Essays on Capital Flows, Crises and Economic Performance

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Contents

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Abstract

This thesis explores three important factors that have been central to the pursuit of economic development in developing countries, particularly those in Africa. These are capital flows, economic integration and financial crises.

Chapter 1 examines the causes and consequences of capital flight in African countries. Building on standard portfolio choice model, the study links the phenomenon of capital flight to the domestic investment climate (broadly defined) and shows that African agents move their portfolios abroad as a result of a deteriorating domestic investment climate where the risk-adjusted rate of return is unfavourable. The results presented suggest that economic risk, policy distortions and the poor profitability of African investments explain the variation in capital flight. In addition, employing a PVAR and its corresponding impulse responses, the chapter shows that capital flight shocks worsen economic performance.

Chapter 2 explores the (independent) effects of crises and openness on a large sample of African countries using dynamic panel techniques. Focusing on sudden stops, currency, twin and sovereign debt crises, the chapter shows that economic crises are associated with growth collapses in Africa. In contrast, economic openness is found to be beneficial to growth. More importantly, we find that, consistent with standard Mundell-Flemming type models and sticky-price open economy models, greater openness to trade and financial flows mitigates the adverse effects of crises.

In the final chapter, we examine whether capital flows such as FDI, foreign aid and migrant remittances crowd-in or crowd-out domestic investment in developing countries. Applying recently developed panel cointegration techniques which can handle cross-sectional heterogeneity, serial correlation and endogeneity, we find that FDI and remittances have a positive and significant effect on domestic investment in the long-run while aid tends to act as a substitute for investment. We also conduct panel Granger causality analysis and find that the effect of FDI on investment is both transitory as well as permanent. That is, it tends to crowd-in domestic investment both in the short-run and in the long-run. We do not find any causal links between foreign aid and investment. The results show that, while remittances do not have causal effects on investment in the short-run, there is a bidirectional (causal) relationship between the two in the long-run.

Declaration

I declare that no portion of the work referred to in the thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

Copyright Statement

Dedication

To my dear mother [Allaha daayo]
&
To the loving memory of my father [Allaha u naxariisto]

Acknowledgement

Pursuing a doctoral degree in economics is a long and sometimes tough journey. I would like to thank all those who made my journey a joyful one. In particular, I am greatly indebted to my supervisors, Dr Bernard Walters and Dr Katsushi Imai, for their support and guidance throughout my research. I wish also to thank the School of Social Sciences and the Economics Department for funding my PhD.

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During my PhD studies, I had the opportunity to present my research (including two of the chapters in this thesis) at international conferences including the International Economic Association 16th World Congress (Beijing, China) and the CSAE 25th Conference on Economic Development in Africa (University of Oxford) as well as at a number of seminars at the University of Manchester. I wish to acknowledge the suggestions, critics and comments I received from the participants.

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I wish to pay tribute to my dear mother and late father for being a great source of inspiration to me. This thesis is dedicated to them. My heartfelt thanks and appreciation goes to my adoptive mother, Zainab, without whom I would not be where I am today.

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Chapter 1

Introduction

> "Despite a lower level of wealth per worker than any other region, African wealth owners have chosen to locate 39% of their portfolios outside Africa".
>
> - Collier and Gunning (1999; pp 92-93)

The role and movement of capital flows has, for a long time, been a hotly contested issue among economists and policymakers. During the Bretton Wood conference of 1944, for example, the principal architects of the global financial order, John Maynard Keynes and Harry Dexter White, were extremely concerned with the mobility of capital across borders. In their view, "capital flight from poorer countries needed to be regulated in order to reduce the scale of international financial crises, enhance the policy autonomy of poorer countries and preserve a stable exchange rate" (Helleiner, 2005: 289-90).

Almost 70 years on, developing countries, particularly those in Sub-Saharan Africa (SSA), are experiencing a substantial outflow of domestic private capital. Evidence shows that SSA has the highest incidence of capital outflows relative to both GDP and overall private wealth as close to half of all private portfolios are held outside the region (Collier et al. 2001; Collier and Gunning, 1999). A recent study suggests that around $700 billion has left the region between 1970 and 2008 (Ndikumana and Boyce, 2011). This is in spite of the fact that the continent suffers from chronic internal and external imbalances, compelling it to rely heavily on foreign savings. In particular, it is highly dependent on aid to finance a consider-

able portion of its investment and import demand. Similarly, most countries in the region have accumulated a substantial amount of foreign borrowing to cover their domestic imbalances.

In order to reduce the overreliance on foreign savings and at the same time to contain capital flight, virtually all African countries have put in place policies that entail trade and financial liberalisation. The basic premise of these reforms was that increased international trade and financial integration could propel African economies to a high-growth trajectory. At the same time, many developing countries, including most African economies, have implemented policies and measures aimed at attracting foreign direct investment (FDI) into their economies while remittance flows have become an indispensable source of development finance in the developing world.

Nonetheless, like other developing countries in other regions, African economies have also encountered their share of economic and financial crises. As recent global events illustrate, crises can have devastating effects on economic activity and can hit countries with strong, as well as those with weak, macroeconomic fundamentals. Thus, economists and policymakers are increasingly concerned with understanding the genesis, evolution and consequences of economic crises.

In light of these preliminary observations, this thesis is broadly concerned with capital flows, openness, crises and economic performance. It consists of three independent essays with particular reference to African countries. In what follows, we summarise the content of each of the three substantive chapters.

Chapter 2: *Africa's Growth Tragedy Revisited: On the Causes and Consequences of Capital Flight*

If basic economic theory is anything to go by, then capital-scarce less developed countries (LDCs) should be able to retain own domestic capital since the marginal returns are higher there. Capital flight, the outflow of foreign exchange from poorer countries, seems to defy that logic. The objective of this essay is to examine the

determinants and output costs of these outflows in the case of SSA.

In the first part of the essay, we provide a systematic account of why African agents engage in capital flight by adopting a portfolio-choice framework. In particular, we link African capital outflows to the attractiveness of the domestic investment climate and postulate that African agents consider all available information to make optimal choices regarding whether to shift their wealth abroad or not. For the purpose of our empirical analysis, we identify four dimensions of the domestic investment climate at the macroeconomic level, which we argue are important determinants of private capital outflows. The impact of each dimension on capital flight is empirically tested using annual panel data for 37 SSA countries over the 1980-2000 period. The results suggest that an improved investment climate in the form of more profitable opportunities, a sound macroeconomic environment, less economic risk and good institutions are associated with lower capital flight in Africa.

In the second part of the essay, we estimate a dynamic growth model using the bias corrected least-squares dummy variable estimator developed by Kiviet (1995; 1999), Bun and Kiviet (2003) and extended by Bruno (2005) on a panel dataset for 37 SSA economies over the 1980-2007 period, and show that capital flight is associated with a poor growth performance. To capture the dynamic response of domestic investment and economic growth to capital flight episodes, we estimate a bivariate panel vector autoregression (PVAR) model and its associated impulse response functions which confirm that capital flight is harmful to both domestic capital formation and growth.

Chapter 3: *Crises and Growth Collapses in Africa: The Role of Economic Integration*

In the past few decades, many African countries have implemented policies of trade and financial liberalisation. At same time, many of them have encountered economic and financial crises. This chapter explores the (independent) effects of crises and openness on a large sample of African countries using dynamic panel techniques.

More specifically, it explores whether greater openness to trade and financial flows exacerbates or lessens the adverse effects of crises. The chapter is particularly interested in four different types of crises, namely, sudden stops, currency, twin and sovereign debt crises. To our knowledge, this is the first attempt in understanding the effects of these types of crises in the context of African countries. Most of the existing literature focuses on mainly emerging markets, even though many African countries have also been subject to these types of crises.

The study shows that crises are associated with growth collapses in Africa. In contrast, economic openness is found to be beneficial to growth. More importantly, we find that, consistent with standard Mundell-Flemming type models, greater openness to trade and financial flows mitigate the adverse effects of crises. We identify three important channels through which this can occur. First, openness (particularly to trade but also to financial flows) tends to lessen the adjustment costs associated with external crises. This suggests that it is associated with quicker recoveries facilitated by higher output in the tradable sector which would keep the fall in domestic demand in check. Second, at times of crises, open economies tend to enjoy more room for manoeuvre (e.g. trade credits) than closed ones. Finally, openness is associated with higher solvency through greater willingness to meet outstanding external liabilities for fear of sanctions in case of default.

Chapter 4: *Capital Flows and Domestic Investment: Evidence from Panel Cointegration*

Capital flows, both official and private, play a pivotal role in financing development in poorer countries. The three most important types are official aid, FDI and remittances. The objective of this chapter is to examine whether these flows "crowd-in" or "crowd-out" domestic investment in developing countries. The study uses recently developed panel cointegration techniques on a balanced panel of 47 countries, including 21 African economies. More specifically, we pay a particular attention to the time series properties of the variables under study. At the same time, we take

into account issues such as cross-sectional dependence, structural breaks and regime shifts.

We begin by assessing whether capital flows and domestic investment form a stable long-run relationship. We show that this is in fact the case. We then estimate the nature of this relationship using a range of estimators and find that FDI and remittances have a robust crowding-in effect on domestic investment in the long-run. On the contrary, foreign aid has a crowding-out effect on investment. We then conduct panel Granger causality analysis and find that foreign aid does not have a causal effect on investment and *vice versa*.

On the other hand, we show that there is a two-way causality between remittances and investment in the long-run but no causal link in the short-run. That is to say, increases in investment are a *result of* as well as a *cause of* increases in remittances in the long-run. Two mechanisms are highlighted: remittances could be used to enhance human capital (e.g. education and health), this in turn could improve the (rate and/or productivity of) domestic investment in the long-run. In turn, increases in the accumulation of capital investments by remittance-receiving households may cause more remittances in the long-run (assuming that self-interest dominates altruistic motives).

With respect to FDI, the study finds that there is a bi-directional relationship between FDI and investment in the short-run. This suggests that, on the one hand, the FDI activity may crowd-in domestic firms by, for example, demanding more of their products. On the other hand, the FDI activity may itself take place as a result of increased domestic investment which the multinational corporation may interpret as a reflection of the soundness of the economy. In the long-run, however, we find that there is a unidirectional causal link between FDI and domestic investment, running from FDI to investment. Overall, we interpret these findings as evidence that FDI has both transitory positive effects as well as permanent beneficial effects on investment.

Chapter 2

Africa's Growth Tragedy Revisited: On the Causes and Consequences of Capital Flight

2.1 Introduction

Sub-Saharan Africa's (SSA) economic performance for the past four decades has been characterised by economic stagnation. As a result, the region has consistently suffered from balance of payment disequilibria, dwindling government finances, increasing macroeconomic and political instability and, as a consequence, a higher incidence of poverty (Artadi and Sala-i-Martin, 2003; Collier, 2006). These persistent economic difficulties have meant that Africa has become heavily reliant on external financing. More specifically, the region is highly dependent on aid for a considerable portion of its investments and imports. Similarly, most of the countries in the region have been identified by the Highly Indebted Poor Countries Initiative as having unsustainably high levels of debt.

However, paradoxically, the significant inflow of official capital (debt and aid) to SSA has been accompanied by a substantial outflow of domestic private capital. Compared to other developing regions, it has been shown that SSA has the highest incidence of capital flight relative to both GDP and overall private wealth; close to 40 percent of all private portfolios are held outside the region (Collier et al. 2001; Collier and Gunning, 1999). A recent study by Ndikumana and Boyce (2008)

shows that the magnitude of SSA portfolios held abroad surpasses its total liabilities, making it a net creditor to the rest of the world.

A natural question that arises is: what factors are driving private capital out of Africa? This question has attracted a large body of research which, broadly speaking, identifies macroeconomic and political conditions as the main cause of African capital flight (see for example, Lensink et al. 1998; Collier et al. 2001; Ndikumana and Boyce, 2003; Ndiaye 2009). While these contributions have enhanced our understanding of this phenomenon, they mostly fail to consider non-traditional determinants such as governance and the structural features of the African countries.

We attempt to remedy this shortcoming by providing a systematic account of why African agents engage in capital flight. We adopt a portfolio-choice framework and link African capital flight to the attractiveness of the domestic investment climate. The importance of the domestic investment climate in attracting foreign investment has long been recognised in the literature. This chapter addresses the related but neglected issue, namely the role the domestic investment climate can play in determining whether local entrepreneurs retain their portfolios domestically.

The investment climate is defined as the structural, institutional, and overall macroeconomic environments which confront economic agents, whether they be firms, entrepreneurs or individuals. We argue that these location-specific factors determine not only the incentive structures facing agents, but also the (profitable) opportunities available within the domestic economy (World Bank, 2005). For the purpose of our empirical analysis, we identify four dimensions of the domestic investment climate at the macroeconomic level. The impact of each dimension on capital flight is empirically tested using annual panel data for 37 SSA countries over the 1980-2000 period. The empirical analysis suggests that an improved investment climate in the form of more profitable opportunities, a sound macroeconomic environment, less economic risk and good institutions are associated with lower capital flight in Africa. This finding is robust to the exclusion of outliers, sub-samples, and

to endogeneity concerns.

We also explore the macroeconomic consequences of capital flight. To this end, we conduct two types of analyses. First, we augment a fairly standard growth regression with our measure of capital flight using recently developed dynamic panel techniques on a sample of 37 SSA countries over the period 1980-2007. Second, we estimate a panel vector autoregression (PVAR) model and generate its corresponding impulse response functions in order to unravel how economic growth and domestic investment react to capital flight shocks. The results suggest that capital flight is associated with poorer economic performance.

The chapter is organised as follows. Section 2 sets out the concept and measurement of capital flight. Section 3 examines the drivers of capital flight and contains the analytical framework, presenting the data, econometric model and results. Section 4 examines the consequences of capital flight, describing the methods and discussing the results. Finally, Section 5 concludes.

2.2 Capital flight: Concepts, measurement and estimates

> "Capital flight is -like the proverbial elephant- easier to identify than to define". Lessard and Williamson, 1987. p.1

There is a vast and growing theoretical and empirical literature on capital flight. However, providing a rigorous definition of this concept has proven a difficult task even though the late economic historian Charles Kindleberger traces it back to the Revocation of the Edict of Nantes in 1685 (Kindleberger, 1987). Essentially, two strategies have been adopted when trying to define capital flight; one strand of the literature attempts to distinguish it from 'normal' capital outflows in terms of *motive*. This 'motivational' definition was first used by Kindleberger in his well-known work on the nature of short-term capital movements where he viewed capital flight

as 'abnormal' outflows "propelled from a country...by ...any one or more of a complex list of fears and suspicions" (Kindleberger, 1937, p. 158 quoted in Lessard and Williamson, 1987 p. 202). This implies that capital flight, unlike normal portfolio adjustments, is driven by "a significant perceived deterioration in risk-return profiles associated with assets located in a particular country" (Walter, 1987 p. 105). Policy induced distortions such as anticipated tax hikes, expected devaluation and expropriation of assets have been identified as some of the factors that propel capital to 'flee'.

According to Lessard and Williamson (1987, p. 203) capital flight is "that which flees from the perception of abnormal risks at home". Some researchers within this strand further argue that the difference between normal capital outflows and capital flight lies in the fact that the latter is in conflict with the interests of the country in question by imposing an economic cost on the whole economy and violating the "social contract" (Walter, 1987). Hence, the 'motivational' definition implies that investors from capital-scarce LDCs move their capital abroad not in pursuit of better oppurtunities elswhere but rather in fear of higher perceived risks at home. As a result, the action of an American acquiring assets abroad would be termed 'normal' capital outflows whereas a Kenyan purchasing those same assets would be regarded as engaging in 'capital flight'.

A formidable weakness with the above definition, however, is that it is impossible to empirically isolate 'normal' capital outflows from capital flight in terms of *motives*. In fact, the above literature has so far failed to device a measure of capital flight that is able to successfully distinguish 'distortion-induced abnormal outflows' from ordinary portfolio diversifications (see also Gordon and Levine, 1989).

Cuddington (1986) on the other hand confines capital flight to only short term, speculative or 'hot money' flows that leave a given economy in response to either risks or deterioration of expected returns to investment. According to Cuddington (1986), hot money flows tend to respond *swiftly* to "political and financial crises,

heavier taxes .. tightning of capital controls, or major devaluation[s] .. or actual or incipient hyperinflation" (p. 2). In addition, he postulates that short-term flows are more sensative to adverse shocks since they can easily be moved to other favourable destinations especially given the nature of modern capital markets. But what Cuddington seems to ignore is the fact that investors who are scaping adverse domestic shocks may also acquire real assets abroad (eg. land, equipments etc) or purchase longer-term stocks, government bonds and deposits that have maturities greater than 1 year (Chang et al. 1997). Furthermore, long-term capital may also react swiftly to macroeconomic changes since the modern global financial markets eliminate to a greater extent any lequidity loss associated with acquiring long-term bonds or equities (ibid). In particular, long-term securities such as bonds and stocks can increasingly be traded in secondary markets almost as easily as short-term instruments such as T-Bills and commertial papers.

The second strand of the literature avoids the distinction between 'normal' capital outflows and capital flight and defines all build up of foreign assets from capital scarce countries as capital flight. This 'contextual' definition, first proposed by the World Bank (1985), argues that capital flight is inherently related to the notion of national welfare loss. In particular, it is stressed that for a country - unable to cover its investment, import and government budgetary requirements or service its liabilities – any systematic capital outflows represent a great constraint on its economic development potential. This 'contextual' definition makes the measurement of capital flight more tractable and fits well with our view that capital flight diverts resources away from domestic real investment in capital-starved economies such as those in SSA. In their seminal paper on the consquences of capital flight, Deppler and Williamson (1987) essert the following:

> "the fundamental economic concern about capital flight ... is that it reduces welfare in the sense that it leads to a net loss in the total real resources available to an economy for investment and growth. That is, capital flight is viewed as a diversion of domestic savings away from fi-

> nancing domestic real investment and in favor of foreign financial investment. As a result, the pace of growth and development of the economy is retarded from what it otherwise would have been" (p. 52).

The above is quoted at length because it captures one of the main motivations behind the present research. But of course a critical reader may question the validity of the assumption that capital moved from an LDC economy diverts resources away from domestic investment. Gordon and Levine (1989) for example argue that domestic savings could be used for consumption instead of investment or alternatively it could be used to purchase inflation 'hedges' (e.g. real estate) with little impact on overall economic growth. Even if this was the case, however, the profound detrimental effects of 'capital flight' go beyond reductions in domestic savings and include less government revenues, increased macroeconomic instability through herding behaviour, and widened macroeconomic imbalances.

Thus, we define capital flight as the outflow of foreign exchange from poorer countries so our aim is to attempt to explain why any resident capital (be it reported or unreported, long or short-term) would be moved from African economies with limited capital and where presumably the marginal product is higher.

Since the accumulation of foreign assets by agents in LDCs may not be (properly) captured in official statistics, one can residually derive the net increases in the external assets by turning to the well-known fundamental balance of payments (BOP) identity for an open economy. This states that changes in official reserves (RES) must be equal to the sum of the current account (CA), capital account (KA), net errors and omissions (EO):

$$\Delta RES = CA + KA + EO \tag{2.1}$$

For ease of exposition, the capital account, KA[1], can be split into official capital

[1]The flows can be divided into those that are destined for the official sector and those of the private sector. In the first case, we are essentially concerned with increases in external indebtedness ($\Delta DEBT$), while in the latter we are concerned with net equity flows of the private sector (NFI).

inflows ($\Delta DEBT$) plus private inflows (NFI), minus outflows or capital flight (CF):

$$KA = \Delta DEBT + NFI - CF \tag{2.2}$$

Substituting KA from (2.2) into (2.1) and rearranging yields (with $EO = 0$ since it is a balancing item):

$$CF = \Delta DEBT + NFI + CA - \Delta RES \tag{2.3}$$

This is the most widely used approach when estimating the phenomenon of capital flight. It was pioneered by the World Bank (1985) and is the broadest and most reliable measure available. It indicates that any increase in private external assets (capital flight) must be offset by increases in official flows (debt), by net capital flows from foreign investment, by a current account surplus, or by reductions in reserves. This relationship holds since it is directly based on the BOP accounting identity. When expression (2.3) > 0, we have capital flight and when it is < 0 we have a reversal of previous outflows[2].

Our estimates based on the World Bank (1985, 2002) residual method are shown in Figure 2.1. To capture the oppurtunity cost of the outflows, we express the figures as a percentage of GDP. The estimates suggest that the opportunity cost, in terms of foregone output, has been substantial for many SSA countries - on average about 11% of GDP. Gabon is the only country to have had a reversal of previous outflows. The four countries with the highest outflows (more than 20%) are Liberia, Guinea-Bissau, Mozambique, Mauritani and Malawi. These countries, particularly 3 first, have one thing in common; they have experienced substantial political instability, civil conflicts and military coups.

In what follows, we analyse the causes and consequences of private capital outflows from SSA.

[2]For details on the measurement of capital flight, see, World Bank (2002, p80-81).

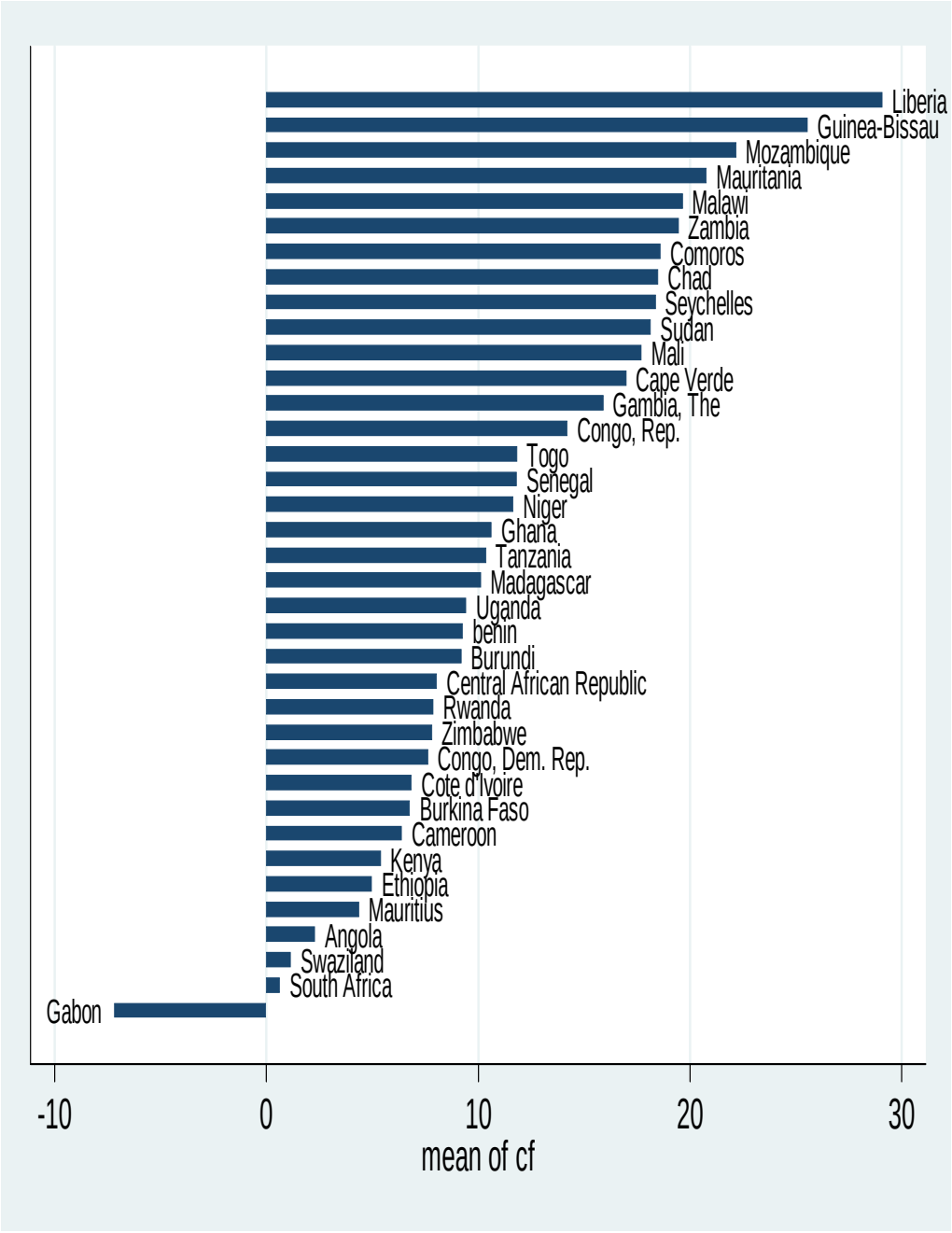

Figure 2.1: Average CF (% GDP) from Africa

2.3 Causes of capital flight: Theoretical considerations

The standard portfolio choice model, in which rational agents consider available information to make optimal portfolio decisions, provides the analytical framework for this chapter. Hence, it is assumed that wealth holders diversify their portfolio holdings by acquiring a range of assets whose demand is influenced by relative risk-return considerations.

Drawing on the theoretical contributions by Sheets (1995), Collier et al. (2001) and Le and Zak (2006), we link the acquisition of foreign assets (i.e. capital flight episodes) to the risk-return features prevailing in African countries. Sheets (1995) is one of the first to explicitly apply a portfolio choice framework in the context of capital flight. His model suggests that capital flight is determined by the usual risk diversification motive along with two important incentives, namely relative risk and return differentials. The first incentive implies that capital flight arises due to factors that raise the relative riskiness of the domestic economy. The second incentive highlights factors that affect the macroeconomic environment adversely and thus reduce the risk-adjusted returns to domestic assets.

Along these lines, Le and Zak (2006) show that the decision to invest domestically is a function of the risk-return features prevailing in a given country relative to world markets. More specifically, agents will retain their portfolio holdings within their own country when domestic profitability improves relative to abroad and when economic risk decreases.

In this study, we generalise the risk-return characteristics to include the whole domestic investment climate. In particular, we postulate that capital flight simply takes place in response to deteriorating domestic economic conditions where the risk-adjusted rate of return to investments is unfavourable. In the following subsection, we identify four factors that influence the domestic investment climate, and hence the decision of agents whether to engage in capital flight.

2.3.1 A poor investment climate and capital flight

Our central hypothesis is that a poor domestic investment climate changes the relative risk and returns of domestically held assets in such a way that, following the implications of portfolio choice theory, incentives for capital flight are created. We distinguish four factors that, at the macroeconomic level, influence the investment climate and hence the likelihood of capital flight: risk-return features; institutions and political risk; structural features; and the composition of capital flows.

Risk and return features

We posit that the relative riskiness and profitability of domestic investments determines whether or not capital flight takes place. An important contributor to the relative riskiness of LDCs is indebtedness. It is generally accepted that a high debt burden increases insecurity as to future tax and public investment levels, through its effects on the debt service capacity of the government. This, in turn, may translate into a greater likelihood of budget deficits, possible inflationary financing, and exchange rate volatility - all of which disadvantage domestic assets relative to foreign assets. Similarly, a high level of indebtedness increases the country's vulnerability to external shocks, which heightens uncertainty over expected future returns to investments. There is overwhelming evidence in support of the hypothesis that indebtedness increases risk and thus causes capital flight in LDCs (see for example, Cerra et al. 2008; Ndikumana and Boyce, 2003; Collier et al. 2001; Lensink et al. 2000).

Another source of increased riskiness in developing countries is the likelihood of economic crises. In particular, low levels of international reserves, which imply a higher probability of a balance of payment crisis, can adversely affect the domestic investment climate. Similarly, unsustainable budget deficits, which may cause agents to lose confidence in the ability of the government to manage the economy, have

been identified as important sources of uncertainty. A number of studies provide empirical evidence that risk indicators such as low levels of official reserves and weak government budget positions are associated with increased capital flight (see for example, Hermes and Lensink, 2001; Cerra at al. 2008).

Furthermore, the specific macroeconomic policies pursued by the government directly influence the riskiness of the domestic economy and hence the investment climate. For instance, macroeconomic instability in the form of high and volatile inflation erodes the real value of domestic assets. Similarly, poor exchange rate management, such as an overvalued currency or a black market premium, may contribute to economic uncertainty, as they generate incorrect signals to economic agents (Edwards, 1989). The existing evidence suggests that currency overvaluation, in particular, can be harmful since it may result in lower economic growth, a higher probability of speculative attacks, shortages of foreign exchange and balance of payments crises (Rodrik, 2008). These distortionary macroeconomic policies have (at least historically) been the norm rather than the exception in most African countries (Collier and Gunning, 1999). The literature on the determinants of capital flight identifies macroeconomic instability and currency overvaluation as important factors that explain cross-country variation in capital flight (see for example, Lensink et al. 1998; Le and Zak, 2006; Ndiaye, 2009).

An important factor that may prompt domestic capital to flee is low domestic returns to investments. A standard proxy for the relative profitability of domestic investments is the interest rate differential between the domestic and world markets (proxied by the US Treasury Bill rate). A large differential implies that domestic agents, in an attempt to maximise their portfolios, substitute into foreign assets if the yield on short-term instruments is higher. That capital flight may take place in response to poor returns to domestic investments is supported by numerous studies. For example, Collier et al. (2004) report that in their sample of countries returns to capital abroad and domestic economic as well as political conditions determine

capital flight. Fedderke and Liu (2002) find that domestic and foreign rates of return play a crucial role in explaining capital outflows from South Africa.

Institutions and political risk

It is largely accepted that good quality institutions are essential for the domestic investment climate. As emphasised by North (1990), institutions, both formal and informal, arise as a result of agents' attempts to reduce transaction costs and uncertainties. Hence, 'high quality' institutions are associated with higher rates of return since they lower transaction costs.

Recent contributions (Acemoglu and Johnson, 2005; Acemoglu et al. 2001) show that institutions directly influence whether economic agents engage in productive investments or not. The decision to invest domestically, for example, depends on whether property rights and other investment-promoting institutions are in place (North, 1990). In the absence of these, agents must internalise additional costs (for example, protection of own capital investments) or other payments in the case of corruption. In addition, uncertainty about property rights causes a wedge between the marginal product of capital and its rate of return (Svensson, 1998).

Moreover, an increasing body of evidence shows that improvements in the institutional framework are associated with productivity gains (Hall and Jones, 1999). It has been established that countries with weak institutions tend to pursue distortionary macroeconomic policies (e.g. high and variable inflation, large budget deficits and misaligned exchange rates) which worsen the domestic investment climate (Acemoglu et al. 2003).

The existing empirical evidence supports the view that a 'good' institutional development is associated with a lower incidence of capital flight (see for example, Lensink et al. 2000; Collier et al. 2004; Le and Zak, 2006; Cerra et al. 2008).

Structural features

In this study, we argue that the structural features of SSA economies may make them susceptible to particular shocks, which may adversely affect their economic performance. For example, low export diversification and high primary commodity dependence have been found to increase African economies' vulnerability to terms of trade shocks (Collier and Dollar, 2004). Similarly, as emphasised by the 'resource curse' literature, natural resource abundance and the rents it generates may have contributed to Africa's corruption, political instability and civil conflicts (Collier and Hoeffler, 1998; Sachs and Warner, 2001). However, if the rents are used for productive investments (e.g. Botswana), the 'curse' should disappear and resources would then be associated with better domestic investment environments.

A profound change to the structures of African countries in the past two decades is the increased liberalisation of trade. However, the impact of trade openness on the domestic investment climate is ambiguous a priori. To the extent that increased integration imports external volatility, the effects would be negative. If, however, trade openness results in static and/or dynamic gains in the form of better allocation of resources, then improved productivity and more profitable investment opportunities would follow. A contribution of this study is that it attempts to investigate how African countries' structural features may relate to the phenomenon of capital flight from the region.

The composition of capital flows

The type and composition of capital flows to SSA may have consequences for the domestic investment climate. For most African countries, foreign aid is still one of the most important sources of finance. However, the effects of aid on the investment climate are highly controversial. Some argue (for example, Knack, 2001) that aid may be detrimental to the investment climate of recipient countries as it tends to

encourage corruption and rent-seeking, while others (for example, Hansen and Tarp, 2001) suggest that it improves the economic performance of recipient economies. Empirically, the literature on capital flight has produced mixed results; for example, Lensink et al. (2000), Hermes and Lensink (2001) and Collier et al. (2004) identify development aid as a significant determinant of capital flight, whereas Cerra et al. (2008) find the opposite. Some types of capital flows, such as short-term borrowing, are known to weaken the investment climate, since they encourage economic risk (Rodrik and Velasco, 1999). Ndiaye (2009) finds evidence that short-term debt fuels capital flight in his sample of African countries. The impact of other types of private capital flows such as FDI, on capital flight is ambiguous. Some studies (for example, Kant, 1996) suggest that FDI reduces capital flight through its beneficial effect on the domestic investment climate, which gains empirical support in the work of Harrigan et al. (2002) and Cerra et al. (2008).

In summary, we hypothesise that capital flight from Africa is linked to the region's poor domestic investment climate. In what follows, we test this empirically.

2.3.2 Data and empirical strategy

The empirical strategy we adopt consists of first estimating a baseline model and then augmenting it with indicators that capture the different dimensions of the domestic investment climate. In doing so, we adopt an incremental approach examining one dimension at a time. The baseline model consists of a set of variables that capture the policy environment and the risk-return features of the countries in the sample. Unless otherwise stated, all the data are drawn from the World Bank's World Development Indicators (2009) and the baseline model is given by:

$$CF_{it} = \beta_0 + risk_{it}\beta' + \gamma return_{it} + \varpi Y_{it} + \eta_i + \zeta_t + \varepsilon_{it} \tag{2.4}$$

where CF_{it} denotes capital flight as a percentage of GDP, η_i is time invariant

country-specific fixed effect, ζ_t is a time specific effect, ε_{it} is the error term and i and t represent country and time period, respectively. The vector, $risk_{it}$, contains distortionary policy indicators such as macroeconomic instability (proxied by the log of CPI inflation), exchange rate overvaluation (measured by the degree to which the domestic currency deviates from Purchasing Power Parity), and the black market premium - a symptom of a tightly controlled foreign exchange market (measured by the ratio of the parallel exchange rate to the official rate), the latter two variables are sourced from the Global Development Network Growth database (2009). As additional indicators of economic risk, we use the level of foreign reserves (measured as months of imports) and indebtedness (measured by net flows of long-term debt as a percentage of GDP). We use this particular indebtedness indicator since it captures new borrowing (including IMF purchases), debt service and interest payments. Hence it is closely linked with changes in domestic economic conditions and provides a good reflection of the extent to which domestic assets are viewed 'risky'.

To capture the rate of return on investment in each African country ($return_{it}$), we use the deposit rate differential between that country and that of world markets (proxied by the US T-bill rate), adjusted for exchange rate changes. We also control for the overall level of economic development using the logarithm of real per capita income denoted by Y_{it}.

Our dataset covers 37 SSA economies over the period 1980-2000 as consistent data on our proxies for macroeconomic distortions are only available till 2000. The definitions and sources for all the variables, along with a list of the countries are provided in Table 2.13 in Appendix 2A.

To investigate the role institutions play in explaining capital flight from Africa, we add to the baseline specification a set of institutional and political risk variables, namely property rights, institutional quality, political stability, governance, and ethnic fractionalisation. Following Acemoglu et al. (2003), we use Polity IV's constraint on the executive as a measure of property rights protection. This variable

captures procedural rules which constrain political leaders and other powerful elites and thus is closely linked with the security of private property rights (Acemoglu et al. 2003).

To capture the quality of African political institutions, we use 'institutional quality' which is a summary index based on three International Country Risk Guide (ICRG) institutional sub-components, namely: corruption; rule of law; and bureaucratic quality, scaled 0-1. 'Political stability' is proxied by the average Freedom House political rights and civil liberty scores (both variables are drawn from Hadenius and Teorell, 2007). 'Governance' is measured by the Polity2 score, which captures the constraints placed on the chief executive, the competitiveness of political participation, and the openness of executive recruitment. A higher value of any of the institutional measures implies a better quality of institutions, meaning stronger property rights, less likelihood for political instability etc. Finally, we also control for ethnic fractionalisation since Easterly and Levine (1997) link it to Africa's 'growth tragedy'.

To examine how the structural features of African countries relate to the phenomenon of capital flight, the baseline specification is augmented with a set of structural variables: the terms of trade; primary export dependence (constructed by Sachs and Warner, 2000 and drawn from Azam and Hoeffler, 2002); government size (captured by government expenditure as a percentage of GDP); trade openness (imports plus exports as percent of GDP); and resource abundance (measured by mineral exports as a percentage of total exports: from IMF DOTS, 2009).

Finally, to examine how the composition of inflows impacts on the extent of capital flight, we add three capital flow variables to the baseline specification: foreign aid (measured in terms of a percentage of GNI); FDI (expressed in percentage of GNP); and short term debt (measured as a percentage of long term debt, the World Bank's Global Development Finance database, 2009).

We first estimate equation (2.4) using the pooled ordinary least squares estima-

tor (POLS) with robust standard errors. However, since the POLS estimator yields biased results in the presence of unobserved country-specific effects, we also apply conventional static panel models such as random (RE) and fixed effects (FE). The RE estimator requires that the country-specific effect is uncorrelated with the independent variables while the FE is consistent irrespective of whether this is true or not.

Since standard macroeconomic datasets are prone to panel heteroscedasticity and serial correlation, we test for group-wise heteroscedasticity and serial correlation using the modified Wald test (Greene, 2000) and the Wooldridge (2002) test, respectively. While both FE and RE can handle panel heteroscedasticity, neither overcomes serial correlation, which, if not properly addressed, leads to consistent but inefficient results (Baltagi, 2006). Throughout, (see Tables 2.1-2.4 below), we find that the within country residuals are serially correlated and the null hypothesis of homoscedasticity is strongly rejected. To take account of these potential biases, we use Feasible Generalised Least Squares (FGLS), which allows estimation in the presence of autocorrelation within panels and heteroskedasticity and cross-sectional correlation across panels.

Tables 2.14 and 2.15 report respectively the summary statistics and pair wise correlations of the variables. The mean of capital flight for the sample is 13.3 percent of GDP and ranges in value between -95.4 and 128.4 percent, both for Liberia. Table 2.14 also shows that, on average, international reserves in Africa are below the recommended level of 3 - 4 months of import cover while inflation amounts to 6 percent.

The correlation matrix shows that capital flight has the expected association with all the baseline variables except return differential. As expected, capital flight is inversely correlated with the measures of institutional development. At the same time, it is positively associated with government size, trade openness, primary commodity dependence and terms of trade, and negatively correlated with natural resources.

Moreover, the correlation between capital flight and all the measures of capital flows is positive, somewhat consistent with previous results.

2.3.3 Empirical results

Baseline model

Table 2.1 presents our baseline model which controls for the level of economic development (log per capita income), economic risk (level of foreign reserves and indebtedness) and macroeconomic distortionary policies (black market premium, macroeconomic instability [log CPI inflation] and currency overvaluation) and profitability (return differential). In all specifications, the results indicate that the higher the level of economic development in the form of increased per capita incomes, the lower the incentives for capital flight. The regressions also show that reserve holdings have a negative and significant association with capital flight, presumably because they help buffer the economy from balance of payments crises. As in Ndikumana and Boyce (2008) and Collier et al. (2001), we find that higher levels of indebtedness are associated with increased capital flight; this may reflect the relative riskiness of African countries.

As expected, we find that currency overvaluation helps to explain the occurrence of capital flight in Africa. The coefficient of this variable is positive and highly significant, implying that, on average, African economies with misaligned exchange rates tend to experience more capital flight, perhaps reflecting expectations about future depreciation of the currency. This is in line with the previous findings reported by Collier et al. (2001) for their African sample. Not surprisingly, macroeconomic instability is positively related to capital flight. This implies that the acquisition of foreign assets may act as a hedge against losses due to a poor domestic macroeconomic environment. However, this variable is insignificant at conventional levels. The black market premium, which has been extensively used as a proxy for trade distortions, enters with an unexpected negative but significant sign. A plausible

Table 2.1: Determinants of Capital Flight in Africa: baseline model

	Pooled OLS	FE	RE	FGLS
	[1]	[2]	[3]	[4]
Per capita income (PCI)	-1.900	1.235	-2.569	-1.723
	[1.100]*	[8.366]	[1.469]*	[0.795]**
Economic risk				
Indebtedness (INDEBT)	1.726	0.999	1.363	1.578
	[0.398]***	[0.253]***	[0.207]***	[0.171]***
International reserves (RES)	-1.700	-3.253	-3.029	-2.163
	[0.441]***	[0.918]***	[0.672]***	[0.344]***
Macro policy distortions				
Currency overvaluation (OVERV)	16.230	20.186	13.840	11.746
	[4.776]***	[8.954]**	[5.657]**	[2.911]***
Macro instability (M_INST)	1.054	0.239	0.380	0.650
	[0.786]	[0.734]	[0.714]	[0.453]
Black market premium (BMP)	-0.006	-0.008	-0.005	-0.005
	[0.002]***	[0.003]**	[0.003]*	[0.002]**
Profitability				
Return differential (RDIFF)	0.010	0.023	0.013	0.015
	[0.007]*	[0.010]**	[0.010]	[0.007]**
Constant	-72.454	17.206	-49.724	-44.407
	[30.075]	[5.586]	[31.046]	[16.027]
Observations	209	209	209	209
R^2	0.50	0.38	0.43	
Wooldridge test (p-values)	0.00	0.00	0.00	0.00
Modified Wald test (p-values)	0.00	0.00	0.00	0.00
Hausman test (p-values)			0.00	

Notes: Robust standard errors in brackets, *p<0.10,**p<0.05,***p<0.01, The Wooldridge test is distributed as F under the null of no autocorrelation. The modified Wald test is distributed as χ^2 under the null of no heteroskedasticity across the panels. The Hausman test statistic is distributed asymptotically as χ^2 with degrees of freedom under the null that the country effects are uncorrelated with the explanatory variables.

explanation for this could be that when the spread between the official and parallel market exchange rate is high, domestic agents can sell their foreign exchange holdings at a premium, which implies a substitution away from foreign assets. Alternatively, it could be that the legal restrictions on domestic residents taking funds outside the country may have been effective. Finally, we include the 'return differential' between each country and that of world markets and find a positive and significant effect. This supports Sheets' (1995) 'return differential incentive', suggesting that when the yield on domestic instruments is low relative to overseas, foreign assets become attractive.

In summary, the preceding results confirm that capital flight from Africa is significantly linked to the region's poor profitability, economic risk and macroeconomic policy distortions.

Institutional and political risk variables

We now consider the role institutional and political risk indicators play in explaining capital flight from Africa. Each institutional measure is firstly added to the baseline model separately in order to examine its direct association with capital flight. We report only the estimates based on the FGLS for the following main reasons: 1) Even though both the FE and RE can overcome heteroscedasticity, neither can handle serial correlation, which, if not properly taken into account, leads to consistent but inefficient estimates (Baltagi, 2006), and 2) when there is an AR(1) error structure within the cross-sections and heteroscedasticity across the groups, neither estimates of the FE nor that of the RE is optimal under both the null and alternative of the standard Hausman test. In particular, the standard formulae for the their variances are invalid (for a discussion see Yu, 2009). Hence, we only report the results based on the more efficient estimator of FGLS.

Table 2.2 contains the results. In column [1], we augment the baseline specification with our measure of 'political stability' and find that it is inversely related to the phenomenon of capital flight, suggesting that countries with stable political

Table 2.2: Baseline Model with Institutional and Political Risk Variables: FGLS

	[1]	[2]	[3]	[4]	[5]	[6]
BMP	-0.004	-0.005	-0.021	-0.032	-0.019	-0.051
	[0.002]**	[0.002]**	[0.008]**	[0.011]***	[0.009]**	[0.010]***
OVERV	8.459	10.788	14.927	17.744	14.098	20.898
	[2.965]***	[3.009]***	[2.678]***	[3.807]***	[3.075]***	[4.241]***
M_INST	0.709	0.814	1.639	1.368	1.326	2.582
	[0.449]	[0.491]*	[0.549]***	[0.543]**	[0.526]**	[0.503]***
RES	-1.959	-2.252	-2.249	-2.857	-2.290	-2.047
	[0.342]***	[0.383]***	[0.396]***	[0.413]***	[0.382]***	[0.511]***
PCI	0.358	-1.925	-2.441	-3.447	-1.946	-0.348
	[1.002]	[0.794]**	[0.812]***	[1.346]**	[0.792]**	[1.293]
RDIFF	0.011	0.015	0.014	0.034	0.010	0.030
	[0.007]	[0.007]**	[0.015]	[0.018]*	[0.017]	[0.022]
INDEBT	1.598	1.558	1.665	0.727	1.620	0.967
	[0.166]***	[0.173]***	[0.179]***	[0.279]***	[0.181]***	[0.237]***
POL_STAB	-1.102					-0.975
	[0.409]***					[0.565]*
ETHNIC		-6.378				-14.218
		[2.713]**				[4.802]***
PRR			-1.302			-3.685
			[0.474]***			[0.889]***
IQ				-17.633		-40.987
				[5.936]***		[6.495]***
GOV					-0.263	
					[0.189]	
N	209	203	186	110	186	90
Tests (*p-values*)						
Wooldridge	0.00	0.00	0.00	0.00	0.00	0.00
WALD	0.00	0.00	0.00	0.00	0.00	0.00

Notes: Robust standard errors in brackets, *p<0.10,**p<0.05,***p<0.01, the Wooldridge test is distributed as F under the null of no autocorrelation. The modified Wald test is distributed as χ^2 under the null of no heteroskedasticity across the panels.

environments are more likely to mitigate the uncertainties associated with domestic investment projects by reducing expropriation risks. When we consider institutional quality and governance, we find that they too have the expected (negative) association with capital flight. From these results, it appears that Rodrik's (2000) notion that political institutions 'rule' can be generalised to the case of capital flight in Africa. Rodrik (ibid, p.3) identifies democratic institutions in particular as 'meta-institutions' that encourage economic certainty and sustained economic growth. Similarly, our measure of 'property rights protection' carries a significant negative sign. This suggests that countries which constrain arbitrary state action tend to have lower shares of capital flight in GDP. Overall, the finding that institutions discourage capital flight corroborates the empirical results of Lensink et al. (2000), Le and Zak (2006) and Cerra et al. (2008).

In their influential study of Africa's 'growth tragedy', Easterly and Levine (1997) identify the degree of ethno-linguistic fractionalisation as an important factor. They postulate that ethnic heterogeneity is associated with collective action problems, poor policy choices and rent-seeking. We include their measure in regression [2] which enters with a significant negative sign, suggesting that, on average, African countries with a high ethnic heterogeneity experience less capital flight. A variety of mechanisms could rationalise this result - the most important being that it is ethnic polarisation and dominance that matters most in LDCs. In fact, it has been argued that diversity may reduce the likelihood of civil conflicts as it may thwart the mobilisation of effective coalitions that can challenge a state's monopoly on violence (Collier, 2001). Hence, fractionalisation may encourage political stability which, in turn, may deter capital flight. The signs on the institutional and political risk variables do not change when we add all of them into the same regression (columns [6])[3]. Thus, once account is taken of Africa's institutional infrastructure, capital flight from Africa is explained by the region's poor profitability, distortionary

[3]We exclude the 'governance' measure in the final regression as it is highly correlated with the other institutional variables.

macroeconomic policies and high risk.

Structural Variables

Table 2.3 presents the results on the link between the structural features of African countries and capital flight. In column [1], we augment the baseline model with a terms of trade index which carries the expected negative sign and is statistically significant at the 5 percent level. This suggests that once African economies manage to reduce their exposure to external volatility, capital flight should reduce. The results of regression 2 suggest that primary export dependence has a statistically significant effect on capital flight in Africa, presumably because it is an important transmission channel for external shocks.

We find that trade openness and government size are positively linked to capital flight. This is presumably because trade openness may be importing increased external volatility while government size may be crowding out the private sector. In column [5] we control for natural resource abundance and find that it has no significant effect on capital flight in Africa. In column [6], we add all 5 structural variables to the baseline model but only terms of trade and government size retain their sign and significance. All the regressions underline the robustness of the baseline variables in explaining capital flight from Africa. More specifically, we find a strong and significant relationship between capital flight and policy distortions and economic risk while the effect of domestic profitability (proxied by the return differential variable) on capital flight is positive but not always significant.

The composition of capital flows

Table 2.4 reports the results of the composition of external financing flows. Across the specifications, we find that foreign aid is negatively related to capital flight. This is in line with the findings of Collier et al. (2004) and Cerra et al. (2008). One explanation for this could be that aid is covering the macroeconomic imbalances faced by African countries and thus improves their economic performance, which

Table 2.3: Baseline Model with Structural Variables: FGLS

	[1]	[2]	[3]	[4]	[5]	[6]
BMP	-0.006	-0.004	-0.004	-0.004	-0.006	-0.004
	[0.002]***	[0.002]**	[0.002]**	[0.002]*	[0.002]**	[0.002]*
OVERV	13.826	11.181	11.598	10.746	15.905	15.220
	[2.932]***	[2.955]***	[3.004]***	[2.948]***	[3.032]***	[4.517]***
M_INST	1.374	0.785	1.032	0.422	0.760	1.560
	[0.513]***	[0.530]	[0.513]**	[0.454]	[0.533]	[0.650]**
RES	-2.123	-2.298	-1.835	-2.352	-1.907	-0.942
	[0.391]***	[0.366]***	[0.418]***	[0.363]***	[0.422]***	[0.570]*
PCI	-1.578	-2.341	-2.018	-3.363	-1.615	-3.782
	[0.848]*	[0.863]***	[0.785]**	[1.024]***	[0.972]*	[1.656]**
RDIFF	0.017	0.011	0.013	0.011	0.015	0.009
	[0.007]**	[0.007]	[0.007]*	[0.007]	[0.008]*	[0.008]
INDEBT	1.538	1.659	1.584	1.482	1.491	1.316
	[0.169]***	[0.186]***	[0.180]***	[0.170]***	[0.205]***	[0.267]***
TOTR	-0.038					-0.063
	[0.014]***					[0.026]**
PRI_COMM		10.127				-3.265
		[5.691]*				[10.332]
GOV_SIZE			0.243			0.761
			[0.118]**			[0.222]***
OPENNESS				0.080		0.078
				[0.031]**		[0.051]
RESOURCES					-0.036	0.011
					[0.036]	[0.032]
Observations	196	190	194	207	174	140
Tests (p-values)						
Wooldridge	0.00	0.00	0.00	0.00	0.00	0.00
Wald	0.00	0.00	0.00	0.00	0.00	0.00

Notes: Robust standard errors in brackets, *p<0.10,**p<0.05,***p<0.01,
the Wooldridge test is distributed as F under the null of no autocorrelation.
The modified Wald test is distributed as χ^2 under the null of no
heteroskedasticity across the panels.

then translates into less capital flight. Alternatively, the tendency for aid inflows to reduce capital flight be linked to debt cancellations which tend to improve the domestic investment climate. Regression [2], by contrast, suggests that FDI is associated with higher outflows of endogenous capital - a result which is statistically significant at the 1 percent level. Provided that this is a causal link, the estimated coefficient would suggest that a one percentage point increase in the share of FDI to GNP will produce a 1.9 percentage point rise in the ratio of capital flight to GDP. This can be interpreted in two ways. It could be that this finding is related to the nature of FDI to most African countries, which is mostly connected to natural resource exploitation with little or no forward and backward linkages with the wider economy. Alternatively, this result could be linked to crisis conditions within the host economy which prevent profit repatriation.

We find, supporting Ndiaye (2009), a significant positive effect of short term borrowing on capital flight in Africa. This is in line with the results of a broader research agenda on the role of short term liabilities in fostering financial instability in LDCs (see for example, Radelet and Sachs, 1998; Rodrik and Velasco, 1999). Regression [4] estimates an extended specification which includes all of our capital flow variables. As can be seen, our results remain largely unchanged.

Based on our results so far, we can state that economic risk, policy distortions and poor profitability of African investments help to explain the variation in capital flight from the region. In addition, we account for the role structural, institutional and external resource flows play in shaping agents' portfolio choice in Africa. The estimated results show that these factors, to the extent that they affect the domestic investment climate, are positively related to capital flight.

Robustness checks: Endogeneity

Our preceding results, which indicated that there is a robust relationship between the domestic investment climate and capital flight, may be subject to endogeneity and reverse causality. There is some evidence (see for example, Ndikumana and Boyce,

Table 2.4: Baseline Model with Capital Flows: FGLS

	[1]	[2]	[3]	[4]
BMP	-0.005	-0.005	-0.004	-0.004
	[0.002]**	[0.002]**	[0.002]**	[0.002]**
OVERV	12.353	11.905	9.854	7.387
	[2.942]***	[3.011]***	[3.145]***	[2.913]**
M_INST	0.786	0.709	0.715	0.643
	[0.474]*	[0.428]*	[0.474]	[0.456]
RES	-2.208	-2.235	-1.985	-1.656
	[0.347]***	[0.343]***	[0.370]***	[0.326]***
PCI	-1.008	-2.050	-1.641	-2.329
	[1.006]	[0.865]**	[0.968]*	[1.150]**
RDIFF	0.013	0.013	0.012	0.006
	[0.007]*	[0.007]*	[0.007]	[0.007]
INDEBT	1.726	1.643	1.495	1.825
	[0.174]***	[0.172]***	[0.184]***	[0.174]***
Aid	-0.039			-0.183
	[0.111]			[0.108]*
FDI		1.874		1.970
		[0.467]***		[0.392]***
STDEBT			0.202	0.263
			[0.082]**	[0.072]***
N	209	209	209	209
Tests (*p-values*)				
Wooldridge	0.00	0.00	0.00	0.00
WALD	0.00	0.00	0.00	0.00

Notes: Robust standard errors in brackets, *p<0.10,**p<0.05,***p<0.01, the Wooldridge test is distributed as F under the null of no autocorrelation. The modified Wald test is distributed as χ^2 under the null of no heteroskedasticity across the panels.

2003, 2008; Cerra et al. 2008) showing that indebtedness may be jointly determined with capital flight in LDCs as they are both the result of poor economic management. Moreover, the literature on institutions has strongly asserted that measures of institutional quality (e.g. our measure of property rights protection) are in fact endogenous to the economic conditions prevailing in different countries (see for example, Acemoglu et al. 2001). To examine the exogeneity of both variables, we use the augmented regression Durbin-Wu-Hausman test suggested by Davidson and Mackinnon (1993). The test confirms that the two variables are in fact endogenous (see Tables 2.5-2.8 below). To deal with the endogeneity problem, we apply the instrumental variables/two-stage least squares (IV/2SLS) estimator. For institutions, the instruments include European settler mortality, the distance from the equator as measured by absolute latitude and religious affiliation (shares of Protestants, Catholics and Muslims in the population). As suggested by Hall and Jones (1999) and Acemoglu et al. (2001), these variables can reasonably capture the historical formation of the institutional framework of a country. For indebtedness, we use its own lag since this is orthogonal to the error term.

In conducting the robustness exercises, we augment the baseline model with only one variable from each of our institutional, structural and capital flow proxies using FE and IV/2SLS estimators. Table 2.5 presents the results. Focusing on the IV/2SLS estimates, it can be seen that the Sargan test does not reject the validity of the over-identifying restrictions assumed for the estimation, suggesting that the instruments are valid. The Shea partial R^2 shows that the instruments are related to the endogenous variables, emphasising their relevance. The baseline variables remain largely unchanged once endogeneity is accounted for. In all specifications, property rights protection is inversely and significantly related to capital flight from Africa, further confirming our previous findings. We re-consider the effects of aid on capital flight in Africa (column [5]) and find that it carries a negative sign and is highly significant. The results also show that government size has a significant

Table 2.5: Robustness - endogeneity

	Fixed effects			Panel IV		
	[1]	[2]	[3]	[4]	[5]	[6]
INDEBT	1.934	2.02	2.022	2.041	2.811	2.955
	[0.225]***	[0.237]***	[0.256]***	[0.311]***	[0.306]***	[0.321]***
BMP	-0.043	-0.046	-0.047	-0.016	-0.014	-0.021
	[0.014]***	[0.014]***	[0.014]***	[0.014]	[0.014]	[0.014]
OVERV	23.416	20.155	21.614	9.246	10.63	10.064
	[7.802]***	[8.291]**	[8.789]**	[5.135]*	[4.967]**	[5.152]*
PCI	7.171	3.278	4.61	-2.995	-3.616	-4.578
	[9.476]	[10.049]	[11.477]	[1.081]***	[1.083]***	[1.115]***
M_INSTAB	0.991	1.074	1.222	1.352	1.433	2.196
	[0.871]	[0.873]	[0.917]	[0.830]	[0.799]*	[0.866]**
RES	-2.159	-1.903	-1.52	-2.3	-1.664	-1.355
	[0.862]**	[0.889]**	[0.975]	[0.573]***	[0.569]***	[0.573]**
RDIFF	0.075	0.077	0.077	0.058	0.058	0.058
	[0.027]***	[0.027]***	[0.027]***	[0.028]**	[0.027]**	[0.027]**
PRR	-1.145	-1.221	-2.596	-3.788	-2.47	-3.017
	[1.003]	[1.004]	[1.269]**	[0.913]***	[1.031]**	[1.013]***
Aid		-0.225	-0.248		-0.431	-0.615
		[0.196]	[0.203]		[0.141]***	[0.143]***
GOV_SIZE			0.387			0.429
			[0.203]*			[0.155]***
N	187	187	173	145	145	133
Test of exogeneity				0.05	0.04	0.03
Sargan test				0.26	0.48	0.27
Shea partial R-squared from first stage						
Indebtedness				0.58	0.68	0.67
Property rights				0.53	0.47	0.56

Notes: Robust standard errors in brackets, *p<0.10,**p<0.05,***p<0.01, the Davidson-MacKinnon test of exogeneity tests the null that an OLS-type estimator would yield consistent estimates. The null of the Sargan test is that the over-identifying restrictions are valid. The Shea partial R-squared is a test of instrument relevancy.

positive relationship with capital flight (column [6]).

Robustness checks: Outliers

To investigate further the robustness of the baseline results, we take into account the possible presence of outliers which may distort the estimates. In line with Easterly et al. (2004), we use Hadi's (1994) method for detecting influential outliers in multivariate regressions, removing distant data points that fall in the 5 percent critical level. The results, shown in Table 2.6, highlight that our fundamental findings are robust to the exclusion of outliers. However, while the effects of risk and macro distortionary indicators are significant, the impact of the profitability of investments in Africa (proxied by the return differential variable) is insignificant. In columns ([2 – 4]), we reconsider the effects of property rights protection on capital flight. The results suggest that this variable, perhaps by facilitating transactions and reducing risks, expands domestic investment opportunities and thus curtails capital flight in our African sample. In line with our previous findings, we find that countries with a higher government expenditures in GDP experience higher incidence of capital flight, a result which is statistically significant. Finally, once outliers are removed the coefficient of the aid variable retains its sign but is marginally insignificant.

Robustness checks: Sub-sample stability

In Table 2.7, we evaluate the stability of the estimates across sub-periods, focusing on the 1980-89 sub-period. We are particularly interested in this period because macroeconomic mismanagement and crises were rife in most African countries during this 'lost decade'. The results show that our risk and policy distortion indicators retain their sign and significance unlike our measures of profitability. Also, property rights, government size and foreign aid are still robustly related to capital flight from Africa. Hence, our results point to the importance of the domestic investment climate for economic agents' portfolio-choice. In particular, weak institutions, poor policy choices and increased economic riskiness, insofar as they influence the domes-

Table 2.6: Robustness - exclusion of outliers: Panel IV

	[1]	[2]	[3]	[4]
Indebtedness	0.963	2.129	2.039	2.383
	[0.352]***	[0.369]***	[0.398]***	[0.344]***
Black market premium	-0.018	-0.028	-0.017	-0.023
	[0.022]	[0.033]	[0.035]	[0.034]
Currency overvaluation	7.537	6.438	6.89	6.786
	[4.366]*	[5.420]	[5.747]	[5.601]
Per capita income	-3.716	-3.381	-3.583	-4.221
	[0.928]***	[1.111]***	[1.165]***	[1.255]***
Macro instability	0.331	1.316	1.783	1.93
	[0.675]	[0.798]*	[0.905]**	[0.886]**
International reserves	-1.898	-2.13	-2.13	-1.83
	[0.444]***	[0.531]***	[0.552]***	[0.547]***
Return differential	-0.032	0.026	0.028	0.039
	[0.036]	[0.048]	[0.048]	[0.048]
Property rights		-3.768	-4.677	-3.981
		[0.857]***	[0.935]***	[1.054]***
Government size			0.317	0.343
			[0.157]**	[0.155]**
Aid				-0.256
				[0.163]
Observations	184	137	125	125
Test of exogeneity (p-values)	0.01	0.01	0.00	0.00
Sargan test (p-values)	0.4	0.64	0.71	0.87
Shea partial R-squared from first stage				
Indebtedness	0.43	0.48	0.48	0.64
Property rights		0.49	0.54	0.48

Notes: Robust standard errors in brackets, *p<0.10,**p<0.05,***p<0.01, the Davidson-MacKinnon test of exogeneity tests the null that an OLS-type estimator would yield consistent estimates. The null of the Sargan test is that the over-identifying restrictions are valid. The Shea partial R-squared is a test of instrument relevancy.

tic investment climate, are robustly related to capital flight from African countries.

Robustness checks: Additional controls

Finally, we address possible omitted variable bias by expanding the set of controls to see whether our main variables retain their sign and significance (2.8). In line with Le and Zak (2006), we explore how the relative political capacity of governments (measured by the ratio of actual government revenue to predicted government revenue) influences the domestic investment climate. This variable, which captures governments' relative ability to mobilise resources from taxation, is sourced from Feng et al. (2000). The regression results suggest that the more efficient the government the less probability of capital flight, a result which is statistically significant in the first two specifications.

We also consider the effects of war on capital flight. We use a dummy variable coded '1' for internal or internationalised conflict with at least 1000 battle related deaths per year and '0' otherwise (source, the UCDP/PRIO Armed Conflict Dataset, 2009 version 4). The results suggest that, as one would expect, there is a positive link between civil conflicts and capital flight. In column 3, we add the growth differential between each African country and the United States to capture the potential for profitable investments and find that the higher the differential the more likelihhod capital flight would take place. This is consistent with the results reported by Ndikumana and Boyce (2002) and Nyoni (2000). We also include a dummy variable capturing whether IMF progamme agreement was in place or not. This variable could be interpreted as a crisis indicator and carries positive sign but is insignificant at conventional levels. In the final two columns, we test whether oil exports (measured by a dummy = 1 if the ratio of fuel exports to total exports exceeded 50% and 0 otherwise)[4] and civil liberties matter for capital flight. The results suggest that being an oil exporter does not explain the variation in capital flight while civil liberties are inverserly but insignificantly related to capital flight.

[4]From Przeworski et al. (2000)

Table 2.7: Robustness - sub-sample stability: Panel IV

	[1]	[2]	[3]	[4]
Indebtedness	1.874	1.77	1.486	2.83
	[0.337]***	[0.358]***	[0.372]***	[0.334]***
Black market premium	-0.011	-0.011	-0.022	-0.025
	[0.015]	[0.015]	[0.016]	[0.015]*
Currency overvaluation	12.925	13.984	10.778	16.363
	[8.196]	[8.296]*	[8.630]	[8.051]**
Per capita income	-3.556	-3.564	-4.981	-5.171
	[1.384]**	[1.385]**	[1.484]***	[1.328]***
Macro instability	0.331	0.265	1.268	2.255
	[1.098]	[1.102]	[1.272]	[1.131]**
International reserves	-2.509	-2.515	-2.621	-0.921
	[0.797]***	[0.798]***	[0.829]***	[0.838]
Return differential	0.045	0.043	0.046	0.044
	[0.033]	[0.033]	[0.033]	[0.029]
Property rights	-3.399	-3.06	-4.729	-3.604
	[1.303]***	[1.362]**	[1.530]***	[1.468]**
Government size			0.51	0.593
			[0.186]***	[0.167]***
Aid				-0.666
				[0.163]***
Observations	114	114	104	104
Test of exogeneity (p-values)	0.10	0.07	0.01	0.18
Sargan test (p-values)	0.86	0.88	0.39	0.86
Shea partial R-squared from first stage				
Indebtedness	0.59	0.52	0.56	0.7
Property rights		0.43	0.46	0.48

Notes: Robust standard errors in brackets, *p<0.10,**p<0.05,***p<0.01, the Davidson-MacKinnon test of exogeneity tests the null that an OLS-type estimator would yield consistent estimates. The null of the Sargan test is that the over-identifying restrictions are valid. The Shea partial R-squared is a test of instrument relevancy.

Table 2.8: Robustness - Additional controls: Panel IV

	[1]	[2]	[3]	[4]	[5]	[6]
PRR	-2.437	-2.833	-2.475	-2.499	-2.422	-3.422
	[1.034]**	[1.058]***	[1.070]**	[1.070]**	[1.131]**	[1.337]**
INDEBTH	2.695	2.764	2.846	2.897	2.904	2.957
	[0.307]***	[0.369]***	[0.365]***	[0.364]***	[0.365]***	[0.363]***
BMP	-0.028	-0.03	-0.023	-0.022	-0.022	-0.027
	[0.013]**	[0.012]**	[0.012]*	[0.013]*	[0.013]*	[0.013]**
OVERV	12.851	8.55	9.721	10.891	11.23	11.279
	[5.171]**	[5.261]	[5.168]*	[5.515]**	[5.977]*	[5.815]*
PCI	-4.038	-2.361	-2.555	-2.471	-2.761	-2.356
	[1.099]***	[1.351]*	[1.314]*	[1.318]*	[2.747]	[2.731]
M_INST	2.035	0.957	0.95	1.001	1.002	1.128
	[0.841]**	[0.877]	[0.856]	[0.856]	[0.857]	[0.855]
RES	-1.449	-1.516	-1.345	-1.21	-1.228	-1.092
	[0.554]***	[0.715]**	[0.706]*	[0.734]*	[0.768]	[0.759]
RDIFF	0.061	0.068	0.069	0.071	0.071	0.075
	[0.026]**	[0.024]***	[0.024]***	[0.024]***	[0.024]***	[0.024]***
Aid	-0.565	-0.498	-0.58	-0.592	-0.601	-0.619
	[0.138]***	[0.149]***	[0.151]***	[0.152]***	[0.161]***	[0.155]***
GOV_SIZE	0.508	0.484	0.475	0.458	0.455	0.468
	[0.150]***	[0.144]***	[0.141]***	[0.143]***	[0.144]***	[0.143]***
GOV_EFFECT	-4.383	-4.24	-3.144	-3.244	-3.226	-3.161
	[2.005]**	[1.911]**	[1.967]	[1.985]	[2.000]	[1.976]
War		4.445	3.895	4.009	3.948	4.734
		[2.449]*	[2.416]	[2.420]*	[2.483]	[2.533]*
GRDIFF			0.474	0.502	0.505	0.532
			[0.176]***	[0.180]***	[0.181]***	[0.180]***
IMF				1.372	1.405	0.831
				[2.007]	[2.018]	[2.050]
OIL					0.874	-0.286
					[7.144]	[7.087]
C_LIB						-1.588
						[1.222]
Observations	136	116	115	115	115	115
Test of exogeneity	0.15	0.09	0.04	0.08	0.16	0.13
Sargan test	0.30	0.12	0.20	0.18	0.18	0.30
Shea partial R-squared from first stage						
Indebtedness	0.67	0.59	0.60	0.61	0.60	0.61
Property rights	0.52	0.57	0.57	0.57	0.55	0.55

Notes: Robust standard errors in brackets, *p<0.10,**p<0.05,***p<0.01, the Davidson-MacKinnon test of exogeneity tests the null that an OLS-type estimator would yield consistent estimates. The null of the Sargan test is that the over-identifying restrictions are valid. The Shea partial R-squared is a test of instrument relevancy.

Throughout, our central results retain their sign and significance, suggesting that omitted variable bias in not a concern.

2.4 Consequences of capital flight

There are various channels through which capital flight may influence the growth performance of African countries. The most obvious is the investment channel as capital flight involves the transfer of scarce financial resources (domestic savings) that could otherwise be used to augment domestic capital formation. For a typical African economy already suffering from chronic internal and external imbalances, any systematic capital outflows would require either a reduction in the amount of foreign exchange reserves available or an increase in external financing. Since there is a limit to both, the economy would eventually need to make BOP corrections by initiating expenditure-switching policies that boost the current account balance and thus offset the initial outflow. Alternatively, expenditure-reducing policies (e.g. contractive monetary policy) would be needed to bring about the required adjustment. Whatever measure undertaken, it is clear that resident capital outflows would lower savings and thus investment and economic growth at least in the short run especially in small open economies (Deppler and Williamson, 1987, p. 224).

Furthermore, capital flight undermines SSA governments' attempts to generate domestic resources by eroding their already thin tax base and thus increases their dependence on external financing. This may exercibate the fiscal position of the government and, in that case, the consequences might be more capital flight. This can be illustrated if one uses an intertemporal framework where the expectations of economic agents become an important driver of their decisions. In particular, provided that agents use all available information, they would expect increased future tax liabilities as a result of the deficit and thus may engage in future capital

flight[5].

Capital flight may also impede the current and future growth potential indirectly through its impacts on the stability of the economy. More specifically, it can be a great source of macroeconomic instability since investors may interpret substantial capital flight as a sign of deeper economic difficulties and this may fuel further flight through herding behaviour. In addition, it has considerable social costs and has consequences for both poverty and income inequality as the poor tend to suffer higher taxation or cuts in social services as a result of the decision of wealthier segments of society to transfer their assets abroad.

Finally, capital flight has an important political economy dimension since "it can be a powerful political weapon against government policies that threaten the wealth or the prerogatives of the rich" (Epstein, 2005 p. 6). In other words, the fear is that certain government policies (e.g. higher taxes at times of crisis) which may be beneficial to society as a whole may alienate the rich in such a way that they decide to take their wealth abroad. To the extent that the government does not implement its desired policy in fear of capital flight, its sovereignty, autonomy and credibility are undermined. Hence, capital flight has the potential to affect income distribution, capital formation, government finances and the macroeconomic environment of SSA countries adversely.

2.4.1 Evidence from a dynamic panel data model

To test the hypothesis that capital flight hinders economic growth in Africa, we augment a fairly standard growth model with our measure of capital flight using the following dynamic model specification:

$$y_{it} = \alpha y_{i,t-1} + \beta CF_{it} + X_{it}\delta + \varepsilon_{it} \tag{2.5}$$

[5]This argument can be contrasted to the central proposition of the Ricardian equivalence where agents are assumed to internalise the government's budget contraint and therefore deficits and their financing does not influence their decisions.

where for $i = 1, ...N$, and $t = 2, ...T$, y_{it} is the growth rate of per capita income, CF_{it} is the share of capital flight in GDP, $\varepsilon_{it} = \eta_{it} + \nu_i$ with $E(\eta_{it}) = E(\nu_i) = E(\eta_{it}\nu_i) = 0$, and the transient errors are assumed to serially independent, i.e. $E(\eta_{it}\eta_{is}) = 0 \; \forall s \neq t$. Further, it assumed that $E(y_{it}\eta_{it}) = 0 \; \forall \; t$.

The vector X_{it} corresponds to a set of standard growth determinants, including domestic investment, inflation, trade openness, financial deepening (captured by the share of M2 in GDP), government expenditure and institutional quality (measured by the 'Polity2 score' from PolityIV dataset). The Polity2 score captures the constraints placed on the chief executive, the competitiveness of political participation, and the openness and competitiveness of executive recruitment. It ranges from -10 to +10, with higher values implying stronger democratic institutions. A list of the countries as well as the sources of the variables are reported in Tables 2.16 while summary statistics are reported in Table 2.17 in Appendix 2.B.

Given the presence of the lagged dependent variable $y_{i,t-1}$ which is positively correlated with the time invariant fixed effect (ν_i), the OLS estimator is inconsistent. The fixed effect or Least-Squares Dummy Variable (LSDV) estimator which wipes out ν_i through 'within' transformation does not entirely solve the problem. To show this, take the first lag of (2.5):

$$y_{it-1} = \alpha y_{i,t-2} + \beta CF_{it-1} + X_{it-1}\delta + \varepsilon_{it-1}, \; where \; \varepsilon_{it-1} = \eta_{it-1} + \nu_i \tag{2.6}$$

Substituting (2.6) into (2.5), one can see that ν_i is now a function of y_{it-1} as it is in ε_{it-1}, violating the assumption of independence between ε_{it} and y_{it},i.e. $E(y_{it}; \varepsilon_{it}) \neq 0$. Hence, the correlation between the autoregressive variable and the transformed error term remains, making the LSDV estimator also bias especially in short panels (Judson and Owen, 1999).

A popular method to address the above bias has been to take the first difference

of equation (2.5) to eliminate ν_i via either an instrumental variable appraoch (e.g. Andersen and Hsiao,1982) or a generalized method of moments (GMM) estimator (e.g. Arellano and Bond, 1991; Arellano and Bover, 1995; Blundell and Bond, 1998). However, Monte Carlo studies (e.g. Kiviet, 1995; Judson and Owen, 1999; Bun and Carree, 2006; Bun and Kiviet, 2006) show that an alternative estimator, which directly corrects for the bias, may perform better in typical macro panels - giving more accurate coefficients and lower standard errors. Known as the bias-corrected LSDV (LSDVC), this estimator was first developed by Kiviet (1995), Bun and Kiviet (2003) and extended to cases of unbalanced panels (such as ours) by Bruno (2005). The LSDVC estimator considers the following matrix version of equation (2.5):

$$y = D\lambda + W\zeta + \varepsilon \tag{2.7}$$

where y and ε are (NT x 1) vectors of the dependent variable and the error term, D is the matrix of individual dummy variables, $W = [y_{i,t-1} \vdots X]$ a (NT x k) is the matrix of observations, $\zeta = [\beta, \delta]$ a (k x 1) vector of coefficients; λ is a vector of individual fixed effects and N, T, k denote the number of observations, periods and coefficients, respectively. To allow for the unbalanced nature of our dataset and following Bruno (2005), one can rewrite equation (2.7) as:

$$Cy = CD\lambda + CW\zeta + C\varepsilon \tag{2.8}$$

where C is a (NT x NT) block-diagonal matrix with the dynamic selection rule c_{it} on the diagonal. Define a selection indicator as $p_{it} = 1$ if $(y_{it}, x_{it}) = 1$ and 0 otherwise and the rule $c_{it} = 1$ if $(p_{it}, p_{it-1}) = (1, 1)$ and 0 otherwise. Hence, the selection rule allows the use of observations for which current and one-period lagged values are available. The LSDV estimator for model (2.7) becomes:

$$\zeta_{LSDV} = (W' M_c W)^{-1} W' M_c y \tag{2.9}$$

where $M_c = C\{I - D(D'CD)^{-1}D'\}C$ denotes the symmetric and indempotent (NT x NT) matrix that removes the individual fixed effects. Kiviet (1995), Bun and Kiviet (2003) and Bruno (2005) derive bias approximation terms which can be subtracted from the standard LSDV estimator as follows:

$$BCLSDV = LSDV - B_i \tag{2.10}$$

where B_i is three different bias approximations given by $B_1 = d_1(T^{-1}), B_2 = B_1 + d_2(N^{-1}T^{-1}), B_3 = B_2 + d_3(N^{-1}T^{-2})$. According to evidence presented by Bun and Kiviet (2003), the bias approximation of B_3 is very close to the true bias. Since the bias approximation depends on the unknown population parameters (σ^2_ε,α), a consistant estimator is needed to obtain these before the bias correction can be conducted[6]. The standard errors are bootstrapped with 1000 replications.

Estimates of the dynamic growth model (2.5) are shown in Table 2.9. In the first specification, the rate of growth of GDP per capita is regressed on capital flight, investment, inflation, trade openness and financial deepening. As a robustness check, we augment this specification with government expenditure and institutional quality, respectively. In the final specification, we include all the variables. With the exception of financial deepening, which carries an unexpected significant negative coefficient, all the other conditioning variables are consistent with our a priori expectations. More specifically, domestic investment and trade openness are found to have a significant positive effect on growth while macroeconomic instability measured by inflation restrains growth. Consistent with the findings of Misati and Nyamongo (2011), we find that government expenditure is negatively related to growth. Also, we find that political institutions are beneficial to growth.

Turning to our variable of interest, we find evidence suggesting that capital flight,

[6]Simulations conducted by Bruno (2005) suggest that the difference GMM estimator of Arellano and Bond (1991) is superior to the system GMM estimator of Blundell and Bond (1998) and the IV estimator of Anderson and Hsiao (1982) when initialising the bias correction. Hence, we use the first.

Table 2.9: Capital flight and economic growth in Africa, 1980-2007

	LSDVC			SGMM		
	[1]	[2]	[3]	[4]	[5]	[6]
y_{it-1}	0.100	0.084	0.067	0.177	0.169	0.117
	[0.039]**	[0.037]**	[0.046]	[0.033]***	[0.034]***	[0.043]***
Capital flight	-0.025	-0.019	-0.020	-0.047	-0.052	-0.065
	[0.010]***	[0.010]*	[0.012]*	[0.013]***	[0.012]***	[0.013]***
Investment	2.979	3.169	3.368	6.833	6.913	9.063
	[0.548]***	[0.495]***	[0.704]***	[1.295]***	[1.441]***	[1.593]***
Inflation	-0.924	-0.800	-0.373	-0.345	-0.406	-0.093
	[0.256]***	[0.272]***	[0.452]	[0.354]	[0.368]	[0.411]
Trade openness	0.034	0.039	0.029	0.032	0.036	0.010
	[0.012]***	[0.013]***	[0.017]*	[0.025]	[0.018]**	[0.026]
Financial depth	-0.044	-0.045	-0.052	-0.078	-0.035	-0.053
	[0.016]***	[0.017]***	[0.029]*	[0.026]***	[0.026]	[0.024]**
Government size		-0.102	-0.105		-0.413	-0.407
		[0.038]***	[0.043]**		[0.077]***	[0.085]***
Institutional quality			0.097			0.081
			[0.051]*			[0.041]**
Observations	879	865	742	879	865	742
Tests (p-values)						
Hansen				0.15	0.79	0.69
AR(1)				0.00	0.00	0.00
AR (2)				0.71	0.54	0.81
Instruments				14	17	18
Countries				38	37	34

Notes: The LSDVC is the bias-corrected estimator proposed by Kiviet (1995) and extended to unbalanced panels by Bruno (2005). To initialise the bias correction of the LSDVC, the difference GMM is used as recommended by Bruno (2005). Its standard errors are shown in the brackets (based on 500 iterations). The SGMM estimates are based on the two-step version. *p<0.10,**p<0.05,***p<0.01.

as expected, is harmful to economic growth. This supports the notion that capital flight, by eroding domestic financial resources, is associated with poor economic performance. This is consistant with the findings reported by Ndiaye (2009) and Fofack and Ndikumana (2009).

The underlying assumption of the LSDVC estimator is that all the right hand side variables are exogenous, except the autoregressive term. However, this may not be the case as there may be various sources of endogeneity with respect to equation (2.5). For instance, there could be a measurement error concerning our indicator of capital flight given the nature of BOP data. In addition, there could be simultaneity and reverse causality as most of the growth determinants we use are known to have a feedback relationship with economic growth. Hence, we relax the assumption of exogeneity of the explanatory variables by applying the system GMM which controls for these issues[7]. The results are presented in the final 3 specifications.

The SGMM results are generally in line with the LSDVC estimates as far as the sign and significance is concerned. More specifically, they provide strong evidence that capital flight significantly retards growth. Across all specifications, the autoregressive parameter is positive and mostly significant implying that growth is relatively persistent over time. This supports the dynamic specification adopted here. The validity of the instruments is not rejected in the SGMM regressions. In particular, the specifications pass the Hansen J test for over-identifying restrictions. They also pass the Arellano-Bond tests for serial correlation, confirming that our models are not misspecified. Finally, all the models pass the F-test for overall signicance of the regressions.

As a robustness test, we re-run the full specification above for sub-periods (1980-89, 1990-99, and 2000-07). The results are summarised in Table 2.10. It seems that

[7]It should be emphasised that the SGMM is appropriate in the context of large N and small T given that its asymptotic prosperities are based on this assumption. Hence, our results should be treated with caution as they do not fulfil this requirement. However, the fact that the results based on LSDVC, SGMM and PVAR (discussed below) all point to the same direction imply that we are able to sidestep any limitation each technique might have separately. The SGMM is fully explained in Chapter 3.

Table 2.10: Capital flight and economic growth in Africa - sub-periods

	LSDVC			SGMM		
	1980-89	1990-99	2000-07	1980-89	1990-99	2000-07
y_{it-1}	0.084	0.007	0.193	0.187	0.153	0.381
	[0.056]	[0.077]	[0.106]*	[0.055]***	[0.062]**	[0.097]***
Capital flight	-0.025	-0.036	-0.017	-0.057	-0.016	-0.042
	[0.014]*	[0.019]*	[0.014]	[0.013]***	[0.019]	[0.010]***
Investment	3.884	3.585	5.171	4.287	18.684	0.472
	[0.870]***	[1.608]**	[1.372]***	[1.908]**	[3.630]***	[1.415]
Inflation	0.185	0.903	-0.555	0.626	-0.119	-1.007
	[0.609]	[0.638]	[0.849]	[0.434]	[0.642]	[0.542]*
Trade openness	0.033	-0.019	0.041	-0.039	-0.140	-0.076
	[0.023]	[0.043]	[0.035]	[0.025]	[0.038]***	[0.034]**
Financial depth	-0.055	-0.180	-0.158	-0.005	0.054	-0.014
	[0.028]**	[0.113]	[0.041]***	[0.026]	[0.040]	[0.047]
Government size	-0.170	-0.203	-0.360	-0.463	-0.674	0.025
	[0.071]**	[0.146]	[0.149]**	[0.104]***	[0.127]***	[0.155]
Institutional quality	0.106	0.147	0.213	0.113	-0.022	0.105
	[0.084]	[0.111]	[0.283]	[0.076]	[0.083]	[0.138]
Observations	514	257	195	514	257	195
Tests (p-values)						
Hansen				0.56	0.74	0.61
AR(1)				0.00	0.037	0.02
AR (2)				0.91	0.74	0.72
Instruments				18	18	18
Countries				34	33	34

Notes:
The LSDVC is the bias-corrected estimator proposed by Kiviet (1995) and extended to unbalanced panels by Bruno (2005). Its standard errors are shown in the brackets (based on 500 iterations).
The SGMM estimates are based on the two-step version.
*p<0.10,**p<0.05,***p<0.01.

our results are stable across the sub-periods and the coefficient of capital flight remains negative and generally significant at conventional levels. Hence, capital flight is associated with lower economic growth in our sample of African countries.

2.4.2 Evidence from PVAR

PVAR approach

While the above findings give us an insight into the relationship between capital flight and growth, it is much more useful to explore the dynamic responses of domestic investment and economic growth to capital flight episodes. To this end, we apply a PVAR approach in the vein of Love and Zicchino (2006) and estimate the following first-order VAR model:

$$Y_{it} = \Psi_0 + \sum_{j=1}^{j} \Psi_j Y_{i,t-j} + \eta_i + \varrho_t + \varepsilon_{it} \tag{2.11}$$

where for country i at time t, Y_{it} is a two-variable vector [either capital flight and investment both expressed as shares of GDP or capital flight and per capita income], η_i represents a vector of country-specific fixed effects, ϱ_t is a vector of period-effects, ε_{it} is a vector of the error disturbances, and j is the lag length. As in Love and Zacchino (2006), the variables are time-demeaned prior to estimation[8].

Since by construction the lagged dependent variables are correlated with the unobserved country-level fixed effect, η_i, we use forward mean-differencing or 'Herlmert procedure'. This procedure transforms the variables into deviations from forward means. For example, $y_{it}^{-p} = \sum_{s=t+1}^{Ti} y_{is}^{p}/(T_i - t)$, where y_{it}^{-p} are future observations of y_{it}^{p}, and $\varepsilon_{it}^{-p} = \sum_{s=t+1}^{Ti} \varepsilon_{is}^{p}/(T_i - t)$[9], where ε_{it}^{-p} are future observations of ε_{it}^{p}, and T_i is the last observation for each i. This transfomation ensures the orthogonality between the transformed and lagged variables and thus validates the use of lagged

[8] The properties of time demeaning is explained in Chapter 3.

[9] y_{it}^{p} and ε_{it}^{p} are components of the vectors $Y_{it} = (y_{it}^{1}, y_{it}^{2}, .., y_{it}^{FM})'$ and $\varepsilon_{it} = (\varepsilon_{it}^{1}, \varepsilon_{it}^{2}, .., \varepsilon_{it}^{FM})'$, respectively.

right hand side variables as instruments for the endogenous variables via system GMM procedure (Love and Zicchino, 2006).

Following Koutsomanoli-Filippaki and Mamatzakis (2009) and Koetter and Porath (2007), we wish to estimate equation (2.11) primarily because we are interested in generating impulse response functions (IRF) which depict the reaction of one variable in the system to innovations in another variable while keeping all other shocks at zero. For this purpose, it is useful to rewrite equation (2.11) into a standard first-order bivariate VAR of the form:

$$CF_{it} = \xi_{1i0} + \xi_{10t} + \sum_{j=1}^{j} \alpha_{11j} CF_{it-j} + \sum_{j=1}^{j} \alpha_{12j} VI_{it-j} + \varepsilon_{1it} \quad (2.12)$$

$$VI_{it} = \xi_{2i0} + \xi_{20t} + \sum_{j=1}^{j} \alpha_{21j} VI_{it-j} + \sum_{j=1}^{j} \alpha_{22j} VI_{it-j} + \varepsilon_{2it} \quad (2.13)$$

where for country i at time t, CF_{it} is the share of capital flight in GDP, VI_{it} denotes a variable of interest (i.e. either investment over GDP or per capita income), ξ_{i0} and ξ_{0t} represent country-specific and year effects, respectively and ε_{it} are uncorrelated white-noise errors with zero means and constant variences. The model captured by equations (2.12) and (2.13) is the so-called structural VAR, which cannot be estimated due to the correlation between CF_{it} with ε_{2it} and of VI_{it} with ε_{1it}. Provided that the endogenous variables are stationary, the estimated model can be solved and a moving average (MA) representation can be set up as follows[10]:

$$CF_{it} = \xi_{10} + \sum_{j=1}^{\infty} b_{11j} \varepsilon_{1it-j} + \sum_{j=1}^{\infty} b_{12j} \varepsilon_{2t-j} \quad (2.14)$$

$$VI_{it} = \xi_{20} + \sum_{j=1}^{\infty} b_{21j} \varepsilon_{1it-j} + \sum_{j=1}^{\infty} b_{22j} \varepsilon_{2t-j} \quad (2.15)$$

[10] In the MA representation, each variable in the system is a function of current and past errors ε_1 and ε_2.

Since the error terms in the above representation are correlated and they tend to move together, they must be made orthogonal (i.e. uncorrelated). One method is to multiply the MA representation with the Cholesky decomposition of the variance-covariance matrix of the errors. The orthogonalised MA representation becomes:

$$CF_{it} = \varphi_{10} + \sum_{j=1}^{\infty} \beta_{11j} e_{1it-j} + \sum_{j=1}^{\infty} \beta_{12j} e_{2t-j} \tag{2.16}$$

$$VI_{it} = \varphi_{20} + \sum_{j=1}^{\infty} \beta_{21j} e_{1it-j} + \sum_{j=1}^{\infty} \beta_{22j} e_{2t-j} \tag{2.17}$$

which is multiplied with:

$$\begin{pmatrix} \beta_{11j} & \beta_{12j} \\ \beta_{21j} & \beta_{22j} \end{pmatrix} = \begin{pmatrix} b_{11j} & b_{12j} \\ b_{21j} & b_{22j} \end{pmatrix} \cdot C, \begin{pmatrix} e_{1it} \\ e_{2it} \end{pmatrix} = C^{-1} \cdot \begin{pmatrix} \varepsilon_{1it} \\ \varepsilon_{2it} \end{pmatrix} \tag{2.18}$$

where C is the Cholesky decomposition of the covariance matrix of the error terms:

$$\begin{pmatrix} Cov & (\varepsilon_{1it}, \varepsilon_{2it}) & Cov & (\varepsilon_{1it}, \varepsilon_{2it}) \\ Cov & (\varepsilon_{1it}, \varepsilon_{2it}) & Cov & (\varepsilon_{1it}, \varepsilon_{2it}) \end{pmatrix} = C \cdot C' \tag{2.19}$$

The orthogonalised MA representation depicts the IRF, where e_{1it} and e_{2it} can be interpreted as a shock in CF and VI, respectively, and the parameter estimates in (2.16) and (2.17) capture the response of the dependent variable to shocks that took place j periods before. Our main coefficient of interest is β_{21j} which captures the response of either domestic investment or per capita income to a shock in CF over periods j. The ordering of the variables in the VAR system is crucial for the Cholesky decomposition. Based on our a priori expectations, we assume that innovations in CF influence our variables of interest contemporaneously and also with a lag, hence CF appears first in the ordering. This implies that investment and income shocks do not have instantenous impact on CF episodes and that they

influence CF only with a lag. The standard errors are produced with Monte Carlo simulations in order to calculate the 10th and 90th percentiles of the distribution which are then used as confidence intervals of the IRF. The Monte Carlo simulations are based on 1000 repetitions.

PVAR results

Given the underlying assumptions of the PVAR, we first test whether our variables are stationary using the augmented Dickey-Fuller and Phillips-Perron tests suggested by Maddala and Wu (1999). The results, which are summarised in Table 1.11, suggest that the variables are indeed stationary. Hence, we proceed with our estimation of the PVAR. To avoid over-parametrisation and at the same time ensure that our findings are not sensitive to the choice of lags, we report lag lengths 1-4[11].

Figure 2.2 summarises some selected results based on a bivariate VAR of CF and INV. Our objective is to explore the dynamic response of INV to a one standard deviation shock in CF. The results indicate, as expected, that INV suffers following a CF episode. More specifically, it falls on impact and rapidly declines the first 3 years. Considering a horizon of 6 years, our results show that INV does not recover in the short to medium term. Consequently, capital flight shocks seem to have a sizeable effect on domestic capital formation in African countries. It could be that CF is magnifying the credit constraints which are, in most African countries, binding. It could also be that, once a proportion of domestic savings shift abroad, African economies are less likely to get access to alternative sources of funds for domestic investment. It is reasonable to assume that international markets may view African agents' acquisition of foreign asset as a sign that the African country concerned is 'risky'. Figure 2.3 shows the response of domestic output to one standard deviation shock in CF. On impact, output response is negative. However, this does not last throughout the 6-year period even though it does not reverse

[11]Based on Schwartz Information Criterion, which we run for each cross-section, the optimal lag is 2. However, our results do not change even when we consider higher order lags.

Table 2.11: Panel unit root tests

	ADF-Fisher		PP-Fisher	
Variable	Chi-square	p-values	Chi-square	p-values
CF	138.249	0.000	382.084	0.000
INV	149.586	0.000	216.038	0.000
Output	101.21	0.056	109.1781	0.0168

Notes: All the variables have been time-demeaned and transformed using the Helmert procedure. The tests are the augmented Dickey-Fuller and Phillips-Perron tests advanced in Maddala and Wu (1999). The null hypothesis states that the data is non-stationary.

back to its pre-shock level. As discussed previously, CF can influence domestic economic performance through various channels including, for example, increasing macroeconomic instability (and hence investment) and government budget balance.

2.4.3 Discussion

Drawing on insights from portfolio choice theory, this chapter presents evidence that, in line with the existing literature, links capital flight to the domestic investment climate. In particular, the study finds that once account is taken of the region's structural and institutional features, private capital outflows from Africa are explained by policy distortions, along with the relative riskiness and poor profitability of investments. In addition, our results suggest that the type and composition of resource flows to the region are important for capital flight: foreign aid generally discourages capital flight while short term borrowing and FDI contribute to it. These findings are robust to endogeneity, outliers, sub-samples, omitted variable bias and to different econometric methods.

Our results relate to previous research which highlights the importance of risk and return indicators for African capital flight. For instance, Smit and Mocke (2006) identify domestic political instablity, exchange rate overvaluation, weak macroeconomic performance and the availability of foreign exchange (proxied by current ac-

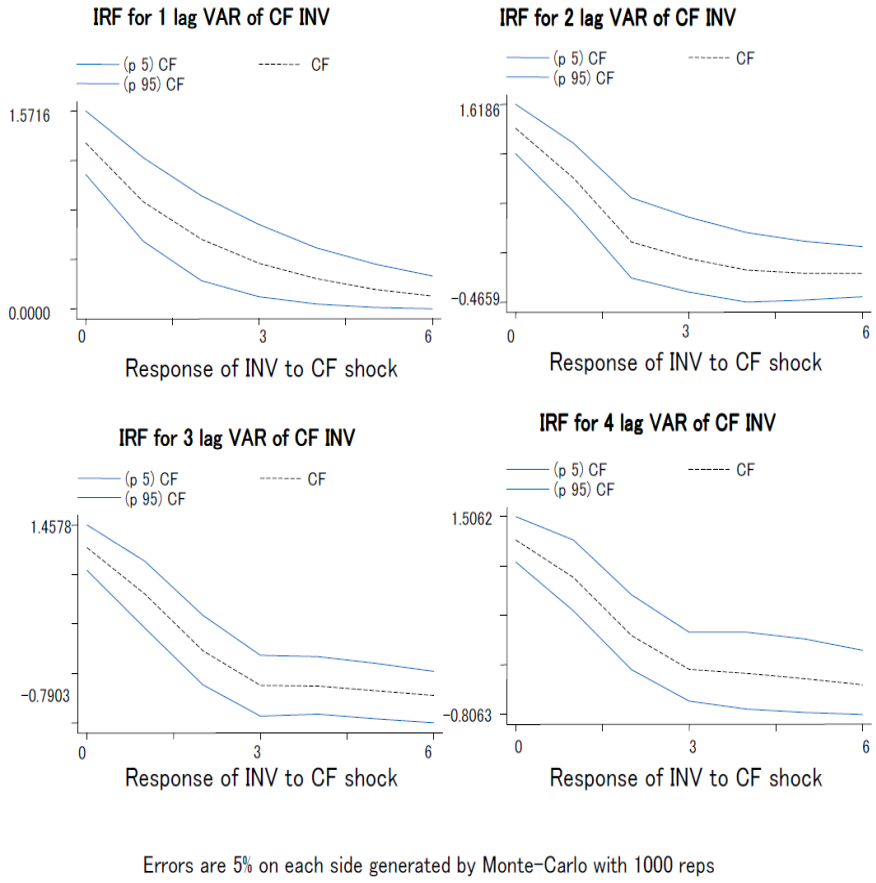

Figure 2.2: Impulse-responses for 1-4 lag bivariate VAR of CF and INV

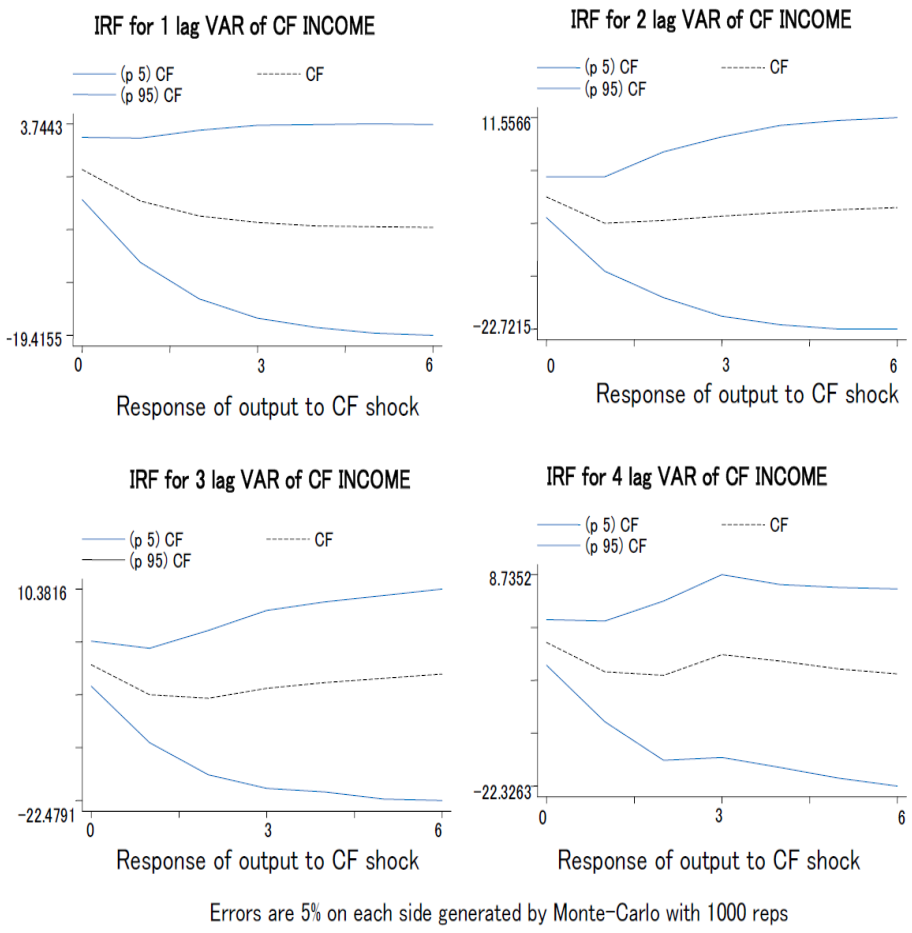

Figure 2.3: Impulse-responses for 1-4 lag bivariate VAR of CF and output

count surpluses and increases in foreign debt) as the most important drivers of capital flight from South Africa. Similarly, Ajayi (1992) reports that capital flight from Nigeria is explained by the rate of growth of the economy, real interest rate differential between Nigeria and the United States, financial repression, degree of currency misalignment, variation in inflation and the fiscal deficit.

Nyoni (2000) attempts to explain the causes of capital flight from Tanzania. His results show that growth differentials between Tanzania and the UK are positively and significantly related to capital flight from Tanzania. Ng'eno (2000) specifies a portfolio adjustment model in which domestic agents allocate their wealth among different financial instruments based on their relative risk and return features using Kenya as a case study. His results indicate that an overvalued exchange rate tends to stimulate capital flight as it signals possible devaluation. The return differential is also found to be negatively and significantly related to capital flight episodes from Kenya.

Fedderke and Liu (2002) test the proposition that capital outflows relate positively to expropriation risk and the foreign rate of return and negatively to the domestic rate of return using South Africa as a case study. Their long-run estimates suggest that the domestic and foreign rates of the return (proxied by the rate of growth of GDP and interest rate differentials) play a crucial role in explaining capital outflows. Similarly, risk indicators, especially political instability, seem to stimulate capital outflows in South Africa.

Lawanson (2007) attempts to capture the portfolio behaviour of private wealth holders in Nigeria and finds that poor economic performance, real interest rate differentials, parallel market exchange rate premium, increased domestic and external debt overhang, fiscal deficits and macroeconomic instability (proxied by changes in inflation rate) are closely related to capital flight episodes. Forgha (2008) finds evidence suggesting that capital flight is determined by political instability and poor macroeconomic performance in the form of high inflation, interest rate differential,

excessive fiscal deficits and high external debt servicing in the case of Cameroon.

Ndikumana and Boyce (2003) analyse the causes of capital flight for a sample of 30 SSA economies, including 24 countries classified as severely indebted low-income countries. They identify external borrowing and the growth differential (between SSA and OECD trading partners as well as the United States) as significant drivers of capital flight from Africa. These findings are reinforced in Ndikumana and Boyce (2008) who, in addition, find that economic growth discourages capital flight instances while macroeconomic instability is found to stimulate it by eroding the confidence of investors. Ndiaye (2009) examines the determinants of capital flight in the case of 15 SSA countries from Franc Zone. Summarily, he finds that short- and long-term borrowing, macroeconomic instability, exchange rate overvaluation, governance and institutional indicators are significant correlates of capital flight episodes.

Tables 2.12 in appendix 2A summarises the core determinants of capital flight previously identified. These determinants may be grouped into 'pull' factors in developed countries and 'push' factors within LDCs. The main pull factors include more developed financial sectors and less risks while the push factors include poor macroeconomic environments, political uncertainty, less developed financial sectors and distortionary policies.

Our findings that capital flight tends to deteriorate domestic economic performance is closely related to the results of Ndiaye (2009) and Fofack and Ndikumana (2009). These authors find that capital flight significantly reduces domestic capital formation. In particular, their results indicate that the adverse effects of capital flight on domestic investment mainly operates through private investment more than public investment.

2.5 Concluding remarks

Many African countries have received significant levels of official capital in the form of debt and foreign aid whilst experiencing substantial outflows of private wealth. Against this backdrop, this study has attempted to unravel the causes and macroeconomic consequences of these outflows.

Building upon the work by Le and Zak (2006), Collier et al. (2001) and Sheets (1995), we link the phenomenon of capital flight to the domestic investment climate (broadly defined) and contend that African agents move their portfolios as a result of a deteriorating domestic investment climate where the risk-adjusted rate of return is unfavourable. The results suggest that economic risk, policy distortions and the poor profitability of African investments can explain the variation in capital flight from SSA. Moreover, the finding that measures of institutional quality are inversely related to capital flight are in line with the theoretical view that institutions reduce transaction costs, improve the profitability of the domestic economy and, hence, encourage entrepreneurs to invest within the economy. Also, these results add to the growing empirical evidence (Lensink et al. 2000; Le and Zak, 2006; Cerra et al. 2008) that institutions, insofar as they influence the domestic investment climate, discourage capital flight. We also find that resource inflows as well as the structural features of African economies are important influences on capital flight. The findings of this study are robust to outliers, endogeneity and sub-samples. On the basis of these findings, we conclude that improved macroeconomic and institutional environments would help African economies, not only to attract more foreign investments, but also to retain their local capital.

The study also confirms that capital flight is indeed harmful to economic growth. The findings based on the dynamic panel model shows that capital flight carries a negative and significant coefficient. This indicates that the loss of domestic savings associated with capital flight episodes are harmful to economic performance.

In an attempt to explore the dynamic responses of investment and domestic out-

put, we find that one standard error shock in capital flight reduces both investment and income. In particular, investment falls on impact following capital flight and does not recover in the short to medium term horizon. Overall, the findings of this study emphasise the detrimental effects of capital flight in the African context where credit is scarce.

2.A Appendix 2

This section contains additional information regarding the dataset used to investigate the determinants of capital flight from SSA.

Data and sources used to calculate capital flight

To calculate CF, equation (2.3) on page 24 was used. The current account deficit and the increases in external debt and official reserves are from Global Development Finance database (World Bank, June 2009); net foreign investments are the sum of the following lines from the International Financial Statistics database (IMF, Sept. 2009): IFS lines78bdd, 78bed, 78bhd, 78bid, 78bkd, 78bmd, 78bwd, and 78bxd. For the specific definitions, please consult the IMF BOP Manual (5th edition). Some of the missing data are filled from IMF country reports.

Table 2.12: Determinants of capital flight - selected results

Study	Sample and period	Significant Variables
Henry (1996)	3 Caribbean countries, 1971-87: Time series	Inflation (-/0); Growth (-/0) Budget deficit (+/0) Pol instability (+); debt (+) interest rate diff (+) Exchange rate (-/0)
Lensink et al. (1998)	9 SSA countries, 1970-91: pooled OLS	Inflation (+); demand deposit (-) Capital stock (-); deposit rate (-) Exchange rate (+); debt (+)
Hermes and Lensink (2001)	84 developing countries 1971–91: Cross-section	Government consumption (+) taxation (+); budget deficit (+) interest rate (+); Aid (+) political instability (+) Bank lending (+/0)
Collier et al. (2001)	50 LDC countries, 1980–90; Cross-section analysis	Capital stock (+/0) Dollar distortion index(+) Square of debt stock (+)
Harrigan et al. (2002)	Malaysia, 1970-96; time series	GDP growth (-); debt (+) ; FDI (-) inflation (-/+); interest diff (+/0) Exchange rate depreciation (+)
Le and Zak (2006)	45 developing countries, 1976-91: Panel data methods	Variance of inflation (+) Macro policy uncertainty (+) Political instability (+) Var [interest rate] (+)
Cerra at al. (2008)	100 developing countries, 1970– 2001; Panel data analysis	GDP growth (-) Budget deficit (+) Domestic credit growth (+) Institutional quality (-) Currency crises (+) Debt (+)
Ndikumana and Boyce (2008)	40 SSA countries, 1970-04: Panel data methods	Lagged cap flight (+); Debt (+) Stock of debt (+) GDP growth lagged (-)
Ndiaye (2009)	15 Franc Zone SSA countries, 1970-05: panel methods	Lagged capital flight (+) FDI (-); Aid (+); Inflation (+) Short-term debt (+) Long-term debt (+) Exchange rate overvaluation (+) Good governance (-) Institutional quality (-)

Notes: signs in parentheses denote a statistically significant effect (+, - and 0 signify positive, negative and no significant relation, respectively); more than one sign in a bracket implies mixed results.

Table 2.13: List of variables, data sources and sample countries

Variable	Source
Capital flight (% GDP)	Estimated using the World Bank residual method, see main text
Black market premium	Global Development Network Growth Database (GDNGD, 2009)
Macroeconomic instability	Measured by the logarithm of CPI (annual change). World Bank (2009): WDI
Real overvaluation index	Expressed in logarithm form. (GDNGD, 2009)
Indebtedness	Net flows on long term debt as a % GDP. World Bank (2009): GDF
International reserves	Expressed in months of imports. World Bank (2009): WDI
Real per capita income	Expressed in logarithm form. World Bank (2009): WDI
Return differential	(Domestic real deposit rate - US T-Bill rate - % change in the exchange rate), where the exchange rate = LCU per US$. World Bank (2009): WDI, IMF (2009): IFS
Property rights	'Constraint on the executive', ranges between 1 (weak) and 7 (strong). PolityIV (2009)
Institutional quality	The mean value of ICRG subcomponents: 'Corruption', 'Law and Order', and 'Bureaucratic Quality', scaled 0 -1, such that higher values indicate higher quality of institutions (Teorell and Hadenius, 2007)
Governance	Captured by 'Polity2' score, indicating a country's governance status on a 0-10 scale, where 10 means strong. Polity IV (2009)
Political stability	Measured by the average Freedom House 'political rights and civil liberty' scores', scaled 1-10, where 10 means strong. Teorell and Hadenius (2007)
Ethnic fractionalisation	Easterly and Levine dataset (1997)
Terms of trade	World Bank (2009): WDI
Trade openness	Captured by the ratio of exports plus imports as a % GDP. WDI (2009)
Government size	Measured by total government expenditure as a % of GDP. WDI (2009)
Primary commodity dep.	Sachs and Warner (2000) - obtained from Azam and Hoeffler (2002)
Aid	Development aid as a % of GNI. World Bank (2009): WDI
FDI	Foreign Direct Investment as a % GNP. World Bank (2009): WDI
Short term debt	Expressed as a % of total external debt. World Bank (2009): WDI
War	A dummy variable. PRIO/Uppsala Armed Conflict Dataset, (2009)
Gov effectiveness	The relative political capacity measure created by Feng et al. (2000)
Resource abundance	Share of mineral exports in total exports. IMF (2009): DOTS
BOP crisis	Likelihood of balance of payment crisis captured by a dummy variable coded 1 if reserves are than 30 days worth of imports, 0 otherwise. World Bank (2009): WDI
List of countries: Angola; Benin; Burkina Faso; Burundi; Cameroon; Cape Verde; Central African Rep.; Chad; Comoros; Congo, Dem. Rep.; Congo, Rep.; Cote d'Ivoire; Ethiopia; Gabon; Gambia; Ghana; Guinea-Bissau; Kenya; Liberia; Madagascar; Malawi; Mali; Mauritania; Mauritius; Mozambique; Niger; Rwanda; Senegal; Seychelles; South Africa; Sudan; Swaziland; Tanzania; Togo; Uganda; Zambia; Zimbabwe.	

Table 2.14: Descriptive Statistics

	Capital flight	Black market Pr.	Overvaluation index	Macro instability
Mean	13.26	90.51	5.40	6.01
Maximum	128.43	4806.89	6.46	8.90
Minimum	-95.41	-8.29	4.84	4.13
Std. Dev	20.10	420.34	0.26	0.99
Observations	740.00	414.00	510.00	556.00

	Indebtedness	Int. reserves	PC income	Ret. differential
Mean	4.73	2.23	6.01	-47.43
Maximum	68.44	11.78	8.90	44.46
Minimum	-9.98	-0.92	4.13	-9129.98
Std. Dev	5.67	1.90	0.99	438.74
Observations	686.00	584.00	723.00	600.00

	Pol. Stability	Ethnic fract.	Prop. rights	Inst. quality
Mean	2.99	0.67	2.76	0.41
Maximum	9.17	0.93	7.00	0.83
Minimum	0.00	0.04	1.00	0.04
Std. Dev	2.35	0.23	1.82	0.16
Observations	740.00	541.00	629.00	406.00

	Governance	Terms of trade	Primary exp.	Gov size
Mean	-3.46	106.37	0.17	15.63
Maximum	10.00	287.64	1.02	54.51
Minimum	-10.00	38.22	0.01	4.36
Std. Dev	5.78	31.97	0.14	7.00
Observations	629.00	634.00	451.00	675.00

	Trade openness	Resources	Aid	FDI
Mean	64.29	16.38	14.47	1.38
Maximum	188.65	153.82	95.25	83.31
Minimum	6.32	0.00	0.41	-4.08
Std. Dev	34.31	31.29	12.55	4.05
Observations	707.00	583.00	687.00	686.00

	Short term debt	Gov. effectiveness	War	BOP crisis
Mean	13.44	1.09	0.26	0.71
Maximum	487.11	3.42	1.00	1.00
Minimum	0.13	0.02	0.00	0.00
Std. Dev	37.07	0.54	0.44	0.45
Observations	698.00	600.00	627.00	584.00

Table 2.15: Correlation Matrix

Capital Flight and Baseline Variables								
	i	ii	iii	iv	v	vi	vii	viii
Capital flight	1.00							
Black market premium	0.03	1.00						
Overvaluation index	0.10*	0.26*	1.00					
Macro instability	0.04	0.17*	-0.11*	1.00				
Log per capita income	-0.12*	-0.14*	0.11*	-0.26*	1.00			
Return differential	-0.01	-0.07	0.06	-0.40*	0.08	1.00		
International reserves	-0.20*	-0.04	-0.24*	-0.13*	-0.25*	0.05	1.00	
Indebtedness	0.51*	0.08	0.02	0.06	-0.16*	0.04	-0.11*	1.00
Capital Flight and Institutional Variables								
			i	ii	iii	iv	v	vi
Capital flight			1.00					
Property rights			-0.08*	1.00				
Institutional quality			-0.20*	0.14*	1.00			
Political stability			-0.08*	0.47*	0.20*	1.00		
Ethnic fractionalisation			-0.02	0.03	-0.24*	0.00	1.00	
Governance			-0.10*	0.90*	-0.30	0.59*	0.00	1.00
Capital Flight and Structural Variables								
			i	ii	iii	iv	v	vi
Capital flight			1.00					
Trade openness			0.04	1.00				
Government size			0.16*	0.49*	1.00			
Primary commodity exports			0.10*	0.45*	0.30*	1.00		
Terms of trade			0.13*	0.02	0.02	0.20*	1.00	
Natural resources			-0.05	0.30*	0.17*	0.45*	0.15*	1.00
Capital Flight and Capital Flow Variables								
					i	ii	iii	iv
Capital flight					1.00			
FDI					0.05	1.00		
Aid					0.30*	-0.05	1.00	
Short term debt					0.11*	0.11*	-0.08*	1.00
Capital Flight and Additional Variables								
					i	ii	iii	iv
Capital flight					1.00			
Government effectiveness					0.04	1.00		
Civil war					-0.04	-0.12*	1.00	
Balance of payments crisis					0.20*	0.00	0.00	1.00

Notes: * indicates significance at the 5 percent level.

2.B Appendix 2

This section contains additional information regarding the dataset used to investigate the consequences of capital flight from SSA.

Table 2.16: Variables, sources and countries

Variable	Source
Capital flight (% GDP)	Estimated using the World Bank residual method, see main text
Investment	Measured as a % of GDP: WDI (2010)
Inflation	Measured by the logarithm of CPI (annual change). World Bank (2009): WDI
Financial depth	Measured the share of M2 in GDP. World Bank (2010): WDI
Real per capita income	World Bank (2010): WDI
Institutional quality	Captured by Polity2 score', ranges between -10 (weak) and +10 (strong). PolityIV (2009)
Trade openness	Captured by the ratio of exports plus imports as a % GDP. WDI (2009)
Government size	Measured by total government expenditure as a % of GDP. WDI (2009)

List of countries: Angola; Benin; Burkina Faso; Burundi; Cameroon; Cape Verde; Central African Rep.; Chad; Comoros; Congo, Dem. Rep.; Congo, Rep.; Cote d'Ivoire; Ethiopia; Gabon; Gambia; Ghana; Guinea-Bissau; Kenya; Liberia; Madagascar; Malawi; Mali; Mauritania; Mauritius; Mozambique; Niger; Rwanda; Senegal; Seychelles; South Africa; Sudan; Swaziland; Tanzania; Togo; Uganda; Zambia; Zimbabwe.

Table 2.17: Descriptive Stats

	Capital flight	Growth	RGDP	lninflation	Investment
Mean	10.05	0.71	830.00	3.05	19.48
Maximum	161.94	37.84	8349.81	10.10	76.70
Minimum	-79.78	-46.89	80.62	-1.65	-23.76
Std. Dev	20.79	5.60	1309.37	0.93	9.60
Observations	1115	1089	1097	950	1078

	Institutional quality	Trade	Financial depth	Government size
Mean	-1.92	69.34	24.76	15.54
Maximum	10	224.66	120.46	54.51
Minimum	-10	6.32	0.00	2.65
Std. Dev	6.12	37.89	15.87	7.11
Observations	966	1082	1046	1064

Chapter 3

Crises and Growth Collapses in Africa: The Role of Economic Integration

3.1 Introduction

It is largely accepted that trade and financial openness *can* promote the transmission of business cycle fluctuations among countries, making them more vulnerable to contagion (Frankel, 2000). However, notwithstanding the potential risks associated with globalisation, an increasing number of African countries have embarked on policies of trade and financial liberalisation. As a result, Africa is today more integrated into the global economic system than it was few decades ago. Yet, like developing countries in other regions, African economies have also encountered their share of economic and financial crises. As recent global events illustrate, crises can have devastating effects on economic activity and can hit countries with strong, as well as, those with weak macroeconomic fundamentals. Thus, economists and policy-makers are increasingly concerned with understanding the genesis, evolution and consequences of economic crises.

The objective of this study is to explore how crises and openness affect economic growth in Africa. More specifically, we examine whether greater openness to trade and financial flows exacerbates or lessens the adverse effects of financial crises. We distinguish between four different types of crises, namely, sudden stops, currency,

twin and sovereign debt crises. To our knowledge, this is the first study to examine the effects of these types of crises in the context of African economies. Most of the existing literature focuses onmainly emerging markets, even though many African countries have also been subject to these types of crises.

A 'sudden stop' in capital inflows is a type of crisis in which access to foreign capital is abruptly and severely curtailed, precipitating large swings in the capital account of the balance of payments[1]. It is closely associated with current account reversals (from large deficits to smaller deficits/ surpluses), reserve depletion, growth collapses as well as currency and sovereign debt crises (Calvo, 1998)[2]. Sudden stops can be caused by the behaviour of global investors (i.e. a sudden decline in gross inflows to a particular country due to a sharp fall in the demand for that country's assets). They can also be driven by domestic economic agents (i.e. a sharp increase in gross outflows or capital flight as a result of a sudden shift towards foreign securities).

A currency crisis, on the other hand, occurs when investors substitute away from a particular country's assets in anticipation of a potential depreciation of the currency, while a sovereign debt crisis involves a default or restructuring of debt obligations. Twin crises, first coined by Kaminsky and Reinhart (1999), arise when currency crises are followed by banking crises. As shown by, among others, Kaufman (2000) and Bordo et al. (2001), twins tend to have much more harmful effects on the economy relative to either currency or banking crises on their own. The different types of crises may hit simultaneously, as they may be triggered off by common underlying factors, and one crisis may also help precipitate another.

Guidotti et al. (2004) find that sudden stops have been a common occurrence in developing countries since the late 1970s, and Deb (2005) asserts that capital

[1] This capital account adjustment is usually termed 'capital reversal' in the existing literature.

[2] Sudden stops and the accompanying liquidity constraints imply that the current account must be abruptly adjusted (i.e. reduced). This can be avoided by depleting the reserve holdings of the central bank, provided there are enough reserves and the central bank is willing to do so (however, reserve depletion may initiate currency crises) or, alternatively, by seeking emergency funding from international financial institutions. In any case, a current account reversal can be very painful as labour and goods markets tend to be inflexible in the short-run.

reversals and sudden stops are developing country phenomena. Edwards (2004) shows that, in his sample of 157 economies, African countries have encountered more sudden stops simultaneously with current account reversals than has any other region. Glick et al. (2006) document that currency crises were more frequent in Africa than in any other developing region. Andersson and Karpestam (2011) show that, of all the types of crises that have hit African countries, debt crises have been the most harmful to both output growth and total factor productivity.

The results of this study, as expected, show that financial crises are associated with growth collapses in Africa. In contrast, economic openness is found to be beneficial to growth. More specifically, we find that, consistent with standard Mundell-Flemming type models, greater openness to trade and financial flows tends to mitigate the adverse effects of crises.

The chapter is organised as follows. Section 2 reviews the existing literature. Section 3 contains some preliminary analysis and presents our crises and openness measures. Section 4 presents the econometric techniques used, while Section 5 discusses the results. Finally, Section 6 concludes.

3.2 Related Literature

In this section, we firstly provide a brief overview of the ways in which economic and financial crises relate to output collapses. Subsequent to this, we revisit the openness-growth relationship with a view to summarising the findings of the existing literature. Finally, we present an analytical discussion of the role economic integration can play in the relationship between crises and output growth.

3.2.1 Crises and output growth

An increasing body of evidence links economic and financial crises to output collapses. The existing literature, both theoretical and empirical, emphasises that crises

are associated with output losses due to their adverse effects on domestic capital formation, labour market, exchange rates, asset prices, aggregate demand, and total factor productivity.

Korinek (2011) postulates that crises cause self-reinforcing 'financial amplification' effects in which countries can be caught in a vicious circle of falling prices (exchange rates and asset prices), deteriorating balance sheets and decreasing aggregate demand. More specifically, crises, particularly those that come in the form of capital reversals, sudden stops and currency crises, are associated with sharp falls in the exchange rate and asset prices. This, in turn, deteriorates domestic firms' balance sheets by undermining their collateral value and net worth, further reducing their ability to borrow and invest owing to reduced access to credit. These effects tend to be amplified in environments where there is credit scarcity, high liability dollarization and financial market imperfections. In crisis-hit countries, lack of credit availability reduces aggregate demand by tightening the budget constraints of agents, so decreasing their consumption and investment levels.

The tendency of crises to undermine investor confidence can arise, not only from lack of credit availability, but also from increased risk and uncertainty. In addition, in Keynesian settings where prices/wages are downward sticky, depressed aggregate demand is associated with higher unemployment and output losses (Reinhart and Calvo, 2000). Furceri and Mourougane (2012) contend that crises may either increase or decrease total factor productivity. On the one hand, crises may reduce total factor productivity through their negative impact on innovation and research and development as these tend to be higher in good times. On the other hand, total factor productivity may increase in crisis situations if firms, in an attempt to minimise losses and retain competitiveness, restructure and/or improve their X-efficiency.

There is a vast literature on the macroeconomic consequences of crises. For example, Dornbusch et al. (1995) show that sudden stop episodes played a crucial

role in triggering and aggravating the Mexican tequila crisis of 1994/1995. Guidotti et al. (2004) find that sudden stops are associated with output contractions across a range of developed and developing countries. More importantly, they find that government policy stance plays a role in the aftermath of a sudden stop crisis. In particular, countries with open trade regimes and floating exchange rates tend to have a better growth performance than those with closed economies and fixed exchange rates. In addition, they find that liability dollarization tends to hurt economic growth in the aftermath of a sudden stop. The contractionary effect of capital flow reversals and sudden stop crises is also confirmed by Deb (2005). However, his results suggest that the negative effects of these types of crises on growth is conditional on the level of economic development so that output losses are more likely to be felt in developing and emerging economies than in industrialised countries.

Edwards (2004) finds that current account reversals associated with sudden stops are inversely related to real GDP growth but that trade openness tends to lessen the negative effects of reversals. In contrast, he finds that financial openness tends not to influence the extent to which reversals affect growth. Similar to the findings reported by Guidotti et al. (2004), Edwards (2004) finds that flexible exchange rates tend to mitigate the adverse effects of reversals.

Other studies highlight the importance of institutions in influencing the outcomes of crises. For example, Cavallo and Cavallo (2010) show that better quality institutions tend to mitigate the adverse effects of banking, debt and sudden stop crises since good institutions tend to promote better policy responses following adverse shocks. On the other hand, Joyce and Nabar (2009) demonstrate that the adverse impacts of crises on domestic investment is conditional on the presence of other types of shocks. More specifically, they find that sudden stops are harmful to investment only if they coincide with banking crises. In a similar vein, Cowan and Raddatz (2012) and Gallego and Tessada (2012) postulate that the negative output

effect of sudden stops arises because these types of crises tend to aggravate financial frictions prevailing in the domestic economy. For example, industries that rely more on external financing and those with higher liquidity constraints tend to experience a fall in their activity during a sudden stop, especially when the domestic financial system is weak.

Gupta et al. (2003) explore the behaviour of output during currency crises for a sample of 91 developing countries. They find that currency crises are in most cases contractionary, particularly in countries that are less open to trade, in large developing countries, in countries with open capital accounts and when crises are preceded by large capital inflows. In a series of studies, Hutchison and Noy (2002; 2005; 2006) examine the output costs of various types of crises in emerging markets. Their findings confirm that currency, banking and sudden stop crises cause substantial output losses, with sudden stops having the most adverse (albeit short-lived) effects on growth.

Focusing on sovereign debt crises, Rose (2005), De Paoli and Hoggarth (2006) and Borensztein and Panizza (2010) emphasise that defaults can impose severe costs on developing countries including loss of trade partners and credit as well as higher costs of future finance. The costs can be particularly high if the developing country defaults on official Paris Club debt. A number of studies confirm that sovereign debt crises are associated with output falls. For example, Sturzenegger (2004) reports that countries that have defaulted grow about 0.6% less than those that have not and that defaults which trigger banking crises and macroeconomic instability are much more harmful to output performance than those that do not. This is confirmed by De Paoli and Hoggarth (2006), who find the negative effect of default on output to be larger when defaults coincide with banking and/or currency crises and when it takes countries longer to clear their arrears or restructure their debts. Similar results are also reported by Borensztein and Panizza (2009).

In sum, the existing studies surveyed above provide ample evidence that financial

crises are associated with output losses, particularly in emerging markets. In this study, we argue that there is scope for additional work to establish the growth outcomes of crises in African countries. Hence, we attempt to fill this gap in the literature.

3.2.2 Economic integration and growth

Economists have long held the view that increased international trade can propel countries to a high-growth trajectory. Standard trade theory, for example, postulates that trade openness is associated with static gains as it provides greater scope for the accumulation of human and physical capital. In particular, openness can facilitate economies to allocate their resources more efficiently by providing market platforms which allow economies of scale and division of labour to take place – increasing total factor productivity. Moreover, endogenous growth theories (e.g. Romer, 1994; Rivera-Batiz and Romer, 1991) predict that opening up trade enables countries to acquire new technologies, skills, knowledge and various other positive externalities which can bring about dynamic gains resulting in higher economic growth.

Similarly, an extensive theoretical literature identifies various direct and indirect channels through which financial openness can foster higher productivity and improve economic performance. Kose et al. (2009) contend that financial integration can increase capital accumulation by relaxing credit constraints and augmenting domestic resources. In addition, openness to financial flows can promote more efficient capital allocation as a result of increased risk-sharing opportunities which enables firms to undertake more risky but high-return investments (Obstfeld, 1994). As the volume of capital increases, the cost of capital should fall since the domestic economy becomes more liquid (Prasad et al. 2003). Other strands of the literature postulate that financial globalisation helps improve the domestic financial sector, market discipline, government policies and corporate governance (Rajan and Zingales, 2003; Klein and Olivei, 2008; Bonfiglioli, 2008; Kose et al. 2009).

An extensive survey of the literature by Williamson and Maher (1998) concludes that, while financial liberalisation can result in higher efficiency in terms of investments and greater financial development, it can coincide with severe banking and other crises. Hence, one particular line of enquiry pursued by many researchers is whether economic integration, especially financial openness, is closely linked with crises. On the one hand, economists such as Stiglitz (2000) argue that capital account openness may increase the likelihood of encountering financial crises. On the other hand, Edwards (2007) and Glick et al. (2006) fail to find evidence that countries with high capital mobility suffer disproportionately more crises than those with lower capital mobility.

Ranciere et al. (2006) decompose the growth outcome of international financial liberalisation into two effects: a positive direct effect and a negative indirect effect due to higher propensity to crisis. Their empirical estimates suggest that the direct positive effect of financial openness on growth significantly outweighs the growth loss associated with more frequent financial crises. Employing probit and panel regressions, Lee and Shin (2007) report similar results, that is, the positive financial liberalisation effect on growth dominates the indirect negative effect due to crises.

The empirical literature focusing on African countries has approached the investigation of the growth-openness relationship in two main ways: (i) by directly testing the growth effects of measures of trade and/or financial openness, and (ii) by identifying the channels through which economic integration influences growth. For example, using instrumental variable estimations, Bruckner and Lederman (2012) find a robust positive link between trade openness and growth in Sub-Saharan Africa. Similar results have been reported by Changa and Mendy (2012). Baliamoune-Lutz and Ndikumana (2007) find results suggesting that institutional quality play an important role in the openness-growth nexus in Africa.

Focusing on financial openness, Fowowe (2008) shows that there is a significant and robust positive relationship between economic growth and financial liberali-

sation policies in his sample of Sub-Saharan African countries. Similarly, Ahmed (2011) provides evidence that financial integration has had a positive (albeit not statistically significant) direct impact on output growth in Africa. However, he finds that financial openness in Africa has had a positive and robust effect on African financial markets and thereby indirectly benefitted their growth performance.

The foregoing review of the existing literature suggests that trade openness can improve economic performance. Similarly, financial openness can improve the efficiency and depth of financial sectors. However, embedded in financial liberalisation is the risk of crises which disrupt economic activity.

3.2.3 The openness-crisis interaction

One can identify two opposing hypotheses as to whether economic and financial integration mitigate or exacerbate the adverse effects of financial crises. On the one hand, some have argued that openness can be an important crisis amplifier, in that it can expose countries to external shocks, while others suggest that it can act as a crisis buffer insofar as it can help accommodate external shocks.

Openness as a crisis amplifier

As summarised by Cavallo and Frankel (2008), a number of arguments have been put forward in support of the view that openness to trade can trigger or exacerbate crises. In particular, countries that are more integrated into the global economy are more likely to be subject to external shocks emanating from, for example, trading partners. As a result, the argument goes, these economies are more prone to export collapses and/or diminishing trade credits which in turn can trigger sudden stops and other types of crises. Empirical findings by Ramey and Ramey (1995), Milesi-Ferretti and Razin (2000) and Easterly et al. (2001) suggest that openness to trade is closely linked to output volatility and a higher likelihood of external crises.

With respect to capital account openness, economists such as Stiglitz (2000) argue that it can aggravate pre-existing market distortions caused by informational

asymmetries, credit market imperfections, poor institutions and moral hazards, increasing the likelihood of crises (Stiglitz, 2000). While the overwhelming majority of economists, including Stiglitz, remain in favour of long-term private capital inflows (e.g. foreign direct investment), many point to the destabilising effects of volatile and pro-cyclical surges in inflows. Hence, it has been argued that capital account openness may lead to increased inflows of short term capital and a higher risk of abrupt reversals (Agenor, 2004; Singh, 2003). Others assert that capital movements, as a result of financial openness, may increase macroeconomic instability (e.g. upward pressures on the exchange rates, asset price bubbles, credit booms, higher inflation, consumption growth volatility etc.) and lead to the presence of more short-term, high risk speculative capital in the economy (Arestis, 2005).

Openness as a crisis buffer

The idea that openness to trade can lower the probability of crises or, alternatively, lessen the adverse effects of external crises is not new in economics. For instance, a number of studies have postulated that there is an inverse relationship between trade openness and default probabilities. More precisely, countries with higher trade activities are less likely to default on their international obligations since their trading partners could impose harsh sanctions on them in the event of a default (Rose, 2005).

An alternative argument suggests that trade openness lessens the adjustment costs associated with external crises. In particular, it has been suggested that open economies are more likely to 'export their way out of a crisis'. This was first noted by Sachs (1985), who observed that in the early 1980s Latin American countries were subject to numerous debt crises, in spite of having similar levels of debt to GDP ratios as Asian countries, precisely because of their lower trade openness and hence their inability to generate foreign exchange to service their debt. Recently, Guidotti et al. (2004) have shown that countries with open trade regimes tend to have better growth performances and quicker recoveries in the face of sudden stop

crises than those with closed economies.

How trade openness reduces the adjustment costs of external shocks has been elaborated on by, among others, Edwards (2004), Cavallo and Frankel (2008), Calvo et al. (2003) and Ripoll-i-Alcon (2010). Suppose that an economy has to abruptly adjust to a shock (e.g. a sudden stop episode). In the first instance, assume that expenditure-switching policies are not possible (i.e. the exchange rate is fixed). In this case, the country must implement spending cuts to satisfy its intertemporal resource constraint and thus run a current account surplus. In the standard Keynesian and Mundell-Flemming type of models, the severity of the adjustment is negatively related to the marginal propensity to import, with a higher propensity implying lower adjustment costs. Thus, more open economies would, *ceteris paribus*, suffer less contraction[3].

Similar conclusions can be reached if one uses traditional tradable/nontradable models. To illustrate this, assume that it is now possible for the country to implement expenditure-switching policies. In this case, to improve the trade balance, the relative price of non-tradables must fall. Hence, the needed adjustment can, at least in part, be achieved through a nominal and real depreciation of the exchange rate. This would in turn, following sticky-price open economy models and conventional Mundell-Fleming type models, improve the recovery of the economy through increased competitiveness[4].

Recent experiences from emerging markets, however, show that the effect of depreciation on output can in fact be contractionary particularly when there is a currency mismatch brought about by the so-called "original sin"[5]. As shown by a number of theoretical (see for example, Aghion et al. 2001; Choi and Cook,

[3]Output losses would be inevitable if wages and prices are rigid. This is more likely to be the case in the short-run.

[4]For a survey, see Lane (2001). The beneficial effects of the depreciation would depend on a number of factors, including whether the Marshall-Lerner condition holds.

[5]This refers to the situation where developing countries cannot get loans denominated in their own currencies from international financial markets. Thus, a depreciation/ devaluation of their currencies would make the value of their liabilities rise. These balance sheet effects would reduce the net worth of firms.

2004) and empirical contributions (see for example, Aguiar, 2005), the balance sheet effects of a depreciation can cause output contraction as a result of dwindling firm net worth. However, as emphasised by Cavallo and Frankel (2008), the required devaluation may not be large for countries with higher trade to GDP ratios and, in turn, the balance sheet effects need not be large. Consequently, the prediction is that more open countries can mitigate the adverse effects of external shocks better than closed economies, which are more likely to end up in a recession due to the need implement more severe adjustments.

Using a simple theoretical model, Ripoll-i-Alcon (2010) shows that trade integration can not only mitigate crises, but can also reduce the frequency of external financial crises. The model highlights three distinct mechanisms all of which are related to the macroeconomic effects of trade growth. The first channel is the standard pro-competitive effect which arises from a depreciation of the exchange rate. The second relates to how trade integration can improve the economy's solvency through, for example, greater willingness to meet outstanding external liabilities for fear of sanctions in case of default. Finally, the model predicts that more open economies would experience a quicker recovery, facilitated by higher output in the tradable goods sector which would keep the fall in domestic demand in check.

Do these effects also apply to financial integration? Edwards (2004) and references cited therein seem to suggest so. That is, similarly to trade integration, financial openness tends to reduce the adjustment costs of external shocks and thus enables the economy to recover more quickly[6].

The African context

As our discussion regarding the two competing hypotheses indicates, the openness-crisis interaction can only be settled empirically. In this study, we argue that a necessary condition for financial openness to amplify crises is the existence of a

[6] A careful examination of the existing literature, however, indicates that, under fairly standard assumptions, financial openness may in fact result in greater instability (see for example Kim et al. 2012 for a review).

highly liquid and well-developed financial system, which is absent in most African countries. In the African context, as is largely accepted, financial crises tend to be transmitted via the real sector (e.g. trade collapses). So the question of whether openness lessens the impact of crises can be approached in two different ways. One way is to examine whether open countries are more prone to crises (i.e. whether they have a higher probability of encountering an external shock). An alternative way, which is perhaps more useful, is to explore whether countries that are more open to trade and financial flows suffer smaller reductions in output *following* external shocks relative to more closed economies. In other words, are open economies more likely to accommodate external shocks? In what follows, we attempt to answer this latter question.

3.3 Statistical analysis of key variables

3.3.1 Openness indicators

We utilise several measures of economic and financial openness. We use the economic dimension of the KOF index of globalisation (Dreher, 2006). It is a weighted index of actual economic flows (trade, foreign direct investment, portfolio investment and income payments to foreign nationals each measured as a percentage of GDP) and their restrictions (hidden import barriers, mean tariff rate, taxes on international trade and capital account restrictions). This is our preferred indicator since it captures the degree to which economies are connected to the rest of the world. As sensitivity tests, we also employ the actual economic flows sub-index from the same dataset and the share of trade (sum of exports and imports) in GDP, each capturing different aspects of cross border transactions.

To measure financial openness, we use the de facto indicator constructed by Lane and Milesi-Ferretti (2006). This variable measures the external assets and

liabilities of economies (as a share of GDP) and thus provides a useful overview of a country's financial linkages to the rest of the world. As a robustness check, we disaggregate the gross external liabilities and use the sub-component of FDI as an additional measure of financial integration[7]. Finally, we use the *de jure* index of capital account openness proposed by Chinn and Ito (2006). This measure is the first principal component of four binary dummy variables related to restrictions on cross-border financial transactions.

3.3.2 Crises indicators

To identify episodes of sudden stop crises, we closely follow the work of Guidotti et al. (2004) and Calvo et al. (2004) to define a sudden stop as a fall in the financial account that is at least one standard deviation below the sample mean and more than 5 percent of the country's GDP. However, we impose an additional requirement in that we require the episode to be *disruptive*. One way to do this is to follow the procedure by Hutchison and Noy (2006). They focus on episodes that coincide with other types of crises. Our approach is broader and requires the episode to coincide with, or be followed by, other forms of financial crises, namely, currency and debt crises. In this way, our measure of a sudden stop reflects not only changes in the mood of global capital markets, but also how harmful the episode might be. Hence, we use a dummy variable that takes on a value 1 if there is a sudden stop in a country during a particular year and 0 otherwise.

We also make use of similar dummy variables capturing the incidence of currency and sovereign debt crises. Our currency crisis measure is based on that of Reinhart and Rogoff (2009), who define it as an annual depreciation (local currency vs US dollar) of 15 percent or more. Our sovereign debt crisis measure comes from the same source and is defined as a failure to meet a principal or interest payment on

[7]Kose et al. (2008) do a similar disaggregation of stocks of liabilities into debt, FDI and equity components (from Lane and Milesi-Ferretti, 2006), arguing that the benefits of financial openness are closely linked with the effects of these inflows.

the due date (or specified grace period) including rescheduling of debt agreements irrespective of the nature of any new terms.

Following Kaminsky and Reinhart (1999) and Bordo et al. (2001), we also consider the effects of the joint ('twin') occurrence of banking and currency crises on output growth in Africa. The data on banking crises comes from the dataset by Laeven and Valencia (2008). Finally, to capture the severity and intensity of financial crises, we construct a composite crisis index, which can take on a value between 0 and 4, depending on the number of types of crises encountered by a country in a particular year. For example, in 1992 Nigeria simultaneously experienced a sudden stop episode with currency, twin, and sovereign debt crises. Hence, we award Nigeria an index score of 4 for that particular year. We then weigh the index by the share of each country's GDP in world output. A similar procedure has been adopted by Reinhart and Reinhart (2010). The composite measure has a number of attractive features relative to the crisis dummies, which we discuss later.

3.3.3 The anatomy of African crises

Using the definitions and sources detailed above, we identify a total of 202 currency crises, 172 sovereign debt crises, 249 sudden stop episodes and 56 twin crises (banking and currency). Figure 3.10 shows the distribution of currency crises over time. It seems that the highest number of currency crises were recorded in 1994, when the CFA franc was devalued by 50%. The occurrence of sovereign debt crises peaked during the mid to late 1980s (Figure 3.11), while a significant number of countries experience sudden stop episodes from the late 1970s onwards (Figure 3.12). Twin crises were the least frequent type of crisis during the sample period, occurring mostly in the 1990s (Figure 3.13).

We now turn our attention to the behaviour of output growth during crisis episodes. To this end, we conduct a basic event analysis where we examine whether

a crisis event is accompanied by an output loss or growth collapse[8]. The existing literature defines an output loss or growth collapse as the deviation of actual output (growth) from its potential trend[9] (see, for example, Bordo et al. 2001; Boyd et al. 2005 and Gupta et al. 2007). As is standard in the literature, we estimate the output trend based on a 5-year pre-crisis period ending 3 years prior to each crisis event using Hodrick-Prescott smoothed output series. However, in the majority of cases, we end up with negative growth trends[10]. Similar problems have been encountered by Abiad et al. (2009) and Angkinand (2008). To get round this, the first authors extend the pre-crisis period back until a positive trend is achieved (10 to 20 years back) while the latter author sets all the negative 3-year pre-crisis growth rates to zero.

In this study, we opt for an alternative strategy which imposes as few restrictive assumptions as possible. In particular, we ask the following question. How does output growth behave before, during and after financial crises? A simple way to do this is to compare the actual growth rates in period T (onset of a crisis) to those in $T_{-1}, ..T_{-5}$ (pre-crisis window) and in $T_{+1}, ..T_{+5}$ (post crisis period)[11]. Figure 3.1 shows that debt crises tend to be associated with greater output collapses in Africa. This is in line with the findings of Andersson and Karpestam (2011) that debt crises have been the most harmful to type of crisis output growth in Africa. The figure suggests that sudden stop episodes tend to be preceded by a boom and that output tends to suffer a small contraction. The idea that sudden stops occur on the back of boom times is consistent with the notion that developing countries tend to experience capital inflow bonanzas during good times (procyclicality), perhaps

[8] Event studies have become standard in the crises literature following the seminal work by Eichengreen et al. (1995) and Frankel and Rose (1996).

[9] The potential output (growth) trend is usually estimated from the average of 3-5 year pre-crises output (growth).

[10] Negative trends would suggest that output falls indefinitely, even in the absence of a shock (see Abiad et al. 2009).

[11] Any crisis episodes occuring within a window of 4 years are grouped as 1 and their average is used. Where 5-year averages are not available, shorter windows are used instead. Countries with episodes lasting 10 or more consecutive years are omitted.

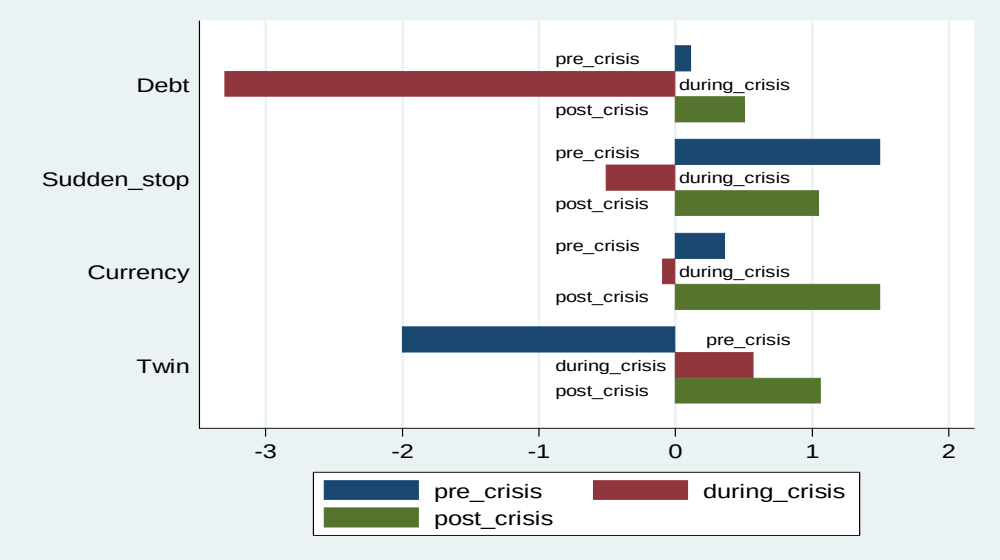

Figure 3.1: Average growth performance around crisis episodes in Africa

driven by a strong surge in global commodity prices (Reinhart and Reinhart, 2008). As Reinhart and Reinhart (2008) put it;

> "The heavy inflow episode can persist, often lulling policymakers and investors into treating the bonanza as a *permanent* phenomenon rather than a *temporary* shock. Episodes end, more often than not, with an abrupt reversal or "Sudden stop" á la Calvo" (p. 3).

Similar to the findings of Reinhart and Rogoff (2009), the figure indicates that currency crises are, on average, associated with mild contractions. In addition, in the case of currency crises, post-crisis growth tends to be higher than the pre-crisis level. This may be a result of the pro-competitive effects of the exchange rates. In contrast to the other cases, growth tends to be poor in the run-up to a twin crisis but the onset of the crisis itself is not associated with a growth collapse.

However, it should be emphasised that pooling the growth performance around crisis episodes across the sample countries only captures the general trend and does not represent the experiences of all countries. In an attempt to shed further light on how particular countries perform when they encounter crises, we depict the experiences of selected African economies. The results are shown in Figures (3.2-3.5). As

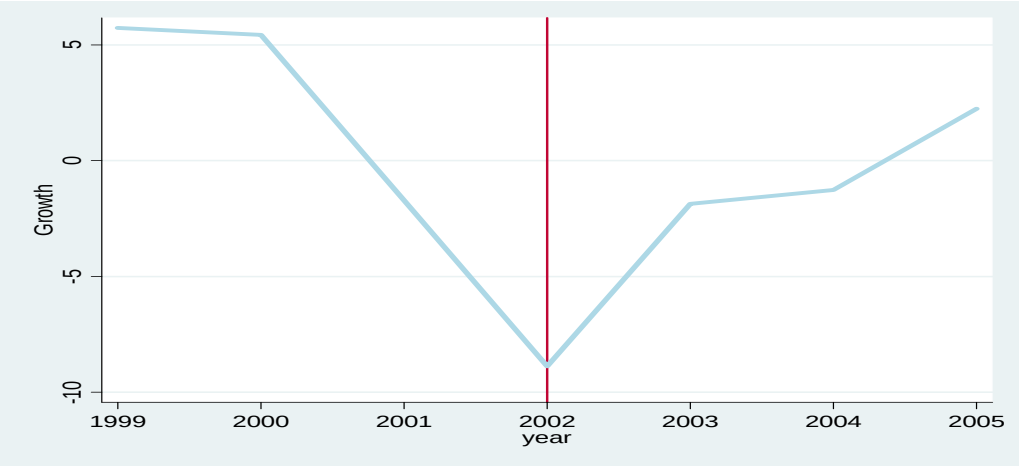

Figure 3.2: Growth performance around a sudden stop crisis (Guinea-Bissau)

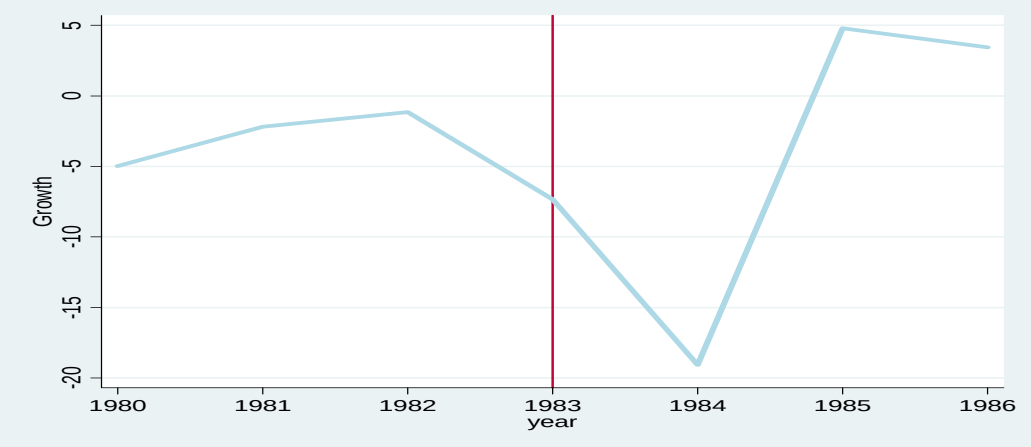

Figure 3.3: Growth performance around a sovereign debt crisis (Niger)

can be seen, financial crises can coincide with growth collapses (e.g. Guinea-Bissau in 2002). Alternatively, they can occur either during a period of sluggish growth (e.g. Niger in 1983) or on the back of a good performance (e.g. Ethiopia in 1998). Finally, crises can coincide with impressive growth rates (e.g. Mozambique in 1987).

While these simple exercises are suggestive as to the behaviour of output during crisis episodes, they, nonetheless, do not give the full picture regarding whether crises are contractionary or not. For this purpose, we follow the procedure by Gupta et al. (2007) and closely examine whether output contracts or expands during

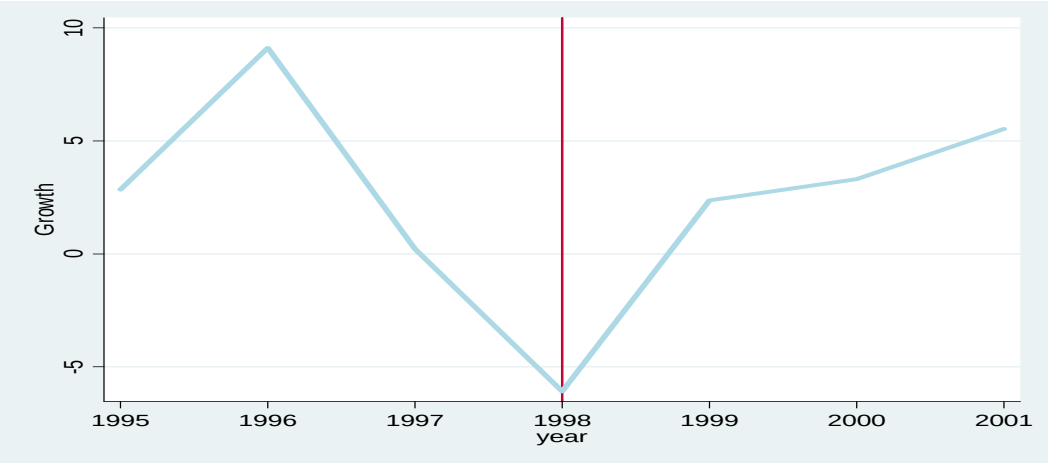

Figure 3.4: Growth performance around a currency crisis (Ethiopia)

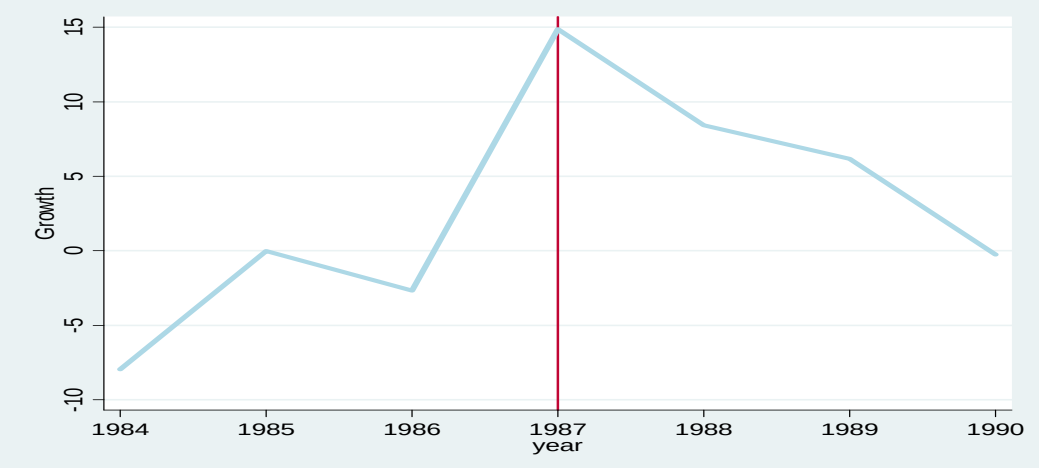

Figure 3.5: Growth performance around a twin crisis (Mozambique)

crisis periods[12]. A useful way to do this is to measure output growth in the crisis period against a country-specific historical benchmark, which can be proxied by the behaviour of output in some pre-crisis "tranquil" period. The results are summarised in Table 3.1. The first column shows the average growth performance during crisis-periods while the second column shows the behaviour of growth relative to a 3-year pre-crisis "tranquil" period. The first measure suggests that 67% of debt crises and 52% of currency crises are contractionary. The comparable figures for the other measure are 53% and 59%, respectively. On average, contractionary debt crises tend to reduce growth by around 2.9 percentage points while the figure for currency crises is around 3.7 percentage points. In contrast to debt and currency crises, sudden stops and twin crises tend to be expansionary - recording average growth expansions in the region of 3.1 to 4.4 percentage points, respectively.

We now explore whether particular variables of interest mitigate or amplify the effects of crises on output growth. A simple way to do this is to plot the bivariate correlation between each variable of interest (measured in the pre-crisis period) and crisis-period growth. Figure 3.6 indicates that there is a positive, but weak, association between crisis-period growth and economic integration. This suggests that more open economies tend to experience less output contraction than more closed economies. A similar story emerges when we consider Lane and Milesi-Ferretti's measure of financial openness (Figure 3.7). Figure 3.8 suggests that countries that have higher shares of short-term borrowing in their total debt tend to experience slower growth during crises. On the other hand, Figure 3.9 indicates that higher international reserve holdings (measured in months of imports) are positively associated with output growth when the economy is hit by a shock.

While these simple exercises are only indicative, they nonetheless provide an overview of the behaviour of output growth during crisis periods. In what follows,

[12]Because the full effects of crises may take time to be felt throughout the economy, the crisis period is defined as T and T_{+1}.

Table 3.1: Output growth performance during crises

	Average growth in T and T_{+1}	Crisis-period growth relative to tranquil years
Average growth during debt crises	-1.72	-0.63
% of expansionary crises	33	47
Average expansion	1.9	3.0
% of contractionary crises	67	53
Average contraction	-3.52	-3.90
Average growth during currency crises	0.60	0.85
% of expansionary crises	48	41
Average expansion	2.8	4.3
% of contractionary crises	52	59
Average contraction	-2.75	-3.06
Average growth during twin crises	1.02	2.10
% of expansionary crises	67	57
Average expansion	2.98	5.89
% of contractionary crises	33	43
Average contraction	-2.92	-2.86
Average growth during sudden stops	0.73	1.70
% of expansionary crises	63	68
Average expansion	2.66	3.63
% of contractionary crises	37	32
Average contraction	-2.53	-2.46

Notes: T denotes the crisis year. In column 3, we measure the size of the expansion or contraction as (Average growth in T and T_{+1}) - (Average growth in 3 closest tranquil years), where 'tranquil year' means a non-crisis year.

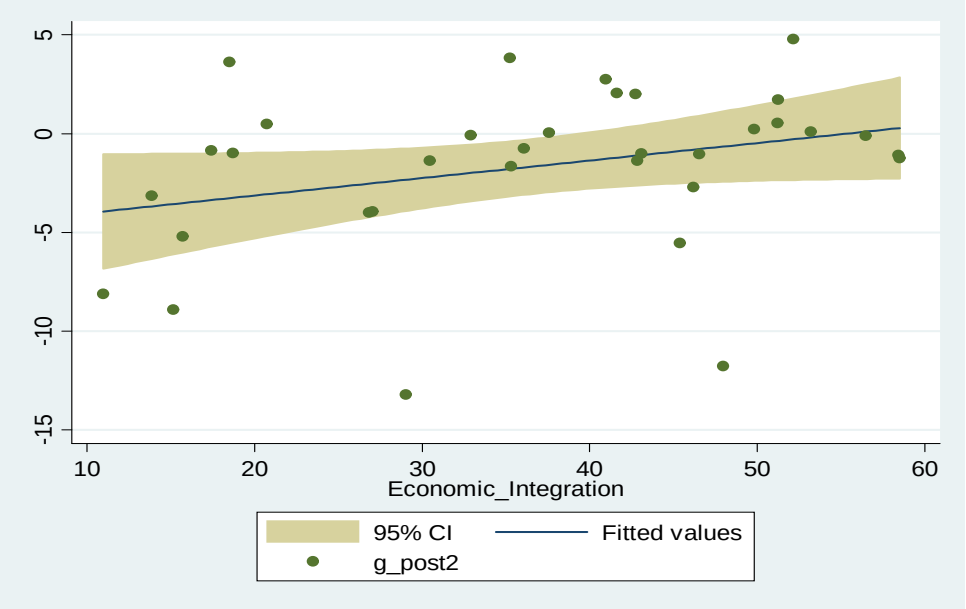

Figure 3.6: Output growth and economic integration during debt crises

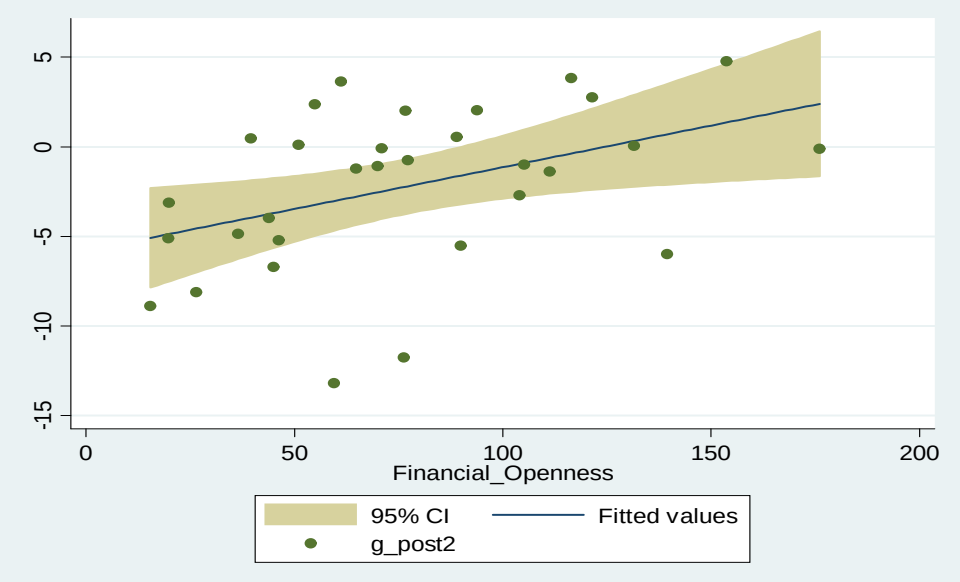

Figure 3.7: Output growth and financial openness during debt crises

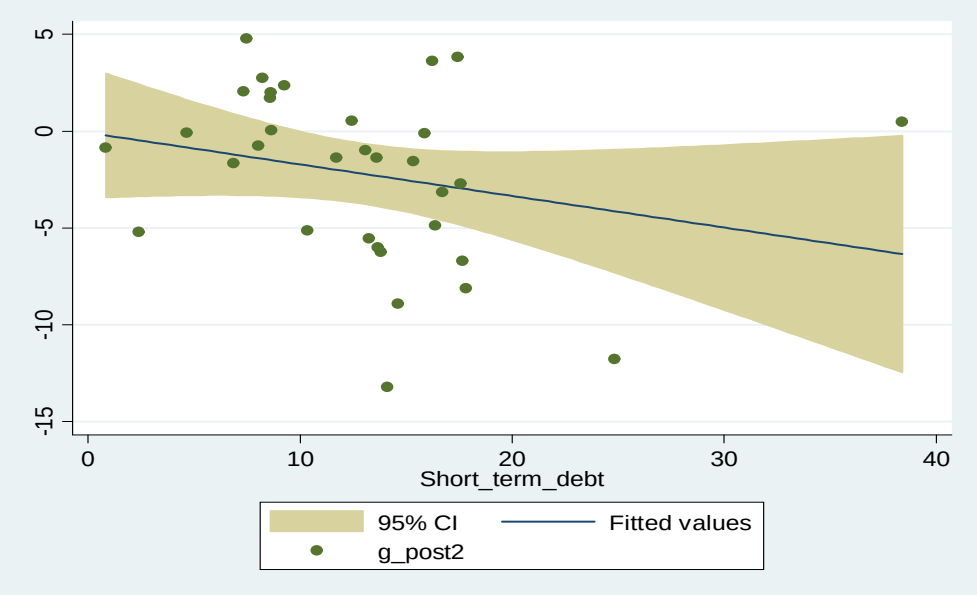

Figure 3.8: Output growth and short-term debt during debt crises

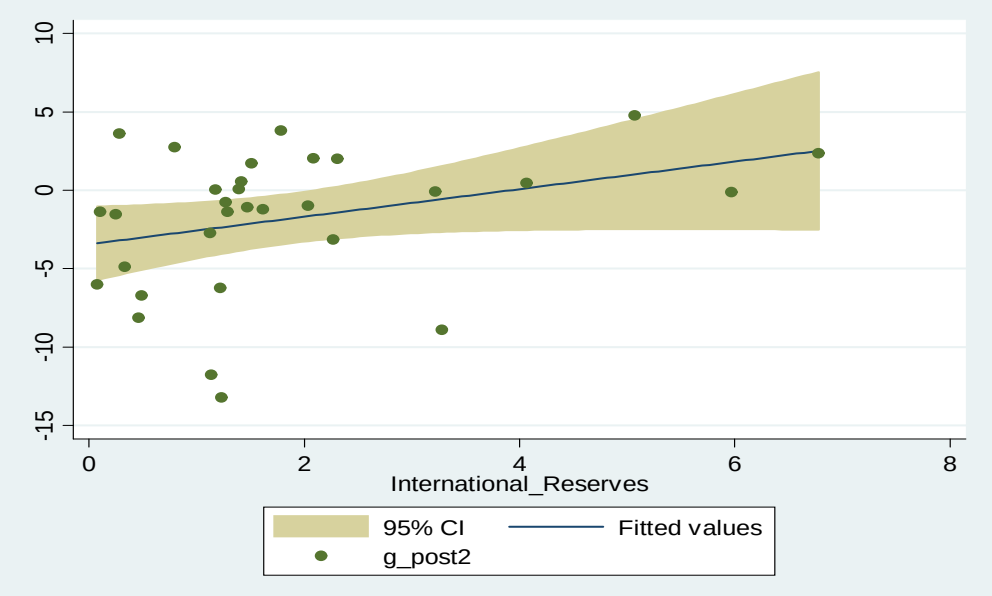

Figure 3.9: Output growth and international reserves during debt crises

we apply dynamic panel regressions in order to gain a better understanding of the effects of crises on economic growth (both in crisis and non-crisis periods).

3.4 Panel regression analysis

3.4.1 Data

Following, among others, Cavallo and Cavallo (2010), we want to explore the medium to long-term effects of crises on output growth. To this end, we construct a panel dataset on a maximum of 41 African countries and 8 non-overlapping 5-year period averages from 1970-74 through 2005-09[13]. In line with the existing literature, the data is averaged to reduce business cycle effects. Table 3.15 in Appendix (3.A) provides full definitions and sources of all the variables. The model we estimate takes the following form:

$$y_{it} - y_{it-1} = \beta_0 + \beta_1 y_{it-1} + \delta_1 CR_{it} + \delta_2 EO_{it} + \beta_2 X_{it} + \eta_i + \zeta_t + \varepsilon_{it} \tag{3.1}$$

where for$i = 1, ...N$ and $t = 1, ...T$, y denotes the real GDP per capita for country i at time t, CR_{it} and EO_{it} denote our measures of crises and economic integration, respectively, η_i is a time invariant country-specific fixed effect, ζ_t is a time specific effect and ε_{it} is the error term. We are interested in testing whether the marginal effects of crisis and openness on growth, δ_1 & δ_2, are statistically significant.

The X_{it} is a set of standard control variables, largely drawn from the existing literature. To control for macroeonomic instability, we include inflation. The share of investment in GDP is included since it has previously been identified as one of the most fundamental determinants of economic growth (see, for example, Barro and Sala-I- Martin, 1995). In line with the seminal contribution by Beck et al. (2000), we account for the role of financial development in economic growth. We use the

[13]The variable "economic integration" which is one of our main variables of interest is only available for 37 of the 41 countries in our sample. Hence, in most regressions we have 37 countries.

ratio of liquid liabilities to GDP as an indicator of financial development. We include population growth to control for the demographic trends of African countries. As suggested by Barro (1997) and Petrakos et al. (2007), high population growth can have a negative effect on growth through its impacts on the dependency ratio and quality of human capital. Finally, we control for the level of indebtedness since it may play an important role in the relationship between crises and growth. In particular, we wish to test whether crises are significantly harmful to growth even after controlling for one of the most important correlates of crises, namely 'debt overhang'.

We then extend our analysis by allowing the growth effect of crises to vary with the level of economic integration. We do this by interacting the crises measures with indicators of openness, as follows:

$$y_{it}-y_{it-1} = \beta_0+\beta_1 y_{it-1}+\delta_1 CR_{it}+\delta_2 EO_{it}+\gamma_1(CR_{it}\cdot EO_{it})+\beta_2 X_{it}+\eta_i+\zeta_t+\varepsilon_{it} \quad (3.2)$$

A good way to understand how growth reacts to external shocks in countries with varying levels of openness is to examine the marginal effect from equation (3.2)

$$\frac{\partial(y_{it}-y_{it-1})}{\partial CR_{it}} = \delta_1 + \gamma_1 EO_{it} \quad (3.3)$$

Thus, we interpret the signs of the coefficients of CR_{it} and the interaction term as follows: if $\delta_1 < 0$ and $\gamma_1 > 0$, this would confirm the hypothesis that openness acts as a crisis buffer, which would suggest that the adverse effects of crises are decreasing with the level of economic integration. On the other hand, if $\delta_1 < 0$ and $\gamma_1 < 0$, this would confirm the hypothesis that economic integration can amplify the negative effects of crises on output growth.

3.4.2 Methods

A particular issue of concern in estimating our model (equation 3.1 or 3.2) is endogeneity bias. The endogeneity may arise from omitted variables, simultaneity or reverse causality. Another concern is the presence of the autoregressive term, which invalidates the ordinary least squares estimator along with conventional static panel fixed effects and random effects. Thus, we use the generalised method of moments (GMM) estimators proposed by Holtz-Eakin et al. (1988) and Arellano and Bond (1991) and further developed by Arellano and Bover (1995) and Blundell and Bond (1998). These estimators address the likely source of endogeneity, η_i, by differencing and then using 'internal' instruments for the right hand side variables. Controlling for time-specific effects, equations (3.1) or (3.2) can be written more concisely as:

$$y_{it} = \alpha y_{it-1} + \beta' X_{it} + \eta_i + \varepsilon_{it} \tag{3.4}$$

Given that y_{it} and x_{it} may be correlated with η_i and that y_{it-1} and X_{it} are not strictly exogenous (i.e. they are not uncorrelated to past, present and future error terms), one can use the differenced GMM estimator suggested by Arellano and Bond (1991) which allows for the elimination of the possible source of omitted variable bias, namely η_i, by differencing both sides of equation (3.4):

$$\begin{aligned} y_{it} - y_{it-1} &= \alpha(y_{it-1} - y_{it-2}) + \beta'(x_{it} - x_{it-1}) + (\varepsilon_{it} - \varepsilon_{it-1}) \\ &\text{or} \\ \Delta y_{it} &= \alpha \Delta y_{it-1} + \beta' \Delta x_{it} + \Delta \varepsilon_{it} \end{aligned} \tag{3.5}$$

However, by construction, the lagged dependent variable is correlated with the differenced error term ($E[\Delta y_{it-1}, \Delta \varepsilon_{it}] \neq 0$). In addition, the endogeneity of the regressors remains. Arellano and Bond (1991) show that if one assumes the transient

errors to be uncorrelated ($E[\varepsilon_{it}, \varepsilon_{it-s}] = 0$ for all $s \geq t$) and the explanatory variables to be weakly exogenous (i.e. they are uncorrelated with future realisations of the error term), one can use lagged values as instruments. Hence, the moment conditions defining the differenced GMM is given by:

$$E[y_{i,t-s}(\varepsilon_{it} - \varepsilon_{it-1})] = 0, \tag{3.6}$$

$$E[X_{i,t-s}(\varepsilon_{it} - \varepsilon_{it-1})] = 0, \quad \text{for } s \geq 2;\ t = 3, ...T \tag{3.7}$$

Hence, we can use 'deeper' internal instruments dated $t-2$ or earlier as instruments. However, as shown by Arellano and Bover (1995) and Blundell and Bond (1998), in cases where the data series displays persistence, the lagged levels of the variables could be weak instruments, resulting in downward biased estimates, especially in short panels. In recognition of this, we use the system GMM (SGMM) dynamic panel estimator advanced in Arellano and Bover (1995) and Blundell and Bond (1998), which has been shown to have superior finite sample properties. Retaining the weak exogeneity assumption, the SGMM applies a system of equations, one in levels (equation 3.4) and one in differences (equation 3.5), and uses lagged first differences of the regressors as instruments in the first case and lagged levels of the dependent and explanatory variables as instruments in the latter case. The validity of the additional instruments requires, however, that the first differences of the regressors in equation (3.5) are uncorrelated with the country specific effects, η_i, across all periods. That is,

$$E[y_{i,t+p} \cdot \eta_i] = E[y_{i,t+q} \cdot \eta_i] \tag{3.8}$$

$$E[X_{i,t+p} \cdot \eta_i] = E[X_{i,t+q} \cdot \eta_i] \quad \text{for all p and q} \tag{3.9}$$

Based on this and on the previous assumption of weak exogeneity, the moment

conditions for the regression in levels become:

$$E[(y_{i,t-s} - y_{i,t-s-1}) \cdot (\eta_i + \varepsilon_{it})] = 0 \tag{3.10}$$

$$E[(X_{i,t-s} - X_{i,t-s-1}) \cdot (\eta_i + \varepsilon_{it})] = 0 \quad \text{for } s = 1;\ t = 3, ...T \tag{3.11}$$

Whether the lagged values of the variables in the growth model are valid instruments can be examined by a test on the appropriateness of the moment restrictions. We use three specification tests suggested by Blundell and Bond (1998): 1) a Hansen J test for over-identifying restrictions, which evaluates the joint validity of the instrument matrix by testing the null hypothesis that they are uncorrelated with the residuals, 2) a difference-in-Hansen J test for the validity of the additional moment restrictions required for the 2-step SGMM (i.e. the additional instruments for the levels equation), and 3) the Arellano-Bond test of second-order serial correlation examining the hypothesis that the error term, ε_{it}, is not serially correlated.

The SGMM has both a one-step and a two-step version. The one-step GMM estimator is built on the assumption that ε_{it} is $i.i.d$ (i.e homoskedastic across i and t) while the two-step estimator allows ε_{it} to be heteroskedastic. Even though the two-step estimator is asymptotically more efficient, its standard errors are downward biased making inference problematic (Blundell and Bond, 1998; Roodman, 2006). We solve this by implementing Windmeijer's (2005) finite sample correction, which makes the two-step GMM efficient asymptotically. As shown by, among others, Windmeijer (2005) and Roodman (2009), a large number of instruments can have serious consequences in finite samples because they overfit the endogenous variables and also weaken the Hansen J test. To avoid this, we follow the procedure suggested by Roodman (2009), collapsing the instrument matrix and restricting the instrument set to the closest possible lags of all non strictly exogenous variables.

Table 3.11 reports the summary statistics of all the variables used in the esti-

mations[14]. As can be seen, economic growth and our measures of openness display considerable heterogeneity among the sample countries. As a starting point, Table 3.12 depicts the pairwise correlation coefficients between each of our crisis indicator and the dependent variable. As expected, we observe a negative relationship - that is, financial crises are associated with a poor economic performance. The table also shows that, even though the crisis variables capture different dimensions of shocks, they are related to one another. As Table 3.13 indicates, growth is significantly and positively correlated with economic integration, cross border transactions and trade openness. Finally, Table 3.14 indicates that there is a negative correlation between crises and openness.

3.5 Results

3.5.1 Baseline results

In Table 3.2, we explore the (independent) effects of crises and openness on economic growth (i.e. without interaction terms). Across the 5 regressions, we augment our growth model with the five different indicators of crises described above, along with our preferred measure of economic integration. These regressions are based on the standard fixed effects panel estimator. The estimated coefficients of economic integration are all positive and generally significant at conventional levels, suggesting that openness is associated with a better growth performance. Consistent with the existing literature, a sudden stop crisis is harmful to output growth. Similarly, the rest of the financial crisis indicators are inversely related to growth, the coefficients of these variables being statistically significant at the 1% level. Hence, these preliminary findings support the notion that crises tend to disrupt economic activity while openness, perhaps by relaxing credit constraints and thus improving capital accumulation, is beneficial to economic performance.

[14] Tables 3.11 through 3.14 are displayed in Appendix 3A.

Table 3.2: Crises, Economic Integration and Growth in Africa - FE

	[1]	[2]	[3]	[4]	[5]
Economic integration	0.068	0.055	0.064	0.053	0.063
	[0.032]**	[0.033]*	[0.033]*	[0.038]	[0.031]**
Sudden stop crisis	-1.401				
	[0.370]***				
Currency crisis		-1.412			
		[0.448]***			
Sovereign debt crisis			-1.521		
			[0.476]***		
Twins				-1.588	
				[0.553]***	
Composite crisis index					-0.816
					[0.176]***
Controls					
Log(initial GDP)	-3.745	-3.952	-3.45	-3.672	-3.493
	[1.075]***	[1.106]***	[1.066]***	[0.973]***	[1.050]***
Log(1+inflation)	-1.111	-0.983	-0.924	-0.939	-0.983
	[0.547]**	[0.578]*	[0.532]*	[0.480]*	[0.533]*
Investment/GDP	0.109	0.110	0.104	0.106	0.105
	[0.031]***	[0.031]***	[0.031]***	[0.030]***	[0.030]***
External debt/GDP	-0.011	-0.011	-0.009	-0.009	-0.009
	[0.005]**	[0.004]**	[0.004]**	[0.006]	[0.005]*
Financial depth/GDP	0.100	0.785	-0.036	0.788	-0.259
	[2.188]	[2.330]	[2.301]	[2.477]	[2.269]
Population growth	2.409	2.244	2.782	2.171	1.923
	[2.203]	[2.146]	[2.156]	[2.120]	[2.142]
Constant	2.148	4.735	-3.675	3.399	5.032
	[22.727]	[22.439]	[22.416]	[20.827]	[22.174]
Observations	229	229	229	229	229
R^2	0.372	0.362	0.351	0.354	0.400

Notes: The dependent variable is per capita GDP growth. The estimates are based on the fixed effects estimator with robust standard errors. Time fixed effects included but not reported. *, **, and *** denote significance at the 10, 5 and 1% levels, respectively.

In general terms, all the conditioning variables are consistent with our prior expectations. More specifically, initial income carries a significant negative sign, confirming the conditional convergence hypothesis. The estimated coefficients of inflation are significantly negative, implying that macroeconomic instability is linked to low growth rates. In line with the so-called 'debt overhang' hypothesis, we obtain negative and generally significant coefficients of external debt. There is no evidence to support the idea that population growth or financial depth have a significant influence on growth. Investment, on the other hand, helps to explain the variation in growth, further underlying the importance of capital accumulation for economic development.

However, a legitimate concern with these results is that some of the right hand side variables may be endogenously related to growth. A particular source of endogeneity which may plague our baseline model is reverse causality. For example, it is likely that the level of economic integration may change with the growth performance of the economy, so that countries may open up their current and capital accounts precisely because of improved domestic growth performance. To overcome these concerns, we re-estimate the baseline regressions in Table 3.2 using the two-step SGMM. The results are reported in Table 3.3.

Once endogeneity concerns are addressed, economic integration retains its positive and significant effect on growth. Across all specifications, the coefficients of this variable are significant at the 1% level, emphasising that openness does matter for growth in Africa. Focusing on regression [1], the results imply that a 1% increase in the economic openness to GDP ratio is accompanied by a rise in income of 0.25 percentage points. We find robust evidence that crises are detrimental to economic performance. The results suggest that currency crises have a marginally stronger depressing impact on output growth than the other types of crises, closely followed by twin crises, sovereign debt and sudden stops. Interestingly, the coefficient of our composite measure, which captures the intensity with which countries encounter

multiple crises, is somewhat lower than the other crisis indicators but, nonetheless, negative and highly significant. Accordingly, crisis-hit African economies are expected, on average, to grow between 1.68 and 1 percentage points less than those that do not suffer from any crises.

The three specification tests are all well-behaved; the Hansen test of over-identifying restrictions fails to reject the null that the instruments are valid. Similarly, the difference-in-Hansen test fails to reject the null that the orthogonality conditions derived from the levels equation are appropriate. Finally, the regressions pass the second order serial correlation test, confirming that there is no second-order serial correlation in the error term of the first-differenced equation. Hence, these tests support the validity and consistency of the SGMM estimator.

Varying the impact of crises across levels of openness

In order to investigate whether the level of economic integration influences the relationship between crises and growth, we interact the openness variable with our crises indicators. The results are summarised in Table 3.4.

Regression [1] shows that sudden stop episodes have a highly significant negative association with economic growth: an African country which experiences a sudden stop episode in a given period is expected to grow 4 percentage points less than a country without such an episode. On the other hand, openness has a significant beneficial effect on economic performance. The coefficient of the interaction term carries a significant positive sign, suggesting that economic integration mitigates the adverse effects of a sudden stop crisis. So a highly open economy such as South Africa with an average openness to GDP ratio of 0.60, would be able to avoid any output losses around sudden stops[15]. On the other hand, in a period of crisis, the output growth of the least open economy (i.e. Rwanda with an average openness to

[15]The overall growth effect following a sudden stop for South Africa would be given by the following equation; $-4.191 + (0.07 * 0.60) * 100 = 0.009$

Table 3.3: Crises, Economic Integration and Growth in Africa - SGMM

	[1]	[2]	[3]	[4]	[5]
Economic integration	0.248	0.226	0.268	0.244	0.216
	[0.052]***	[0.047]***	[0.062]***	[0.057]***	[0.065]***
Sudden stop crisis	-1.478				
	[0.439]***				
Currency crisis		-1.688			
		[0.507]***			
Sovereign debt crisis			-1.519		
			[0.540]***		
Twin crises				-1.528	
				[0.581]***	
Composite crisis index					-0.999
					[0.237]***
Controls					
Log(initial GDP)	-3.159	-2.395	-4.293	-3.153	-2.440
	[1.344]**	[0.973]**	[1.227]***	[1.411]**	[1.073]**
Log(1+inflation)	-1.425	-0.820	-1.536	-1.210	-1.084
	[0.768]*	[0.709]	[0.924]*	[0.735]	[0.639]*
Investment/GDP	0.123	0.147	0.071	0.117	0.126
	[0.073]*	[0.065]**	[0.084]	[0.080]	[0.076]*
External debt/GDP	-0.014	-0.011	-0.017	-0.014	-0.009
	[0.011]	[0.008]	[0.008]**	[0.007]**	[0.011]
Financial Depth/GDP	4.674	2.465	7.115	5.223	3.557
	[3.336]	[2.856]	[3.218]**	[3.753]	[3.291]
Population growth	0.337	0.495	0.003	0.468	0.490
	[0.659]	[0.612]	[0.835]	[0.668]	[0.525]
Constant	8.924	1.931	18.558	6.851	3.427
	[12.755]	[11.022]	[13.752]	[13.516]	[9.807]
Observations	229	229	229	229	229
Instruments	32	32	32	32	32
Countries	37	37	37	37	37
Hansen test	0.620	0.621	0.537	0.595	0.595
Diff Hansen test	0.739	0.508	0.684	0.487	0.537
AR (1) test	0.008	0.005	0.010	0.005	0.005
AR (2) test	0.894	0.808	0.895	0.771	0.771

Notes: The estimates are based on the two-step System-GMM estimator with Windmeijer finite sample correction. AR(1) and AR(2) are respectively Arellano-Bond's 1st and 2nd autocorrelation tests. The Hansen J-statistic reports the p-values for the null of instrument validity. The Diff-in-Hansen reports the p-values for the validity of the additional moment restriction for the System GMM. Time fixed effects included but not reported. *, **, *** denote significance at 10, 5 and 1%, respectively.

GDP ratio of 0.16) would drop by more than 3 percentage points[16].

In regression [2], we consider currency crises, which are found to be inversely related to output growth. When we interact this variable with openness, we find a positive and significant sign. This implies that openness tends to attenuate the negative relationship between currency crises and growth. Economic integration itself retains its positive and significant sign. Regression [3] examines how debt crises relate to growth. The coefficient of this type of crisis is negative and highly significant. This suggests that debt crises, similar to the other types of crises, is detrimental to growth. The coefficient of the interaction term is significantly positive, indicating that the more an African economy is integrated with the rest of the world, the weaker the negative association between debt crises and economic performance. The pattern is the same across the remaining specifications, the coefficients of our indicators of twin crisis and composite crisis measures both being negative, the latter significantly so at the 1% level. However, the former is marginally insignificant and likewise its interaction term. The coefficient of the interaction between the composite crisis index and openness is positive and significant.

To sum up, in line with both the theoretical and the empirical literature, our results show that financial crises are associated with output losses. Our findings also indicate that the crisis-growth relationship is conditional on the openness of the country to trade and financial flows. More specifically, in open countries, the harmful impacts of crises is lessened. This is not the case in closed economies. This suggests that open countries tend to experience a smoother adjustment following an external shock, perhaps driven by the performance of the tradable goods sector. It could also be that countries that are more integrated with the rest of the world may perhaps be given more room to manoeuvre (e.g. trade credits) by international partners. These opportunities may not be available to more closed economies.

[16] Following the marginal effect equation, for Rwanda this is calculated as: $-4.191 + (0.07 * 0.16) * 100 = -3.071$

Table 3.4: Growth effects of crises and interaction with economic integration - SGMM

	[1] Sudden stops	[2] Currency	[3] Debt	[4] Twins	[5] Composite
Economic integration	0.215	0.202	0.256	0.228	0.188
	[0.061]***	[0.050]***	[0.067]***	[0.058]***	[0.058]***
Sudden stops	-4.191				
	[1.600]***				
Currency crises		-3.434			
		[1.425]**			
Sovereign debt crises			-5.638		
			[1.613]***		
Twin crises				-2.970	
				[1.981]	
Composite crises index					-1.899
					[0.669]***
Integration*crisis	0.070	0.054	0.111	0.041	0.028
	[0.033]**	[0.031]*	[0.049]**	[0.044]	[0.016]*
Controls					
Log(initial GDP)	-3.714	-2.814	-4.848	-3.585	-3.633
	[1.212]***	[1.018]***	[1.379]***	[1.340]***	[1.303]***
Log(1+inflation)	-1.390	-0.531	-1.884	-1.176	-1.304
	[0.778]*	[0.852]	[0.774]**	[0.579]**	[0.681]*
Investment/GDP	0.131	0.130	0.081	0.118	0.082
	[0.077]*	[0.071]*	[0.081]	[0.084]	[0.074]
External debt/GDP	-0.017	-0.012	-0.018	-0.018	-0.013
	[0.008]**	[0.007]*	[0.008]**	[0.007]***	[0.009]
Financial Depth/GDP	5.734	4.348	7.461	5.699	6.973
	[2.622]**	[2.741]	[4.878]	[3.511]	[3.105]**
Population growth	0.174	0.366	-0.555	0.101	0.086
	[0.658]	[0.664]	[1.074]	[0.744]	[0.724]
Constant	14.737	5.688	28.379	13.604	16.556
	[11.456]	[11.411]	[16.608]*	[13.450]	[13.753]
Observations	229	229	229	229	229
Instruments	34	34	34	34	34
Countries	37	37	37	37	37
Hansen test	0.719	0.569	0.477	0.426	0.702
Diff Hansen test	0.801	0.752	0.536	0.488	0.680
AR (1) test	0.005	0.003	0.011	0.004	0.004
AR (2) test	0.893	0.790	0.876	0.497	0.826

Notes: The estimates are based on the two-step System-GMM estimator with Windmeijer finite sample correction. AR(1) and AR(2) are respectively Arellano-Bond's 1st and 2nd autocorrelation tests. The Hansen J-statistic reports the p-values for the null of instrument validity. The Diff-in-Hansen reports the p-values for the validity of the additional moment restriction for the System GMM. Time fixed effects included but not reported. *, **, *** denote significance at 10, 5 and 1% levels, respectively.

Productivity growth as the dependent variable

We have so far been using the growth rate of real per capita GDP as the dependent variable. However, it could be that, for example, economic integration influences growth through its beneficial effects on productivity. Hence, we are interested to see whether our results can be generalised to productivity growth (i.e. output per worker)[17]. Table 3.5 presents the effects of economic integration and crises on productivity growth. Across the different regressions, our measures of crises enter with the expected (negative) signs and are all statistically significant. Similarly, openness retains its sign and significance - reinforcing our previous findings. The coefficients of the interaction terms remain positive and marginally significant in most cases. Hence, the results corroborate the hypothesis that openness can act as a crisis buffer.

Alternative measures of economic integration

To ensure that our results are not sensitive to the choice of openness indicator, we use various other measures that capture the degree to which economies are integrated with the rest of the world. For the sake of brevity, Tables 3.6 and 3.7 contain only the results for our variables of interest (i.e. measures of openness, crises and their interaction terms)[18]. As can be seen in Panel A of Table 3.6, our previous findings remain largely robust when we use 'cross border transactions' as a measure of openness. However, while the coefficient of this variable is positive, it is only significant in 2 out of the 5 regressions. Nonetheless, our measures of crises retain their expected (negative) signs and are statistically significant at conventional levels. More importantly, the interaction effects remain positive and generally statistically significant.

In panel B of Table 3.6, we apply trade openness as an indicator of economic

[17] Hall and Jones (1999) show that output per worker is strongly correlated with productivity or the Solow residual ($r = 0.89$). Strictly speaking, however, this may not be a good indicator of productivity but we follow Joyce and Nabar (2009) who do a similar robustness check.

[18] The regressions include the set of control variables employed so far.

Table 3.5: Productivity growth as the dependent variable - SGMM

	[1] Sudden stops	[2] Currency	[3] Debt	[4] Twins	[5] Composite
Economic integration	0.145	0.192	0.184	0.131	0.174
	[0.081]*	[0.076]**	[0.065]***	[0.070]*	[0.072]**
Sudden stops	-2.163				
	[0.720]***				
Currency crises		-5.806			
		[2.957]**			
Sovereign debt crises			-6.018		
			[2.472]**		
Twin crises				-4.483	
				[1.885]**	
Composite crises index					-3.825
					[1.830]**
Integration*crisis	0.038	0.126	0.127	0.089	0.068
	[0.023]*	[0.092]	[0.067]*	[0.048]*	[0.044]
Controls					
Log(initial per worker)	-2.669	-3.422	-3.028	-2.684	-2.565
	[1.262]**	[1.242]***	[1.207]**	[1.397]*	[1.377]*
Log(1+inflation)	-0.506	-1.458	-0.768	-0.127	-0.447
	[0.998]	[1.248]	[0.872]	[1.175]	[0.908]
Investment/GDP	0.012	0.028	0.038	0.047	0.026
	[0.067]	[0.060]	[0.071]	[0.069]	[0.069]
External debt/GDP	-0.018	-0.023	-0.021	-0.017	-0.017
	[0.007]***	[0.007]***	[0.007]***	[0.007]**	[0.008]**
Financial depth/GDP	4.573	6.283	6.276	6.647	4.784
	[2.758]*	[3.370]*	[3.321]*	[3.064]**	[3.230]
Population growth	0.530	0.623	0.660	0.621	0.698
	[0.616]	[0.821]	[0.690]	[0.739]	[0.704]
Constant	7.973	11.777	6.779	5.006	3.723
	[12.291]	[14.223]	[12.451]	[13.802]	[13.015]
Observations	229	229	229	229	229
Instruments	34	34	34	34	34
Countries	37	37	37	37	37
Hansen test	0.232	0.266	0.266	0.177	0.171
Diff Hansen test	0.842	0.824	0.761	0.771	0.707
AR (1) test	0.000	0.002	0.001	0.001	0.001
AR (2) test	0.428	0.408	0.384	0.434	0.303

Notes: The estimates are based on the two-step System-GMM estimator with Windmeijer finite sample correction. AR(1) and AR(2) are respectively Arellano-Bond's 1st and 2nd autocorrelation tests. The Hansen J-statistic reports the p-values for the null of instrument validity. The Diff-in-Hansen reports the p-values for the validity of the additional moment restriction for the System GMM. Time fixed effects included but not reported. *, **, *** denote significance at 10, 5 and 1% levels, respectively.

Table 3.6: Growth effects of crises and interaction with economic openness - SGMM

Panel A:	Crisis type and interaction of economic integration with				
Cross border transactions	[1]	[2]	[3]	[4]	[7]
	Sudden stop	Currency	Debt	Twins	Composite
Cross border transactions	0.070	0.044	0.113	0.107	0.074
	[0.053]	[0.034]	[0.045]**	[2.600]**	[0.046]
Crisis	-5.359	-5.747	-6.642	-4.363	-2.198
	[1.972]***	[1.661]***	[2.772]**	[2.400]*	[0.722]***
Openness *crisis	0.075	0.090	0.107	0.046	0.022
	[0.036]**	[0.035]***	[0.063]*	[1.170]	[0.013]*
Specification tests					
Observations	225	219	219	225	225
Instruments/ countries	34/36	34/35	34/35	34/36	34/36
Hansen test	0.424	0.526	0.433	0.255	0.528
Diff Hansen test	0.628	0.655	0.643	0.285	0.605
AR (1) test	0.001	0.001	0.003	0.001	0.001
AR (2) test	0.866	0.680	0.854	0.437	0.861
Panel B:	Crisis type and interaction of economic integration with				
Trade openness	[6]	[7]	[8]	[9]	10]
	Sudden stop	Currency	Debt	Twins	Composite
Trade openness	0.052	0.052	0.066	0.059	0.042
	[0.021]**	[0.018]***	[0.022]***	[0.019]***	[0.021]**
Crisis	-3.223	-5.296	-5.779	-3.499	-1.971
	[1.518]**	[1.674]***	[2.874]**	[1.503]**	[0.735]***
Openness *crisis	0.024	0.060	0.051	0.032	0.016
	[0.017]	[0.026]**	[0.039]	[0.019]*	[0.008]**
Specification tests					
Observations	253	247	247	253	253
Instruments/ countries	36/41	36/40	36/40	36/41	36/41
Hansen test	0.151	0.179	0.228	0.215	0.165
Diff Hansen test	0.755	0.825	0.869	0.784	0.755
AR (1) test	0.001	0.000	0.001	0.001	0.000
AR (2) test	0.875	0.614	0.778	0.511	0.933

Notes: The estimates are based on the two-step System-GMM estimator with Windmeijer finite sample correction. AR(1) and AR(2) are respectively Arellano-Bond's 1st and 2nd autocorrelation tests. The Hansen J-statistic reports the p-values for the null of instrument validity. The Diff-in-Hansen reports the p-values for the validity of the additional moment restriction for the System GMM. Time fixed effects included but not reported. *, **, *** denote significance at 10, 5 and 1% levels, respectively.

integration and the results are broadly in line with our previous findings. The coefficients of trade openness and crises carry the expected signs and are significant in all specifications, suggesting that countries that are relatively more open tend to experience better growth performance than those that are more closed. Similarly, crisis-hit countries tend to suffer from higher output losses than those that do not encounter any crises. The coefficient of the interaction term is positive and generally significant. Overall, these findings tend to support the view that openness can mitigate the negative effects of crises.

We also consider other openness measures that exclusively focus on the capital account. In panel A of Table 3.7, we use the financial openness indicator of Lane and Milesi-Ferretti (2006), which enters with positive and mostly significant coefficients across the different specifications. Once again, crisis is negative and significant, except in the second regression. It is worth noting that the interaction term is positive, albeit insignificant in three out of the five regressions. Panel B reports the results using FDI liabilities as an openness measure. The estimated coefficients of crisis and openness suggest that, while the first exerts a statistically significant negative effect on growth, the latter is significantly beneficial in an economically meaningful way. Similarly to our previous findings, the interaction term is positive and mostly significant.

Interestingly, when we use the Chinn and Ito measure of capital account openness (Panel C) we find that it is insignificant. This is perhaps not too surprising since this indicator is a 'de jure' measure, solely focusing on restrictions on the capital account. However, financial crises and the interaction terms are in line with our previous results.

Table 3.7: Growth effects of crises and interaction with financial openness - SGMM

Panel A:	Crisis type and interaction of economic integration with				
Financial openness	[1]	[2]	[3]	[4]	[5]
	Sudden stop	Currency	Debt	Twin	Composite
Financial openness	0.038	0.046	0.033	0.051	0.044
	[0.023]	[0.023]**	[0.018]*	[0.019]***	[0.014]***
Crisis	-6.160	-2.323	-4.206	-1.579	-1.835
	[2.649]**	[1.638]	[1.307]***	[1.327]	[0.570]***
Openness*crisis	0.033	0.007	0.017	0.002	0.007
	[0.019]*	[0.010]	[0.012]	[0.007]	[0.002]***
Observations	168	168	168	168	168
Instruments/ countries	32/32	32/32	32/32	32/32	32/32
Hansen test	0.447	0.701	0.778	0.886	0.784
Diff Hansen test	0.259	0.743	0.782	0.739	0.579
AR (1) test	0.002	0.005	0.003	0.007	0.003
AR (2) test	0.987	0.709	0.441	0.417	0.890
Panel B:					
FDI liabilities	[6]	[7]	[8]	[9]	[10]
FDI liabilities	0.288	0.277	0.272	0.261	0.239
	[0.103]***	[0.137]**	[0.140]*	[0.113]**	[0.128]*
Crisis	-2.255	-2.050	-2.761	-2.227	-1.089
	[0.704]***	[0.743]***	[0.789]***	[0.884]**	[0.299]***
Openness *crisis	0.358	0.210	0.420	0.316	0.172
	[0.132]***	[0.170]	[0.312]	[0.185]*	[0.083]**
Observations	253	247	247	253	253
Instruments/ countries	36/41	36/40	36/40	36/41	36/41
Hansen test	0.281	0.138	0.172	0.202	0.183
Diff Hansen test	0.125	0.062	0.144	0.107	0.079
AR (1) test	0.001	0.001	0.001	0.001	0.000
AR (2) test	0.831	0.837	0.801	0.381	0.741
Panel C:					
Capital account openness	[11]	[12]	[13]	[14]	[15]
Capital account openness	0.361	-0.079	0.178	0.158	0.158
	[0.263]	[0.412]	[0.403]	[0.436]	[0.323]
Crisis	-2.007	-1.784	-3.005	-2.106	-1.093
	[0.489]***	[0.473]***	[1.647]*	[0.819]**	[0.162]***
Openness *crisis	0.603	1.429	-0.908	0.669	0.346
	[0.357]*	[0.539]***	[1.558]	[0.559]	[0.189]*
Observations	249	243	243	249	249
Instruments/ countries	34/41	34/40	34/40	34/41	34/41
Hansen test	0.354	0.374	0.416	0.280	0.286
Diff Hansen test	0.267	0.498	0.480	0.263	0.172
AR (1) test	0.001	0.001	0.001	0.001	0.000
AR (2) test	0.666	0.981	0.752	0.389	0.791

Notes: See footnotes to Table (3.6)

3.5.2 Further robustness analyses

Additional controls

To ensure that our crises indicators do not merely proxy for other events that may influence growth, we control for a number of additional variables. In the following sensitivity analyses, we report only the results for our preferred measures of openness and crisis, namely, economic integration (proxied by the economic dimension of the KOF index) and the composite crisis indicator. Our composite measure has a number of attractive features. Firstly, it captures whether simultaneously encountering different types of crises has an additional adverse effect on growth, above and beyond the adverse effect of each crisis individually. Secondly, and perhaps more importantly, it is more suitable in the context of the system GMM where lags are used as instruments to overcome issues of endogeneity[19]. The results are summarised in Table 3.8. In the first sets of regressions, we account for the roles political and institutional variables play in determining output growth (e.g. Acemoglu et al. 2003). Recent evidence also suggests that political variables can have a significant influence on the growth outcomes of financial crises (Cavallo and Cavallo, 2010). Hence, we add indicators such as regime type, polity, civil unrest and political rights to the baseline specification. These variables are not significantly related to output growth in our sample countries, of more interest in the present context, our central findings remain robust.

We need to rule out the possibility that crisis incidence and the extent to which it influences growth may depend on the availability of sufficient reserves or changes in the terms of trade (see for example, Li and Ouyang, 2011). Thus, we explore the influence of reserve holdings and terms of trade on growth and find that the first carries a significant and positive sign while the latter is insignificant (regressions [5] and [6]). This implies that a high level of reserves may be interpreted as a significant

[19] Using the lag of a dummy variable to account for endogeneity may not be appropriate (see, Cavallo and Cavallo, 2010).

Table 3.8: Sensitivity analysis: Additional controls - SGMM

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
	Regime type	Polity	Civil unrest	Pol. rights	Reserve holdings	Terms of trade	Gov. size	Cons. volatility
Econ integration	0.188	0.182	0.220	0.118	0.046	0.116	0.110	0.171
	[0.051]***	[0.066]***	[0.044]***	[0.068]*	[0.076]	[0.103]	[0.066]*	[0.062]***
Composite crisis	-2.061	-1.857	-2.034	-2.118	-1.933	-2.255	-1.927	-1.841
	[0.642]***	[0.586]***	[0.644]***	[0.631]***	[0.651]***	[0.865]***	[0.624]***	[0.643]***
Interaction	0.030	0.025	0.029	0.035	0.031	0.037	0.028	0.027
	[0.015]*	[0.012]**	[0.015]*	[0.015]**	[0.014]**	[0.020]*	[0.015]*	[0.015]*
Controls								
Log(initial GDP)	-3.669	-2.399	-3.613	-2.230	-2.215	-2.449	-2.379	-2.922
	[1.354]***	[1.309]*	[1.317]***	[1.131]**	[0.950]**	[1.376]*	[1.184]**	[1.359]**
Log(1+inflation)	-1.217	-1.030	-1.287	-0.828	-0.513	-1.086	-0.808	-1.187
	[0.628]*	[0.545]*	[0.638]**	[0.660]	[0.585]	[0.435]**	[0.659]	[0.651]*
Pop growth	0.007	0.771	0.088	0.110	-0.537	-0.314	0.148	0.379
	[0.783]	[0.635]	[0.682]	[0.055]**	[0.508]	[0.767]	[0.073]**	[0.710]
Investment	0.077	0.071	0.085	0.526	0.107	0.030	-0.098	0.107
	[0.074]	[0.051]	[0.083]	[0.517]	[0.060]*	[0.096]	[0.454]	[0.059]*
Debt	-0.016	-0.012	-0.017	-0.013	-0.001	-0.016	-0.013	-0.011
	[0.009]*	[0.008]	[0.009]*	[0.007]*	[0.007]	[0.007]**	[0.006]*	[0.008]
Financial depth	6.873	2.482	5.663	4.735	1.094	5.782	3.598	5.393
	[3.306]**	[4.738]	[4.027]	[2.484]*	[4.102]	[3.724]	[1.828]**	[2.346]**
Additional control	-0.004	0.127	-0.546	-0.076	1.243	0.007	-0.132	0.000
	[0.009]	[0.446]	[0.822]	[0.394]	[0.494]**	[0.010]	[0.084]	[0.000]
Constant	17.799	2.873	16.344	5.887	9.691	16.282	13.809	9.627
	[14.916]	[11.908]	[13.478]	[8.528]	[9.298]	[12.867]	[9.735]	[13.372]
Observations	229	223	229	229	229	193	226	229
Instruments	36	36	36	36	36	34	36	36
Countries	37	36	37	37	37	37	36	36
Hansen test	0.588	0.349	0.557	0.610	0.251	0.877	0.447	0.728
Diff Hansen test	0.647	0.480	0.555	0.590	0.657	0.895	0.590	0.697
AR (1) test	0.004	0.004	0.007	0.003	0.003	0.001	0.003	0.004
AR (2) test	0.940	0.867	0.893	0.768	0.721	0.707	0.540	0.665

Notes: The estimates are based on the two-step System-GMM estimator with Windmeijer finite sample correction. AR(1) and AR(2) are respectively Arellano-Bond's 1st and 2nd autocorrelation tests. The Hansen J-statistic reports the p-values for the null of instrument validity. The Diff-in-Hansen reports the p-values for the validity of the additional moment restriction for the System GMM. Time fixed effects included but not reported. *, **, *** denote significance at 10, 5 and 1%, levels respectively.

deterrent of potential economic difficulties. As expected, the coefficient of crisis exhibits a negative and statistically significant effect on growth. The coefficient of the interaction between crisis and openness is positive and significant (with a p-value of 0.022) in column [5] but the significance level drops to 10 percent in column [6]. Based on this, we can posit that the (negative) relationship between crises and growth gets weaker the more integrated an economy becomes. In other words, economic integration acts as a crisis buffer by mitigating the adverse effects of crises on output growth.

We also examine how growth relates to consumption volatility and government size. We find that, while both of these variables carry the expected signs, neither of them are significant at conventional levels and their inclusion does not alter our basic findings. Hence, we can state that our results remain robust when we account for other important correlates of growth. Moreover, the validity of the instruments is not rejected in any of the SGMM regressions. In particular, the specifications pass the Hansen J test for over-identifying restrictions. They also pass the Arellano-Bond tests for serial correlation, confirming that our models are not misspecified.

Sub-samples

As an additional robustness check, we re-estimate our baseline results for various sub-samples to test their stability. Firstly, there could be parameter heterogeneity across the conditional growth distribution, so that countries in the higher growth quantiles may respond differently to both crises and economic integration than do countries whose growth rates are in the lower quantiles. To explore this, the first two columns of Table 3.9 are based on quantile regressions where we report both the 25^{th} quantile (low growth) and the 75^{th} quantile of the growth distribution (high growth). Interestingly, we find that high growth performers tend to benefit significantly from openness while poor performers do not as much. In addition, the coefficient of openness for the high growth group is more than twice as large

as that for the low growth group. The results suggest that the adverse impact of crises on output growth is significantly different from zero for both groups, but the magnitude is slightly larger in the higher growth distribution. More importantly, the coefficient of the interaction term is positive and significant for both groups, albeit only marginally so for the high growth group. Hence, our baseline results remain unchanged.

In a similar vein, we test whether higher income African countries are driving the results, since they generally tend to be more integrated with the rest of the world. To confront this, we split the sample according to the level of economic development and define those economies with a level of per capita income equal to or below the sample median as 'low income'. The results for this group are reported in column 3 and continue to point to the importance of crises in undermining growth in low income African countries. While there is no significant link between economic integration and growth, the results suggest that the adverse effect of crises on growth is lower the more open the economy is.

The negative link between crises and growth that we have found so far could be due to the presence of resource-rich countries since these may be more prone to crises but also more integrated with the rest of the world. Hence, we examine whether our central findings survive if we focus on resource-poor economies only. As a proxy for resources, we use the share of oil rents in GDP. The estimated regression (column [4]) is largely in line with our previous findings insofar as it points to the tendency of openness to lessen the adverse effects of crises.

As previously emphasised by a number of studies (see, for example, Loayza and Ranciere, 2005), one of the most important transmission channels between crises and output growth is the financial system. Accordingly, it could be that our results are driven by countries with more developed financial systems. The regression results reported in column [5] are based on a sub-sample of countries with relatively poor financial systems. Again, the interaction term between crises and openness is

positive and significant, implying that openness tends to lessen the disruptive effects of crisis on output growth, even in the absence of sophisticated financial systems. We also examine whether our findings are true for those countries with greater restrictions on trade. This sample of 'closed' economies is selected based on levels of tariffs (column[6]). As the results show, the baseline results remain unchanged.

As a number of studies indicate (see, for example, Esaka, 2010), the exchange rate regime of a country may influence the relationship between crises and output. As a final exercise, therefore, we divide our sample countries into two groups, based on the prevailing exchange rate regime. In column [7], we show the results for countries with 'semi flexible' regimes (i.e. those with either crawling/managed floated or pure floated) and find that this does not alter our baseline results significantly. When we conduct similar exercise for those with 'fixed/pegged' exchange rates, we find that, while crisis is negative and significant, both openness and the interaction term lose their significance.

To sum up, our sub-sample analysis indicates that crises are significantly associated with poorer economic performance. However, this negative effect decreases with the level of openness. Lastly, the SGMM diagnostics are satisfactory throughout the sensitivity analysis.

Alternative estimators

Finally, we check whether our results remain robust to alternative estimators. Table 3.10 shows the results. The first column reports results based on simple pooled OLS. Even though this estimator does not account for unobserved heterogeneity or endogeneity, it can nonetheless shed some light on the links between crises and growth. The significant negative sign of the coefficient of the crisis variable confirms the detrimental effect of crises on output growth. The sign and significance of the interaction term is in line with our baseline regression.

To ensure that our results are not sensitive to the presence of outliers, we re-run

Table 3.9: Sensitivity analysis - sub-samples -SGMM

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
	25th quantile	75th quantile	Low income economies	Resource poor	Weak finance	Closed countries	S-Flex ER regime	Fixed ER regimes
Econ integration	0.024	0.054	0.130	0.064	0.044	0.093	0.067	0.087
	[0.022]	[0.026]**	[0.087]	[0.048]	[0.077]	[0.041]**	[0.044]	[0.065]
Composite crisis	-1.278	-1.464	-2.401	-2.637	-2.953	-2.982	-2.150	-2.029
	[0.347]***	[0.423]***	[0.851]***	[0.722]***	[0.745]***	[0.675]***	[0.930]**	[1.156]*
Interaction	0.020	0.021	0.040	0.038	0.056	0.046	0.034	0.027
	[0.009]**	[0.011]*	[0.023]*	[0.016]**	[0.019]***	[0.020]**	[0.018]*	[0.031]
Controls								
Log(initial GDP)	-0.406	-1.194	-2.446	-1.688	-3.349	-2.139	2.774	0.016
	[0.264]	[0.218]***	[2.028]	[1.338]	[1.216]***	[0.730]***	[2.725]	[1.809]
Log(1+ inflation)	0.481	0.025	-0.831	-0.456	-1.660	-0.424	-0.376	-0.580
	[0.288]*	[0.327]	[0.633]	[0.412]	[0.351]***	[0.653]	[1.650]	[1.078]
Investment	0.045	0.098	0.135	0.076	0.092	0.080	0.172	0.118
	[0.023]**	[0.023]***	[0.058]**	[0.087]	[0.092]	[0.049]	[0.049]***	[0.079]
Debt	-0.011	-0.015	-0.012	-0.009	-0.011	-0.018	-0.003	-0.005
	[0.002]***	[0.003]***	[0.005]**	[0.009]	[0.007]	[0.007]**	[0.008]	[0.017]
Financial depth	2.541	2.233	3.741	3.028	-5.027	0.458	-9.426	-9.805
	[1.054]**	[1.229]*	[3.127]	[4.825]	[6.550]	[5.097]	[8.387]	[9.714]
Pop growth	-0.152	-0.172	0.201	-0.473	-0.307	-0.164	2.522	-0.118
	[0.142]	[0.157]	[1.179]	[0.723]	[0.597]	[0.363]	[1.531]*	[0.786]
Constant	1.485	8.215	8.759	13.564	27.579	13.412	-40.174	1.813
	[2.338]	[2.562]***	[19.750]	[12.670]	[10.209]	[4.851]	[32.280]	[14.330]
Observations	229	229	187	162	113	136	90	124
Instruments			24	24	24	34	24	24
Countries			30	30	27	33	22	28
Hansen test			0.462	0.532	0.850	0.714	0.625	0.304
Diff Hansen test			0.614	0.795	0.734	0.647	0.625	0.328
AR (1) test			0.006	0.004	0.009	0.005	0.025	0.029
AR (2) test			0.653	0.302	0.585	0.861	0.727	0.429

Notes: The estimates are based on the two-step System-GMM estimator with Windmeijer finite sample correction. AR(1) and AR(2) are respectively Arellano-Bond's 1st and 2nd autocorrelation tests. The Hansen J-statistic reports the p-values for the null of instrument validity. The Diff-in-Hansen reports the p-values for the validity of the additional moment restriction for the System GMM. Time fixed effects included but not reported. *, **, *** denote significance at 10, 5 and 1% levels, respectively.

Table 3.10: Sensitivity to estimation methods

	[1] Pooled OLS	[2] LAD	[3] 1-step DGMM	[4] 1-step SGMM
Log(initial GDP)	-0.547	-0.581	-1.962	-3.616
	[0.278]*	[0.325]*	[0.606]***	[0.955]***
Log(1+inflation)	0.379	0.171	-0.803	-1.130
	[0.291]	[0.406]	[0.226]***	[0.449]**
Investment/GDP	0.064	0.092	0.093	0.051
	[0.029]**	[0.030]***	[0.013]***	[0.060]
External debt/GDP	-0.011	-0.010	-0.001	-0.016
	[0.003]***	[0.004]**	[0.004]	[0.008]**
Financial depth/GDP	2.126	2.326	0.053	5.215
	[1.208]*	[1.549]	[1.973]	[3.243]
Population growth	-0.132	0.055	4.769	-0.043
	[0.153]	[0.205]	[0.834]***	[0.681]
Economic integration	0.021	0.022	0.055	0.210
	[0.028]	[0.030]	[0.029]*	[0.053]***
Composite crises index	-1.675	-1.566	-1.456	-2.113
	[0.434]***	[0.475]***	[0.242]***	[0.571]***
Integration * composite index	0.028	0.029	0.019	0.029
	[0.011]**	[0.012]**	[0.005]***	[0.012]**
Observations	229	229	192	229
R^2	0.354			
Hansen test			0.110	0.702
Diff Hansen test				0.680
AR (2) test				0.991

Notes: Huber-White robust standard errors in brackets, *, **, *** denote significance at 10, 5 and 1% levels, respectively. AR(1) and AR(2) are respectively Arellano-Bond's 1st and 2nd autocorrelation tests. The Hansen J-statistic reports the p-values for the null of instrument validity. The Diff-in-Hansen reports the p-values for the validity of the additional moment restriction for the System GMM. Time fixed effects included but not reported.

the baseline specification using the Least Absolute Deviation (LAD) estimator. By using the median (instead of the mean) of the dependent variable (conditional on the values of the explanatory variables), this estimator tends to generate results that are less affected by distant data points. As can be seen in the second column of Table 3.10, the results support our previous finding that openness tends to dampen the negative influence of crises on growth.

Our main results so far have been based on the two-step system GMM. As a robustness check, in the last two columns we report results based on 1-step DGMM and SGMM, respectively. The estimates suggest that openness is positively and significantly associated with higher growth rates. They also indicate that there is a significant negative relationship between growth and crises. Finally, the coefficient of the interaction term is consistent with our previous results.

In sum, we find that financial crises are associated with output losses in our sample of countries. Our results also suggest that economic integration, perhaps by relaxing credit constraints, helps economies to overcome the adverse effects of financial crises on economic performance.

3.6 Concluding Remarks

In this study, we use a large African sample to analyse comprehensively the relationship between crises and growth. Focusing on four different types of financial crises, we provide evidence showing that external shocks can account for a large fraction of the cross-country variation in output growth over the sample period. The central findings of this study are in line with the theoretical view that crises disrupt economic activity. Our empirical results add to the growing empirical evidence (Cavallo and Cavallo, 2010; Joyce and Nabar, 2009) that crises undermine economic growth.

In contrast to the existing literature, our study solely focuses on African countries. In addition, our main results are obtained using the two-step system GMM

developed by Arellano and Bover (1995) and Blundell and Bond (1998), which controls for endogeneity, measurement error and omitted variable biases. Also, our results remain robust to a battery of sensitivity analyses where we consider additional control variables, various econometric methods, outliers and sub-samples.

In line with the existing literature (e.g. Bruckner and Lederman, 2012; Changa and Mendy, 2012), we find a robust positive link between economic openness and growth performance in Africa. Our results can be generalised to measures of financial openness. A variety of mechanisms could rationalise this result - the most plausible being that financial openness may have had a robust beneficial effect on African financial markets and thus indirectly promoted growth (see, Ahmed, 2011).

In an attempt to identify the specific channels through which crises affact output growth, we test the hypothesis that the level of economic integration in the crisis-hit country might be important. We find that crises have had a more disruptive effect on growth in countries with lower levels of openness. For instance, it could be that openness lessens the adjustment costs associated with external crises, as suggested by sticky price open economy models as well as conventional Mundell-Flemming type models. This implies that once an economy reaches a certain level of financial and economic openness, the negative effects of crises would be minimised, presumably because the country would be in a position to keep the fall in aggregate demand in check.

However, an important caveat remains; most of the hypothesized beneficial effects of openness (e.g. more efficient capital allocation) highlighted in the theoretical literature cannot be empirically tested due to lack of appropriate proxies. Nevertheless, in tandem with both the theoretical and empirical literature, our results strongly indicate that economic openness is associated with higher growth rates in Africa. But at the same time, as our previous results with respect to capital flight show, openness may exacerbate the domestic investment climate through its tendency to import volatility. Moreover, it may create avenues for capital flight to take

place (e.g. under-invoicing of exports and over-invoicing of imports etc.). Thus, openness would be more beneficial in an environment where the other dimensions of the domestic investment climate are strong - good institutions and macroeconomic stability, among others.

3.A Appendix 3

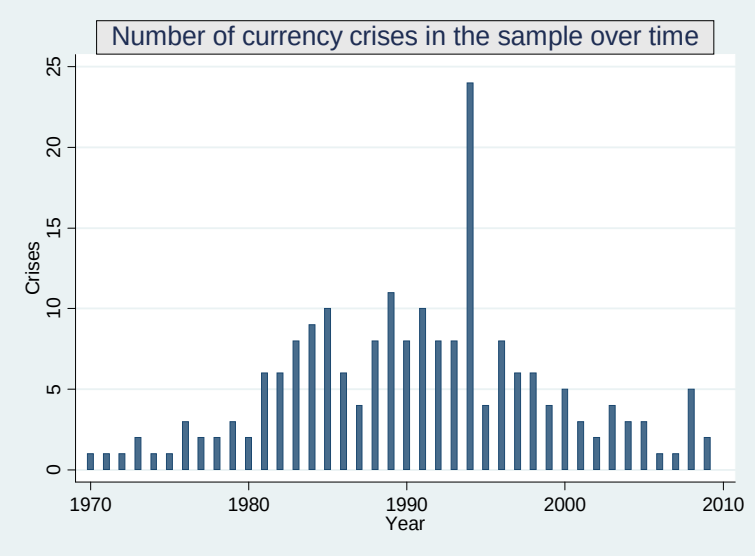

Figure 3.10: Currency crises in Africa

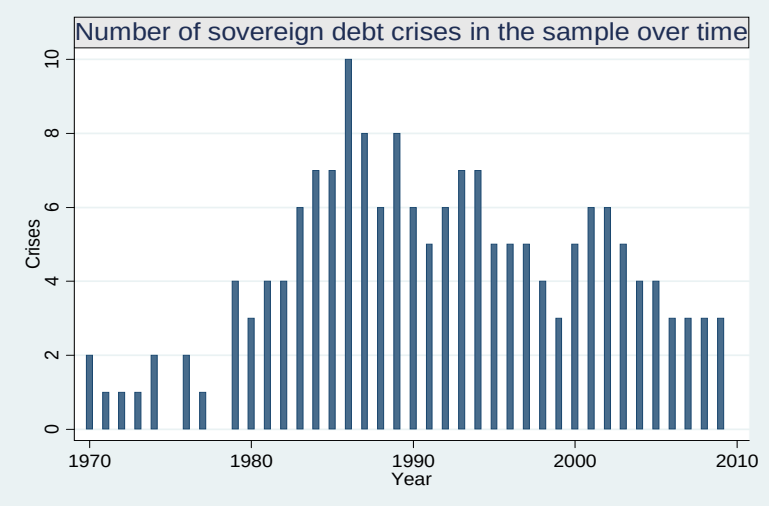

Figure 3.11: Sovereign debt crises in Africa

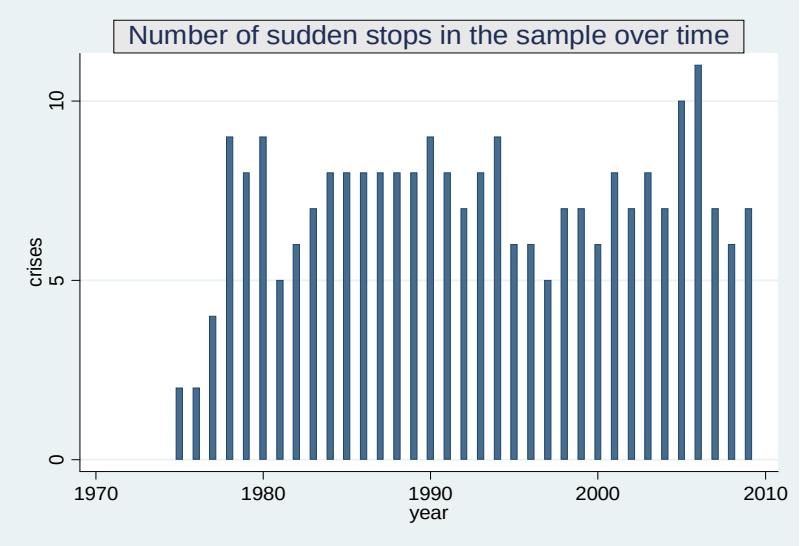

Figure 3.12: Sudden stop episodes in Africa

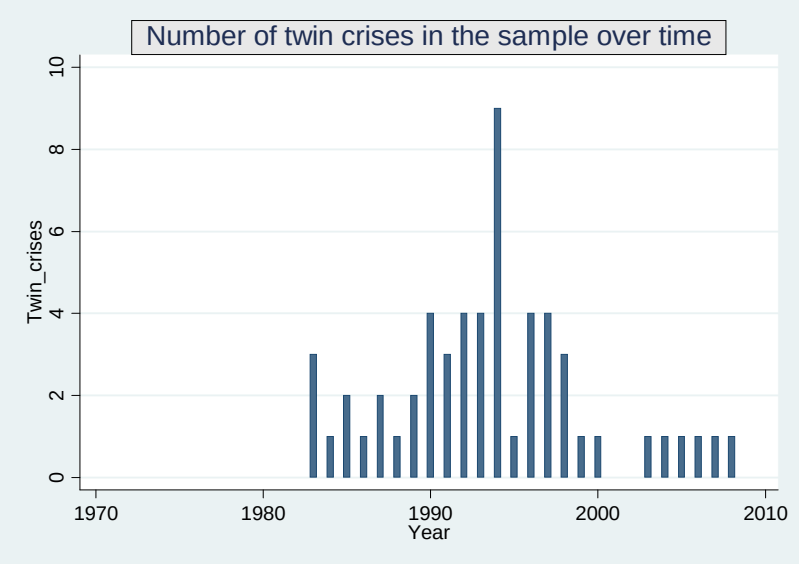

Figure 3.13: Twin crises in Africa

Table 3.11: Descriptive statistics

	Obs.	Mean	Std. Dev.	Min	Max
Growth	358	1.20	4.46	-30.26	31.23
Initial income (ln)	354	6.19	1.00	4.06	8.93
Investment	340	20.95	9.78	3.58	86.79
Population growth	384	2.51	1.05	-4.64	6.23
Debt	343	80.06	103.36	0.00	1090.98
Inflation (ln)	358	3.06	0.69	1.41	8.85
Liquid liabilities	282	0.29	0.19	0.01	1.02
Economic integration	328	37.62	14.54	10.16	73.08
Composite crisis measure	384	1.05	1.21	0.00	4.00
Financial openness	242	106.25	60.42	11.95	308.38
Capital account openness	358	-0.77	0.96	-1.84	2.48
Cross border transactions	336	44.48	21.01	5.92	95.62
Trade	357	70.44	36.52	12.88	224.21
FDI liabilities	359	3.10	7.49	0.00	81.25
Political rights	377	5.14	1.59	1.00	7.00
Regime collapse	375	19.65	33.66	1.00	100.00
Reserves	366	5.07	1.88	0.31	11.31
Terms of trade	275	113.38	41.67	26.05	320.94
Consumption volatility	384	-64.14	1242.18	-24327.11	276.11
Polity	356	2.96	1.78	1.00	7.00
Government size	343	15.89	6.78	2.83	54.38
Output per worker	382	1.38	5.52	-31.80	56.48

Notes: The definitions and sources of all variables used are shown in Table 3.15

Table 3.12: Correlations between crises and growth

	I	II	III	IV	V	VI
I. Growth	1.00					
II. Sovereign debt crisis	-0.22**	1.00				
	(0.00)					
III. Twin crisis	-0.21**	0.14**	1.00			
	(0.00)	(-0.01)				
IV. Composite crisis index	-0.28**	0.57**	0.63**	1.00		
	(0.00)	(0.00)	(0.00)			
V. Sudden stop crisis	-0.17**	0.38**	0.33**	0.82**	1.00	
	(0.00)	(0.00)	(0.00)	(0.00)		
V. Currency crisis	-0.18**	0.15**	0.56**	0.71**	0.47**	1.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	

Notes: p-values in parentheses, ** denotes a significance at 5% level or lower

Table 3.13: Correlations between openness and growth

	I	II	III	IV	V	VI	VII
I. Growth	1.00						
II. Economic integration	0.25**	1.00					
	(0.00)						
III. Cross border transactions	0.15**	0.87**	1.00				
	(-0.01)	(0.00)					
IV. Trade openness	0.29**	0.69**	0.76**	1.00			
	(0.00)	(0.00)	(0.00)				
V. Financial openness	-0.02	0.54**	0.50**	0.38**	1.00		
	(-0.77)	(0.00)	(0.00)	(0.00)			
VI. FDI liabilities	0.08	0.25**	0.24**	0.00	0.25**	1.00	
	(-0.11)	(0.00)	(0.00)	(-0.98)	(0.00)		
VII. Capital account openness	0.03	0.18**	0.26**	0.25**	0.05	0.08	1.00
	(-0.60)	(0.00)	(0.00)	(0.00)	(-0.41)	(-0.12)	

Notes: p-values in parentheses, ** denotes a significance at 5% level or lower

Table 3.14: Correlations between crisis and openness

	I	II	III	IV	V	VI	VII
I. Composite crisis index	1.00						
II. Economic integration	0.01	1.00					
	(-0.88)						
III. Cross border transactions	0.05	0.87***	1.00				
	(-0.40)	(0.00)					
IV. Trade openness	-0.12*	0.69***	0.76***	1.00			
	(-0.03)	(0.00)	(0.00)				
V. Financial openness	0.23***	0.54***	0.50***	0.38***	1.00		
	(0.00)	(0.00)	(0.00)	(0.00)			
VI. FDI liabilities	0.10	0.25***	0.24***	0.00	0.25***	1.00	
	(-0.05)	(0.00)	(0.00)	(-0.98)	(0.00)		
VII. Capital account openness	-0.12*	0.18**	0.26***	0.25***	0.05	0.08	1.00
	(-0.03)	(0.00)	(0.00)	(0.00)	(-0.41)	(-0.12)	

Note:p-values in parentheses; *p<0.05,**p<0.01,***p<0.001

Table 3.15: Data sources

Variable	Definition and Source
Growth	Real per capita GDP growth rate. World Bank (2011): WDI
Initial income	First value of real per capita income for each 5-year period. World Bank (2011): WDI
Sudden stop crisis	Own calculation based on a modified version of Calvo et al. (2004). See text for description
Currency crisis	Reinhart and Rogoff (2009). See text for description
Sovereign debt crisis	Reinhart and Rogoff (2009). See text for description
Twin crisis	Joint occurrence of banking and currency crises. The data on banking crises is from Laeven and Valencia (2008)
Composite crisis index	Own calculation based on types of crises encountered in a particular year, weighted by each country's share in world output.
Investment	Gross capital formation as a % of GDP. World Bank (2011): WDI
Debt	External borrowing as a % of GDP. World Bank (2011): WDI
Financial depth	Captured by Liquid liabilities as a % of GDP. World Bank (2011): WDI
Inflation	Change in CPI. World Bank (2011): WDI
Trade openness	Imports + exports as a % of GDP. World Bank (2011): WDI
Economic integration	Measured by actual flows of trade and investment and their restrictions, expressed as a % of GDP. Dreher (2006, revised 2011)
Cross border transaction	De-facto measure of openness (measured by actual flows of trade, FDI +portfolio + payments to foreigners) as a % of GDP. Dreher (2006, revised 2011)
Capital acc. openness	Chinn-Ito's de jure index (revised 2011)
Financial openness	De facto fin openness sum of total cross-border assets and liablities over GDP.
FDI liabilities	Share of FDI liabilities in GDP. Lane and Milesi-Ferretti (2006, revised 2011)
Productivity	Output per worker. PWT 7.0 (2011)
Government size	Government expenditure as % of GDP. World Bank (2011): WDI
Political rights	The extent of political rights in a country as calculated by Freedom House. Coded from 1-7 (7 being the worst). FH surveys (2011)
Regime type	Ranges from Monarchy, Military, One-party, Multi-party system to full Democracy (higher value), Teorell and Hadenius (2007).
Reserves	FX Reserves minus gold (% GDP). Lane and Milesi-Ferretti (2006)
Civil unrest	Dummy taking the value 1 if country has a military conflict in current year. PRIO/UCDP (2011)
Terms of trade	Net barter terms of trade index. World Bank (2011): WDI
Consumption volality	Standard deviation of consumption. Underlying data from PWT 7.0 (2011)
Polity	Executive Constraints (Decision Rules): from (1) Unlimited Authority to (7) Limited Authority. PolityIV dataset (2011)

Chapter 4

Capital Flows and Domestic Investment: Evidence from African and Other Developing Countries

4.1 Introduction

Foreign capital inflows are viewed by many economists as means of accelerating the rates of growth of developing countries. The three most important external sources of capital are official aid, foreign direct investment (FDI) and migrant remittances. Historically, foreign aid has been the dominant, but in the last two decades, FDI and remittances have taken a more prominent role in developing countries.

An important issue, however, is whether these types of inflows act as complements or substitutes for domestic investment and thus economic growth. Theoretically, capital inflows can facilitate economic development by enhancing the availability of funds for productive investments and thereby ease the resource constraints faced by recipient countries. In addition, some of these flows, particularly FDI, can have embedded in them knowledge, technology and management skills, which can have positive externalities on the host economy.

On the other hand, as has been suggested by many, these types of external finance may in fact have adverse effects on the recipient economy. For example, foreign

aid, or at least certain types of it, can displace domestic savings and thus erode the ability of the recipient countries to generate own resources for investment and growth (Ouattara, 2009). Similarly, FDI may have negative effects on the performance of domestic firms by outcompeting them in, for example, product markets. Some of the activities of multinational companies (e.g. transfer pricing, dividend and royalty repatriation, high import-propensity) can have adverse effects on the host countries' tax revenues and balance of payments (Apergis et al. 2006). Remittances too may not contribute to economic growth as it may act as a compensatory transfer, which tend to be used for consumption rather than productive investment (Chami et al. 2005).

The empirical evidence on the relationship between capital inflows and domestic investment has been mixed. Some studies find that capital inflows exert a positive effect on domestic investment, while others either report a negative association or fail to find any significant link.

The objective of this study is to contribute to this literature but we depart from the existing literature in a number of ways. Firstly, we use recently developed panel cointegration tests that can handle a number of econometric issues, including cross-sectional heterogeneity, structural breaks and endogeneity concerns. Secondly, we examine the long-run relationship between these inflows and domestic investment for the panel as a whole as well as for individual countries. Thirdly, we apply panel error correction methods to uncover the short-run dynamics in the relationship between capital flows and domestic investment. Finally, we conduct a panel Granger causality analysis in order to establish whether the long and short-run effects are indeed of a causal nature.

The chapter is organised as follows. Section 2 provides a brief overview of the existing literature on the relationship between capital flows and domestic investment. Section 3 sets out the econometric model, presenting the data and the techniques used. Section 4 discusses the results while Section 5 concludes.

4.2 Capital flows and domestic investment

The literature on the effects of capital inflows on domestic investment is vast with varying results. In what follows, we summarise the ways in which these inflows can influence domestic investment. In doing so, we highlight the contributions of the present study.

4.2.1 Remittances and domestic investment

The macroeconomic effects of remittances largely depend on whether they act as pure compensatory transfers or capital flows (Chami et al. 2005). In the first case, altruistic motives dominate in the sense that the migrant is concerned with the well-being of his/her relatives. In the latter case, though, self-interest dominates, suggesting that the migrant retains some sort of ownership over the assets. In both cases, however, the response of the economy to increases in remittances could be either negative or positive.

On the one hand, remittance flows can have negative effects on the recipient economy through their adverse influences on income distributions (Orrenius et al. 2010), household's labour supply and savings rates (Chami et al. 2005). In addition, similar to any other resource inflow, sustained levels of remittances tend to be associated with "Dutch disease" effects (Amuedo-Dorantes et al. 2004) as well as increases in conspicuous consumption rather than productive investments (Chami et al. 2005).

On the other hand, there is considerable evidence showing that, although remittances may mainly go to consumption, a substantial portion of it goes to human capital formation in the form of better nutrition, schooling and health (Gupta et al. 2009). Moreover, increased consumption and even "unproductive" investments (e.g. real estate) can have significant multiplier effects, encouraging more capital accumulation and growth through spillover effects (Ratha, 2003; Gupta et al. 2009).

Evidence also suggests that remittances tend to reduce households' credit constraints and thus boost the depth of the financial sector (Guilamo and Ruiz-Arranz, 2009; Aggarwal et al. 2011). Furthermore, it has been shown that remittance receiving households, on average, tend to save and invest more than other comparable households (Adams, 2007). Other studies show remittances are associated with poverty reductions (Adams and Page, 2005) and higher educational attainments (Rapoport and Docquier, 2005). Finally, remittance flows have been found to act more countercyclically than other types of inflows and thus are a more stable source of foreign exchange at times of economic difficulties (Combes and Ebeke, 2011; Chami et al. 2009).

4.2.2 Foreign aid and domestic investment

Foreign aid differs from the two other flows in two distinct ways. Firstly, it goes to the public sector. Secondly, and perhaps more importantly, its relationship with domestic investment is much more straightforward, particularly in low income countries. This is because, in such countries, foreign aid can directly augment the level of public investment as it relaxes the government budget constraint. However, this argument assumes the absence of the so-called 'fungibility proposition' in which aid may not enhance public investments as it tends to go to government consumption instead (see for example, Boone, 1996; Swaroop et al. 2000).

However, as shown by Herzer and Morrissey (2009), the general validity of the 'fungibility proposition' can be questioned on the grounds that government consumption and investment are not easily distinguishable. For example, government consumption may include expenditures that cover the social sector (e.g. human capital investments). Evidence suggests that aid is significantly associated with increases in public investment, including expenditures on health and education as well as reductions in public sector borrowing (Ouattara, 2006). In an earlier contribution, Hansen and Tarp (2001) find that, in most countries, there is a one-to-one relation

between aid flows and investment. Focusing on an African sample, Levy (1988) finds that foreign aid has a significant positive association with both investment and economic growth. Also, examing this issue for a sample of African countries, Hadjimichael et al. (1995) suggest that the effect of aid on investment is at best mixed. However, when they divide the countries into good performers vs poor performers, their results indicate that aid crowds-in domestic investment in countries with good macroeconomic conditions.

Besides public investments, foreign aid can stimulate overall domestic investment through its beneficial effects on private investments. According to Herzer and Grimm (2012) and Herzer and Morrissey (2009), under certain conditions, increased aid inflows may reduce the level of tax-financed public investments which implies less resource transfer from the private sector.

Besides the level of public and private investments, one can identify various other indirect ways through which foreign aid can either stimulate or discourage, not just the level of domestic investment, but its productivity. As the literature on aid-effectiveness suggests, to the extent that aid improves the overall investment climate of the recipient country (e.g. enhanced infrastructure, institutional environment, human capital etc.), other things being equal, it should increase the productivity of domestic investment projects (Herzer and Morrissey, 2009).

On the other hand, foreign aid may discourage domestic investment if, for instance, it aggravates the institutional environment of the recipient country by promoting rent-seeking activities or if the inflows are not properly managed by the government or the central bank (for example, Dutch disease effects).

4.2.3 FDI and domestic investment

Most developing countries have implemented policies to attract FDI into their economies. This move has been justified on the grounds that multinational companies possess some intangible assets including technological capabilities and man-

agerial skills, creating linkages with domestic firms (Agosin and Machado, 2005). However, the impact of FDI on domestic investment can be very complicated. On the one hand, FDI can crowd-out domestic investment by squeezing endogenous firms in both product and financial markets (Borensztein et al. 1998). In particular, it can put pressure on wages and other input prices as well as deteriorate the balance of payments of the host economy through higher import propensity (Apergis et al. 2006). Even in the absence of these negative effects, FDI may not create the needed backward and forward linkages with the wider economy (Agosin and Machado, 2005).

On the other hand, FDI can crowd-in domestic investment by creating complementarities with domestic firms, encouraging them to adopt new technologies (Apergis et al. 2006). Similarly, FDI, particularly in the form of Greenfield investment, can increase the demand for domestic input products and employment and through spillover effects increase the productivity of domestic firms (Borensztein et al. 1998; Apergis et al. 2006).

However, the existing evidence suggests that the beneficial effects of FDI on domestic investment are conditional on a number of factors. It has been found that FDI tends to crowd-in domestic investment if the degree of technological spillover is high (Sanna-Randacio, 2002), if the technology gap between the foreign firm and the domestic one is not that big (Kokko, 1994) and if there is a minimum level of human capital in the host country (Borensztein et al. 1998).

4.2.4 Summary

As the above review suggests, the impact of capital flows on domestic invesment can either be positive or negative. In addition, the relationship can be dynamic in nature in the sense that some of the flows may undermine domestic investment in the short-run while this may not be the case in the long-run. Also, their effects on investment may be conditional on a number of country-specific factors. Moreover, at least in

the case of FDI and less so in the case of remittances, domestic investment may itself be responsible for the capital inflow. For example, in an environment where information is costly or incomplete, multinational firms may view the investments made by domestic firms as a reflection of the soundness of the domestic economy (Apergis et al. 2006). Hence, it is important to take these points into account, which we try to do in our empirical exercises.

4.3 Econometric issues

To examine the relationship between capital flows and domestic investment, we use recently developed panel cointegration techniques. An attractive feature of these methods is that they are able to overcome a number of econometric issues such as omitted variable bias, endogeneity concerns and measurement errors (Baltagi and Kao, 2001; Phillips and Moon, 2000). Moreover, they can be applied on shorter data series since they utilise both the time and cross-sectional dimensions.

Before we begin our analysis, we first examine the time series properties of the variables. We then perform panel cointegration tests to establish whether there is a long-run equilibrium relationship between our variables of interest. This is followed by an estimation of the long-run estimates. Finally, we estimate the short-run relationship as well as the direction of any causality.

4.3.1 Panel unit-root tests

To test the time series properties of the variables, we apply the panel unit root test developed by Levin, Lin and Chu (2002) (LLC). This test can be viewed as an extension of the standard (Augmented) Dickey–Fuller test and takes the following form:

$$\Delta y_{it} = x'_{it}\theta + \gamma y_{it-1} + \sum_{j=1}^{k} \rho_{ij} \Delta y_{it-j} + \varepsilon_{it} \tag{4.1}$$

where $i = 1, 2, ...N$, $t = 1, 2, ...T$, y_{it} denotes each variable under consideration in our model, k denotes the lag length, the vector x'_{it} includes panel-specific fixed effects or panel-specific fixed and time effects, and θ is the corresponding vector of coefficients. Hence, the test assumes that the coefficient of the autoregresssive term to be homogeneous across all i (i.e. $\gamma_i = \gamma$) and examines the null hypothesis of H_0:$\gamma = 0$, against the alternative H_1:$\gamma_i < 0$. However, the restriction of γ to be the same for all countries may be problematic. Thus, we also report the Im, Pesaran and Shin (2003) (IPS) test, which allows for heterogeneity across i but also for serial correlation in the error term. The IPS is based on the following model:

$$\Delta y_{it} = x'_{it}\theta_i + \gamma_i y_{it-1} + \sum_{j=1}^{k} \rho_{ij} \Delta y_{it-j} + \varepsilon_{it} \tag{4.2}$$

where the null hypothesis is that all the series are non-stationary, H_0:$\gamma_i = 0$, against the alternative of stationarity in some of the series, H_1:$\gamma_i < 0$ for $i = 1, ..N_1$; $\gamma_i = 0$ for $i = N_1 + 1, ..N$. This test applies a standardised t-bar statistic which is based on estimating separate unit root tests and averaging their ADF t-statistic:

$$\bar{t} = \frac{\sqrt{N}(t_{iT} - N^{-1} \sum_{i=1}^{N} E(t_{iT})}{\sqrt{N^{-1} \sum_{i=1}^{N} Var(t_{iT})}} \tag{4.3}$$

where t_{iT} is the individual ADF t-statistic for the N cross-section units, $E(t_{iT})$ and $Var(t_{iT})$ are respectively the mean and variance of t_{iT} computed via Monte Carlo simulations by Im et al. (2003).

However, both the LLC and IPS unit root tests may lead to erroneous results if there is cross-sectional dependence among the N units emanating from, for example,

common effects. In other words, if the assumption of uncorrelated error terms among the countries is violated so that $E[\varepsilon_{it}\varepsilon_{js}] \neq 0 \; \forall \; t, s$ and $i \neq j$. Hence, we also report the cross-sectionally augmented ADF test statistic developed by Pesaran (2007), which takes the following model as its point of departure:

$$\Delta y_{it} = x'_{it}\theta + \gamma_i y_{it-1} + \sum_{j=1}^{k} \rho_j \Delta y_{it-j} + \beta_i \bar{y}_{it-1} + \sum_{j=0}^{k} \lambda_{ij} \Delta \bar{y}_{it-j} + \varepsilon_{it} \tag{4.4}$$

where cross-sectional dependence is addressed by including the cross-sectional mean of the lagged values of y_{it} and its differences. The cross-sectionally augmented IPS (CIPS) is then defined as the simple average of the individual cross-section ADF regressions and is given by:

$$CIPS = \frac{1}{N} \sum_{i=1}^{N} t_i \tag{4.5}$$

where t_i is the t-statistic of the OLS estimate of γ_i in Equation (4.4). The critical values are tabulated by Pesaran (2007).

4.3.2 Panel cointegration tests

Our primary objective is to test whether there is a long-run cointegration between domestic investment and each of our variables of interest. To this end, we implement the residual based panel cointegration test developed by Kao (1999) which can be formulated as follows:

$$y_{it} = \alpha_i + \beta x_{it} + \varepsilon_{it} \tag{4.6}$$

where $i = 1, 2, ...N$, $t = 1, 2, ...T$, y_{it} denotes our dependent variable, x_{it} is, respectively, each of our explanatory variables. The residual from Equation (4.6) can be applied to an ADF-type test as follows:

$$\varepsilon_{it} = \rho\varepsilon_{it-1} + \sum_{j=1}^{n} \theta_j \Delta\varepsilon_{it-j} + \upsilon_{it} \tag{4.7}$$

The null hypothesis tested is that there is no panel cointegration, H_0:$\rho = 0$, against the alternative of cointegration, H_1:$\rho < 0$, based on the assumption that β is common across the N cross-sectional units implying that there is homogenous cointegrating vectors.

Since the assumption of homogeneity among the cross-sectional units may be too strong, we also report the Pedroni (1999, 2004) panel cointegration test which offers considerable flexibility as it allows for heterogeneity in the long-run cointegrating vectors. This test considers the following model for each cross-section:

$$y_{it} = \alpha_i + \lambda_{it} + x_{it}\beta_i + \varepsilon_{it} \tag{4.8}$$

where y_{it} and x_{it} are assumed to be integrated of order one, $I(1)$, α_i and λ_{it} are respectively country-specific time and fixed effects, and ε_{it} denote the generated residuals, capturing deviations from the long-run relationship. The test can handle multiple explanatory variables (if needed) and allows the parameter β to be different across i. More specifically, it is based on establishing whether the residuals from Equation (4.8) are $I(1)$ by estimating the following auxiliary regression:

$$\varepsilon_{it} = \rho_i\varepsilon_{it-1} + \upsilon_{it} \tag{4.9}$$

Pedroni (1999, 2004) constructs seven test statistics which capture both the within- and between-dimensions of the panel. The within-dimension tests consist of four different test statistics which pool ρ across i for the unit root tests on ε_{it}. The null hypothesis of these four statistics is that there is no cointegration, H_0:$\rho_i = 1$, against the alternative that there is a common ρ in the countries, i.e. $(\rho_i = \rho) < 1$ for all i. The between-dimension tests which consist of three different test statistics also test the null hypothesis of no cointegration, H_0:$\rho_i = 1$ but the alternative states that

each cross-section has a different ρ, such that $\rho_i < 1$ for all i. The between-dimension tests are based on averages of ρ across i for the unit root tests on ε_{it}. As shown by Pedroni (1999, 2004), these seven test statistics are distributed asymptotically as standard normal, $N(0,1)$.

Considering cross-sectional dependence

An important shortcoming with the above panel cointegration tests is that they impose a common factor restriction - that is, they assume that the long-run parameters for the level variables are equal to the short-run parameters of the variables in their first differences. As shown by Westerlund (2007), when this assumption does not hold, the above cointegration methods suffer from a significant loss of power. Thus, a failure to account for cross-sectional dependence may lead to biased estimates. Therefore, in addition to the above methods, we also report more appropriate panel cointegration tests proposed by Westerlund (2007) to explore whether there is a long-run relationship between capital flows and domestic investment. Westerlund (2007) sidesteps the assumption of a common factor restriction by utilising the structural (rather than residual) dynamics. In particular, he tests the null hypothesis of no cointegration by examining whether the error-correction term in a conditional panel error-correction is equal to zero. Thus, a rejection of the null can be interpreted as a rejection of the null of no cointegration. The error-correction tests assume the following data-generating process:

$$\Delta y_{it} = \delta_i' d_t + \alpha_i(y_{it-1} - \beta_i' x_{it-1}) + \sum_{j=1}^{p_i} \alpha_{ij} \Delta y_{it-j} + \sum_{j=-q_i}^{p_i} \gamma_{ij} \Delta x_{it-j} + \varepsilon_{it} \qquad (4.10)$$

where $i = 1, 2, ...N$, $t = 1, 2, ...T$, d_t contains the deterministic components, p_i and q_i are, respectively, lag and lead orders (to account for weakly exogenous variables) while y_{it} and x_{it} denote our dependent and each of our explanatory variables. The above specification can handle serially correlated residuals, country-specific intercept

and slope parameters along with trend terms. Equation (4.10) can be rewritten as:

$$\Delta y_{it} = \delta_i' d_t + \alpha_i y_{it-1} - \lambda_i' x_{it-1} + \sum_{j=1}^{p_i} \alpha_{ij} \Delta y_{it-j} + \sum_{j=-q_i}^{p_i} \gamma_{ij} \Delta x_{it-j} + \varepsilon_{it} \qquad (4.11)$$

where $\lambda_i' = (-\alpha_i \beta_i')$, α_i is the error correction term, capturing the speed at which the system reverts back to equilibrium after a shock. If $\alpha_i < 0$, then there is an error correction, suggesting that y_{it} and x_{it} are cointegrated. On the other hand, if $\alpha_i = 0$, then there is no cointegration since the model would not be error-correcting. Thus, the null hypothesis is H_0: $\alpha_i = 0$ for all i. Westerlund (2007) develops four different statistics which can be used to establish the existance of a panel cointegration. Two of them are *panel* tests (denoted P_τ and P_α), testing the alternative hypothesis that the panel is cointegrated as a whole (H_1^p: $\alpha_i = \alpha < 0$ for all i). On the other hand, the other two are *group-mean* statistics, (denoted G_τ and G_α), which test the alternative that at least one element in the panel is cointegrated (H_1^g: $\alpha_i < 0$ for at least one i). Thus, the panel tests assume that α_i is homogenous for all i while the group-mean tests do not require this.

Cross-sectional dependency

To formally examine whether the panel members are indeed independent, we apply the CD test proposed by Pesaran (2004). This test is normally distributed under the null of cross-sectional independence and is based on an average of all pair-wise correlations of the OLS residuals from the individual regressions in the panel model:

$$y_{it} = \alpha_i + \beta_i x_{it} + \epsilon_{it}, \qquad (4.12)$$

where $i = 1, 2, ...N$, $t = 1, 2, ...T$. Allowing α_i and β_i to vary across the panel members, the residuals from (4.12) can be written as:

$$\hat{\epsilon}_{it} = y_{it} - a_i - \hat{\beta}_i x_{it} \qquad (4.13)$$

The CD test statistic is then given by:

$$CD = \frac{\sqrt{2T}}{N(N-1)} \left(\sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \hat{\omega}_{ij} \right) \tag{4.14}$$

where $\hat{\omega}_{ij}$ is the sample estimate of the pair-wise correlation of the OLS residuals, $\hat{\epsilon}_{it}$, based on equation (4.12):

$$\hat{\omega}_{ij} = \frac{\sum_{t=1}^{T} \hat{\epsilon}_{it} \hat{\epsilon}_{jt}}{\left(\sum_{t=1}^{T} \hat{\epsilon}_{it}^2 \right)^{1/2} \left(\sum_{t=1}^{T} \hat{\epsilon}_{jt}^2 \right)^{1/2}} \tag{4.15}$$

where $\hat{\epsilon}_i$ and $\hat{\epsilon}_j$ are the (T x 1) vector of estimated residuals from each panel member. Pesaran (2004) shows that the CD test is robust to a single or multiple breaks in the slope parameters and/or in the residual variances of the individual regressions.

Structural breaks and regime shifts

Given the length of the time period we cover and the heterogeneity of the countries under study, it is highly likely that our variables of interest may have been influenced by various shocks emanating from, for example, regime and policy changes. As is well-known, most developing countries have implemented economic reforms which may have had a direct impact on investment rates but also on capital flows. Similarly, our variables of interest may have been influenced by exogenous shocks given the nature of the global economy. International capital flows, for example, tend to coincide with global economic trends, increasing in boom times and declining in bad ones. Thus, to fully understand the relationship between investment and capital flows, structural breaks and regime shifts need to be accounted for.

In this study, as an additional robustness, we implement the panel cointegration test proposed by Westerlund and Edgerton (2008), which accounts for both structural breaks and cross-sectional dependence. Westerlund and Edgerton (2008) develop two different tests that allow for unknown structural breaks in both intercept and slope of the cointegrating model, heteroskedastic and serially correlated

errors as well as time trends. The location of the structural breaks may be at different dates for the cross-sectional units. The two versions are derived from Lagrange Multiplier-based (LM) unit-root tests based on the model

$$y_{it} = a_i + \eta_i t + \delta_i D_{it} + x'_{it}\beta_i + (D_{it}x_{it})' + \gamma_i + z_{it} \tag{4.16}$$

where $x_{it} = x_{it-1} + w_{it}$ is a k-dimensional vector containing the regressors which follows a random walk (w_{it} is an error term with a mean zero and assumed to be independent across i), and D_{it} is a scaler break dummy such that $D_{it} = 1$ if $t > T_i$ and zero otherwise. The intercept and slope (a_i and β_i) are country-specific while δ_i and γ_i are their parameter values after the break or shift. To allow for cross-sectional dependence, the disturbance term z_{it} is assumed to depend on unobserved common factors as follows:

$$z_{it} = \lambda' F_t + \upsilon_{it}, \tag{4.17}$$

$$F_{jt} = \rho_j F_{jt-1} + u_{jt}, \tag{4.18}$$

$$\phi(L)\Delta\upsilon_{it} = \phi\upsilon_{it-1} + e_{it}, \tag{4.19}$$

where F_t is a r-dimensional vector of unobserved common factors F_{jt} for $j = 1, 2, ...r$, $\phi(L) := 1 - \sum_{j=1}^{p_i} \phi_{ij} L^j$ is a scaler polynomial in the lag operator L and λ_i is a comformable vector of loading parameters. F_t is stationary assuming that $\rho_j < 1$ for all j. Therefore, the relationship in equation (4.16) is cointegrated if $\phi_i < 0$ and it is spurious if $\phi_i = 0$. The null hypothesis to be performed states that all N cross-sections are spurious against the alternative that the first N_1 are cointegrated while the rest ($N_0 = N - N_1$) are spurious. Westerlund and Edgerton (2008) utilise the LM principle in which the parameters defined by the hypotheses can be tested in a likelihood framework. In particular, they test whether the score vector (or first derivative vector) has a zero mean when evaluated at the vector of true parameters

under the H_0. For this purpose, they consider the following log-likelihood function:

$$Log(L) = \text{cons tan t} - \frac{1}{2}\sum_{i=1}^{N}\left(T\log(\sigma_i^2) - \frac{1}{\sigma_i^2}\sum_{t=1}^{T} e_{it}^2\right). \tag{4.20}$$

To derive the test, Westerlund and Edgerton (2008) focus on the log-likelihood with respect to σ_i^2 which they then use to evaluate the resulting score. Defining $\hat{\sigma}_i^2 := 1/T \sum_{t=1}^{T} e_{it}^2$, the score for each i becomes:

$$\frac{\partial \log L}{\partial \phi_{it}} = \frac{1}{\hat{\sigma}_i^2}\sum_{t=2}^{T}(\Delta\hat{S}_{it} - \Delta\hat{S}_i)(\hat{S}_{it} - \hat{S}_i) \tag{4.21}$$

where $\hat{S}_{it}$ is a residual (see below) and $\Delta\hat{S}_i$ and $\hat{S}_i$ are, respectively, the mean of $\Delta\hat{S}_{it}$ and $\hat{S}_{it}$. Westerlund and Edgerton (2008) show that the score vector is proportional to the numerator of the OLS estimate of ϕ_i in the model

$$\Delta\hat{S}_{it} = \text{cons tan t} + \phi_i\hat{S}_{it-1} + error \tag{4.22}$$

Thus, the null of no cointegration vs. H_1 for each i can be setup as a zero-slope restriction in (4.22) using, for example, the t-ratio associated with ϕ_i. For the panel as a whole, then, the sum of these can be used. The variable $\hat{S}_{it}$ is given by (to allow for cross-sectional dependence):

$$\hat{S}_{it} := y_{it} - \hat{\alpha}_{it} - \eta_i t + \hat{\delta}_i D_{it} - x_{it}'\hat{\beta}_i - (D_{it}x_{it})'\hat{\gamma}_i - \hat{\lambda}_i'\hat{F}_t, \tag{4.23}$$

where $\hat{F}_t$ are based on the sum of the first principal component of the common factor estimates $(\Delta\hat{F}, \Delta F)$. To allow for serial correlation equation (4.22) becomes

$$\Delta\hat{S}_{it} = \text{cons tan t} + \phi_i\hat{S}_{it-1} + \sum_{j=1}^{p}\phi_{ij}\Delta\hat{S}_{it-j} + error \tag{4.24}$$

Given these, Westerlund and Edgerton (2008) develop two LM-based tests to examine H_0 vs. H_1. First, they define the first test statistic as follows:

$$LM_{\phi}(i) := T\hat{\phi}_i \left(\frac{\hat{\omega}_i}{\hat{\sigma}_i} \right) \tag{4.25}$$

where $\hat{\phi}_i$ is the OLS estimate in equation (4.24), $\hat{\sigma}_i$ are the estimated standard error $\hat{\omega}_i$ are the long-run variance of the error terms all from regression (4.24). The second test statistic is given by:

$$LM_{\tau}(i) := \frac{\hat{\phi}_i}{SE(\hat{\phi}_i)}, \tag{4.26}$$

where $SE(\hat{\phi}_i)$ are the standard errors of $\hat{\phi}_i$. They show that the two LM-based tests for the panel are simply:

$$LM^*_{\phi}(N) := \frac{1}{N} \sum_{i=1}^{N} LM_{\phi}(i),\ LM^*_{\tau}(N) := \frac{1}{N} \sum_{i=1}^{N} LM_{\tau}(i) \tag{4.27}$$

where $LM^*_{\phi}(N)$ and $LM^*_{\tau}(N)$ are respectively the means. Westerlund and Edgerton (2008) show the corresponding normalised test statistics are given by[1]:

$$z_{\phi}(N) = \sqrt{N}(LM^*_{\phi}(N) - E(B_{\phi})), \tag{4.28}$$

$$z_{\tau}(N) = \sqrt{N}(LM^*_{\tau}(N) - E(B_{\tau})) \tag{4.29}$$

Thus, the above two panel cointegration tests account for cross-sectional dependence as well as unknown structural breaks in both slope and intercept.

4.3.3 Long-run panel estimates

Once we confirm the presence of a cointegration among the variables, we apply the within-dimension-based dynamic OLS (WD-DOLS) estimator developed by Kao and Chiang (2000) to uncover the effects of each type of inflow on domestic capital

[1]For a proof of the asymptotic properties of the two LM tests as well as their detailed derivations, see Westerlund and Edgerton (2008).

formation. To implement the WD-DOLS estimator, we consider the following panel model:

$$INV_{it} = \lambda_i + \beta_1 CF_{it} + \varepsilon_{it} \tag{4.30}$$

where CF_{it} is, respectively, each of our endogenous regressors. Provided that our data is non-stationary, the WD-DOLS estimator addresses issues of serial correlation and endogeneity concerns by augmenting equation (4.30) with leads and lags of the first differences of each right hand side (endogenous) variable as follows:

$$INV_{it} = \lambda_i + \beta CF_{it} + \sum_{j=-q}^{q} \Psi_{ij} \Delta CF_{it+j} + \upsilon_{it} \tag{4.31}$$

where Ψ_{ij} are the leads and lags. The WD-DOLS estimator is superconsistent, under cointegration, producing unbiased estimates of the long-run cointegrating relationship.

Nevertheless, a particular weakness with the WD-DOLS estimator is that it assumes that the slope coefficients are homogenous across the cross-sectional units. However, this pooling assumption, if not true, can result in a serious bias in both static and dynamic panels (Asteriou and Hall, 2007). Thus, as a robustness check, we also estimate our model (equation 4.30) using the between-dimension mean-group DOLS (MG-DOLS) estimator for heterogeneous cointegrated panels suggested by Pedroni (2001). This estimator allows the long-run slope coefficients to vary across countries by running seperate regressions for each cross-section and then averaging them, $\hat{\beta} = N^{-1} \sum_{i=1}^{N} \hat{\beta}_i$. Thus, the estimates can be viewed as the mean value of the individual cointegrating vectors. As emphasised by Pesaran and Smith (1995), group-mean estimators generate more consistent estimates, in the presence of heterogeneous cointegrating vectors, than do within-dimension estimators. In addition, the MG-DOLS estimator has better small sample properties (Pedroni, 2001).

As highlighted previously, we need to consider the possible issue of cross-sectional dependency. For example, investment rates and capital flows in our sample of countries may respond to (unobserved) common external shocks (e.g. global business cycles), meaning that they may become correlated across i. Ignoring this interdependence may result in erroneous estimates. A simple way to deal with this type of error dependence is to demean the data over the cross-sectional units so that the cross-section averages of the variables, say $\bar{x}_t = N^{-1} \sum_{i=1}^{N} x_{it}$ are subtraced from the observations, say x_{it}. This procedure can mitigate the effects of error dependence (Pedroni, 2001; Levin et al. 2002). Thus, we re-estimate the WD-DOLS regressions using demeaned data. This simple strategy, while effective, implies that the unobserved external factors are the *same* across countries. To the extent that countries have different macroeconomic and institutional environments, for example, it is highly likely that their responses and behaviour towards capital flows would be different. To this end, we also apply the Common Correlated Effects Mean Group estimator (CCEMG) developed by Pesaran (2006). Applying this estimator, one can rewrite the error term in Eq (4.30) as having a multifactor structure as follows:

$$\varepsilon_{it} = \omega_i' \mathbf{f}_t + \upsilon_{it} \tag{4.32}$$

where $\mathbf{f}_t$ is k x 1 vector of unobserved common factors, which may affect the countries with different intensities, and υ_{it} is country-specific error term, assumed to be weakly dependent across the cross-sectional units. The common factors $\mathbf{f}_t$ are allowed to be correlated with the regressors in Eq (4.30):

$$x_{it} = \eta_i + \xi_i' \mathbf{f}_t + \epsilon_{it} \tag{4.33}$$

where x_{it} is each of our regressors, ξ_i is k x 1 vector of factor loadings, and ϵ_{it} is the error term assumed to be independently distributed of $\mathbf{f}_t$ and υ_{it}.

To take into account the presence of common effects, Pesaran (2006) suggests

that one can approximate $\mathbf{f}_t$ by cross-section averages of the dependent and explanatory variables and then run standard panel regressions augmented with these averages. As shown by a number of studies (e.g. Pesaran, 2006; Pesaran and Tosetti, 2011), this CCEMG performs well in small samples and can handle the presence of autocorrelation in the residuals and unit roots in the common factors.

As a final robustness check, we apply Breitung's (2005) two-step estimator which, unlike the above methods, can handle dynamic effects. Following Breitung (2005), it can be shown that a cointegrated model has the following Vector Error Correction Model (VECM) representation (in the case of a VAR[1]):

$$\Delta y_{it} = a_i \beta' y_{it-1} + \varepsilon_{it} \tag{4.34}$$

where ε_{it} is a white noise error with $E(\varepsilon_{it}) = 0$ and positive definite covariance matrix $\sum_i = E(\varepsilon_{it}\varepsilon_{jt})$. The matrix β' captures the long-run relationship among the variables and is assumed to be the same across i while a_i and $\sum_i$ are short-run parameters which vary across i. In the first step, the country-specific short-run parameters are generated from separate models for each cross-section unit resulting in country-specific cointegration vectors. In the second step, the long-run cointegration matrix β' is estimated using the pooled regression:

$$\hat{q}_{it} = \beta' y_{it-1} + \hat{v}_{it} \tag{4.35}$$

where $\hat{q}_{it}$ and $\hat{v}_{it}$ are based on the generated short-run parameters a_i and $\sum_i$. Breitung (2005) and Breitung and Pesaran (2008) show that this estimator has a normal distribution and corrects for endogeneity in the second step.

4.3.4 Short-run dynamics and causality issues

Provided that the variables are cointegrated, a panel VEC can be utilised to test the causality between capital flows and domestic investment. Based on the Engle and Granger (1987) representation theorem, a two-step procedure can be performed. First, the long-run model specified in equation (4.30) can be estimated using any efficient estimator in order to obtain its residuals. Second, defining the lagged residuals from equation (4.30) as the error correction term, the following error correction model can be estimated:

$$\Delta INV_{it} = \alpha_{1j} + \sum_{k=1}^{p} \gamma_{11ik} \Delta INV_{it-k} + \sum_{k=1}^{p} \gamma_{12ik} \Delta CF_{it-k} + \lambda_{1i} \varepsilon_{it-1} + u_{1it}, \quad \text{(a)}$$

$$\Delta CF_{it} = \alpha_{2j} + \sum_{k=1}^{p} \gamma_{21ik} \Delta CF_{it-k} + \sum_{k=1}^{p} \gamma_{22ik} \Delta INV_{it-k} + \lambda_{2i} \varepsilon_{it-1} + u_{2it}, \quad \text{(b)}$$

where Δ is the first-difference operator; p is the optimal lag length determined by standard information criterion. The null hypothesis of no short-run causality can be examined, respectively, based on H_0:$\gamma_{12ik} = 0$ and H_0:$\gamma_{22ik} = 0$ for all ik. In other words, short-run causality can be tested evaluating the statistical significance of the partial F-statistic associated with the corresponding regressor. On the other hand, long-run causality can be tested by the statistical significance of, respectively, λ_{1i} and λ_{2i} (the error correction terms) using t-statistics.

4.4 Empirical analysis

4.4.1 Data

In this study, we apply a balanced panel of 47 developing and emerging economies over the period 1980-2006. The sample selection is based on the availability of

consistent data on all the relevant variables[2]. To examine the relationship between capital flows and domestic investment, we estimate the following version of model (4.30):

$$INV_{it} = \alpha_i + \gamma_{it} + \beta CF_{it} + \varepsilon_{it} \tag{4.36}$$

where INV_{it} is the share of investment in GDP for countries $i = 1, ...N$ and time periods $t = 1, ...T$, α_i and γ_{it} are, respectively, country specific fixed and time effects, capturing any country-specific unobservables that are relatively stable over time and ε_{it} is the error term, CF_{it} denotes, respectively, FDI, remittances and foreign aid, all expressed as a share of GDP and sourced from World Development Indicators (2011).

As is the standard norm in panel cointegration studies (see for example, Crowder and de Jong, 2011; Herzer and Grimm, 2012), equation (4.36) is a very parsimonious specification that soley focuses on the bivariate *long-run* link between each type of inflow and domestic investment. The validity of this specification, however, requires that the variables in (4.36) are nonstationary or, more precisely, integrated of the same order. In that case, the variables would have a stationary error term, implying that they constitute a cointegrating vector (Asteriou and Hall, 2007). Following from the well-known cointegration proposition, then, provided there is cointegration between investment and each type of inflow, such (long-run) relationship should exist even if more variables are added to the specification (see for example, Herzer and Grimm, 2012).

In estimating equation (4.36), we first need to consider the properties of the variables and then whether they form a cointegrating relationship. Moreover, we need to control for any cross-sectional dependence that may be present (e.g. common shocks such as global business cycle effects or other spillover effects). In addition, we

[2]The techniques we apply require a balanced panel so we restrict our sample to developing countries with consistent data.

have to make explicit assumptions regarding whether the slope coefficients (the βs in eq(4.36)) are indeed the *same* across the panel or whether they are heterogenous. Also, we need to control for the possibility that the variables and countries under study go through structural breaks and regime shifts.

While our primary objective is to understand the long-run relationship between capital flows and domestic invesment, we also explore two additional questions: 1) How does domestic investment repond to capital flows in the short-run? and 2) Are the long and short-run effects of a causal nature? Finally, besides establishing the effects of capital flows on domestic investment for the sample as a whole, we also attempt to capture the relationship between the variables in individual countries.

4.4.2 Unit-root results

Table 4.1 reports the results of the LLC, IPS and CIPS panel unit root tests which include a constant and trend term. In general terms, the tests indicate that we cannot reject the null hypothesis of a unit root in levels, suggesting that the variables are non-stationary. However, the four series are stationary in first-differences, implying that they are integrated of order one, $I(1)$[3]. This is generally true when we divide the sample into regional categories. Hence, we can now proceed with panel cointegration tests to explore whether there is a long-run equilibrium relationship between capital flows and domestic investment.

4.4.3 Panel cointegration test results

Table 4.2 shows the results of the residual-based panel cointegration tests. In the top panel, we report the results of the Kao (1999) test, which strongly rejects the null

[3]The IPS statistic suggests that aid is stationary in levels for the sample as a whole but since we find evidence of cross-sectional dependence (see below) the results of this test are not reliable anyway. The CIPS is our preferred test statistic as it overcomes the issue of cross-sectional dependence.

Table 4.1: Panel unit root test results

	LLC statistics		IPS statistics		CIPS statistics	
	Levels	Diff	Levels	Diff	Levels	Diff
Full sample (47 countries)						
Investment_{it}	-0.41	-1.22**	-2.21	-3.09**	-2.22	-2.73**
Remittance_{it}	-0.23	-1.05**	-1.41	-2.81**	-2.16	-2.70**
FDI_{it}	-0.53	-1.53**	-1.99	-3.62**	-1.94	-3.01**
Aid_{it}	-0.53	-1.57	-2.38**		-2.29	-3.06**
Africa (21 countries)						
Investment_{it}	-0.39	-1.25**	-2.09	-3.06**	-2.06	-2.54**
Remittance_{it}	-0.31	-1.15**	-1.92	-3.30**	-2.23	-2.78**
FDI_{it}	-0.52	-1.52	-1.91	-3.05**	-2.05	-3.20**
Aid_{it}	-0.54	-1.55**	-2.4	-3.34**	-1.92	-2.95**
Latin America (15 countries)						
Investment_{it}	-0.51	-1.29**	-2.31	-3.23**	-2.41	-2.84**
Remittance_{it}	-0.06	-0.67	-0.72	-2.00**	-2.04	-2.20**
FDI_{it}	-0.56	-1.62**	-2.14	-3.41**	-2.02	-2.99**
Aid_{it}	-0.86**		-3.49**		-2.41	-3.15**
Asia (11 countries)						
Investment_{it}	-0.39	-1.07*	-2.37	-2.91**	-2.03	-2.79**
Remittance_{it}	-0.28	-1.13	-1.52	-2.75**	-1.57	-2.68**
FDI_{it}	-0.65	-1.72	-1.66	-2.83**	-2.01	-3.29*
Aid_{it}	-0.36*		-2.47*		-2.17	-2.83**

Notes: The tests are: Levin, Lin and Chu (2002, LLC), Im, Pesaran and Shin (2003, IPS) and Pesaran (2007, CIPS) ** and * indicate the rejection of the null of non-stationarity at the 5 and 10% levels respectively. Two lags used to account for autocorrelation and the tests include intercept and trend in levels.

hypothesis of no cointegration for our three models (1, 2 and 3). We also reject the null of no cointegration when we allow for heterogenous cointegrating vectors using the Pedroni (1999, 2004) tests (bottom panel). These results, therefore, suggest that there is in fact a long-run relationship between each type of inflow and domestic invesment in our sample of countries.

In Table 4.3 we report the results of the Pedroni test for our sub-samples. With the exception of the Asian region which contains only 11 countries, the test confirms that there is indeed a long-run link between capital inflows and domestic investment. However, as shown above, neither the Pedroni test nor the Kao test accounts for cross-sectional dependence. Hence, Table 4.4 reports the results based on Westerlund (2007). To account for cross-sectional dependence, bootsraped p-values are reported (based on 500 replications). We first examine the results from equation (4.36) with FDI as the explanatory variable (model [1]). The results indicate that the null hypothesis of no cointegrating relationship can be rejected irrespective of whether we treat α_i as homogenous (tests P_τ and P_α) or not (tests G_τ and G_α). Similarly, the null of no cointegration can be rejected with REM and AID as the respective independent variables. The results hold when we divide the countries in to regional groups. Thus, there is a strong evidence of a cointegrating relationship between domestic investment and the three types of capital inflows.

To formally establish the existance of a cross-sectional dependence, we apply the CD test. Table 4.5 shows the results. The CD test statistic strongly rejects the null hypothesis of no cross-sectional dependence across the different models and sub-samples. Hence, a failure to take this cross-sectional dependence into consideration may result in biased results.

Finally, we consider the effects of structural breaks and regime shifts on the long-run relationship between capital flows and domestic investment using the test developed by Westerlund and Edgerton (2008). Table 4.6 reports the panel cointegration results allowing for structural breaks as well as regime shifts. We report

Table 4.2: Panel cointegration test results: Full sample

Kao's residual panel cointegration test			
	Model 1: (INV FDI)	Model 2: (INV REM)	Model 3: (INV AID)
t-Statistic	-2.774**	-2.982**	-2.630**
Prob.	0.002	0.001	0.004

Pedroni residual panel cointegration test		
	t-Statistic	Prob.
	Model 1: (INV FDI)	
Panel ν-stat	-4.621**	0.000
Panel ρ-stat	-2.377**	0.024
Panel PP-stat	-9.037**	0.000
Panel ADF-stat	-11.647**	0.000
Group ρ-stat	1.084	0.222
Group PP-stat	-8.647**	0.000
Group ADF-stat	-6.240**	0.000
	Model 2: (INV REM)	
Panel ν-stat	-5.235**	0.000
Panel ρ-stat	-2.808**	0.007
Panel PP-stat	-6.736**	0.000
Panel ADF-stat	-8.647**	0.000
Group ρ-stat	1.087	0.221
Group PP-stat	-3.585	0.000
Group ADF-stat	-5.480**	0.000
	Model 3: (INV AID)	
Panel ν-stat	-6.044**	0.000
Panel ρ-stat	-1.076**	0.224
Panel PP-stat	-5.836**	0.000
Panel ADF-stat	-7.943**	0.000
Group ρ-stat	2.044**	0.050
Group PP-stat	-2.404**	0.022
Group ADF-stat	-3.056**	0.004

Notes: For both tests, the nulll hypothesis is that the variables are not cointegrated. The lag lengths are based on Schwartz Information Criterion with a maximum number of 3 lags.

** denotes significance level of 5% or lower.

Table 4.3: Panel cointegration test results: Sub-samples

	Pedroni (1999, 2004) test					
	Panel-PP			Group-PP		
	[a]	[b]	[c]	[a]	[b]	[c]
Africa	-3.35**	-2.32**	-3.93**	-5.87**	-3.27**	-5.59**
Asia	-0.51	-1.02	-4.24**	-1.01	-0.63	-4.49**
Latin America	-4.95**	-4.22**	-2.66**	-3.33**	-1.94*	-2.56**

Notes: ** and * indicate the rejection of the null hypothesis of no cointegration at the 5 and 10% levels respectively. The lag length selection is based on Schwartz Information Criterion with a maximum number of three lags. [a], [b] and [c] denote respectively equations: INV FDI, INV REM and INV AID. For the Pedroni tests only the panel- and group-pp tests reported.

three models (no break, level break and regime shift) for each of our three regressions. Focusing on the full sample, the results suggest that the null hypothesis of no cointegration can generally be rejected for the first two cases (no break and level break). This implies that domestic investment and capital inflows form a cointegrating relationship when structural breaks are accounted for. However, when we consider regime shifts, the null hypothesis is only rejected in the INV FDI model. The results are even more interesting when we divide the sample into sub-samples; once account is taken of structural breaks, there is no longer a robust long-run relationship between domestic investment and the different types of inflows across the sub-samples. However, with the exception of African countries, the results generally suggest that there is a long-run relationship between FDI and domestic investment. Since the results for full sample are robust to structural breaks, we should have more confidence in this specification. Thus, having established that there is a long-run relationship between capital flows and domestic investment, we can now estimate the nature of this link.

To sum up, we find that there is a long-run relationship between the 3 types of flows and domestic investment. This link is robust to cross-sectional dependence and structural breaks. So we can now estimate the nature of this relationship.

Table 4.4: Panel cointegration with cross-sectional dependence

Sample	Statistic	[a]	[b]	[c]
Full sample	Gt	-2.267**	-2.314**	-2.084**
	Ga	-7.581***	-7.765***	-7.441***
	Pt	-13.741***	-14.221***	-12.550***
	Pa	-6.669***	-6.588***	-6.151***
Africa	Gt	-2.181**	-2.036**	-1.834
	Ga	-7.409***	-6.884***	-6.580***
	Pt	-7.989***	-8.317***	-7.053***
	Pa	-5.786***	-5.511***	-5.028***
Latin America	Gt	-2.703***	-2.948**	-2.363**
	Ga	-8.963***	-10.029***	-8.939***
	Pt	-9.069***	-9.179***	-8.644***
	Pa	-8.289***	-8.197***	-8.002***
Asia	Gt	-1.839	-1.979	-2.179*
	Ga	-6.024***	-6.358***	-7.044***
	Pt	-7.424***	-8.250***	-7.319***
	Pa	-6.929***	-8.131***	-7.444***

Notes: The optimal lag length is based on the Akaike Information Criterion with a maximum lag and lead lengths of 2 and the width of the Bertlett-kernel window is set to 3. The two types of statistics are respectively the group-mean and the panel tests. To control for cross-sectional dependencies, bootsrapped p-values are reported (based on 500 replications) for a one-sided test. The null is no panel cointegration. [a], [b] and [c] denote respectively equations: INV FDI, INV REM and INV AID. ***, ** and * denote significance at 1, 5 and 10% levels respectively.

Table 4.5: Cross-sectional independence tests

Sample	Statistic	[a]	[b]	[c]
Full sample	CD without a linear trend	12.16***	12.66***	12.40***
Africa		2.36**	3.09***	3.11***
Latin America		3.45***	3.47***	3.62***
Asia		7.03***	9.47***	7.83***
Sample	Statistic	[a]	[b]	[c]
Full sample	CD with a linear trend	9.38***	12.01***	12.19***
Africa		0.76	3.05***	2.90***
Latin America		6.60***	8.50***	7.85***
Asia		3.30***	3.41***	3.32***

Notes: The CD test is due to Pesaran (2004) and takes the null of cross-sectional independence. [a], [b] and [c] denote respectively equations: INV FDI, INV REM and INV AID. *** and ** denote significance at 1 and 5 % levels respectively.

Table 4.6: Panel cointegration with structural breaks and cross-sectional dependence

Full sample	[a]		[b]		[c]	
Model	$Z_\tau(N)$	$Z_\phi(N)$	$Z_\tau(N)$	$Z_\phi(N)$	$Z_\tau(N)$	$Z_\phi(N)$
No break	-57.27***	-107.25***	-11.53***	-20.55***	-58.18***	-121.15***
Level break	3.48	-1.56*	-8.35***	-17.84***	-14.79***	-33.06***
Regime shift	-3.37***	-13.24***	3.70	0.06	9.70	7.67
Africa	[a]		[b]		[c]	
Model	$Z_\tau(N)$	$Z_\phi(N)$	$Z_\tau(N)$	$Z_\phi(N)$	$Z_\tau(N)$	$Z_\phi(N)$
No break	-32.91***	-58.37***	-5.46***	-18.16***	-4.84***	-5.84***
Level break	6.88	2.21	1.26	-3.01***	5.69	1.47
Regime shift	16.83	5.00	4.30	1.23	12.37	5.85
Latin America	[a]		[b]		[c]	
Model	$Z_\tau(N)$	$Z_\phi(N)$	$Z_\tau(N)$	$Z_\phi(N)$	$Z_\tau(N)$	$Z_\phi(N)$
No break	-8.65***	-18.80***	2.15	-2.37**	0.94	-2.34**
Level break	-9.02***	-10.17***	-0.43	-1.07	-3.10**	-3.20**
Regime shift	-2.46**	0.92	8.07	2.95	8.77	5.18
Asia	[a]		[b]		[c]	
Model	$Z_\tau(N)$	$Z_\phi(N)$	$Z_\tau(N)$	$Z_\phi(N)$	$Z_\tau(N)$	$Z_\phi(N)$
No break	-6.64***	-18.49***	5.18	1.27	11.74	5.29
Level break	-4.33***	-1.58*	0.11	1.48	0.38	-1.05
Regime shift	0.92	-1.04	9.17	4.09	9.93	3.67

Notes: The null hypothesis is the absence of a cointegration among the variables. The no-break case does not include any break while the level-break model includes a break only in intercept. The regime shift model includes a break in both intercept and slope. The lag lengths are based on procedure suggested by Campbell and Perron (1991). *, ** and *** denote significance at the 1, 5 and 10% levels, respectively. The associated p-values of the test statistics are for a one-sided based on the normal distribution.

4.4.4 The impact of FDI on investment

Table 4.7 contains the results of the estimates of the long-run effects of FDI on domestic investment. The coefficient of FDI is positive and highly significant at the 1% level. The magnitude of the coefficient ranges between 0.4 and 1.6, implying that, in the long-run, a one percentage point increase in the FDI to GDP ratio leads to an increase in INV_{it} of around $0.4 - 1.6$ percentage points. However, there is a considerable heterogeneity in the impact of FDI across the sample countries. As

Table 4.7: The impact of FDI on investment

Full sample			
	FDI_{it}	N	Obs
WD-DOLS (Kao and Chiang, 2000)	0.998 [13.46]***	47	1269
WD-DOLS (Demeaned data)	0.404 [6.31]***	47	1269
MG-DOLS (Pedroni (2001)	1.603 [14.05]***	47	1269
CCEMG estimator ((Pesaran, 2006)	0.604 [3.83]***	47	1269
2-step estimator (Breitung, 2005)	0.459 [7.53]***	47	1269
Sub-samples#			
Africa	1.737 [13.88]***	21	567
LA	0.456 [5.36]***	15	405
Asia	0.03 [0.15]	11	297

Notes: The DOLS regressions are estimated with two leads and two lags.
T-statistics in brackets. *** indicate singificance at the 1% level.
#These estimates are based on the WD-OLS estimator.

shown in Table 4.8, for 10 out of the 47 countries (or 21% of the sample countries) FDI flows are associated with a decrease in domestic investment, while in 37 out of the 47 countries (or 79% of the countries) the effect of FDI on investment is positive. Significant large negative effects are observed in countries such as Mozambique and Sudan, closely followed by Jordan while significant positive effects are recorded in Algeria, Niger and Bangladesh.

When we consider the effects of FDI on investment for the 3 regional sub-samples, it seems that the positive long-run assocation between the two variables is only significant for the African and Latin American regions while it is not statistically significant for the Asian group. The coefficient of FDI is highest for the African sub-sample, suggesting that FDI has a stronger crowding-in effect in in this region. Again, the insignificance of the coefficient of FDI for the Asian sub-sample may be due to the low number of countries in the sample.

The long and short-run Granger causality tests are reported in Table 4.9. The

results suggest that, for the sample as a whole, there is a bidirectional causal link between FDI and domestic investment in the short-run as both respective (lagged) regressors are significantly different from zero at standard confidence levels. This indicates that, in the short-run, increased investment is both the *result* of as well as the *driver* of increased FDI. The error correction term is statistically significant in equation (a), with a moderate speed of adjustment to the long-run equilibrium. On the other hand, the error correction term in equation (b) is insignificant. From this, we can deduce that, in the long-run, the relationship between the two variables is unidirectional from FDI to domestic investment. With the exception of the Asian sub-sample where the long-run relationship is bidirectional, we observe a unidirectional link (from FDI to investment) in both the African and Latin American regions. For the Asian group, both of the lagged regressors are insignificant, meaning there is no causal link between FDI and Investment in the short-run.

4.4.5 The impact of remittances on investment

The long-run effects of remittances on investment are summarised in Table 4.10. Similar to the FDI case, our estimates suggest that remittances are positively associated with domestic investment. The coefficient of this variable is significant in all but one estimator (CCEMG estimator). The point estimates suggest a beneficial effect in the region of 0.2 to 0.6 percentage points in the long-run. As can be seen in Table 4.11, there is a considerable heterogeneity with respect to the long-run effects of remittances on investment. In roughly 1/3 of the countries, remittances carry a negative coefficient while there is a positive effect in 2/3 of the countries.

We observe similar results when we disaggregate the sample into 3 regional groups. In particular, the coefficient of the remittance variable is positive for all regions, albeit insignificant for the Asian countries. Again, we suspect that the low number of Asian countries in the sample may be the cause of the insignificance of this variable.

Table 4.8: DOLS country estimates for FDI

Country	FDI	t-Statistic	Country	FDI	t-Statistic
Algeria	9.464**	5.725	Lesotho	0.585**	-3.613
Argentina	0.138	-1.521	Madagascar	5.958**	3.274
Bangladesh	8.481**	4.971	Mauritania	5.754*	2.247
Bolivia	0.128**	-3.980	Mexico	1.296	0.849
Botswana	-1.762**	-3.984	Morocco	0.916	-0.104
Brazil	0.327	-0.733	Mozambique	-10.366*	-2.830
Burkina Faso	-0.625	-0.888	Niger	9.284**	4.349
Cameroon	3.173**	7.594	Pakistan	-0.021**	-4.356
Colombia	-1.397**	-5.030	Panama	0.929	-0.221
Costa Rica	0.945	-0.444	Pap.N. Guinea	1.582	0.349
Cote d'Ivoire	0.521**	-3.541	Paraguay	2.406*	2.355
Dominica	0.772	-0.441	Philippines	6.084**	5.732
Dominican Rep.	-2.785**	-8.205	Rwanda	3.057	0.523
Egypt	5.144**	13.514	Senegal	3.557**	3.652
El Salvador	3.976	1.329	Sri Lanka	0.542	-1.150
Fiji	0.909	-0.080	Sudan	-7.803	-1.338
Gabon	3.881**	5.760	Suriname	0.723*	-2.408
Gambia	1.856**	8.795	Syria	1.216	0.128
Ghana	5.772**	11.507	Thailand	5.139*	2.811
Guatemala	-1.357	-0.329	Togo	0.095	-1.521
Honduras	9.352**	3.239	Tri'dad & Tobago	0.243*	-2.434
India	3.788**	4.939	Tunisia	1.310	0.593
Jordan	-7.513**	-17.253	Turkey	0.247	-0.215
Kenya	-7.459	-1.640			

Notes: The country-coefficients are generated using the DOLS estimator developed by Pedroni (2001). The number of leads and lags are based on a maximum set to 3. * denotes significance at the 10% level while ** denotes significance at 5 % or lower.

Table 4.9: Short-run dynamics and causality for FDI

	Full Sample		
Dependent variable	Source of causality		
	Short-run		Long-run
	ΔINV	ΔFDI	ECT
Equation (a) ΔINV	-	4.71** (0.030)	0.660*** (0.000)
Equation (b) ΔFDI	24.02*** (0.000)	-	0.017 (0.199)
	Africa		
Equation (a) ΔINV	-	4.00** (0.045)	0.762*** (0.000)
Equation (b) ΔFDI	12.28***(0.000)	-	0.0170 (0.264)
	LA		
Equation (a) ΔINV	-	2.30 (0.129)	0.457*** (0.000)
Equation (b) ΔFDI	8.33*** (0.000)	-	0.069 (0.137)
	Asia		
Equation (a) ΔINV	-	0.06 (0.804)	1.383* (0.012)
Equation (b) ΔFDI	0.75 (0.390)	-	0.119*** (0.000)

Notes: Partial F-statistics are reported with respect to short-run changes in the respective regressor. The ECM is the coefficient of the error correction term. ** indicates singificance at 5% or lower.

Table 4.10: The impact of REM on investment

Full sample			
	REM_{it}	N	Obs
WD-DOLS (Kao and Chiang, 2000)	0.431 [4.46]***	47	1269
WD-DOLS (Demeaned data)	0.222 [1.91]**	47	1269
MG-DOLS (Pedroni (2001)	0.628 [9.38]***	47	1269
CCEMG estimator ((Pesaran, 2006)	0.222 [0.98]	47	1269
2-step estimator (Breitung, 2005)	0.302 [6.29]***	47	1269
Sub-samples#			
Africa	0.414 [3.24]***	21	567
LA	0.526 [2.66]**	15	405
Asia	0.151 [0.57]	11	297

Notes: The DOLS regressions are estimated with two leads and two lags.

T-statistics in brackets. *** indicate singificance at the 1% level.

#These estimates are based on the WD-OLS estimator.

Table 4.11: DOLS country estimates for REM

Country	REM	t-stat	Country	REM	t-stat
Algeria	-3.043**	-5.020	Lesotho	0.257**	-5.533
Argentina	-43.553	-0.807	Madagascar	15.297**	2.157
Bangladesh	1.074	0.041	Mauritania	2.620	0.394
Bolivia	-3.666*	-2.160	Mexico	4.573**	3.023
Botswana	3.192	1.611	Morocco	0.581	-0.942
Brazil	-7.494**	-4.254	Mozambique	-5.254**	-4.138
Burkina Faso	0.287	-1.253	Niger	6.085	0.953
Cameroon	41.186**	3.610	Pakistan	-0.235**	-7.560
Colombia	0.868	1.217	Panama	1.113	1.277
Costa Rica	0.941	1.580	Pap. N. Guinea	15.659**	2.826
Cote d'Ivoire	0.571	-0.382	Paraguay	-1.662**	-15.639
Dominica	-1.280**	-14.123	Philippines	-2.558**	-8.241
Dominican Rep.	-0.160**	-2.541	Rwanda	-0.989	-0.749
Egypt	1.400**	2.759	Senegal	1.225	0.817
El Salvador	0.533**	-5.212	Sri Lanka	-0.997**	-2.859
Fiji	-2.483**	-4.512	Sudan	1.486	0.533
Gabon	-100.460**	-3.922	Suriname	-21.865	-1.725
Gambia	1.793**	2.796	Syria	1.578	0.370
Ghana	-8.324	-1.027	Thailand	10.998	1.260
Guatemala	0.723*	-2.051	Togo	0.912	-0.055
Honduras	6.365**	6.035	Tri'dad & Tobago	9.369**	3.597
India	1.037	0.090	Tunisia	1.415	0.306
Jordan	-1.216**	-12.064	Turkey	-1.154*	-2.034
Kenya	-1.710**	-5.437			

Notes: The country-coefficients are generated using the DOLS estimator developed by Pedroni (2001). The number of leads and lags are based on a maximum set to 3. * denotes significance at the 10% level while ** denotes significance at 5 % or lower.

The question is then: Are these effects of a causal nature? Table 4.12 shows that, in general, there is no causal relationship between remittances and investment in the short-run for the sample as a whole or for the regional groups. However, in the long-run, we find a significant two-way causal relationship for the full sample as well as for the African and Latin American sub-sample. That is, increases in investment is both a result of as well as a cause of increases in remittances. This could suggest that remittance flows are being used in improvement of human capital (e.g. education and health). These would have beneficial effects on investment in the long-run. Alternatively, the multiplier effects generated by the expenditures of remittance-receiving households may be encouraging more investment or the households may themselves be making small capital investments. In the latter case, this could generate more remittance flows if we assume that the migrant is not just altruistic but also self-interested. In other words, if remittance-receiving households engage in successful business ventures, the migrants may send more remittances in order to enhance their own wealth[4]. Results by Alleyne et al. (2008) seem to confirm that remittances are not only driven by altruistic motives but also investment motives. Thus, remittances may drive investment while investment itself may cause more remittances.

4.4.6 The impact of aid on investment

Table 4.13 contains the results on the link between foreign aid and investment. The coefficient of aid carries a significant negative sign, suggesting that aid has a discouraging effect on domestic investment in the long-run. There is a great variation in the magnitude reported by the different estimators. The MG-DOLS and the CCEMG estimators, which allow the slope coefficients to vary across the sample countries, indicate a much larger negative association between aid and investment. As for

[4]This assumes that the migrant and the remittance-receiving household can overcome issues of adverse selection and moral hazard and that they can trust each other.

Table 4.12: Short-run dynamics and causality for REM

	Full sample		
Dependent variable	Source of causality		
	Short-run		Long-run
	ΔINV	ΔREM	ECT
Equation (a) ΔINV	-	1.260 (0.262)	0.458*** (0.000)
Equation (b) ΔREM	1.920 (0.166)	-	0.019*** (0.009)
	Africa		
Equation (a) ΔINV	-	0.020 (0.893)	0.749*** (0.000)
Equation (b) ΔREM	1.590 (0.207)	-	-0.008* (0.017)
	LA		
Equation (a) ΔINV	-	3.640* (0.056)	0.400*** (0.000)
Equation (b) ΔREM	0.190 (0.665)	-	0.026** (0.032)
	Asia		
Equation (a) ΔINV	-	0.040 (0.851)	-0.210 (0.440)
Equation (b) ΔREM	0.840 (0.360)	-	0.005 (0.674)

Notes: Partial F-statistics are reported with respect to short-run changes in the respective regressor. The ECM is the coefficient of the error correction term. ** indicates singificance at 5% or lower.

the regional sub-samples, the results seem mixed. In particular, we find a significant negative association for the Asian and African regions while the relationship is insignificant for Latin American group.

Table 4.14 shows that the impact of aid on investment is not of a causal nature as it appears that foreign aid does not have a significant effect on investment in the short-run as well as in the long-run[5]. For the regional groups, however, we find a significant unidirectional link from aid to investment for Asian and Latin American countries. Following our previous panel cointegration results, we can conclude that there is a long-run association between the two variables for the whole sample as well as for the regional sub-samples.

4.4.7 Summary

We find that the variables under study are of an $I(1)$ process as the unit root hypothesis is rejected in their first differences. This is also true when we divide the

[5]We do not report the country effects as there is no causal link between aid and investment.

Table 4.13: The impact of AID on investment

	AID_{it}	N	Obs
WD-DOLS (Kao and Chiang, 2000)	-6.694 [-1.73]**	47	1269
WD-DOLS (Demeaned data)	-4.577 [-1.37]*	47	1269
MG-DOLS (Pedroni (2001)	-46.023 [-5.60]***	47	1269
CCEMG estimator (Pesaran, 2006)	-135.404 [-1.77]*	47	1269
2-step estimator (Breitung, 2005)	2.298 [1.06]	47	1269
Sub-samples[#]			
Africa	-9.961 [-1.88]**	21	567
Asia	-12.732 [-1.62]*	11	297
LA	10.462 [0.85]	15	405

Notes: The DOLS regressions are estimated with two leads and two lags. T-statistics in brackets. *** indicate singificance at the 1% level. [#]These estimates are based on the WD-OLS estimator.

countries into 3 regional groups, namely, Africa, Asia and Latin America. We also conduct panel cointegration analysis which confirm that the models we consider are error-correcting. That is to say, we can reject the null hypothesis of no cointegration for the sample as a whole and also for the regional groups. We also confirm the presence of cross-sectional dependence also for the regional sub-samples.

Because the variables are stationary and form a cointegrating relationship, we estimate the nature of this link. The long-run estimates show that FDI and remittances are positively related to domestic investment in the sample as a whole while aid is negatively associated with it. These results generally hold for the regions under consideration. In particular, the long-run effects of remittances and FDI on investment are positive in all three regions, albeit insignificant in the Asian group. The coefficient of aid is negative and significant in Africa and Asia while it is positive and insignificant in Latin America. The insignificance of remittances and FDI in the Asian sub-sample may be due to the small number of countries we have.

Our causality analysis provides additional insight into the effects of capital flows

Table 4.14: Short-run dynamics and causality for AID

	Full sample		
Dependent variable	Source of causality		
	Short-run		Long-run
	ΔINV	ΔAID	ECT
Equation (a) ΔINV	-	0.270 (0.604)	-2.980 (0.132)
Equation (b) ΔAID	0.220 (0.636)	-	0.000 (0.182)
		Africa	
Equation (a) ΔINV	-	0.080 (0.775)	-3.583* (0.065)
Equation (b) ΔAID	0.190 (0.665)	-	0.000 (0.263)
		LA	
Equation (a) ΔINV	-	0.280 (0.594)	-2.601 (0.875)
Equation (b) ΔAID	0.120 (0.725)	-	(0.000) (0.261)
		Asia	
Equation (a) ΔINV	-	0.170 (0.684)	19.342 ** (0.004)
Equation (b) ΔAID	0.030 (0.868)	-	0.000 (0.728)

Notes: Partial F-statistics are reported with respect to short-run changes in the respective regressor. The ECM is the coefficient of the error correction term. ** indicates singificance at 5% or lower.

on investment. In particular, we find that there is a bidirectional link between FDI and investment in the short-run while there is a unidirectional relationship in the long-run from FDI to investment. Our results sugest that, while there is no causal link between remittances and investment in the short-run, the relationship between the two is of a causal nature in the long-run. This indicates that increases in investment is the outcome of and the cause of increases in remittances. Conversely, while we find aid to be negatively associated with investment in the long-run, our results suggest that this is merely an association.

4.4.8 Additional robustness

In the first instance, we explore whether the long-run results for the panel as a whole are sensitive to potential outliers. To this end, we re-estimate the 3 respective regressions, removing one country at a time from the estimation. Figure 4.1 grahically shows the coefficients as countries are removed and their t-statistics. As can be seen,

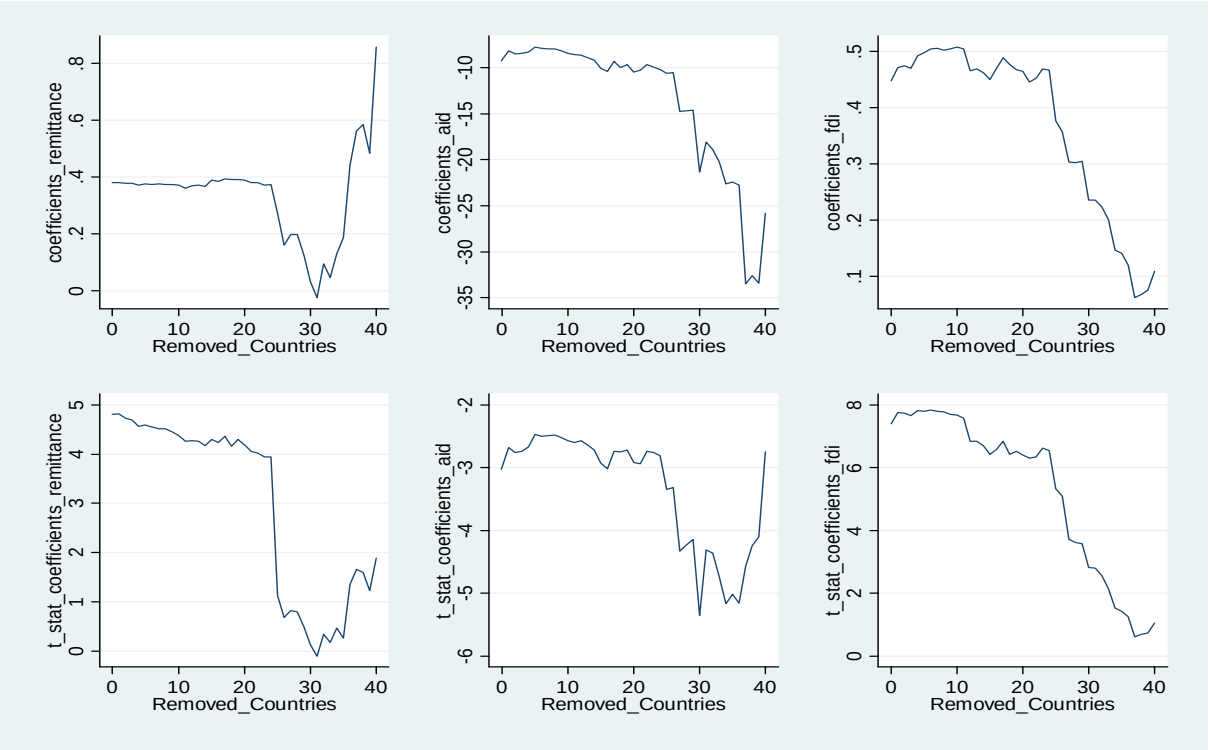

Figure 4.1: Outlier removals: WD-DOLS estimates

the coefficients of both FDI and remittance always carry a positive sign which are mostly significant whereas aid is always negative and significant. Thus, the long-run results are robust to the exclusion of outliers.

As shown previously, our results are robust to endogeneity and omitted variable bias given the superconsistant properties of panel cointegration techniques. To formally show that this is indeed the case, we rewrite equation (4.36) in the form of a multivariate ARDL $(p, 1, ...q)$ model. This would enable us to capture how domestic investment adjusts to changes to capital flows and other regressors:

$$INV_{it} = \alpha_i + \sum_{k=1}^{p} \gamma_{ik} INV_{it-k} + \sum_{k=0}^{q} \zeta'_{ik} x_{it-k} + \varepsilon_{it} \tag{4.37}$$

where i and t index country and time, respectively, k is the lag length, α_i is a fixed effect and $x_{it} = (FDI_{it}, REM_{it}, AID_{it}, Controls_{it})$. We control for economic development (real per capita income), macroeconomic stability (proxied by money

growth), openness (trade/GDP) and government size (proxied by government expenditure/GDP). All the variables are drawn from WDI (2011).

Following Pesaran and Smith (1995), equation (4.37) can be re-parameterised as:

$$\Delta INV_{it} = \alpha_i + \phi_i INV_{it-1} + \beta_i' x_{it} + \sum_{k=1}^{p-1} \gamma_{ik}^* \Delta INV_{it-k} + \sum_{k=0}^{q-1} \zeta_{ik}^{*\prime} \Delta x_{it-k} + \varepsilon_{it}, \quad (4.38)$$

where

$\phi_i = -(1 - \sum_{k=1}^{p} \gamma_{ik}), \beta_i = \sum_{k=0}^{q} \zeta_{ik},$

$\gamma_{ik}^* = -\sum_{m=k+1}^{p} \gamma_{im}, k = 1, 2, ...p-1,$ and

$\zeta_{ik}^* = -\sum_{m=k+1}^{q} \zeta_{im}, k = 1, 2, ...q-1,$

To estimate the short-run dynamics as well as the long-run effects, equation (4.38) can be expressed as an error-correction model as follows:

$$\Delta INV_{it} = \alpha_i + \phi_i (INV_{it-1} - \varphi_i' x_{it}) + \sum_{k=1}^{p-1} \gamma_{ik}^* \Delta INV_{it-k} + \sum_{k=0}^{q-1} \zeta_{ik}^{*\prime} \Delta x_{it-k} + \varepsilon_{it}, \quad (4.39)$$

where $\varphi_i = (\beta_i/\phi_i)$ captures the long-run relationship between investment and the regressors while γ_{ik}^* and $\zeta_{ik}^{*\prime}$ capture the short-run dynamics linking investment to both its past values and the other variables in the model. The error-correction parameter, ϕ_i, measures the speed of adjustment of investment to its long-run equilibrium following a change in the regressors. Provided that ϕ_i is significant and negative, one can deduce that the variables exhibit a return to long-run equilibrium (i.e. there is a long-run relationship between them).

The above ARDL specification overcomes issues of endogeneity since all the regressors enter the model with lags. In addition, it allows the parameters to be different for each country. To estimate equation (4.39), we use the Pooled Mean Group estimator developed by Pesaran and Smith (1995). This estimator allows

Table 4.15: The effects of capital flows on investment

Variable	Long-run estimates	Variable	Short-run estimates	ECT
FDI	0.410***	ΔFDI	0.234**	−0.307***
	[0.097]		[0.109]	[0.034]
REM	0.348***	ΔREM	0.502	
	[0.108]		[0.455]	
AID	−6.417***	ΔAID	9.432	
	[1.495]		[31.923]	
$Trade$	0.029	$\Delta Trade$	0.060***	
	[0.019]		[0.020]	
$Money\ growth$	0.002***	$\Delta Money\ growth$	−0.021**	
	[0.001]		[0.008]	
$Income$	−0.003***	$\Delta Income$	0.032***	
	[0.001]		[0.011]	
GOV	−0.118**	ΔGOV	0.185	
	[0.001]		[0.197]	

Notes: Standard errors reported in parentheses,***, ** and * indicate singificance at the 1, 5 and 10% levels respectively.

heteregenous intercepts, error-correction terms and error variances but treats the long-run parameters to be the same across the countries[6].

The results are reported in Table 4.15. The first thing to notice is that the error-correction term is negative and highly significant. This indicates that, in line with our previous findings, we have stationary residuals and hence an non-spurious long-run equilibrium relationship among the variables. Focusing on our variables of interest, the long-run estimates confirm the robustness of our previous results. That is, remittances and FDI are positively and significantly linked to domestic investment. Foreign aid, on the other hand, has a negative impact on investment in the long-run. Similar to our previous results, the estimates suggest that only FDI has a significant positive effect on investment in the short-run. Thus, it seems that FDI has both transitory positive effects as well as permanent beneficial effects on investment.

[6]Pesaran and Smith (1995) suggest that one can use Hausman type test to check the validity of the long-run parameter homogeneity. If the test fails to reject the homogeneity of the long-run parameters, they show that this estimator is more efficient than both their Mean Group and Dynamic fixed effect estimators.

4.4.9 Discussion

Our analysis above indicates that foreign aid, as expected, is different from the two other flows. In particular, it tends to crowd-out domestic investment in the long-run. However, this is merely an association and not a causation. Thus, it should be emphasised that our findings do not imply that aid is harmful to development as such. They merely suggest that there is a long-run negative association between total investment and aid.

On the one hand, there is evidence which suggests that aid tends to displace private investment. This is, for example, the findings of Herzer and Grimm (2012). Using two different datasets on 18 and 39 developing countries, the authors find robust evidence showing that aid is detrimental to private investment in the long-run. Moreover, they show that this is true even when aid is disaggregated into financial, invested and consumed aid. Unlike our findings above, Herzer and Grimm (2012) show that their results are of a causal nature in the long-run. Similarly, Herzer and Morrissey (2009) show that aid has a negative effect on output in the long-run.

On the other hand, there is evidence showing that aid has beneficial effects on public investment as well as public sector finances, including reductions in government borrowing requirements (Ouattara, 2006). Thus, the link between aid and total investment may be moderated by public investment. Using a large dataset on 116 countries, Cavallo and Daude (2011) show that public investment has a strong and robust crowding-out effect on private investment. Based on these, we contend that the negative association between investment and aid may be due to increased public investment caused by increases in aid which in turn may displace private investment.

We found that remittances are positively related to investment and thus economic development. This is largely in line with the findings of Ramirez and Sharma (2009) in their sample of Latin American countries. Our results are also consistent

with the findings of Nsiah and Fayissa (2011) who found that remittances are positively related to economic development in developing countries. Similar to us, these authors found that the positive impact is significant in Latin America and Africa while this is not the case in Asian countries.

Finally, our results indicate that, of the 3 flows, FDI has been most beneficial to the countries in our sample. We find that there is a bidirectional (causal) linkage between domestic investment and FDI in the short-run. This is consistent with the idea that increased FDI results in an increase in the demand for, for example, domestically produced inputs while at the same time the operations of domestic firms may induce more FDI (Apergis et al. 2006). In the long-run, however, our results show that there is a unidirectional causal link - from FDI to investment. The channels through which this crowding-in may take are many and include technological spillover and various other complementarities with domestic firms.

Overall, our results point to the beneficial effects of FDI and remittances.

4.5 Concluding Remarks

The objective of this study was to establish whether there is a long-run stable relationship between domestic investment and the 3 main types of capital flows that developing countries receive. Using recently developed panel cointegration techniques, the study utilises a balanced panel of 47 developing countries.

The results show there is a long-run relationship between investment and each of the inflows. This result is robust to cross-sectional dependency as well as structural and regime changes. Upon estimating the nature of the long-run equilibrium relationship, the study finds that remittances and FDI have statistically significant positive effects on investment in the long-run. On the contrary, the results suggest that aid is inversely associated with investment.

While the role of aid in economic development is by no means a trivial one,

this study shows that private sources of development finance can play a pivotal role in developing countries. This is particularly relevant now given the heated debate aid tends to generate in both the economics literature and in policy circles. An important contribution of this study is that it pays particular attention to the properties of the variables under study as well the underlying assumptions of the econometric techniques. Given that we employ more superior estimation methods, our results should be more reliable.

The overall findings suggest a number of important policy implications. In the case of remittances, developing countries can improve the effectiveness of these flows. A particular channel is the financial system. Thus, developing countries should develop their financial sectors in order to allow remittance-receiving households to have the facilities needed for productive investments. Given that remittances tend to boost the level of deposits and credit in banking system (Aggarwal et al. 2011), a well-developed financial system would generate even more benefits. In the same vein, they should adopt policies that reduce the transaction costs attached to receiving the funds so that households can get their remittances as smoothly as possible. One way to do this is to reduce redtape, but perhaps, more importantly, competition should be encouraged among money transfer companies.

With respect to FDI, as is largely accepted, developing countries should improve the human capital of their citizens. Similarly, given the experiences of East Asian countries, governments should have clear policies in regards to FDI with the aim of maximising the benefits domestic firms get from multinational companies. Even though our results are strongly in favour of FDI, we emphasise that, unless the particular country formulates cohesive policies, the beneficial effects of FDI would be minimal. The actual experience of many African countries is a case in point; many multinational companies in a number of African countries have not created forward and backward linkages with the wider economy.

While we do not find a positive link between domestic investment and foreign

aid, we argue that this does not necessarily imply that aid is *bad* for developing countries. We should remember an important point which is; it is highly unlikely that remittances and FDI would reach the poorest households. Thus, aid tends to fill a crucial gap in the finances of developing countries, particularly development projects. It can also have other benefits; as the first chapter indicated, it tends to reduce capital flight, perhaps, through its beneficial effects on the public sector.

Overall, the important role these resource flows can play in economic development is not a trivial matter. As this study has shown, capital flows can propel developing economies to a high-growth trajectory by augmenting the rate of capital accumulation.

Chapter 5

Overall conclusions

This thesis deals with the broad issues of capital flows, openness and crises and how these in turn affect the economic performance of developing countries particularly those in Africa. Throughout the various parts of the thesis, we have attempted to make significant contributions to the existing literature. In what follows, we highlight these. Subsequent to this, we identify possible avenues for further research.

5.1 Main findings and policy issues

The existing literature on why African agents move their portfolios abroad tends to be somewhat fragmented and insufficient, identifying mainly macroeconomic and political conditions as the cause (Lensink et al. 1998; Collier et al. 2001; Ndikumana and Boyce, 2003; Ndiaye, 2009). To mitigate these shortcomings, Chapter 2 adopts a more systematic approach to finding the causes of capital flight. To this end, it emphasises the importance of the investment climate - defined as the structural, institutional and overall macroeconomic environments which confront economic agents, whether they be firms, entrepreneurs or private individuals. The chapter then specifies four factors that, at the macroeconomic level, influence the investment climate and hence the likelihood of capital flight: risk-return features;

institutions and political risk, structural features and the composition of capital flows.

The results indicate that good institutions are robustly associated with lower capital flight in SSA. This is a crucial (and robust) finding, particularly given the range of indicators we use. This result is in line with the central tenets of institutional economics. Institutional economics defines institutions as both formal and informal rules that agents devise in order to reduce transaction costs and uncertainties (Menard and Shirley, 2005). Thus, institutions provide incentive structures and determine agents' behaviour. Within this perspective, markets as well as the overall economy can be viewed as organisational arrangements that support production and exchange. However, in SSA, markets are characterised by imperfect information, poor enforcement mechanisms and high levels of transaction costs. This is due to extensive uncertainties and risks. In such environment, private agents tend to engage in demonetisation, currency substitution (dollarisation) and capital flight (Nissanke and Aryeetey, 2003). Furthermore, African economies tend to be dualistic and segmented in nature with a large informal sector governed by "indigenous social norms and codes" and a small formal sector governed by weak "third-party enforcement and other elaborate institutional structures" (Ibid, p. 38 & 58). Thus, improvements in the institutional environment are expected to positively influence the domestic investment climate and hence discourage capital flight.

The chapter postulates that capital flight, like any other decision reached by rational economic agents, depends largely on their expectations about their future situation which makes their perception of the macroeconomic environment a significant factor. Thus, as the results show, capital flight from Africa is significantly linked to the region's poor profitability, economic risk and macroeconomic distortions. Thus, there are crucial gains to be had by reducing macroeconomic risk and initiating structural transformation of African economies.

The empirical results also show that capital flight undermines economic perfor-

mance. The growth regressions suggest that capital flight robustly retards growth. With respect to domestic investment, the impulse response functions show that investment falls in response to capital flight episodes. We show that it does not recover to its pre-episode level in the short to medium term horizon. We contend that capital flight episodes may be magnifying the credit constraint which are, in most African countries, binding.

It should be emphasised that the dynamic response of invesment and output to capital flight has never been captured in the context of African countries. This is an important gap the present research addresses. Overall, we conclude that capital flight is a pressing policy concern in SSA since it adversely affects domestic capital formation, government finances and the general economic performance.

The second chapter contributes to the literature on the output costs of financial crises in African economies. To the best of my knowledge, this has so far been neglected in the context of African countries. The chapter shows that crises are detrimental to growth in African countries. This suggests that crises impede economic activity. This is undoubtedly true in the African context where many countries depend on few commodities and where the public finances are already under pressure.

One of the main aims of the chapter was to explore whether openness modarates the relationship between crises and output growth. After controlling for a range of growth determinants, the interactive model shows that openness tends to mitigate the adverse effects of crises on growth. This is robust to various measures of openness. Economic integration itself is robustly related to growth. An important conclusion is that African countries should adopt policies that maximise the benefits of economic integration. In particular, international trade should be diversified and should be the corner stone of the structural transformation needed in most African countries. As the study shows, openness to financial flows (mainly long-term) has been good to African economic performance. This is not to say that financial flows

are without risks but rather - that African countries should harness their full potential. An important factor in this context is the need for African countries to develop their financial sectors. A widely held view, however, is that the shallow and underdeveloped financial systems of Africa are a blessing in disguise since the financial sector is an important channel through which crises transmit into countries. However, if this was true emerging and developed countries would not have been hit by crises. Overall, our view is that, while trade and financial openness can amplify the transmission of business cycle fluctuations among countries, they can, nonetheless, act as an engine of growth.

The final chapter revisits the old debate of whether capital flows encourage domestic investment. This is an important policy issue. The chapter attempts to explore the short-run as well as the long-run dynamics of these flows. In addition, since the effects of capital flows could be different across countries, the experiences of individual countries is also considered. A significant contribution of the study is that it utilises recently developed panel cointegration techniques which have a number of advantages over existing static and panel methods. For example, the need for finding instruments for the variables is sidestepped. Moreover, rich dynamic specifications are adopted. We find that FDI and remittances have robust positive effects on domestic investment. An important implication emenating from this study is that policies should be adopted that promote the use of remittances for the acquisition of human capital as well as physical capital. The same can be said about FDI, that is, unless African countries devise proper policies so as to herness the full benefits of foreign direct investment, the effects would be minimum. An important finding is that aid seems to be negatively associated with investment in the long-run. As we emphasise below, this finding needs more scrutiny.

5.2 Areas for further research

While the current study improves our understanding of the causes of capital flight from SSA, the possible linkages between private outflows and the government fiscal stance has not been addressed due to data constraints. However, we know from a number of public finance models that there may be an important relationship between the two. For example, Ize and Ortiz (1987) present a theoretical model in which an LDC government fails to adjust swiftly to sudden adverse shocks due to fiscal rigidities. As a result, the rigidities increase the probability of the government defaulting on its liabilities since they weaken its debt-servicing capacity. The model shows that, in such economic environments, capital flight would be stimulated for two reasons. First, domestic investors would increase their acquisition of foreign assets expecting higher government taxation in the future. Second, it is postulated that in case of acute debt-servicing difficulties the government would give priority to its foreign debt obligations (since they attract harsher penalties e.g. less trade credits etc) as compared to its domestic debt obligations. This discriminatory treatment of domestic asset holders leads to increased instances of capital flight. Given the potential importance of this relationship particularly in poor African countries where fiscal rigidities are prevalent, country case studies could potentially be used in future studies so as to overcome the issue of data availability.

Another avenue for future research and one which the current literature has so far failed to take note off relates to the phenomenon of sudden stops. As is largely known, this phenomenon can be driven by both *global* and *local* economic agents. Nonetheless, the existing literature defines sudden stops as episodes that involve sudden *net* reversals. This may not be that helpful from the point of few of policy makers. More specifically, without knowing whether the sudden stop originates from the domestic economy or from the outside, it may not be easy to do something about it. Whether this can be done in the future largely depends on data availability.

Finally, the finding that aid crowds out domestic investment is an important

avenue for further research for the following reasons. First, private inflows such as FDI or remittances will not cover basic development projects or other public goods. Second, strictly speaking, these flows are not meant for poverty reduction (i.e. not all poor households can count on them). Hence, the importance of aid for poverty alleviation cannot be overemphasised. Thus, the conditions under which aid flows crowd-out investment need to be investigated. Along these lines, the effects of different types of aid flows on investment should also be explored.

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