confirm with the results from cross-country analysis for the main regressors. One of the consistent results with the cross-sectional regressions is the inverse U-shape relationship between capital flight and GDP per capita. The coefficients of GDP per capita and its quadratic term are consistently significant in the both cross-country and panel regressions. Moreover, from the panel regression results, net capital flows and the total capital inflows and outflows are all linearly and positively correlated with GDP per capita.

From the panel regression results, exchange rate over-valuation has a significantly positive relationship with capital flight. It is in line with theoretical

intuition that over-valuation will lead to higher capital flight. The coefficients of political variable are significantly negative for capital flight and net capital outflow when only time dummy variable is included, which are also consistent with the cross-sectional results. However, when both time and country dummy variables are included in the regressions (Table 8), the effects of this political variable seem to be over-shadowed by the country specific effects. On the other hand, when both of the time and country effects are used, the GDP per capita increase sharply for all the four types of capital flows.

The most interesting observation is that the coefficient of trade openness show a conflicting results in Table 7 and Table 8 after country effects are used. When only time dummy is used, the estimation results on the coefficient of trade openness is similar to cross-country results, however, when both time and country effects are included, the coefficients of trade openness become negative. It seems that controlling for country specific effects reinforces the effects of GDP per capita while reduces the significance of other regressors. Based on these estimation results, its role of trade and financial openness on the four types of capital flows are still ambiguous.

Table 7 Panel Regression Result-A (With Year Dummy)

	Capital Flight	Net Outflow	Total Inflow	Total Outflow
gdppc	0.739 (0.235)***	0.715 (0.185)***	0.112 (0.046)**	0.281 (0.051)***
gdppc2	-0.024 (0.008)***	- -	- -	- -
RIR	-0.026 (0.028)	-0.007 (0.022)	-0.019 (0.017)	-0.04 (0.019)**
INF	-0.001 (0.002)	-0.005 (0.001)***	0.001 (0.001)	0.001 (0.001)
polity	-0.337 (0.084)***	-0.295 (0.066)***	0.014 (0.048)	-0.086 (0.053)
openf	0.09 (0.115)	0.217 (0.090)**	0.256 (0.065)***	0.35 (0.072)***
Growth	-0.031 (0.159)	-0.204 (0.125)	0.334 (0.093)***	0.173 (0.102)*
kaopen	0.365 (0.391)	0.63 (0.307)**	0.622 (0.225)***	0.571 (0.248)**
oval	0.008 (0.003)**	-0.001 (0.003)	0.002 (0.002)	0.004 (0.002)*
Constant	-1.408 (1.472)	-7.163 (1.157)***	-1.116 (0.727)	-3.599 (0.802)***
country dummy	no			
year dummy	yes			
Observations	238	238	226	225
R-squared	0.18	0.37	0.38	0.44

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Notes: This is a report on panel estimation results using the five-year average data over the period 1980-2003. Therefore, each country has 5 observations for all the variables. We include dummy variables for each time period to control the time effect. Dependent variables are the capital flight, net capital outflow, total capital inflow and total capital outflow to GDP ratios. Explanatory variables include: **GDPPC** is GDP per capita, PPP. **GDPPC2** is the square term of **GDPPC**. **Openf** is the gravity model fitted trade openness. **Polity** is the political rating of democracy(10) and autocracy (-10). **RIR** is the annual domestic real interest rate. **INF**: Annual domestic inflation rate, consumer prices (annual %). **Kaopen** is the Chinn measure for capital account openness. **Oval** is exchange rate over-valuation. **Growth** is the annual GDP per capita growth rate. See Appendix C for the detailed explanations of all variables.

Table 8 Panel Regression Result -B (With Year Dummy and Country Dummy)

	Capital Flight	Net Outflow	Total Inflow	Total Outflow
gdppc	2.906 (0.828)***	1.251 (0.450)***	0.722 (0.180)***	1.298 (0.193)***
gdppc2	-0.052 (0.021)**	- -	- -	- -
RIR	-0.064 (0.036)*	-0.011 (0.02)	0.005 (0.02)	-0.018 (0.02)
INF	0.001 (0.00)	-0.001 (0.00)	0 (0.00)	0.001 (0.00)
polity	-0.195 (0.17)	0.046 (0.09)	-0.01 (0.10)	-0.055 (0.11)
openf	-0.713 (0.70)	-1.216 (0.383)***	-1.275 (0.379)***	-1.418 (0.404)***
Growth	0.385 (0.228)*	0.092 (0.12)	0.3 (0.128)**	0.403 (0.135)***
kaopen	0.912 (0.69)	0.244 (0.38)	0.45 (0.39)	0.304 (0.42)
oval	0.013 (0.004)***	0.002 (0.00)	0 (0.00)	0.002 (0.00)
Constant	-19.942 (17.02)	10.197 (9.26)	24.638 (9.343)***	3.565 (3.61)
country dummy	yes			
year dummy	yes			
Observations	238	238	226	225
R-squared	0.58	0.85	0.7	0.75

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Notes: This is a report on panel estimation results using the five-year average data over the period 1980-2003. Therefore, each country has 5 observations for all the variables. We include dummy variables for each time period and also for each country to control for both time and country specific effect. Dependent variables are the capital flight, net capital outflow, total capital inflow and total capital outflow to GDP ratios. Explanatory variables include: **GDPPC** is GDP per capita, PPP. **GDPPC2** is the square term of **GDPPC**. **Openf** is the gravity model fitted trade openness. **Polity** is the political rating of democracy(10) and autocracy (-10). **RIR** is the annual domestic real interest rate. **INF**: Annual domestic inflation rate, consumer prices (annual %). **Kaopen** is the Chinn measure for capital account openness. **Oval** is exchange rate overvaluation. **Growth** is the annual GDP per capita growth rate. See Appendix C for the detailed explanations of all variables.

From panel data regressions, an interesting finding is that among other additional variables, exchange rate overvaluation is significantly correlated with capital flight. It has been elaborated by many authors that domestic currency

overvaluation may lead to higher capital flight. The panel data regression results confirm with this point of view. However, the cross-sectional regressions using average data for more than 20 years may even out the effect therefore the correlation is not as clear as shown in the panel regression results.

Basically the results are the same as our finding in the cross-sectional regressions, except that the coefficients of the gravity-fitted trade openness variable in the two sets of panel regressions are conflicting. One possible explanation for the difference in sign and significance on the coefficient of trade openness between the two set of regressions is that the country dummy variables may explain a large part of the effects of gravity-fitted trade openness. This is not surprising since the gravity model uses several specific country factors to obtain this fitted value.

4.3 The Threshold Regression (TR)

The non-linear relationship between capital flight and a country's GDP per capita indicates an inversed U shape. It means that before an economy reaches a certain level of income, capital flight will increase as the economy grows. However, after the country passes this threshold level, capital flight will start to decline. In order to understand more precisely about this non-linear relationship, I also apply a special estimation method, that is, the threshold regression (Hansen 1999 and 2000) to find out the threshold level of economic development.

4.3.1 The TR model

In a series of original research studies, Hansen (1996, 1999 and 2000) develops new econometric techniques for threshold regression analysis, i.e., the

endogenous threshold regression techniques. Hansen's endogenous approach has critical advantages. First, it does not require any specified functional form of nonlinearity, and the number and location of thresholds are completely endogenously determined by the data. Second, it provides an asymptotic distribution theory to construct confidence intervals for the parameters. A bootstrap method is also applied to assess the statistical significance of the threshold effects.

In this paper I follow Hansen (1999) using bootstrap procedure to test the null hypothesis of a linear formulation against a TR alternative. The TR model assumes the data is given by $\{y_i, x_i, q_i\}_{i=1}^n$, where y_i and q_i are observations on the dependent variable and a threshold variable, respectively, and x_i is a $p \times 1$ vector of explanatory variables. The threshold variable q_i splits the sample into different groups and may be part of x_i . The TR model is given by

$$\begin{aligned} y_i &= x_i^T \beta_1 + \varepsilon_i, & q_i &\leq \gamma \\ y_i &= x_i^T \beta_2 + \varepsilon_i, & q_i &> \gamma \end{aligned} \quad (14)$$

The model can be written in a single equation form by defining a dummy variable $d_i(\gamma) = I(q_i \leq \gamma)$ where $I(\cdot)$ denotes the indicator function. If we write the variable $x_i(\gamma) = x_i d_i(\gamma)$, equation (14) could be expressed as

$$y_i = x_i^T \beta + x_i^T(\gamma) \theta_n + \varepsilon_i \quad (15)$$

where $\beta = \beta_2$ and $\theta_n = \beta_1 - \beta_2$, which is the threshold effect. equation (15) allows all the regression coefficients to differ between sample groups. Their proposed solution is to let $\theta_n \rightarrow 0$ as $n \rightarrow \infty$. This can be achieved by holding β_2 fixed and

thereby making β_1 approach β_2 as $n \rightarrow \infty$. Hansen (1999) also provides an algorithm that searches over the values of γ using conditional OLS regressions based on a sequential search over all $\gamma = q_i$, for $i = 1, \dots, n$. The procedure also provides estimates of β and θ .

An important hypothesis for the test is whether the TR model is statistically significant relative to a simple linear specification. The null hypothesis in this case describes the simple linear specification and can be expressed as:

$$H_0 : \beta_1 = \beta_2 \quad (16)$$

Devising a test for the null hypothesis in (16) runs into a series of obstacles, namely the threshold parameter γ is not identified under H_0 . I follow Hansen (1999) who suggests a heteroskedasticity-consistent Lagrange Multiplier (LM) bootstrap procedure to test the null hypothesis of a linear formulation against a TR alternative. Since γ is not identified under the null hypothesis of the no-threshold effect, the p values are computed by a fixed bootstrap method. In that case the x_i values are used as regressors and the bootstrap-dependent variable is generated from $N(0, \hat{e}_i^2)$, where $\hat{e}$ is the OLS residual from the estimated threshold model. Hansen (1999) shows that this procedure yields asymptotically correct p values. It is important to note that if the hypothesis in (16) is rejected and a threshold level is identified, we should test again the TR model against a linear specification after dividing the original sample according to the threshold thus identified. This procedure is carried out until the null in (16) can no longer be rejected.

In testing the inverse-U relationship hypothesis, I use the following TR model to do the cross-country TR regressions:

$$CF_i = \begin{cases} \alpha_1 Open + \alpha_2 polity + \alpha_3 RIR + \beta_1 GDP + \mu_i + \varepsilon_i \dots \dots \dots GDP_i \leq \gamma \\ \alpha_1 Open + \alpha_2 polity + \alpha_3 RIR + \beta_2 GDP + \mu_i + \varepsilon_i \dots \dots \dots GDP_i > \gamma \end{cases} \quad (17)$$

where CF is the average capital flight as a ratio to GDP, $open$ is the gravity-fitted trade openness, $polity$ is the political indicator for democracy and autocracy, and RIR is the domestic real interest rate. GDP is GDP per capita (PPP), as the threshold variable we are going to test. The focus of this estimation is the threshold effect of economic development on capital flight, and the estimation of the exact threshold value.

4.3.2 Estimation Results for Capital Flight

The cross-country data are used for threshold estimations because it allows us to divide country into different stage of development according to their average GDP levels without worrying about the time effect. Another reason for using cross-sectional data is that Hansen's regression method is more suitable for cross-sectional or time series data set, but not for panel data. Owing to data availability, some countries are dropped because of incomplete data in one or more of the explanatory variables. The obvious outlier, Kuwait, is dropped out from the regression because it affects the estimated threshold value greatly. As a result, the sample size is reduced to 96 countries.

Results are shown in Table 9 and Table 10. Table 9 presents the results of the likelihood ratio test statistics for the test of the statistical significance of threshold effects as well as their 1000 bootstrap p-value. I find that the test for a

single threshold of GDP per capita is significant with a 1000 bootstrap p-value of 0.001. Furthermore, the test for a second threshold of GDP per capita is also statistically significant with a 1000 bootstrap p-value of 0.003. However, the test for a third threshold level is not significant with a p-value greater than 0.60. These results provide strong evidence to suggest that there exists three stages for capital flight in terms of income levels, which is consistent with previous OLS regressions. The estimated two threshold levels of income are 2974.18 and 5034.49 US\$ in GDP per capita PPP, by which the sample can be split into three regimes--- 36 low income economies, 16 middle income countries and 44 high income economies (including the 22 industrial countries). I also test the threshold effect of openness on capital flight using openness as the threshold variable. However, the 1000 bootstrap p-value for openness is 0.895 for single threshold, which is far beyond any acceptable significant level. Therefore, the linear relationship between openness and capital flight cannot be rejected. After finding the estimated values for threshold level of income, it is possible to do the separate OLS regressions by the three different regimes respectively. Table 10 demonstrates the OLS estimation results for the three groups of countries. The second column is for countries below the first threshold level and the last column is for countries above the second threshold level. For countries in the first stage (low income countries with GDP per capita less than USD2974), the relationship between capital flight and GDP per capita is positive and highly significant; while for countries in the third stage (high income countries with GDP per capita over USD 5034), the relationship is negative and statistically significant. For countries in the

second stage, there is no strong and clear relationship between capital flight and the economic development. These estimation results again confirm the hypothesis of the non-linear relationship: at the initial stage, capital flight will increase as an economy grows and its residents accumulate more wealth which is the source for capital flight. However, after the economy passes a certain threshold level, capital flight will decline as other economic fundamentals improve and the residents regain confidence in the domestic economy.

Table 9 Test Results for Threshold Effects (Capital Flight)

Threshold Variable	GDP per capita	Openness
Test for single threshold		
The likelihood ratio statistics	19.890381	6.2803907
Bootstrap P-Value	0.001***	0.895
Threshold Estimate	2974.18	-
95% Confidence Interval	[1966.33 , 3195.04]	-
Test for second threshold		
The likelihood ratio statistics	16.432665	-
Bootstrap P-Value	0.003***	-
Threshold Estimate	5034.487	-
95% Confidence Interval	[4719.326 , 14498.57]	-
Test for third threshold		
The likelihood ratio statistics	7.7335	-
Bootstrap P-Value	0.604	-
Threshold Estimate	-	-
95% Confidence Interval	-	-

Notes: Table 9 presents the test results for threshold effects using Hansen(1999) Threshold model. The dependent variable is net capital outflow. Cross-sectional data are used for 97 countries over 1980-2003. Two variables are tested for the threshold effect: GDP per capita and Trade openness.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 10 Threshold Regression Estimation (Capital Flight)

Variable	Stage 1 Estimate	Stage 2 Estimate	Stage 3 Estimate
	GDP≤2974.18	2974.18<GDP≤5034.487	GDP>5034.487
GDPPC	1.73 (0.58)***	-0.013 (0.456)	-0.109 (0.054)***
RIR	-0.17 (0.039)***	0.010 (0.029)	-0.004 (0.022)
POLITY	-0.18 (0.10)*	0.227 (0.109)***	-0.111 (0.074)*
OPENF	-0.03 (0.223)	0.541 (0.180)***	0.134 (0.077)***
Constant	-2.22 (1.24)*	-2.761 (1.939)	3.050 (0.760)***
Observations	36	16	44
R-squared	0.53	0.476	0.326

Notes: Values given in parenthesis denotes standard errors.

* significant at 10%; ** significant at 5%; *** significant at 1%

This is a report on cross-country regressions using the threshold model. Average data are used for all the variables over the period 1980-2003. Dependent variable is the capital flight to GDP ratio. Explanatory variables: **GDPPC** is the GDP per capita, PPP. **OPENF** is the gravity model fitted trade openness. **POLITY** is the political rating of democracy(10) and autocracy (-10). **RIR** is the annual domestic real interest rate.

Countries in Stage 1 (36):

Angola; Bangladesh; Benin; Bolivia; Burkina Faso; Burundi; Cameroon; Central African Republic; Chad; China; Congo, Rep.; Egypt, Arab Rep.; Ghana; Haiti; Honduras; India; Indonesia; Kenya; Lao PDR; Madagascar; Mali; Mauritania; Mozambique; Nepal; Niger; Nigeria; Rwanda; Senegal; Sierra Leone; Sri Lanka; Syrian Arab Republic; Tanzania; Togo; Uganda; Zambia; Zimbabwe

Countries in Stage 2 (16):

Albania; Dominican Republic; Ecuador; El Salvador; Fiji; Guatemala; Jamaica; Jordan; Lebanon; Morocco; Nicaragua; Paraguay; Peru; Philippines; Thailand; Tunisia

Countries in Stage 3 (44):

Argentina; Australia; Austria; Bahrain; Belgium; Brazil; Bulgaria; Canada; Chile; Colombia; Costa Rica; Cyprus; Denmark; Finland; France; Gabon; Germany; Greece; Hungary; Ireland; Israel; Italy; Japan; Korea, Rep.; Malaysia; Mauritius; Mexico; Netherlands; New Zealand; Norway; Oman; Panama; Poland; Portugal; Singapore; South Africa; Spain; Sweden; Switzerland; Trinidad and Tobago; United Kingdom; United States; Uruguay; Venezuela, RB

In the TR regressions, three additional determinants for capital flight are also included, namely openness, polity and real interest rate, so that we could see whether the results are consistent with the OLS regressions. According to the coefficients in Table 9, real interest rate is negatively correlated with capital flight only for countries in the first stage. In the second and third stages, interest rate does not play an important role in reducing capital flight. Political openness could reduce capital flight in the first and third stages but not for countries in the second stage (between USD 3000 to 5000 in GDP per capita). In terms of trade openness, it is positively correlated with capital flight in the second and third stage. Therefore, for countries in different stage of development, the factors that stimulate or reduce capital flight are quite different.

This leads to an interesting interpretation of the capital flight from the mid-income group: when the countries reach this level of income, wealth accumulation is not a major reason leading to capital flight, however, trade and financial openness may play a more important role in stimulating capital flight. According to the estimation result, capital flight will increase as the economy becomes more open in trade or financial markets. The same is true with political openness, as the coefficients on Polity show that political openness is negatively correlated with capital flight in the first and third stage, but positively related with capital flight in the second stage. Only after the countries enter into stage 3, political openness will then help to reduce capital flight. Therefore, countries in the second stage need to be more cautious in liberalizing their economic and political systems, because it may lead to large increases in capital flight. Only when a country passes the second

threshold (5000 in GDP per capita), capital flight will then automatically decline as the economy grows.

4.3.3 Testing Threshold Effect for Net Capital Outflow

In order to test if the inverse U-shape is unique for capital flight, I also conduct the same threshold regressions on net capital outflow using income and openness as the threshold variables. Cross-sectional data for 97 countries are used for the estimation. Regression models are the same as the previous threshold regressions on capital flight, with GDP per capita and openness as the threshold variable and two additional variables that affect net capital outflow. Table 11 presents the estimation results on the threshold effects of GDP and openness respectively. Similar to capital flight, estimation results show that there are two threshold levels of threshold effect on GDP per capita that while there is no threshold effect on openness. With the bootstrap p -value significant at the 1% level for single threshold and 10% level for second threshold, it is clear there are two stage of threshold effect. The estimated threshold levels are USD 3,911 and 14,427 respectively. Thus the sample can be split into three regimes and we can analyze the effects of GDP per capita on net capital outflow under these three different stages separately. Compare Table 11 with Table 9, the first threshold level for net capital outflow is merely USD1,000 higher, however, the second threshold level for net capital outflow is USD 14427 , which is much more higher than that of capital flight. Separate estimations on the three stages respectively provide more interesting finding and economic implication.

Table 12 presents the OLS regression results for the three regimes respectively. As shown in the coefficients of the regressors, net capital outflow shows clearly distinct patterns in the three regimes. In general, the signs for all of the four explanatory variables are rather consistent throughout the three regimes, and also confirm with previous OLS estimation results. However, for countries with different level of income, the major factors that affect capital outflow are quite different. For example, in countries with GDP per capita below USD 3,911, the major factor that stimulate net capital outflow is openness, while income, real interest rate and political democracy may not have significant effects. For countries in the second regime (with GDP per capita between USD 3,911 and 14,427), all the four explanatory variables seem to be insignificant. For countries with GDP per capita over 14,427, the four variables become significant and could explain to a large extend of net capital outflow.

The most interesting finding of the threshold regressions on net capital outflow is that it shows an opposite pattern to capital flight. First, in all the three stages, net capital outflow is always positively correlated with GDP per capita. This means when a economy grows, net capital outflow will increase. Second, in the first two groups of countries with relatively lower income, net capital outflow is not significantly affected by the national income. Although there is a positive relationship between net capital outflow and GDP per capita, the coefficients are not significant. On the other hand, for countries with per capita income above USD 14,427, increase in GDP per capita will lead to large increase in net capital outflow. With a coefficient of 0.609, it implies that for countries in this group, an increase

of USD1000 in GDP per capita will lead to a 0.6 per cent increase in the net capital outflow to GDP ratio. In other words, net capital outflow will increase faster when a country pass a threshold level of USD 14,427 in GDP per capita. This is exactly opposite to the pattern of capital flight, which will gradually decrease when a country pass the threshold income level. Therefore, the inverse U-shape in relationship to income level is unique of capital flight. The relationship between net capital flows and income is more like an upward exponential shape, indicating that net capital flows will increase dramatically only after countries accumulate sufficient wealth.

Table 11 Test Results for Threshold Effects (Net Capital Outflow)

Threshold Variable	GDP per capita	Openness
Test for single threshold		
The likelihood ratio statistics	20.3753	7.991
Bootstrap P-Value	0.000***	0.628
Threshold Estimate	3911.44	-
95% Confidence Interval	[884.626 , 14427.79]	-
Test for second threshold		
The likelihood ratio statistics	11.5637	-
Bootstrap P-Value	0.066*	-
Threshold Estimate	14427.79	-
95% Confidence Interval	[11077.36 , 15203.92]	-
Test for third threshold		
The likelihood ratio statistics	9.882	-
Bootstrap P-Value	0.127	-
Threshold Estimate	-	-
95% Confidence Interval	-	-

Notes: Table 11 presents the test results for threshold effects using Hansen (1999) Threshold model. The dependent variable is net capital outflow. Cross-sectional data are used for 97 countries over 1980-2003. Two variables are tested for the threshold effect: GDP per capita and Trade openness.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 12 Threshold Regression Estimation (Net Capital Outflow)

Variable	Stage 1 Estimate	Stage 2 Estimate	Stage 3 Estimate
	GDP≤3911.44	3911.44<GDP≤14427.79	GDP>14427.79
GDPPC	0.169 (0.926)	0.104 (0.134)	0.609 (0.154)***
RIR	-0.144 (0.091)	-0.008 (0.025)	-0.237 (0.090)***
POLITY	-0.130 (0.134)	-0.062 (0.075)	-0.823 (0.073)***
OPENF	0.837 (0.405)***	0.052 (0.067)	0.154 (0.053)***
Constant	-8.338 (1.593)***	-2.612 (1.015)***	-4.930 (2.577)***
Observations	43	30	24
R-squared	0.216	0.096	0.67

Notes: Values given in parenthesis denotes standard errors.

* significant at 10%; ** significant at 5%; *** significant at 1%

This is a report on cross-country regressions using the threshold model. Average data are used for all the variables over the period 1980-2003. Dependent variable is the net capital outflow to GDP ratio. Explanatory variables: **GDPPC** is the GDP per capita, PPP. **OPENF** is the gravity model fitted trade openness. **POLITY** is the political rating of democracy (10) and autocracy (-10). **RIR** is the annual domestic real interest rate.

Countries in Stage 1 (43):

Albania, Angola, Bangladesh, Benin, Bolivia, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, China, Congo, Rep., Ecuador, Egypt, Arab Rep., Ghana, Guatemala, Haiti, Honduras, India, Indonesia, Jamaica, Kenya, Lao PDR, Madagascar, Mali, Mauritania, Morocco, Mozambique, Nepal, Nicaragua, Niger, Nigeria, Philippines, Rwanda, Senegal, Sierra Leone, Sri Lanka, Syrian Arab Republic, Tanzania, Togo, Uganda, Zambia, Zimbabwe

Countries in Stage 2 (30):

Argentina, Bahrain, Brazil, Bulgaria, Chile, Colombia, Costa Rica, Dominican Republic, El Salvador, Fiji, Gabon, Hungary, Jordan, Korea, Rep., Lebanon, Malaysia, Mauritius, Mexico, Oman, Panama, Paraguay, Peru, Poland, Portugal, South Africa, Thailand, Trinidad and Tobago, Tunisia, Uruguay, Venezuela, RB

Countries in Stage 3 (24):

Australia, Austria, Belgium, Canada, Cyprus, Denmark, Finland, France, Germany, Greece, Ireland, Israel, Italy, Japan, Kuwait, Netherlands, New Zealand, Norway, Singapore, Spain, Sweden, Switzerland, United Kingdom, United States

4.4 Robustness Checks

4.4.1 Negative Capital Flight

From the estimation results on capital flight in Chapter 3, there are some countries with negative capital flight figures, mostly from the two end of the sample---either high income industrial countries or the very poor countries. Negative figure of capital flight is not a new issue in the studies of capital flight. In many empirical works on capital flight from various countries, there are often periods of very low or even negative capital flight. Opposite to the usually observed capital flight, negative capital flight figures indicates that the domestic use of capital exceeds the source of capital inflow, and there are unreported or secret channels for capital inflow entering into those countries. This could be the result of private holders of external assets to repatriate their capital or non-residents bring in capital through secret channels. Similar to the various reasons leading to capital flight, the determinants of repatriations of capital are also complicated. But intuitively, the improvement in domestic economic as well as political environments will reduce capital flight and also entice private holders of assets to repatriate capital. However, this question has not been formally addressed in previous studies.

Another fact which needs more attention is that capital flight is largely a developing country problem, and therefore researchers often focus on those countries with very high capital flight. However, capital flight is not just a developing country problem. Studies have documented capital flight from Europe and the United States in the early twentieth century and, in the case of Europe,

during the seventeenth century or even earlier (see, e.g., Kindleberger, 1987). In the 1930s, and later after World War II, concerns about capital flight from Europe to the United States became the subject of debates at the Bretton Woods meetings (Helleiner, 1994). Even in recent decades, studies have documented capital flight from some Organization of Economic Cooperation and Development (OECD) countries (see, e.g., Gibson and Tsakalotos, 1993)—which are evidence that capital flight affects the developed world, too. According to the experience of those developed countries, there might be a certain stage of economic development when capital flight is relatively high but eventually it may drop to low or even negative figures when the economy grows steadily.

In the past three decades, most empirical studies on capital flight only look at the developing countries and seldom think about the capital flight from developed countries. Since negative capital flight does not have apparent adverse effects on the economy, the question of negative capital flight has been neglected all through the years. In fact, negative capital flight indicates secret capital inflow; therefore countries with negative capital flight might be just the places where large volumes of flight capital flow in. Owing to this large sample size with countries of different income levels, it is easier to see the patterns of capital flight at different stage of economic development, which is a major contribute of this paper to capital flight literature.

Appendix D presents the average capital flight as a percentage of GDP from 70 countries with positive capital flight, in the order of GDP per capita levels. Similarly, Appendix E presents the average capital flight from 54 countries with

negative capital flight. It is interesting to see that countries with negative capital flight in general fall into two groups: the higher income countries with GDP per capita above 13,000 USD, and the low income countries with GDP per capita below 5,000 USD. The reasons behind the negative capital flight from these two groups could be quite different, given the huge difference in their economic and political background. However, it is difficult to identify the factors that lead to secret capital inflow into these countries, and may require deeper investigation on each country's specific economic and political situations in order to find out the true reasons behind those negative capital flows.

As for the positive capital flight, there is still a non-linear relation ship with the level of economic development. Table 14 demonstrates the estimation results using positive capital flight as the dependent variables by cross-sectional, reduced panel and annual data panel regressions respectively. Although the sample size is reduced by a large extend, the coefficients on all the explanatory variables are rather similar to previous benchmark regressions. The non-linear relationship with GDP per capita is still significant, and other variables show the same effects on capital flight as predicted by previous full sample analysis. This indicates that the negative capital flight does not affect the estimation results and the previous conclusions on capital flight are robust with or without negative capital flight.

Table 13 Regression Results for Negative Capital Flight

	Poor Countries (GDP<12,000)		Rich Countries (GDP>12,000)	
	Reduced panel	Annual Data	Reduced panel	Annual Data
gdppc	-5.702 (8.935)	0.981 (6.196)	5.032 (1.802)**	2.993 (0.585)***
gdppc2	0.371 (0.618)	0.165 (0.527)	-0.064 (0.035)*	-0.061 (0.013)***
RIR	-0.306 (0.097)***	-0.064 (0.020)***	0.14 (0.583)	-0.142 (0.110)
INF	0.015 (0.003)***	0.008 (0.001)***	-0.982 (0.508)*	-0.14 (0.106)
polity	-0.967 (0.443)**	-1.222 (0.315)***	4.387 (4.222)	0.649 (1.018)
openf	-0.846 (1.695)	-0.029 (1.119)	-1.926 (1.538)	-0.251 (0.352)
Growth	-0.218 (0.716)	-0.155 (0.270)	0.092 (0.682)	-0.054 (0.139)
kaopen	2.172 (2.080)	-1.089 (1.117)	-2.841 (1.556)*	-1.119 (0.450)**
oval	0.031 (0.011)***	-0.033 (0.016)**	0.661 (0.888)	0.129 (0.150)
Constant	-6.484 (8.196)	-2.355 (23.939)	-112.56 (52.347)**	-40.465 (12.671)***
Observations	53	239	42	226
R-squared	0.86	0.33	0.66	0.41
country dummy	Yes	Yes	Yes	Yes
year dummy	Yes	No	Yes	No
Standard errors in parentheses				
* significant at 10%; ** significant at 5%; *** significant at 1%				

Notes: This is a report of regressions on capital flight for countries with negative capital flight. Owing to data availability, each model of regression may have slightly different number of observations. We include dummy variables for each time period and also for each country to control for both time and country specific effect. Dependent variables are the capital flight to GDP ratios. Explanatory variables include: **GDPPC** is GDP per capita, PPP. **GDPPC2** is the square term of **GDPPC**. **Openf** is the gravity model fitted trade openness. **Polity** is the political rating of democracy (10) and autocracy (-10). **RIR** is the annual domestic real interest rate. **INF**: Annual domestic inflation rate, consumer prices (annual %). **Kaopen** is the Chinn measure for capital account openness. **Oval** is exchange rate over-valuation. **Growth** is the annual GDP per capita growth rate. See Appendix C for the detailed explanations of all variables.

Table 14 Regression Results for Positive Capital Flight

	Cross-Country	Panel(reduced)	Panel(Annual)
gdppc	0.951 (0.300)***	0.715 (0.248)***	0.586 (0.167)***
gdppc2	-0.035 (0.012)***	-0.024 (0.009)**	-0.019 (0.006)***
RIR	0.020 (0.053)	0.003 (0.024)	-0.052 (0.009)***
INF	-0.001 (0.004)	0 (0.002)	0.003 (0.000)***
polity	-0.404 (0.106)***	-0.456 (0.075)***	-0.474 (0.054)***
openf	0.170 (0.125)	0.139 (0.103)	0.281 (0.075)***
Growth	-0.754 (0.218)**	-0.602 (0.150)***	-0.355 (0.067)***
kaopen	1.101 (0.480)**	0.652 (0.363)*	0.45 (0.272)*
oval	0.007 (0.009)	0.002 (0.003)	0.001 (0.004)
Constant	0.052 (1.631)	1.994 (1.320)	1.121 (2.649)
Observations	45	123	581
R-squared	0.58	0.44	0.32
country dummy	-	no	
year dummy	-	yes	

Standard errors in parentheses
 * significant at 10%; ** significant at 5%; *** significant at 1%

Notes: This is a report of regressions on capital flight for countries with positive capital flight. Owing to data availability, each model of regression may have slightly different number of observations for all the variables. We include dummy variables for each time period and also for each country to control for both time and country specific effect. Dependent variables are the capital flight to GDP ratios. Explanatory variables include: **GDPPC** is GDP per capita, PPP. **GDPPC2** is the square term of **GDPPC**. **Openf** is the gravity model fitted trade openness. **Polity** is the political rating of democracy(10) and autocracy (-10). **RIR** is the annual domestic real interest rate. **INF**: Annual domestic inflation rate, consumer prices (annual %). **Kaopen** is the Chinn measure for capital account openness. **Oval** is exchange rate over-valuation. **Growth** is the annual GDP per capita growth rate. See Appendix C for the detailed explanations of all variables.

4.4.2 Outliers

Since the data for capital flight estimation come from several different databases, there might be concerns about the data accuracy, particularly for developing countries. To eliminate the effect of data inaccuracy, I exclude all observations for which the capital flight to GDP ratio has an absolute value greater than 1 or less than -1. (i.e. the volume of capital flight or reversal exceeds the country's annual GDP). By taking this measure I drop 4 observations from 4 countries for the year 1998 (The countries are Singapore, Bahamas, Barbados, and Bahrain). In addition, one of the countries in the sample---Kuwait--- has higher level of capital flows in terms of capital flight and net capital outflow than all other countries. For instance, average capital flight from Kuwait is 26.18 per cent while the overall average capital flight for the 130 countries is only 0.7 percent. Therefore, Table 15 presents the cross-country regression results after dropping this obvious outlier from the sample. Compared with the coefficients in Table 6, the outlier does not have dominant effects on the regressions. It is clear that my regression results are not driven by outliers.

Table 15 Regression Results (Drop Out Outlier)

	Cross-sectional		Panel Regressions	
	Capital Flight	Net Outflow	Capital Flight	Capital Flight
gdppc	0.459 (0.172)***	0.215 (0.077)***	2.725 (0.818)***	2.626 (0.516)***
gdppc2	-0.018 (0.006)***	- -	-0.047 (0.021)**	-0.044 (0.013)***
RIR	-0.022 (0.035)	-0.003 (0.044)	-0.07 (0.035)*	-0.033 (0.009)***
INF	-0.001 (0.003)	-0.003 (0.003)	0.001 (0.002)	0.003 (0.000)***
polity	-0.145 (0.073)**	-0.16 (0.087)*	-0.224 (0.163)	-0.338 (0.094)***
openf	0.068 (0.085)	0.092 (0.105)	-0.165 (0.710)	-0.291 (0.344)
Growth	0.004 (0.162)	0.199 (0.196)	0.578 (0.234)**	-0.095 (0.073)
kaopen	0.178 (0.329)	0.254 (0.410)	0.722 (0.680)	0.661 (0.367)*
oval	0.001 (0.003)	-0.012 (0.004)***	0.014 (0.004)***	-0.007 (0.003)**
Constant	-0.357 (0.728)	-3.903 (0.789)***	-29.381 (16.924)*	1.352 (7.604)
Observations	74	74	235	1008
R-squared	0.19	0.58	0.47	0.3

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Notes: This is a report on regressions result for both cross-sectional and panel data over the period 1980-2003 after dropping the outlier Kuwait. Dependent variables for cross-sectional regressions are the capital flight and net capital outflow to GDP ratios. For panel data regressions, the dependent variables are only capital flight to GDP ratios. Column 3 is for non-overlapping 5 year average data and last column is for annual data. Explanatory variables include: **GDPPC** is GDP per capita, PPP. **GDPPC2** is the square term of **GDPPC**. **Openf** is the gravity model fitted trade openness. **Polity** is the political rating of democracy(10) and autocracy (-10). **RIR** is the annual domestic real interest rate. **INF**: Annual domestic inflation rate, consumer prices (annual %). **Kaopen** is the Chinn measure for capital account openness. **Oval** is exchange rate over-valuation. **Growth** is the annual GDP per capita growth rate. See Appendix C for the detailed explanations of all variables.

4.4.3 Endogeneity

In empirical studies, one of the most pervasive problems is endogeneity. It occurs when the independent variable is correlated with the error term in a regression model. This implies that the regression coefficient in an OLS regression is biased. The endogeneity problem is particularly relevant in the context of time series analysis of causal processes. In this study, the using time averages of cross-country data can potentially lead to endogeneity of some of the regressors. Although time averages of both dependent and explanatory variables have been taken over a rather long time period, which mitigates the endogeneity problem, there could still exist a feedback mechanism from capital flows to some of the explanatory variables such as growth rate or interest rate.

There are many methods of overcoming this, including instrumental variable regression and Heckman selection correction. Usually it is not easy to find a suitable instrumental variable, or to replace the data set. Therefore, typically researchers would take values of explanatory variables from some base period to avoid endogeneity and create predetermined regressors (Alfaro 2008). However, this will undermine the dynamic structure of the relationship under study.

In order to test whether the OLS regression results are biased by potential endogeneity problem, the following cross-country regressions are performed, using average data on all of the four dependant variables and take values of the major regressor, GDP per capita, from the base year (Sample period starts from 1980, therefore base year is 1980. Regression results are shown in Table 16). Comparing Table 16 with previous cross-country estimation results, it is apparent that the

coefficients of all the regressors are rather similar in the sign and significance as those in Table 6, only with minimum decreases in some of the regressors' significance. Therefore, it can be concluded that the previous OLS regression results are not affected by endogeneity problem.

Table 16 Cross-country Regression Results (Endogeneity Test)

	Capital Flight	Net Outflow	Total Inflow	Total Outflow
gdppc	0.604 (0.271)**	0.433 (0.107)***	0.067 (0.112)	0.275 (0.119)**
gdppc2	-0.021 (0.011)*	- -	- -	- -
RIR	0.006 (0.050)	0.015 (0.053)	-0.041 (0.056)	-0.037 (0.060)
INF	0.000 (0.004)	-0.002 (0.004)	0.004 (0.004)	0.001 (0.005)
polity	-0.377 (0.092)***	-0.414 (0.096)***	0.163 (0.100)	-0.050 (0.107)
openf	0.243 (0.116)**	0.247 (0.124)*	0.553 (0.127)***	0.642 (0.135)***
Growth	-0.390 (0.208)*	-0.053 (0.224)	0.526 (0.240)**	0.333 (0.255)
kaopen	0.349 (0.453)	0.364 (0.488)	0.823 (0.498)	0.879 (0.530)
oval	-0.002 (0.004)	-0.014 (0.004)***	-0.001 (0.004)	0.001 (0.004)
Constant	-0.422 (1.096)	-4.254 (1.012)***	-1.107 (1.094)	-3.319 (1.165)***
Observations	71	71	67	67
R-squared	0.357	0.60	0.47	0.55

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Notes: This is a report on cross-country regressions using the average data for all the explanatory variables over the period 1980-2003. Dependent variables are the capital flight, net capital outflow, total capital inflow and total capital outflow to GDP ratios in 1980. Explanatory variables include: **GDPPC** is GDP per capita, PPP. **GDPPC2** is the square term of **GDPPC**. **Openf** is the gravity model fitted trade openness. **Polity** is the political rating of democracy (10) and autocracy (-10). **RIR** is the annual domestic real interest rate. **INF**: Annual domestic inflation rate, consumer prices (annual %). **Kaopen** is the Chinn measure for capital account openness. **Oval** is exchange rate over-valuation. **Growth** is the annual GDP per capita growth rate. See Appendix C for the detailed explanations of all variables.

4.4.4 Fixed Effects

Many cross-country panel studies use fixed effects, so as to control for all country-specific effects. In this study, I also control for the time- and country-specific effects because my sample covers a large and heterogeneous group of countries (including low income and high income countries) over a relatively long time span (1980-2003). Although some of the regressors are slowly changing over time (e.g. GDP per capita, polity, real interest rate), other variables may change greatly over the period (e.g. trade openness, FDI, and currency over-valuation). In this study, I try to improve the panel regressions in two ways: one with only the time dummy variables, the other with both time and country dummies. Basically these two methods yield similar results, and are also close to the cross-sectional results.

4.4.5 Higher Frequency Data

In order to examine the robustness of the results at higher frequencies, I also estimate the panel regressions using annual data. Although there could be considerable noise and measurement error in annual data for some developing countries, it is nevertheless useful to examine the sensitivity of the results to the choice of data frequency.

Using the annual data, I re-estimate the panel regressions with time and country effects. Table 17 presents the regression results for annual data using the four types of flows, with country and year dummy variables. The coefficients for the main regressors are very close to Table 8, in which the 5-year averaged data are

used. The threshold effect of GDP per capita on capital flight and net capital outflow is clearly shown by the coefficients in row 1 and 2 in table 17. In fact, this higher frequency test results are more consistent with the theoretical expectations on the signs and significance of the explanatory variables.

The distinct differences between Table 17 and previous cross-sectional and panel regressions lie in the coefficients for several additional variables: First, the coefficients for real interest rate and inflation are statistically significant and the signs are the same as expected. A negative sign for real interest rate implies that higher domestic interest rate will reduce capital flight, and a positive sign for inflation rate implies higher inflation will stimulate capital flight. Another finding from annual data regressions is that economic growth rate is negatively correlated with capital flight and net capital outflows, but positively correlated with total capital inflows and outflows. It could be explained that higher growth rate lead to higher returns on capital, therefore it is similar to real interest rate. The most important finding from annual data regressions is that financial openness could be positively correlated with capital flight. This finding is important because previous studies did not provide us with any clear-cut conclusions on how openness may affect the level and pattern of capital flight. The cross-sectional and reduced panel regressions did not tell us the correlation either. Therefore, these annual data regressions may provide a better understanding on how trade and financial openness may affect the pattern of capital flight.

Table 17 Panel Regression Result -C (Annual Data)

	Capital Flight	Net Outflow	Total Inflow	Total Outflow
gdppc	2.68 (0.513)***	0.82 (0.293)***	0.464 (0.096)***	1.037 (0.091)***
gdppc2	-0.046 (0.013)***	- -	- -	- -
RIR	-0.032 (0.009)***	-0.001 (0.01)	0 (0.00)	-0.001 (0.00)
INF	0.003 (0.000)***	0 0	0 0	0 0
polity	-0.321 (0.095)***	0.083 (0.05)	0.006 (0.05)	-0.03 (0.05)
openf	-0.56 (0.330)*	-0.469 (0.188)**	-0.574 (0.157)***	-0.664 (0.149)***
Growth	-0.161 (0.068)**	-0.13 (0.039)***	0.08 (0.035)**	0.077 (0.032)**
kaopen	0.757 (0.370)**	0.34 (0.21)	0.517 (0.182)***	0.17 (0.18)
oval	-0.007 (0.003)**	-0.001 (0.00)	0.001 (0.00)	0.001 (0.00)
Constant	-34.857 (9.470)***	-13.69 (5.397)**	-1.111 (3.66)	-0.455 (3.48)
country dummy	yes			
year dummy	yes			
Observations	1021	1021	958	946
R-squared	0.39	0.66	0.44	0.56

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Notes: This is a report on panel estimation results using annual data over the period 1980-2003. Owing to data availability, each country may have slightly different number of observations for all the variables. We include dummy variables for each time period and also for each country to control for both time and country specific effect. Dependent variables are the capital flight, net capital outflow, total capital inflow and total capital outflow to GDP ratios. Explanatory variables include: **GDPPC** is GDP per capita, PPP. **GDPPC2** is the square term of **GDPPC**. **Openf** is the gravity model fitted trade openness. **Polity** is the political rating of democracy(10) and autocracy (-10). **RIR** is the annual domestic real interest rate. **INF**: Annual domestic inflation rate, consumer prices (annual %). **Kaopen** is the Chinn measure for capital account openness. **Oval** is exchange rate over-valuation. **Growth** is the annual GDP per capita growth rate. See Appendix C for the detailed explanations of all variables.

4.4.6 Serial Correlation

A possible concern with the regressions is the effect of serial correlation. According to several authors (Collier et al 2001), the stock of capital flight could be one of the determinants of flows of capital flight. Therefore, serial correlation might have some effects on my panel regressions. However, since I use the 5-year average data in the panel estimation, it is less likely that serial correlation is a problem.

To be more cautious about serial correlation problem, I test it in the panel regressions with annual data by including a lagged term of capital flows as the explanatory variable. The regression function is as follows, with CF_{it-1} representing the lagged term of capital flows:

$$CF_{it} = \alpha_i + \beta_1 CF_{it-1} + \beta_2 Y_{it} + \beta_3 Y_{it}^2 + \beta_4 Z_{it}' + \lambda_i + \varepsilon_{it} \quad (18)$$

As shown in Table 18, the coefficients of the lagged terms are all significantly positive, implying that stock of capital flows may have effects on the current volume of capital flows. On the other hand, the coefficients on the lagged capital flight term are in the range of 0.20 to 0.63 for all the four types of capital flows, indicating a limited persistence in this variable even at the annual frequency. For other variables, adding these lagged terms does not affect the sign and significance of the coefficients. The threshold effect of economic development on capital flight is still robust. The coefficients for other variables as show in Table 18 are quite similar with that in Table 17.

Table 18 Panel Regression Result -D (Annual data with AR1)

	Capital Flight	Net Outflow	Total Inflow	Total Outflow
gdppc	1.633 (0.543)***	-0.081 (0.28)	0.482 (0.103)***	0.807 (0.098)***
gdppc2	-0.028 (0.014)**	- -	- -	- -
RIR	-0.027 (0.009)***	-0.008 (0.004)*	0 (0.00)	-0.001 (0.00)
INF	0.003 (0.000)***	0 0	0 0	0 0
polity	-0.261 (0.101)***	0.047 (0.05)	0.015 (0.05)	-0.013 (0.05)
openf	-0.444 (0.35)	-0.085 (0.18)	-0.604 (0.170)***	-0.456 (0.152)***
Growth	-0.149 (0.069)**	-0.121 (0.035)***	0.079 (0.036)**	0.059 (0.032)*
kaopen	0.731 (0.371)**	0.071 (0.19)	0.477 (0.189)**	0.207 (0.18)
oval	-0.007 (0.003)**	0.001 (0.00)	0 (0.00)	0 (0.00)
Lag term	0.254 (0.033)***	0.451 (0.030)***	0.213 (0.046)***	0.631 (0.056)***
Constant	5.103 (7.48)	-2.053 (3.83)	-0.865 (3.66)	-0.495 (3.28)
country dummy	yes			
year dummy	yes			
Observations	983	983	915	898
R-squared	0.42	0.72	0.46	0.63

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Notes: This is a report on panel estimation results with AR(1) using annual data over the period 1980-2003. Owing to data availability, each country may have slightly different number of observations for all the variables. We include dummy variables for each time period and also for each country to control for both time and country specific effect. Dependent variables are the capital flight, net capital outflow, total capital inflow and total capital outflow to GDP ratios. Explanatory variables include: **GDPPC** is GDP per capita, PPP. **GDPPC2** is the square term of **GDPPC**. **Openf** is the gravity model fitted trade openness. **Polity** is the political rating of democracy(10) and autocracy (-10). **RIR** is the annual domestic real interest rate. **INF**: Annual domestic inflation rate, consumer prices (annual %). **Kaopen** is the Chinn measure for capital account openness. **Oval** is exchange rate over-valuation. **Growth** is the annual GDP per capita growth rate. See Appendix C for the detailed explanations of all variables.

In summary, the OLS regression results confirm the expected signs and significance of the main regressors that are tested. From these regression results, the following conclusions could be reached: First, it is clear that capital flight is non-linearly related with a country's income. Net capital outflow could also be non-linearly correlated with income, but the effect is not as strong as for capital flight. This implies that poor countries are not the ones that export more capital, it is rather the middle income developing countries which experience higher percentage of outward capital flight and net capital outflows. Total capital inflows and outflows are positively correlated with income. Richer countries experience larger size of capital flows in both directions. Poor countries receive less capital inflows and at the same time invest less abroad.

Secondly, higher economic growth rate will reduce capital flight and net capital outflows, although it will stimulate capital flows in both directions. This is contradicting to some authors' findings that capital flow does not go to poor countries with more rapid growing economies, or the "allocation puzzle"(Courinchas et 2007, Prasad et 2007). In fact, as shown in this study, countries with fast growing rate have less net capital outflow than those with a lower growth rate.

Finally, trade and financial openness stimulates total capital inflow and outflow. At the same time, financial openness will also lead to higher capital flight. This is not surprising since many of the financial crisis were the result of or indirectly caused by improper liberalization in the domestic financial markets.

Therefore, this thesis provides another evidence for policy makers that cautions need to be used in the decision of opening their financial sector.

Chapter 5 Conclusion

The international movement of capital is an important topic to study under the current trend of financial liberalization and integration. Economic literature has provided much insight on the modeling of capital inflows both theoretically and empirically, however, studies on capital outflows are relatively few. The objective of this thesis is to fill up this gap in literature. I analyze empirically the pattern of four types of capital flows of 130 countries over 24 years to understand the role of economic fundamentals in shaping the direction and the magnitude of the flows.

More specifically, this thesis provides an comprehensive investigation on four types of capital flows, namely capital flight, net capital outflow, total capital inflow and total capital outflow, for groups of 108 developing countries and 22 industrial countries from 1980 to 2003. Several dimensions on the issues of capital movements are explored:

Firstly, I update the estimates on magnitude of the four types of capital flows for the 130 countries (including 22 industrial countries) with data until 2003. This is the first attempt to include both industrial and developing countries in the sample, and therefore the coverage of the sample size is the largest in capital flow studies. The estimation results show that there are great differences in the pattern between each type of capital flows as well as between flows from developing and industrial countries. In general, rich countries experience higher volumes of total capital inflow and outflow, and also have higher net capital outflows. Poor countries, which are less open in trade and financial sector, receive less capital

inflow and experience higher outward capital flight at the same time, especially those with a slow growth rate.

Secondly, from both cross-sectional and panel regression estimation results, I find that there is a non-linear relationship between capital flight and economic development. Since the coefficients on the squared terms of GDP per capita in the OLS regressions are statistically significant from zero, an inverse U-shape relationship between capital flight and income is proposed. The Hansen threshold estimation method further confirms this inverse U-shape relationship. In addition, using the Hansen threshold estimations I identify a three-stage threshold effect of economic development on capital flight: below the threshold, capital flight increases as economy grows, and decrease when the economy grows beyond that threshold. However, this threshold effect only exists between capital flight and economic development. Other three types of capital flows are all positively correlated with income.

In addition, higher economic growth rate will reduce capital flight and net capital outflows, although it will stimulate capital flows in both directions. This is contradicting to some authors' findings that capital flow does not go to poor countries with more rapid growing economies, or the "allocation puzzle"(Courinchas et 2007, Prasad et 2007). In fact, as shown in this study, countries with fast growing rate have less net capital outflow than those with a lower growth rate.

These findings are important and illuminating in the sense that they are corresponding with economic intuition. If all the countries in the sample are

divided into these three stages according to the threshold income level, we could expect that poor countries experience lowest level of capital flows in all the four types, while middle income countries experience high capital flight but moderate inflows, outflows and net capital outflows. For these middle income countries, the progress in financial liberalization and political openness may provide easier channels for capital to flee out. Therefore, policy setting and proper governance will be more crucial at this stage. The rich countries are opposite to middle income countries: they experience high levels of capital inflows, outflows, and net capital outflows, but at the same time may have secret capital flight entering into the economy. These empirical results are interesting and useful for economists and policy makers.

Furthermore, capital flows from several developing countries are examined with more detailed analysis to provide better understanding of these flows. I choose the largest two developing countries---China and India---as a case study to provide some policy implications for developing countries in tackling with capital flight and financial openness issues. Although both countries have similar economic background and take similar reform and open-up policies, the volume and pattern of capital flight from these two countries are rather different. It is interesting to find that China, with higher income and FDI inflow, experience much higher capital flight than India. One explanation may lie in the social and political factors. India is an open, participatory, multiparty democracy, while China is still an authoritarian with one party regime. Since political stability and property rights are major reasons leading to capital flight, this difference in political and social climate

may help to explain the huge difference in capital flight from these two countries. Other explanations could be that China also receives a larger capital inflow and has a higher level of integration to the global trade and financial network. Finally, the stringent control over exchange rate and the over-valuation and under-valuation of yuan also help to explain the large capital flight from China.

Finally, I also try to identify the effect of financial openness on the pattern of capital outflows. The regression results suggest that there could be a positive correlation between financial openness and capital flight, but relationship between financial openness and net capital outflow is not clear. Higher financial openness also leads to higher capital inflows but does not have a significant effect on capital outflows. This is an important implication for policy makers in emerging markets during their strides toward financial liberalization.

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Appendix A--Summary of Panel Data Studies on Capital Flight

Authors	Methodology	No. of Countries	Period	Estimation tech	Main Regressors
Cuddington (1986)	Hot money	8	1974-82	OLS	REER(+/-), FINC, RINTR, RINTRF, INFL (+)
Cuddington (1987)	Hot money	4	1974-84	OLS	REER (+), RINTRF, INFL
Dooley (1986)	Dooley	8	1977-84	OLS (pooled) with instruments	INFL(+), FINC (+), PR(-)
Ketkar and Ketkar (1989)	Hot money	3	1977-86	OLS	RINTR, RINTRF, INFL(+), REER(+), DUMG (+), SPREAD
Pastor (1990)	Residual	8	1973-87	OLS (pooled)	INFL, FINC (+), REER (+), BUDDDEF(+), YG(-), TAXGDP
Mikkelsen (1991)	Weighted average of residual and hot money	22	1978-85	OLS (pooled)	YG(-), E (FINC) (+), BUDDDEF (+)
Hermes and Lensink (1992)	Residual and asset	6	1978-88	OLS (pooled)	DEBTGDP (+), REER (+) FINC, YG, RINTRF, AIDGDP, SHDGP
Muscatelli and Hallet (1992)	Hybrid	5	1976-88	OLS	INFL(+), YG(-), BUDDDEF (+), RINTR (-), REER (+)
Henry (1996)	Residual	4	1971-87	OLS	BUDDDEF, YG, TAXGDP, REER, INFL, DEBTGDP(+), SPREAD
Murinde et al. (1996)	Residual	6	1976-91	SUR	DEBTGDP(+), REER, FINC, INFL, YG, RINTRF, AIDGDP
Lensink et al. (1998)	Residual	9	1970-91	SUR	DEBTGDP(+), REER, FINC, INFL, YG, RINTRF, AIDGDP
Hermes et al. (1999)	Residual	3	1982-95	OLS	DEBTGDP(+), REER, BUDDDEFIN, AIDGDP
Lensink et al. (2000)	Residual, hot money and Dooley	84	1971-91	EBA and CDF	BANKL (+), AIDGDP (+), FDI, PINSTAB, WAR CIVLIB (+), PRIGHTS, PARCOM (+)
Collier et al. (2001)	Residual	39	1970-90	LAD	DEBTGNP(+), REER (+), CFS(+)
Hermes and Lensink (2001)	Residual	84	1971-91	CDF	BANKL(+), AIDGDP (+), PINSTAB(+), CIVLIB(+), EGOVC (+), ETAX (+), EBUD(+), EINF(+), ERINTR(+)
Ndikumana and Boyce (2002)	Residual	30	1970-96	OLS	KF-1 (+), KF-2 (+), DEBGP (+), DEBST(+), INFL, BUDDDEF (-), FINC, VOICE (-), FREE(-), CORR (-), GOVEFF, CONT
Quan and Zak (2005)	Residual	45	1975-91	FGLS	4 political risk variables

Appendix B--Country List

Latin America and Caribbean (30)

Antigua and Barbuda
Argentina
Bahamas, The
Barbados
Belize
Bolivia
Brazil
Chile
Colombia
Costa Rica
Dominica
Dominican Republic
Ecuador
El Salvador
Grenada
Guatemala
Haiti
Honduras
Jamaica
Mexico
Nicaragua
Panama
Paraguay
Peru
St. Kitts and Nevis
St. Lucia
Suriname
Trinidad and Tobago
Uruguay
Venezuela, RB

Middle-east and North Africa (14)

Bahrain
Cyprus
Egypt, Arab Rep.
Iran, Islamic Rep.
Israel
Jordan
Kuwait
Lebanon
Libya
Morocco
Oman
Saudi Arabia
Syrian Arab Republic
Tunisia

Africa (37)

Angola
Benin
Botswana
Burkina Faso
Burundi
Cameroon
Cape Verde
Central African Republic
Chad
Comoros
Congo, Rep.
Cote d'Ivoire
Gabon
Ghana
Kenya
Lesotho
Madagascar
Mali
Mauritania
Mauritius
Mozambique
Namibia
Niger
Nigeria
Rwanda
Sao Tome and Principe
Senegal
Seychelles
Sierra Leone
South Africa
Sudan
Swaziland
Tanzania
Togo
Uganda
Zambia
Zimbabwe

South Asia (7)

Bangladesh
Bhutan
India
Maldives
Nepal
Pakistan
Sri Lanka

East Asia and Pacific (13)

China
Fiji
Indonesia
Korea, Rep.
Lao PDR
Malaysia
Papua New Guinea
Philippines
Samoa
Singapore
Solomon Islands
Thailand
Vanuatu

Europe and Central Asia(7)

Albania
Bulgaria
Hungary
Malta
Poland
Romania
Turkey

Industrial countries (22)

Australia
Austria
Belgium
Canada
Denmark
Finland
France
Germany
Greece
Iceland
Ireland
Italy
Japan
Netherlands
New Zealand
Norway
Portugal
Spain
Sweden
Switzerland
United Kingdom
United States

Appendix C--Data Description

Dependent Variables:

Capital Flight: 1980-2003. Volume of annual capital flight in measured in US dollars using the World Bank residue method. The formula for our computation is $CF = \Delta Debt + FI - CAD - \Delta FR$, where all items are annual data measured in US dollars for current year price index. Data on *foreign investment*, *current account deficit* and *change in foreign reserve* are from the World Development Indicators 2005. Data on change in external debt for most of the developing countries are from WDI, with some supplemental data from Source OECD. Data on external debt for industrial countries are from the National Accounts of Source OECD, under the term of Net lending (borrowing).

CF/GDP: 1980-2003. Capital flight as a ratio of GDP. Data on GDP for all countries are from WDI, in current year US dollars.

Net Capital Outflow: 1980-2003.Data on net capital outflow, which is represented by a current account surplus, is the sum of net exports of goods, services, net income, and net current transfers. Data are obtained from the World Development Indicators in current U.S. dollars. A positive figure, or a surplus, implies net capital outflow from and country, and a negative figure implies net capital inflow.

Net Capital Outflow/GDP: 1980-2003. Net capital inflow as a ratio to GDP. Data on GDP for all countries are from WDI, in current year US dollars.

Total Capital Inflow: 1980-2003. It is the sum of short- and long-term capital inflows as reported under FDI inflow and portfolio inflow in the balance of payment. Data on FDI and portfolio investment flows are obtained from the International Financial Statistics (Lines 78bed and 78bgd). The dataset covers 119 countries over the period of 1980-2004.

Inflow/GDP: 1980-2003. Total capital inflow as a ratio to GDP. Data on GDP for all countries are from WDI, in current year US dollars.

Total Capital Outflow: 1980-2003. Volume of annul normal capital outflow measured in current US dollars. Normal capital outflow is computed by the sum of Foreign Direct Investment outflow and portfolio outflow. Data on FDI and portfolio outflow are from the International Financial Statistics (Balance of Payment database lines 78bdd and 78bfd respectively)

Outflow/GDP: 1980-2003. Normal capital outflow as a ratio to GDP. Data on GDP for all countries are from WDI, in current year US dollars.

Explanatory Variables:

GDPPC: 1980-2003. GDP per capita based on purchasing power parity (PPP, constant 2000 international \$). GDP PPP is gross domestic product converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GDP as the U.S. dollar has in the United States. Data are from WDI in constant 2000 international dollars.

Polity: 1980-2003. It is the POLITY2 index from the Polity IV data set, with a range from -10 to 10 (-10 = high autocracy; 10 = high democracy). It is a combined polity score computed by subtracting *AUTO*C from *DEMO*C. *DEMO*C---Democracy Score (numeric) Range = 0-10 (0 = low; 10 = high) : general openness of political institutions. The 11-point Democracy scale is constructed additively. *AUTO*C---Autocracy Score (numeric) Range = 0-10 (0 = low; 10 = high): general closedness of political institutions. The 11-point Autocracy scale is constructed additively

Institutions: 1984-2000. Follow Alfaro 2006, we construct a yearly composite index using International Country Risk Guide's (ICRG) variables from the PRS Group. The composite index is the sum of the 11 indices: *investment profile*, *government stability*, *internal conflict*, *external conflict*, *no-corruption*, *non-militarized politics*, *protection from religious tensions*, *law and order*, *protection from ethnic tensions*, *democratic accountability*, and *bureaucratic quality*. This index takes values from 0 to 10 for each country, where a higher score means lower risk.

School: *Years of Schooling:* 1970, 1975, 1980, 1985, 1990, 1995, 1999. Average years of secondary, higher and total schooling in the total population. Data from Barro, Robert J. and Jong-Wha Lee (2000), *International Data on Educational Attainment: Updates and Implications*. Center for International Development at Harvard University (CID).

Cap Inx: *1980-2000*. Restrictions to Capital Mobility constructed by Edward (2005). It is a new index on capital mobility that combines information from Quinn (2003) and Mody and Murshid (2002). The new index has a scale from 0 to 100, where higher numbers denote a higher degree of capital mobility; a score of 100 denotes absolutely free capital mobility.

Kaopen: *1980-2003*. *Kaopen* is an index to measure a country's degree of capital account openness constructed by Chinn and Ito (2005). It is based on the binary dummy variables that codify the tabulation of restrictions on cross-border financial transactions reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions.

DomeC: *1980-2003*. Domestic credit to private sector (% of GDP). Domestic credit to private sector refers to financial resources provided to the private sector, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, that establish a claim for repayment. For some countries these claims include credit to public enterprises. This is used as a proxy for the level of development in the domestic financial market.

INF: 1980-2003. Annual domestic inflation rate, consumer prices (annual %)

Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a fixed basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used.

FDIin: 1980-2003. Foreign direct investment, net inflows (% of GDP) from the

WDI. Foreign direct investment are the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series shows net inflows in the reporting economy and is divided by GDP.

Growth: 1980-2003.GDP per capita growth (annual %) from the WDI. It is the annual percentage growth rate of GDP per capita based on constant local currency. GDP per capita is gross domestic product divided by midyear population.

RIR: 1980-2003. Real interest rate (%) from the WDI. It is the lending interest rate adjusted for inflation as measured by the GDP deflator.

TRADE: 1980-2003. Trade openness from the WDI. Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product.

OpenF: 1980-2000. Trade openness by gravity model fitted value constructed by

Andrew K. Rose 2002.

OVAL: 1980-1998. over/under-valuation of the exchange rate, calculated by

comparing the official exchange rate with the black-market exchange rate. A

positive figure indicates over-valuation and a negative figure indicates

undervaluation. Source: IFS.

Appendix D--Countries with Positive Capital Flight

Country	CF/GDP (%)	GDP Per Capita (US\$)	Country	CF/GDP (%)	GDP Per Capita (US\$)
Burundi	0.66	733.15	Panama	3.84	5389.93
Nigeria	7.84	817.82	Turkey	2.45	5495.43
Chad	0.80	857.84	Namibia	8.19	5838.67
Sierra Leone	2.64	890.69	Colombia	0.93	5858.95
Uganda	1.41	1007.58	Venezuela, RB	4.76	5987.47
Lao PDR	4.92	1188.65	Bulgaria	0.81	5994.00
Lesotho	9.83	1225.68	Gabon	2.67	6344.13
Sudan	1.43	1253.57	Malaysia	3.97	6410.92
Bangladesh	0.96	1279.71	Chile	0.42	6798.03
Mauritania	1.16	1568.17	Brazil	1.05	6833.45
Pakistan	0.28	1593.20	Uruguay	3.44	7685.97
Ghana	1.16	1677.61	Trinidad and Tobago	6.38	7983.49
Angola	8.58	1966.33	Mexico	0.86	8060.17
Solomon Islands	0.30	2136.17	Poland	1.20	8954.91
Cameroon	1.36	2196.54	South Africa	0.83	9734.06
Papua New Guinea	4.89	2198.86	Korea, Rep.	1.33	10983.60
Bolivia	1.26	2259.54	Argentina	3.86	11077.36
China	2.93	2426.31	Oman	2.37	11097.84
Indonesia	3.33	2450.83	Hungary	4.03	11555.16
Zimbabwe	0.58	2588.17	Malta	8.39	12094.56
Egypt, Arab Rep.	2.36	2973.61	Bahrain	5.25	14427.79
Syrian Arab Republic	5.91	2974.18	Kuwait	26.18	14471.60
Vanuatu	2.45	2975.87	Cyprus	6.08	14498.57
Morocco	0.93	3283.73	Singapore	6.19	15763.51
Ecuador	2.12	3402.70	Bahamas, The	2.87	15971.77
Swaziland	0.13	3799.05	New Zealand	0.85	17481.60
Samoa	0.18	3859.85	Spain	0.33	17620.79
Philippines	2.78	3879.24	Israel	1.19	19096.02
El Salvador	1.59	4001.85	Germany	2.46	21402.98
St. Lucia	0.01	4423.88	Australia	0.42	21584.18
Belize	2.20	4600.66	France	0.15	22063.67
Dominican Republic	0.60	4662.43	Sweden	3.64	22133.62
Thailand	0.50	4819.92	Belgium	1.04	22664.88
Tunisia	0.39	5034.49	Netherlands	2.13	23529.89
Iran, Islamic Rep.	1.75	5098.10	United States	0.49	28690.60

Notes: 70 countries with positive capital flight are listed in the order of their income levels. Capital flight is estimated using World Bank method and averaged over 1980-2003, in percentage to GDP. GDP per capita is obtained from World Development Indicators, averaged over 1980-2003 in current US dollars.

Appendix E--Countries with Negative Capital Flight

Country	CF/GDP (%)	GDP Per Capita (US\$)	Country	CF/GDP (%)	GDP Per Capita (US\$)
Tanzania	-6.92	512.41	Jordan	-0.60	4193.96
Mozambique	-4.14	715.90	Dominica	-3.55	4342.08
Mali	-3.75	741.96	Fiji	-1.47	4499.27
Niger	-4.52	884.63	Peru	-0.87	4719.33
Benin	-1.92	904.72	Paraguay	-0.34	4746.23
Burkina Faso	-1.74	919.82	Botswana	-1.90	5335.87
Madagascar	-0.88	921.67	Grenada	-3.92	6066.32
Congo, Rep.	-1.11	954.77	Romania	-0.18	6136.75
Zambia	-0.44	965.38	Costa Rica	-1.26	7034.33
Kenya	-1.24	1068.25	Mauritius	-0.43	7046.95
Nepal	-2.75	1068.42	St. Kitts and Nevis	-0.63	7783.73
Rwanda	-0.44	1157.94	Antigua and Barbuda	-0.98	8078.04
Central African Republic	-0.41	1277.06	Seychelles	-0.97	12964.98
Senegal	-4.19	1402.62	Saudi Arabia	-1.53	13395.35
Togo	-5.01	1567.93	Portugal	-0.66	14307.86
Cote d'Ivoire	-1.60	1792.44	Greece	-1.71	15203.92
India	-0.16	1817.50	Ireland	-3.16	18780.77
Comoros	-0.41	1949.66	Finland	-1.90	21463.01
Haiti	-0.57	2310.67	Italy	-0.49	21642.57
Honduras	-0.04	2514.23	United Kingdom	-1.71	21990.71
Sri Lanka	-0.72	2629.61	Japan	-0.46	22729.87
Albania	-2.37	3195.04	Canada	-1.47	23174.22
Guatemala	-1.81	3532.74	Austria	-0.27	23818.18
Jamaica	-0.14	3538.81	Iceland	-0.56	24487.00
Nicaragua	-1.28	3574.57	Denmark	-0.49	24560.62
Cape Verde	-0.71	3869.05	Norway	-1.46	27600.90
Lebanon	-5.70	3911.45	Switzerland	-2.56	28994.10

Notes: 54 countries with positive capital flight are listed in the order of their income levels. Capital flight is estimated using World Bank method and averaged over 1980-2003, in percentage to GDP. GDP per capita is obtained from World Development Indicators, averaged over 1980-2003 in current US dollars.