DFID GLOBALISATION AND POVERTY RESEARCH PROGRAMME

Project R7624:

The Determinants of International Capital Flows and Implications for Pro-Poor Growth in Sub-Saharan Africa

END OF PROJECT FINAL REPORT
MAY 2003

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Aims: The project was intended to assess what determines the volume and composition of foreign capital inflows received by developing, especially sub-Saharan African, countries. It was to address the impact of changes in the composition of capital inflows on growth, and the implications this may have on strategies to reduce poverty.

Addendum: Three phases of the research have been completed and written. The first shows that volatility of capital inflows (FDI) have an adverse effect on growth. The second quantifies trends in inflows and volatility of various capital flows to developing countries. The third addresses the implications of increasing, and increasingly volatile, private capital inflows for macroeconomic policy management in sub-Saharan Africa. Econometric analysis of determinants of capital inflows and the impact on growth has been conducted but the discussion papers have not yet been completed.

Project R7624: International Capital Flows

END OF PROJECT FINAL REPORT
May 2003

Oliver Morrissey

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Appendix A: Paper on 'Private Capital Flows to Sub-Saharan Africa' submitted to Development Bank of South Africa (for their 2003 Report).

Appendix B: Conference paper on 'Foreign Direct Investment: Flows, Volatility and the Impact on Growth in Developing Countries' by Lensink and Morrissey.

1. Background

Capital inflows are a fundamental element in economic performance. Such inflows are essential to finance investment, and economic policy is sensitive to the mobility and volatility of capital given the globalisation of capital markets. Aid, the major source of investment finance for the poorest countries, is often linked to requirements to follow particular types of economic policies. Private capital flows have increased significantly in volume over the past decade, but are also perceived to have become more volatile (i.e. there can be increasingly large changes in the value of inflows from one year to the next). If the composition of capital flows is changing such that a greater share of inflows is inherently short-term and mobile, there are important implications for economic management.

Some characteristics of the changing composition of increased capital flows, as short-term private capital becomes more important, can generate serious problems (Gabriele *et al* 2000). For example, foreign direct investment (FDI) is likely to be attracted to countries exhibiting stable macroeconomic policies, but is a relatively long-term commitment. In contrast, short-term inflows such as investing in equity or bond markets are volatile and are thus a less reliable source of capital inflow. Financial liberalisation, by attracting short-term inflows, exposes host countries to instability. Foreign investors will have limited information about the nature of the market in developing countries, especially small ones, and will not be able to monitor how the funds are used locally. Foreign investors tend to act together (herding) and respond quickly to new information (which may reflect market sentiment rather than actual macroeconomic indicators), so rapid outflows may occur if confidence in a country declines. Developing countries are exposed to volatile private capital flows and contagion effects (a lack of confidence in one market quickly spreads to other countries). The result is that a crisis can occur even where macroeconomic fundamentals are sound.

The volume of private capital flows to sub-Saharan Africa (SSA) increased in the 1990s, after a decline since the early1980s. By the early 2000s, FDI inflows had reached about two per cent of GDP for SSA overall, and other private inflows were nearing that level. However, private flows appear to have become more volatile as the composition changes such that a greater share of inflows is inherently short-term and mobile.

The research project, with a central focus on sub-Saharan Africa (SSA), comprised an empirical study of capital inflows to identify trends and volatility (the extent of year on year changes) of different types of inflows. A specific objective was to derive policy implications regarding how the poorest countries can attract and respond to increased inflows of private capital. A second phase of the project addressed the determinants of different types of capital inflows on the economy and their impact on the economy. The research objective is to contribute to our understanding of how poor countries can influence and manage the composition of capital inflows so as to maximise the economic and development benefits to the economy.

2.   Methods

The core methods of empirical analysis were statistical and econometric, complemented by country case studies. As it was implemented, the project evolved in four distinct components (Robert Osei was employed as a full-time research officer, responsible for data and econometric work, and Miyuki Shibata was employed as a part-time research assistant). The first involved the development of a theoretical model to show how volatility of capital inflows could have an adverse effect on growth; this has been tested and supported for FDI flows). The second comprised a statistical analysis of trends in inflows and volatility of various capital flows to developing countries. A third component reviewed economic theories of financial crises to identify the implications of increasingly volatile private capital inflows for macroeconomic policy management in sub-Saharan Africa. The fourth and final component was an econometric analysis of determinants of different types of capital inflows and the impact of flows and their volatility on growth.

There are many different types of capital flow, and their importance to specific countries differs. The research concentrated on four types of capital flows – debt flows (as an aggregate measure), FDI, other private flows (OPC), and official development finance (ODF or aid) as being the major flow to sub-Saharan Africa (SSA) countries. Remittances are important inflows to developing countries but, in the statistics used, could be classed as FDI or OPC. The definitions used were:

Foreign Direct Investment (FDI): net inflows of investment with the aim of acquiring a lasting management interest in a firm or enterprise. These are generally considered as relatively long-term flows.
Other Private Capital (OPC): commercial bank lending, bonds, other private credit, non-debt flows and portfolio equity investments (excludes FDI). These are mostly short-term flows.
Total external debt (flows): annual change in debt owed to non-residents; includes public, public guaranteed and private non-guaranteed long and short term debt and the use of IMF credit.
Official Development Finance (ODF): net disbursements of official development assistance (aid, grants and loans by the official sector at concessional financial terms) plus non-concessional resources from multilateral and bilateral sources (including refinancing loans).

The data on the aid variables were from the *Geographical Distribution of Financial Flows 1999* (OECD, CD-ROM); FDI, private flows and debt data are from *World Development Indicators 2000* (World Bank, CD-ROM).

For each type of inflow, the project computed and compared three different measures of volatility (full definitions can be found in Osei *et al* 2002):

The coefficient of variation (CoV): expresses the standard deviation as a percentage of the mean value for the series over time. This can be interpreted as a simple measure of overall volatility during the period.

The SDT Index (SDT): the standard deviation around a simple time trend. This can be interpreted as de-trended volatility over the period expressed as a percentage of the mean.

The SDF Index (SDF): the standard deviation around a forecast value, intended to represent unanticipated volatility. The forecast trend can be based on adaptive expectations such that in principle it allows for changes that could, in principle, be anticipated.

Econometric Analysis of Capital Flows

The data on trends and volatility of types of capital inflows was used to compile a panel covering 60 developing countries over the period 1970-97 (for some of the analysis of FDI we also included data on developed countries). We then employed the panel to estimate the effects of (different types of) capital inflow on growth and to estimate the determinants of types of capital inflow. The econometric analysis employed recent panel regression techniques (developed by Arellano and Bover, 1995; Blundell and Bond, 1997; Baltagi and Griffin, 1997; Arellano and Bond, 1998). The findings are reported in the next section.

Policy Responses to Capital Inflows

The project reviewed theories of financial crisis and identified a set of 'crisis indicators' supported by this literature. These indicators were then calculated for a sample of countries (Ghana. Kenya, Malawi, Tanzania and Uganda) for sub-periods over 1970-2000. This was used to assess the macroeconomic implications of increased private capital inflows. The findings are reported below. The country analysis was supported by visits to meet with officials of the Central Banks in Ghana, Tanzania and Uganda during the project.

3.   Findings

For convenience and brevity, we simply summarise the core findings in the papers already produced, and indicate the preliminary findings from the more extensive econometric analysis.

Lensink and Morrissey (2001, 2002) contribute to the literature on FDI and economic growth. A succinct version of this work (as presented at the *Australian Economists Society Conference 2001*) is included as Appendix B. The research deviates from previous studies by introducing measures of the volatility of FDI inflows. As introduced into the model, these are predicted to have a negative effect on growth. We estimate the standard model using cross-section, panel data and instrumental variable techniques. Whilst all results are not entirely robust, there is a finding that FDI has a positive effect on growth (although this is not consistently significant for the sample of developing countries) whereas volatility of FDI has a negative impact (consistently significant). The evidence for a positive effect of FDI is not sensitive to which other explanatory variables are included. In particular, it is not conditional on the level of human capital (as found in some previous studies). There is a suggestion that it is not the volatility of FDI *per se* that retards growth but that such volatility captures the growth-retarding effects of unobserved variables. This is consistent with Lensink and Morrissey (2000) who find that the volatility of aid receipts is negatively associated with growth, although the level of aid has a positive impact.

<u>Osei, Morrissey and Lensink (2002)</u> reports on trends and levels of capital inflows, and the volatility (or instability, the terms tend to be used interchangeably) of such inflows, to a sample of 60 developing countries over the period from 1970 to 1997. The data cover aid and official development finance as the principal forms of official flows, FDI and other private flows (OPC), and debt (stock and flows) as a comparative aggregate inflow measure. For each type of inflow to each country, three alternative measures of volatility are calculated. To summarise the results, the countries are grouped into low income, lower middle and upper middle income. The measures of volatility for each type of inflow in each group and the evolution over time are discussed.

The paper provides evidence that:
* volatility has increased in the 1990s (relative to the 1980s, but not to the 1970s),
* official flows are less volatile than private flows,
* volatility in FDI is lower than in other private flows,
* the poorest countries have become increasingly reliant on aid and debt finance, attracting almost no private capital and little FDI (most of the increase in such inflows has been since 1996),
* total private capital inflows declined by more than 80% between the peak of the late 1970s and trough of the early 1990s, with OPC becoming less important relative to FDI.
* only the richer developing countries attract significant volumes of FDI and private capital (but both are quite volatile).

<u>Morrissey (2003)</u> reports on trends and levels of capital inflows, and the volatility of such inflows, to a sample of 26 sub-Saharan African (SSA) countries over the period from 1970 to 1997 (the paper is attached as Appendix A). The data cover FDI and other private flows (OPC), debt flows for an aggregate comparison, and official development finance (aid) as the principal form of official inflows. For each type of inflow to each country, the three alternative measures of volatility are calculated and discussed. Private inflows to SSA are very low, less than two per cent of GDP on average over the whole period. Having peaked in the late 1970s, private inflows have subsequently diminished, albeit with a recovery in FDI in the late 1990s. Aid remains the most important inflow, averaging 12 per cent of GDP over the entire period, with a steady increase from about six per cent of GDP in 1970-75 to 14% in 1991–95. The paper provides evidence that volatility has increased in the 1990s, that official flows are less volatile than private flows, and the volatility of FDI is much less than of other private flows. While private inflows, especially of short-term capital, pose problems in macroeconomic management, such flows have been too small to pose such problems in SSA prior to the late 1990s. In recent years, however, private inflows have increased in significance. Private inflows currently account for 3-4% of GDP in SSA countries on average.

<u>Shibata and Morrissey (2002)</u> address the macroeconomic implications in the context of theories of financial crisis. The 1990s have witnessed an increase in private capital inflows to sub-Saharan African (SSA) countries. Such capital flows are viewed as volatile and hence a threat to macroeconomic stability. A sudden reversal of capital inflows was one factor underlying the East Asian crisis of 1997. The paper begins with a brief review of

theories of currency crises in the light of the East Asian financial crisis. From this, a number of 'crisis indicators', such as the rate of domestic credit expansion and level of foreign exchange reserves, are identified. The nature of the exchange rate regime is central to managing capital inflows and vulnerability to crisis. The paper then examines trends in exchange rate regimes and crisis indicators for five SSA countries in the 1990s (Ghana, Kenya, Malawi, Tanzania and Uganda). None of the indicators suggest that managing private flows posed a problem to the economies prior to the latter half of the 1990s.

One emerging problem that is identified is the prevalence of large trade deficits that could be exacerbated by exchange rate appreciation. Capital inflows are associated with pressures for appreciation, which is attractive to investors, whereas large current account deficits suggest the need for devaluation, which meets trade policy objectives (helps exporters). The implications of capital inflows and exchange rate pressures need to be recognised by policy-makers. Investors can be expected to monitor trade deficits, reserves and exchange rate pressures. Consequently, the domestic authorities responsible for managing capital inflows should be aware of the indicators of concern to investors.

The analysis highlights a number of issues for macroeconomic policy:
- Many SSA countries have moved from a fixed to floating exchange rate system since the 1980s, whilst experiencing increasing private capital inflows and increased exposure to volatility of capital flows.
- Financial liberalisation appears to have been associated with increasing real domestic interest rates and this has not been associated with an expansion of domestic credit, implying sound macroeconomic policies.
- There is evidence that increased capital inflows have created pressure for a real appreciation in many SSA countries.
- However, the dependence on 'volatile' private foreign capital invites risk. A potential source of shock is the high level of trade deficits that may be unsustainable in many countries.
- Macroeconomic stability is threatened by volatile capital flows controlled by powerful private agents subject to unpredictable herd behaviour. As information quality is relatively low for SSA countries, and there are likely to be many small investors, susceptibility to herd behaviour is a potential problem.

This suggests a number of policy reactions.
- ➢ Countries could consider introducing some capital controls while promoting domestic institutional development in the financial and banking sectors.
- ➢ Institutions such as the IMF and the World Bank could act in a financially expansive, counter-cyclical fashion to off-set herd behaviour, panic and contagion effects.
- ➢ A particular aim should be improving the quality of information available to investors. One example is to provide regular 'investor briefings' that review the performance of important indicators. The most relevant indicators are the expansion of domestic credit, the level of foreign reserves, the trade deficit and exchange rate. Such information should be made easily available and trustworthy.

Determinants of Capital Inflows

Econometric analysis aimed at identifying the factors influencing private capital inflows, distinguishing FDI and non-FDI private inflows. In policy terms it is quite important to distinguish these two types of private inflows. This is not only because different factors may be more important for each type of inflow, but also because governments may prefer to attract one rather than the other. In particular, FDI is generally a more stable source of investment finance and presents fewer problems of macroeconomic management than non-FDI private inflows (as these short-term inflows tend to be very volatile). Private capital flows have usually been explained by two sets of factors – the 'push' and 'pull' factors. The push (external) factors relate to how economic conditions in the source countries affect the volume of global private capital flows. These external factors explain total global private capital outflows rather than how these flows are distributed across recipient countries, and it is the latter that the project was concerned with.

The pull (or domestic) factors aim to capture the determinants of cross-country variation in private capital inflows. The basic finding is that favourable macroeconomic performance increases private returns on investments and attracts private capital to the country. Two main channels are identified. The first relates to the productivity gains that result from increased confidence in the macroeconomic environment. Private investors move into these countries (or geographic regions) to take advantage of these productivity gains. A second channel is factors that make the receiving country more creditworthy (e.g. a stable exchange rate or falling debt burden). While studies have not identified a definitive set of determinants of private inflows, we identify some factors that are likely to be important for private flows to SSA countries.

The following factors are quite consistently found to influence FDI:
- Growth is certainly important in attracting FDI, as such investment is seeking relatively long-run opportunities.
- Trade is a significant factor associated with FDI, and this applies to both importing and exporting. Foreign investors appear to be attracted by more open trade regimes, either producing import-competing goods to serve the domestic market or for export production. The former is more likely if the market is growing, and may also be attracted by regional integration.
- FDI does not seem to be associated with other capital inflows, whether private or official. In other words, other than growth (which is an influence on all capital inflows), the factors influencing FDI seem to be independent of the factors influencing other inflows. This may be because FDI responds to specific opportunities.
- Current FDI inflows is the best indicator of future FDI, and FDI is the most stable private capital inflow.

Few factors have been identified as robust determinants of non-FDI private inflows to low-income countries such as those in SSA, but the following appear to be important:

- The level of credit available to the private sector is one of the few factors that is consistently, and positively, associated with capital inflows. Financial liberalisation may be the relevant policy option to attract non-FDI private capital.

- Non-FDI private capital tends to go only to richer countries, so sustained growth is especially important. However, this is a reason why flows to SSA are so low rather than a viable policy option in the short-term.
- There is a negative association between aid inflows and non-FDI private inflows. This is largely a reflection of the fact that poorer countries receive more aid; only when aid dependence has been reduced are non-FDI private inflows likely to increase.

The project set out to address the following hypothesis:

H1 *Capital inflows are inter-dependent*. There was little evidence for this, except that countries with high aid receipts or debt tended not to attract OPC.

H2 *Capital inflows share a common set of determinants*. This was not found to be the case, except that economic growth generally attracts private inflows while reducing the need for (and hence level of) aid inflows.

H3 *Economic liberalisation increases the inflow of foreign investment*. This is found to be true insofar as privatisation and liberalisation of trade attract increased FDI, and financial liberalisation is associated with increased OPC inflows.

H4 *Types of capital inflow have differing effects on economic performance*. There was no direct evidence for this. In general, all capital inflows contribute to growth, but only aid inflows were found to be consistently associated with growth in developing countries. This is probably because private inflows were at low levels for these countries for most of the period studied. However, volatility of capital inflows was found to be negatively associated with growth, and private inflows (especially short-term capital) are more volatile than official inflows.

Policy Implications

For the majority of SSA countries, the best prospects for attracting private capital are in respect of FDI. While sustained growth will attract foreign investors, there are many other factors that influence FDI, especially insofar as it responds to specific opportunities. Traditionally FDI has often reflected natural resource endowments, especially in extractive industries, and this will continue to be important for certain countries. More generally and recently, privatisation attracts FDI. This can be complemented by policies to increase the skill level of the workforce, investment in general education and provision of vocational training. Trade liberalisation, increased openness, also appears to attract FDI. All of these policies can be mutually reinforcing, as openness, higher levels of human capital and FDI all tend to contribute to growth.

The prospects for increasing short-term (non-FDI) private capital inflows to SSA economies are bleak, as such flows are discouraged by the instability and weak economic performance that are features of poor countries. This may not be a serious disadvantage, as short-term inflows are volatile and pose problems for aspects of macroeconomic management. Short-term inflows are easily reversed in response to changes in market sentiment that are difficult to predict or control. While some capital controls can limit exposure to sudden outflows, the controls may distort FDI and trade financing. Without

controls, volatile capital flows can create pressure on exchange rates and capital account management. Economies with high levels of short-term capital inflows are more susceptible to financial crises. When SSA countries achieve sustained growth and greater economic stability, they will need to consider the policy responses needed to counter the volatility of short-term private capital inflows. The major policy dilemma is reconciling the conflicting pressures on the exchange rate: private investors will tend to favour appreciation, whereas trade objectives are often better served by devaluation.

4.   Dissemination

The research output of the project has been regularly disseminated through discussion papers, most published as CREDIT Research Papers. These papers have been mailed to relevant researchers and research institutes, and are available on the web (the site is frequently accessed). The research has also been disseminated through conference and seminar presentations, including successful presentations in Ghana and Tanzania.   A *Highlights* summary has been prepared for id21, and will also be disseminated via the CREDIT website.

Conference Presentations
Morrissey presented 'FDI Flows, Volatility and the Impact on Growth in Developing Countries' at the *30th Annual Conference of Economists*, University of Western Australia, Perth, 23-26 September 2001.
Lensink and Morrissey presented 'FDI Flows, Volatility and Growth' at the *DESG Annual Conference 2001*, University of Nottingham, April 2001.

Seminars:

Morrissey presented seminars on 'FDI Flows, Volatility and Growth' at Melbourne University (September, 2001), University of Wales at Cardiff (October 2001), and University of Groningen (March 2002).

Country Workshops:

Morrissey presented findings from the project (with specific reference to macroeconomic issues in the country) in Ghana and Tanzania in April 2003. Robert Osei, the principal Research Officer on the project, has taken up a post in the Institute of Economic Affairs (IEA) in Accra, and hosted the seminar on 16 April. The seminar was chaired by Dr Amoako-Tuffour (Ministry of Finance) and was extremely well attended by academics and officials from the Ministry of Finance and the Bank of Ghana. The event was covered by the media, including interviews by the two TV channels. The Economic and Social Research Foundation (ESRF) hosted the seminar in Dar-es-Salaam (30 April), which was also well attended by officials and academics.

5.   Publications

Whilst a number of papers have been submitted to journals, none are published. We provide here only the list of Research Papers that have been published and are currently available**.** Two papers reporting on the econometric analysis will be completed over the summer in 2003 and published as research papers. The CREDIT papers are available at www.nottingham.ac.uk/economics/credit/ (under Research Papers).

Lensink, R. and O. Morrissey (2001), 'Foreign Direct Investment: Flows, Volatility and Growth', *CREDIT Research Paper 01/06*.

Lensink, R. and O. Morrissey (2002), 'The Volatility of FDI not the Level Affects Growth in Developing Countries', University of Groningen: *CDS Research Report No. 13*.

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Osei, R., O. Morrissey and R. Lensink (2002), 'The Volatility of Capital Inflows: Measures and Trends for Developing Countries', *CREDIT Research Paper 02/20*.

Shibata, M. and O. Morrissey (2002), 'Are Private Capital Inflows A Potential Problem for Sub-Saharan African Countries?', University of Nottingham, School of Economics, *CREDIT Research Paper 02/21*.

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HIGHLIGHTS

The Challenge of Private Capital Inflows

The main findings of this research project are that capital inflows (official and private) do contribute to growth and in this way may help to reduce poverty. Private capital has not made a significant contribution to growth in poor countries because the levels of such inflows have been low. However, the volatility of inflows (the extent to which they vary from year to year) has a negative impact on growth, and private capital inflows display greater volatility than official inflows. Furthermore, short-term private capital is very response to macroeconomic indicators and can increase the likelihood of a financial or exchange rate crisis, which would have an adverse effect on poverty. The recent increase in private capital inflows to sub-Saharan Africa poses some important challenges to macroeconomic management, with implications for the macroeconomic policy component of a pro-poor growth strategy.

Capital inflows are a fundamental element in economic performance. Such inflows are essential to finance investment, and economic policy is sensitive to the mobility and volatility of capital given the globalisation of capital markets. Developing countries do aim to attract private capital and reduce dependence on aid. However, short-term private capital inflows are more volatile (i.e. there can be increasingly large changes in the value of inflows from one year to the next) than official (aid) inflows. If the composition of capital inflows is changing such that a greater share of inflows is inherently short-term and mobile, there are important implications for economic management.

The research project, with a central focus on sub-Saharan Africa (SSA), comprised an empirical study of the changing composition of inflows and volatility, and analysis of the determinants of capital inflows. The study found that:

- The poorest countries have become increasingly reliant on aid and debt finance, attracting almost no private capital and little FDI (most of the increase in such inflows has been since 1996).
- Volatility has increased in the 1990s.
- Official flows are less volatile than private flows.
- Volatility in FDI is lower than in other private flows.
- Capital inflows do contribute to growth (especially aid in developing countries).
- Volatility of capital inflows has a negative impact on growth.
- Sustained growth is the most important factor in attracting increased private capital.
- Many SSA countries have exhibited stable macroeconomic management in the latter half of 1990s. This, in conjunction with privatisation, financial and trade liberalisation has attracted increased private capital.
- Macroeconomic stability is threatened by volatile capital flows controlled by powerful private agents subject to unpredictable herd behaviour.

Increased capital inflows have created pressure for a real appreciation of the exchange rate in many SSA countries. This creates a policy conflict as managing the trade deficit suggests devaluation (to encourage exports). The analysis suggests a number of policy reactions.

- Countries could consider introducing some capital controls while promoting domestic institutional development in the financial and banking sectors.
- Institutions such as the IMF and the World Bank could act in a financially expansive, counter-cyclical fashion to off-set herd behaviour, panic and contagion effects.
- A particular aim should be improving the quality of information available to investors. One example is to provide regular 'investor briefings' that review the performance of important indicators. The most relevant indicators are the expansion of domestic credit, the level of foreign reserves, the trade deficit and exchange rate. Such information should be made easily available and trustworthy.

Key Words: Capital Inflows, Volatility, Growth, Macroeconomic Policy.

Sources:
The CREDIT papers are available at www.nottingham.ac.uk/economics/credit/ (under Research Papers).

Lensink, R. and O. Morrissey (2001), 'Foreign Direct Investment: Flows, Volatility and Growth', *CREDIT Research Paper 01/06*.
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Submitted by Oliver Morrissey, May 2003.

DFID GLOBALISATION AND POVERTY RESEARCH PROGRAMME

Final Report for Project R7624:

The Determinants of International Capital Flows and Implications for Pro-Poor Growth In Sub-Saharan Africa

APPENDIX A: Submission to DBSA

PRIVATE CAPITAL FLOWS TO SUB-SAHARAN AFRICA

by Oliver Morrissey [1]

Draft of chapter to appear in Development Bank of South Africa (DBSA) *Development Report 2003: Finance for Development: Enhancing the Role of Private Finance*

1   Introduction

Foreign capital inflows are an essential source of investment finance for all countries, especially those on lower income levels (for which domestic savings rates tend to be low). The volatility of inflows, how variable they are from year to year, and hence how predictable they are, is important as it can influence investment decisions. The composition and volatility of inflows can have implications for economic policy. Foreign direct investment (FDI) is likely to be attracted to countries exhibiting stable macroeconomic policies, but is a relatively long-term commitment. While the level of FDI inflows will vary from year to year, net outflows are rare and volatility is relatively low. Short-term private capital, by reputation the most volatile (inflows can easily be reversed into outflows) are sensitive to expectations regarding the exchange rate. Aid, the major source of investment finance for the poorest countries, is often linked to requirements to follow particular types of economic policies. There are many different types of capital flow, and their importance to specific countries differs. This paper concentrates on four types of capital flows – debt flows (as an aggregate measure), FDI, other private flows (OPC), and official development finance (ODF or aid) as being the major flow to sub-Saharan Africa (SSA) countries. We consider trends in the importance and volatility of each type of inflow.

The volume of capital flows to SSA increased in the 1990s, although estimates vary according to the source of data.[2] There is a tendency for international organisations to

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[1] This paper is based on a study of 'Capital Flows to Developing Countries' supported by a research grant from DFID (R7624) as part of the *Globalisation and Poverty Research Programme* (www.gapresearch.org).
[2] For a more detailed discussion of private capital flows than can be provided here, see Bhinda, Griffith-Jones, Leape and Martin (1999).

underestimate the scale of capital flows given difficulties in collecting and assembling comparable data from national sources. Although only a small fraction of global FDI, the volume of FDI to SSA tripled between 1992 and 1995, growing fastest in some of the least developed economies, including Tanzania, Uganda and Ghana. This FDI was often attracted by privatisation. The IMF and World Bank report that portfolio equity inflows are also rising faster in SSA than other developing country regions, albeit from a very low base. However, the level of net inflows through bank loans has decreased in SSA, although net short-term flows have risen in some countries, such as Tanzania since 1996.

Some characteristics of the changing composition of increased capital flows, as short-term private capital becomes more important, can generate serious problems.[3] For example, FDI is generally a long-term commitment to the host country; while the level of FDI inflows can vary from year to year, large FDI reversals (where investors withdraw from the country) are not very common. In contrast, short-term inflows such as investing in equity or bond markets can be and often are reversed (withdrawn) quickly, and are thus a less reliable source of capital inflow. The liberalisation and opening up of capital accounts (allowing easier movement of capital, especially short-term flows) are expected to lead to a better world-wide allocation of capital as investors can allocate funds where returns and opportunities are higher, thus leading to higher investment and growth rates. On the other hand, financial liberalisation by attracting short-term inflows exposes host countries to instability (the flows can quickly be reversed). Foreign investors will have limited information about the nature of the market in developing countries, especially small ones, and will not be able to monitor how the funds are used locally. One consequence of greater access to foreign capital is increased lending for risky projects (which offer potentially high returns but with a high probability of failure). Foreign investors tend to act together (herding) and respond quickly to new information (which may reflect market sentiment rather than actual macroeconomic indicators), so rapid outflows may occur if confidence in a country declines. Developing countries are exposed to volatile private capital flows and contagion effects (a lack of confidence in one market quickly spreads to other countries). The result is that a crisis can occur even where macroeconomic fundamentals are sound.[4]

Private capital flows have increased significantly in volume over the past decade. For example, whereas FDI and other private flows each accounted for less than two per cent of financial flows to least developed countries in 1990, both accounted for over seven per cent of flows to such countries by 1998.[5] However, private flows appear to have become more volatile as the composition changes such that a greater share of inflows is inherently short-term and mobile. For the poorest countries private flows remain relatively low and there is a need to attract increased private capital, which may increase the volatility of inflows. The aim of this paper is to provide data on trends in the composition and volatility of capital inflows to SSA countries since the 1970s. If the composition is changing such

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3 For a general discussion, although it has little on SSA, see Gabriele, Baratav and Parikh (2000).

4 For more on these issues as related to SSA, see Shibata and Morrissey (2002).

5 See UNCTAD's *The Least Developed Countries Report 2002*. By 2000, net private flows and FDI each amounted to about two per cent of SSA GDP (*World Development Report 2003*). While the samples and measures in these reports differ from those used here, the message of increasing private inflows is the same.

that more volatile components account for an increasing share of inflows, this has implications for macroeconomic policy.

Section 2 details trends in capital inflows to SSA as a region, comparing the 1970s, 1980s and 1990s. While the focus is on FDI and other private capital (OPC), debt flows are included as an indicator of total capital inflows (excluding grant aid). Data on official development finance (ODF) are reported, not only for comparative purposes but because aid, for which ODF is a measure, is the major inflow to the region. Section 3 presents measures of the volatility of capital inflows (FDI, OPC and ODF), and how this has changed over time. Has increased OPC lead to an increase in volatility of inflows faced by SSA? The evidence on volatility is related to indicators of economic performance (growth) and economic volatility. Section 4 concludes and discusses some implications for macroeconomic policy.

2   Trends in Composition of Capital Inflows

All the capital flows and external debt data are expressed as a per cent of GDP; this is the most simple means to provide a measure of the 'real' value of the inflow. Definitions and sources are provided in Box 1. Table 1 presents a summary of the trends in each capital inflow to SSA countries (the figures are the ratio of the flow to GDP on average for the countries in the sample).

Box 1: Definitions of Capital Flows

Foreign Direct Investment (FDI): net inflows of investment with the aim of acquiring a lasting management interest in a firm or enterprise. These are generally considered as relatively long-term flows.
Other Private Capital (OPC): commercial bank lending, bonds, other private credit, non-debt flows and portfolio equity investments (excludes FDI). These are mostly short-term flows.
Total external debt (flows): annual change in debt owed to non-residents; includes public, public guaranteed and private non-guaranteed long and short term debt and the use of IMF credit.
Official Development Finance (ODF): net disbursements of official development assistance (aid, grants and loans by the official sector at concessional financial terms) plus non-concessional resources from multilateral and bilateral sources (including refinancing loans).

The data on the aid variables are from the *Geographical Distribution of Financial Flows 1999* (OECD, CD-ROM); FDI, private flows and debt data are from *World Development Indicators 2000* (World Bank, CD-ROM).

Overall debt flows to SSA have remained quite stable at 5-8% of GDP until the 1990s, when new debt fell below five per cent of GDP, and there was net repayment in 1996/7

(Table 1). Note that this corresponds to a significant increase in the debt stock, from less than 40% of GDP in the 1970s to over 100% in the 1990s, a trend that began to be reversed in the late 1990s. Private inflows peaked in the late 1970s, albeit at very low levels of just over one per cent of GDP for FDI and just over two per cent for OPC, but have declined steadily since then. The late 1990s witnessed a significant recovery in FDI, possibly reflecting increased privatisation (as mentioned above), and a less pronounced increase in OPC (although there was a net outflow in the early 1990s). Other data suggest these trends have continued into the 2000s (see above). Aid (ODF) is clearly the most important inflow, averaging 12 per cent of GDP over the entire period, with a steady increase from about six per cent of GDP in 1970-75 to 14% in 1991–95.

Compared to official flows, and debt more broadly (which is largely official debt), private capital inflows have remained at very low levels over the entire period. Total private capital inflows declined by more than 80% between the peak of the late 1970s and trough of the early 1990s, with OPC becoming less important relative to FDI. The same pattern can be observed for low-income countries in general (the majority of which are SSA), and for lower middle-income countries (although the levels are more than twice as high). Even upper-middle income developing countries recorded a poor performance on FDI and OPC prior to the late 1990s, when both categories exceeded three per cent of GDP, but for those countries FDI has been the larger inflow since the mid-1980s.[6]

Table 1: Trends in Capital Inflows (ratios of GDP)- SSA

	Debt (flows)	FDI	OPC	ODF
1970 – 1975	4.45	0.85	0.90	6.38
1976 – 1980	8.32	1.24	2.38	8.25
1981 – 1985	5.23	0.67	0.95	9.53
1986 – 1990	7.68	0.52	0.01	12.31
1991 – 1995	4.09	0.52	-0.02	14.31
1996 – 1997	-2.11	1.03	0.35	11.96
Entire period	*5.39*	*0.78*	*0.81*	*10.89*

Notes: Figures are the mean for the 26 SSA countries of the average annual value of each capital flow in each period. The sample was chosen purely on the availability of a relatively long time series of data. The sample comprises: Benin, Botswana, Burkina Faso, Cameroon, Central African Republic, Chad, Democratic Republic of Congo, Congo Republic, Cote d'Ivoire, Gabon, Gambia, Ghana, Kenya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Swaziland, Sudan, Togo.

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[6] Any comparisons in this paper with other developing countries relate to data in Osei, Morrissey and Lensink (2002). Botswana, Gabon and Mauritius amongst our SSA sample are classified as upper-middle income, Swaziland lower-middle income and all others are low-income.

Overall, the trends confirm what would have been expected *a priori*. Official flows, in particular aid, are the most important for poor SSA countries and have become of increasing importance over time. Private capital inflows had declined (relative to GDP) during the 1980s in particular. The decline in FDI had been reversed by the late 1990s, and flows of other private capital have increased in recent years.

3   Volatility of Capital Inflows

We are here concerned with how volatile capital flows to SSA have been. That is, we want measures that capture the year on year variability of the flow, and that summarise this volatility over the whole period (and allow for a decomposition for sub-periods). In economic terms, the major importance of capital inflows is to finance investment (in the case of aid, financing government spending in general is important). Investment decisions require planning and access to funds, so the predictability of inflows is important. High volatility should be associated with low predictability, and may therefore discourage investment. On the other hand, economic and political instability in a country may discourage inflows, and thus be associated with volatility. Consequently, volatility is a useful indicator in two respects – it captures disincentives to investment and reflects instability in the economy – and both will be negatively associated with economic performance.[7]

Box 2 Measures of Volatility

Although some writers have offered a distinction between volatility and instability, the literature tends to use the terms interchangeably and we follow that tradition. We compute and compare three different measures of volatility.

The coefficient of variation (CoV): expresses the standard deviation as a percentage of the mean value for the series over time. This can be interpreted as overall volatility during the period.

The SDT Index (SDT): the standard deviation around a simple time trend. This can be interpreted as de-trended volatility over the period expressed as a percentage of the mean.

The SDF Index (SDF): the standard deviation around a forecast value, intended to represent unanticipated volatility. The forecast trend can be based on adaptive expectations such that in principle it allows for changes that could, in principle, be anticipated.

Formal definitions can be found in Osei *et al* (2002).

Three measures of volatility are considered, as defined in Box 2. The coefficient of variation (CoV) is a simple measure of total volatility. The SDT Index measures volatility as year on year deviations from a simple (linear) time trend. A comparison between the CoV and SDT measures indicates how much of the volatility can be attributed to the trend in the flow, as a trend can be taken into account in predicting inflows. Typically, the SDT

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[7] For a more extensive discussion in the context of aid, see Lensink and Morrissey (2000), in the context of FDI, see Lensink and Morrissey (2001).

index will be lower; if it is considerably lower, this indicates that the trend is important, whereas if the two measures are quite close, there is no evident trend. It is quite possible that a flow does not follow a linear trend, but still follows a pattern that can be observed (by looking at recent past values) and taken into account in predicting future values. The SDF Index is based the assumption that a forecast based on recent values is a better representation of the pattern than a simple time trend. If this assumption is true, SDF volatility will be lower than SDT, implying that one could improve on a forecast based on a time trend, i.e. SDT overstates the volatility that could be anticipated. If SDT is lower than SDF, this implies that a simple trend captures the pattern over time better than adjusting according to recent values. We present all three measures to indicate the range of estimates of volatility.

Table 2: Volatility of Capital Flows to SSA

	Debt (flows)	FDI	OPC	ODF
	Entire period, 1970-97			
CoV	82.58	63.56	131.35	27.72
SDT	80.80	62.53	117.07	13.75
SDF	94.06	74.31	88.78	16.37
	Trends in Volatility			
1972 – 1980	-26.51	-24.87	-13.48	-1.14
1981 – 1989	3.68	-1.41	1.48	-0.16
1990 – 1997	-0.22	-0.99	2.03	0.96
Period	*-1.14*	*-5.72*	*-1.16*	*0.08*

Notes: Estimates based on volatility of average flows to SSA countries, measures as defined in Box 2. Trends based on annual average flows to countries in each group using the SDF index (similar results are obtained for the SDT index). Period is annual average over 1970-97.

The overall (1970-97 period) volatility values for flows to SSA are given in the top panel of Table 2. It is evident that official flows (ODF) are by far the least volatile, and these have followed a significant trend (CoV is 28% whereas SDT is 14%). Volatility of private capital flows has been much higher, especially for OPC. For FDI, volatility represented some 63% of the mean for both CoV and SDT measures, implying that there was no trend (the SDF value is even higher). While OPC was more volatile, there is more evidence of a predictable pattern (CoV is 131% whereas SDF is 89% of the mean); the 'forecast' (SDF) approach reduces the estimate of volatility by about 30% compared to CoV. Aggregate (debt) inflows were also quite volatile, but do not appear to have followed a time trend. We

can note that private flows to SSA exhibit greater volatility than observed for low-income countries as a group (SDT is 48% for FDI and 94% for OPC).

The lower panel of Table 2 presents the trend in volatility, based on the annual average change in SDF in each period. In general, volatility was greatest in the 1970s but has been declining (the yearly average over the whole period is negative in most cases). This is somewhat misleading as, for most flows, volatility declined significantly in the 1970s but has increased since then. FDI is the only flow that has shown a steady decline in volatility in all periods, while volatility of OPC has been increasing since (albeit not relative to) the very volatile 1970s.

Volatility of Capital Inflows and Economic Performance
Private capital and external debt flows have exhibited the highest volatility, while FDI and, especially, official flows have the lowest volatility. Although there seems to have been a general decrease in volatility over the whole period, this occurred almost completely in the 1970s and the data suggest that volatility has increased in the 1990s, especially for the most volatile flow (OPC). We now consider if volatility is correlated with economic performance.

Table 3 gives the correlation across SSA countries of volatility of the four capital flows (measured using the SDT Index) with output growth (GDP growth rates) and the Commonwealth Vulnerability Index (CVI). The CVI quantifies a country's relative economic and ecological susceptibility to exogenous shocks. It has two components – the impact component and resilience. The impact component reflects the incidence and intensity of risk and threats to a country, as captured by the expected value of income volatility. Resilience reflects the ability of a country to insulate itself from risks and recover from external economic and environmental shocks, and is captured by a country's 1995 GDP. A weighted combination of these two components forms the CVI.

Table 3: Correlation between Volatility, Vulnerability and Growth – SSA

	GDP Growth	CVI	Debt (flows)
FDI	-0.362	0.026	0.129
ODF	0.217	0.076	0.053
OPC	0.089	0.076	0.231
GDP Growth		0.096	
Debt flows	-0.188	-0.138	

Notes: Simple correlation coefficients. Instability measure is SDT Index and CVI is the Commonwealth Vulnerability Index (see Atkins *et al* 2000).

The correlation of volatility of different inflows with growth is low, especially for OPC and debt flows. The highest correlation is that between FDI volatility and growth, and it is negative at –0.362; on average, countries with higher growth experience less volatile FDI inflows. This is consistent with the view that FDI is a relatively long-run commitment such that growing economies attract a more stable or regular inflow of FDI, whereas inflows are less regular to countries with a poor growth performance. The negative correlation between volatility of debt flows and growth has a similar implication. On the other hand, ODF volatility is positively correlated with growth; on average, countries that grow experience greater volatility in aid receipts. This is consistent with increasing aid to poor performing countries, while countries that perform well have less need for aid.

The correlation between CVI and volatility of inflows tends to be positive but very small. There is also a positive, but very low (10%), correlation between CVI and growth. This may seem counter-intuitive as one would expect countries that are vulnerable to have lower growth rates. However this positive correlation can be explained when one considers the components of the CVI in relation to GDP growth. First the impact component of CVI is measured as income volatility (the standard deviation of annual rates of growth of per capita GDP). The impact component could very well be positively correlated with GDP growth. The second component is resilience (1995 GDP) and there is no reason why one should expect this to be negatively correlated with real GDP growth. The more important conclusion is the 'vulnerability' (as measured by the CVI) is not a good indicator of growth or of the volatility of inflows. However, it may be a factor explaining why the level of private capital flows to SSA is so low.

4   Conclusions: Is Volatility a Cause for Concern?

The recent increase in global capital flows to developing countries is a recovery (in terms of inflows/GDP ratios) in comparison to a decline in the 1980s. The volume of capital flows to SSA increased in the 1990s, but most of the increase was accounted for by aid (reflecting the generally poor economic performance of these countries). Only in the late 1990s is there some evidence of increasing private inflows, and most of this is FDI. What we observe is that private capital flows to SSA have been both small (relative to GDP) and highly volatile. Evidently, SSA countries have not succeeded in attracting sustained inflows of private capital. Private capital flows to SSA excluding FDI were negligible at only about 0.35 per cent of GDP in 1996-97. A realistic target would be at least three times this level: by the late 1990s, non-FDI private flows amounted to over three per cent of GDP in upper middle-income countries and over one per cent in lower middle-income countries. Private inflows reached two per cent of GDP in SSA around 2000, but it is not evident this has or can be sustained. The danger with non-FDI private capital is that volatility is very high.

Macroeconomic Policy Challenges

Increased capital inflows, given liberalised financial and exchange rate systems, have macroeconomic implications. Persistent poor growth performance is one reason why the poorest developing countries attract low volumes of FDI and very little private capital,

while they have become more reliant on aid. In one sense this may be beneficial, as aid tends to be the least volatile of inflows. An increase in private capital inflows, especially if of the more volatile short-term flows, can have adverse macroeconomic effects by making a financial crisis more likely. Short-term private capital, the most volatile of inflows, is sensitive to expectations regarding the exchange rate and to any perceived deterioration in economic performance. Have SSA countries become more exposed to financial crises as a result of increased private capital inflows?[8]

Models of financial crisis based on exchange rates (so-called first generation models) are relevant to and instructive for deriving implications for managing capital inflows in SSA. The first generation models predict that a currency collapse is more likely if there is high and increasing domestic credit (lending)and relatively low foreign exchange reserves. If the supply of domestic credit rises faster than domestic money demand growth, the economy is spending more than it earns and the current account in the balance of payments would be negative. This deficit in the current account can be counteracted by a surplus in the capital account (capital inflows) for a short period but, if the deficit persists or grows, ultimately the supply of the domestic currency will exceed the demand for it. There will be pressure for the exchange rate to depreciate to adjust for this imbalance. The monetary authorities can defend the exchange rate by buying domestic currency using foreign exchange reserves, but the ability to do so is less if reserves are relatively low. Foreign investors know that the authorities' ability to sustain the currency is limited and anticipate that the currency will be devalued. This loss in confidence encourages agents to sell the domestic currency in order to withdraw their capital, potentially precipitating a crisis.

These two 'crisis indicators' (domestic credit and foreign reserves) are relatively easy to measure and monitor, although they do not tell the whole story. Investors and speculators can only observe values of the indicators with a delay, and so they will tend to respond to information and expectations on factors that affect the indicators. Whether an exchange rate is attacked or not tends to depend on perceptions of the relative size of government foreign reserves. Countries with small reserves, especially if small relative to the speculators (and this includes most SSA countries), are more likely to be subject to speculative attack. Furthermore, if information about the quality of a market is limited (as would be the case in SSA), foreign investors will tend to follow the lead of whoever moves first and contagion effects are more likely.

Many SSA countries have moved from a fixed to floating exchange rate system since the 1980s, while experiencing increasing private capital inflows and increased exposure to volatility of capital flows. Capital inflows represent demand to buy the domestic currency and the price is pushed up (i.e. the exchange rate appreciates). Appreciation of the exchange rate eases debt-servicing costs and import prices (less domestic currency is required to buy a unit of foreign currency) but reduces competitiveness and export revenues (domestic goods cost more in foreign currency). The government can accumulate foreign reserves to maintain competitiveness, but at a potential cost of higher inflation (the

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[8] For elaboration on the issues discussed here, see Shibata and Morrissey (2002).

Central Bank increase money supply to buy foreign exchange, hold reserves and maintain the exchange rate). One response in some countries has been to raise reserve requirements (the proportion of funds an investor must deposit with the Central Bank) and therefore restrict expansion of domestic credit and of money supply. However, this acts as a tax on banks and reduces credit to the private sector, often exacerbating an existing problem of restricted access to funds for investment.

There is evidence that increased capital inflows have created pressure for a real appreciation in many SSA countries. The markets should anticipate an appreciation rather than devaluation, so there is no indication of a market driven exchange rate crises (as appreciation preserves the value of foreign investors assets). Financial liberalisation appears to have been associated with increasing real domestic interest rates and this has not been associated with an expansion of domestic credit. In fact, reserves have been rising while domestic credit (relative to GDP) has been falling, implying sound macroeconomic policies. However, the dependence on 'volatile' private foreign capital invites risk. As short-term, foreign-denominated private loans are highly mobile, any small shocks may affect market sentiments and trigger a currency crisis. A potential source of shock is the high level of trade deficits that may be unsustainable in many countries.

Financial liberalisation increases the liquidity of domestic borrowers (feeding domestic instability) and the potential for international contagion, thereby shifting policy priorities towards pleasing international investors instead of concentrating on development tasks. Macroeconomic stability is threatened by volatile capital flows controlled by powerful private agents subject to unpredictable herd behaviour. As information quality is relatively low for SSA countries, and there are likely to be many small investors, susceptibility to herd behaviour is a potential problem. Although SSA is minor in terms of global financial flows, a change in sentiments by a few players could have a serious affect on SSA economies. This suggests a number of policy reactions. At the national level, countries could consider introducing capital controls while promoting domestic institutional development in the financial and banking sectors, supervisory and regulatory agencies. Aid provides a relatively secure and predictable source of development finance, but there is a need to monitor whether aid has affects on the exchange rate. At the multilateral level, institutions such as the IMF and the World Bank could act in a financially expansive, counter-cyclical fashion to off-set herd behaviour, panic and contagion effects.

SSA countries could follow the practice of many other countries and impose variable deposit requirements (VDRs) [9] – non-interest reserve requirements deposited with the Central Bank but denominated in foreign currency. As they are relatively easy to vary, VDRs are a flexible instrument for managing the impact of inflows on the domestic economy, and an acceptable form of capital control. This is an option to consider, especially as private capital inflows are often difficult to identify and quantify (a small deposit requirement could assist in monitoring flows). In general, however, private inflows are not so great as to represent a danger to SSA countries, so broad-ranging capital controls are not warranted.

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[9] Suggested by Jonathan Leape in Bhinda *et al* (1999).

For SSA countries, a particular concern is improving the quality of information available to investors. In the context of FDI, this is largely met by investment promotion and related agencies. As such inflows are more long-term in nature, the investors have the incentive to acquire information and establish a local relationship. This cannot be assumed to apply to short-term capital investors, and these are the most susceptible to 'surprise information' (or rumours and contagion). One of addressing this is to provide regular 'investor briefings', perhaps by the Central Bank, that reviews the performance of important indicators. As discussed here, the most relevant indicators are the expansion of domestic credit, the level of foreign reserves, the trade deficit and exchange rate. While such information is available, the point is to make it easily available and trustworthy.

A major issue for SSA countries is the relationship between the exchange rate and the trade deficit. Capital inflows are associated with pressures for appreciation, whereas large current account deficits suggest the need for devaluation. Exporters from SSA are price takers on world markets, so appreciation reduces the domestic currency value of exports and the price of imports. The combination of this disincentive to exporters and incentive for imports could exacerbate an already large trade deficit. If private inflows, especially FDI, are associated with increased demand for imports, this can make the problem even worse. The potential for export growth in SSA, at least in the short run, is very limited. The major macroeconomic policy issue is how to manage and finance imports and the trade deficit. While this is in many respects a trade policy issue, the implications of capital inflows and exchange rate pressures need to be recognised by policy-makers. Investors can be expected to monitor trade deficits, reserves and exchange rate pressures. Consequently, the domestic authorities responsible for managing capital inflows should be aware of the indicators of concern to investors.

The Dangers of Volatile Private Capital
While the objective for SSA countries is to attract increasing private capital, it should be recognised that there are costs associated with substantial short-term capital inflows. We consider three of the most important adverse effects. There are no simple or generally appropriate policy responses, as the nature of volatility and shocks is that they occur for reasons beyond the control of authorities. However, authorities can be prepared for volatility and aware of the implications.

First, as detailed above, short-term private inflows are very volatile. This poses a problem for SSA countries that are marginally creditworthy borrowers as they are more vulnerable to a piece of news. New information that discourages investors could lead to herd behaviour in international financial markets, causing a capital outflow even in countries that are distant from the information (the herd, or panic, effect). This can have a disproportionately large effect on economies with an immature financial sector simply because there is in an inadequate domestic financial base to absorb the shock. Although foreign private investment is low relative to GDP in SSA countries, it can still be a significant proportion of the supply of investment capital in the domestic financial system. African countries are susceptible to sudden shifts in market perceptions because of the lack of good information available to potential (and even incumbent) investors. This constrains

portfolio flows, although privatisation and the establishment of macroeconomic stability have attracted increased foreign investment (and FDI is a more stable inflow). The best policy response is to provide credible, quality and timely information (but even this may not be sufficient to insulate a small country from a major contagion effect).

Second, SSA countries are quite susceptible to external shocks due, for example, to dependence on agriculture and primary commodities, weak integration into international trade and financial markets, and a narrow economic base. Financing adverse shocks with private capital is difficult as capital flows out rather than in at the time of negative shocks. Typically, credit rationing to the marginally creditworthy becomes tighter under adverse shocks and looser under favourable shocks. Such a change will worsen the access to credit when it is needed, particularly for adjustment to external shocks. As observed above, the vulnerability of SSA to shocks may explain why private capital inflows are so low (even if volatility does not appear to be correlated with vulnerability). In SSA, aid has been the only flow with the potential to stabilise economies, but all evidence is that it has *not* been effective in this way. Donors, like investors even if to a lesser extent, are also susceptible to 'bad information' and aid inflows are volatile. This represents a predicament to the authorities as a breakdown in relations with donors tends to reduce aid (the flow that can in principle compensate for a shock) *and* send a bad signal to private investors. There is no simple way to prevent this problem, but providing better quality information can mitigate adverse effects.

Third, weak public finances tend to amplify rather than mitigate shocks in the financial account. At the time of a capital reversal, there is little scope for governments to counteract the impact of the reversal, given low revenue levels, inflexible tax policies, large budget deficits and the absence of automatic fiscal stabilisers (such as social safety nets). Thus, not only does the vulnerability of SSA countries to economic and political shocks deter private inflows, it also renders private inflows a more problematic source of capital. Policy cannot prevent shocks, it can only be prepared for them. Measures that strengthen the base of domestic public finance are essential, both because this is a good signal to investors and because it provides authorities with more 'room to manoeuvre' in dealing with donors.

The conclusion is a brief one: the major issue facing SSA countries is not the problems associated with volatile private capital inflows, it is (all the factors associated with) the difficulty of attracting such inflows. To date, SSA countries have failed to attract private capital. One of the major reasons is the various factors associated with the poor economic performance of SSA countries and their vulnerability to economic and political shocks. Aid is the major inflow, and it is vital that aid is used effectively to promote growth and stability. If this is achieved, the prospects for attracting private inflows, especially FDI (which offers the most promise) will improve. The immediate policy action we recommend is to provide better quality information on the 'state of the economy' to investors.

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DFID GLOBALISATION AND POVERTY RESEARCH PROGRAMME

Final Report for Project R7624:

The Determinants of International Capital Flows and Implications for Pro-Poor Growth In Sub-Saharan Africa

APPENDIX B:

FOREIGN DIRECT INVESTMENT: FLOWS, VOLATILITY AND THE IMPACT ON GROWTH IN DEVELOPING COUNTRIES

Robert Lensink and Oliver Morrissey *

Abstract

This paper contributes to the literature on FDI and economic growth. We deviate from previous studies by introducing measures of the volatility of FDI inflows. As introduced into the model, these are predicted to have a negative effect on growth. We estimate the standard model using cross-section, panel data and instrumental variable techniques for a sample of 67 developing countries. Whilst all results are not entirely robust, the consistent finding is that volatility of FDI has a negative effect on growth. The evidence for a positive effect of FDI is not robust, nor is that for any effect of human capital. For the developing countries in the sample, there is evidence of convergence and the principal factors retarding growth appear to be policy distortions and the volatility of FDI, interpreted as a proxy for factors causing economic instability.

FOREIGN DIRECT INVESTMENT: FLOWS, VOLATILITY AND THE IMPACT ON GROWTH IN DEVELOPING COUNTRIES

1. Introduction

There is now a considerable literature on the impact of foreign direct investment (FDI) and growth. The contribution of this paper is to take the effect of volatility of FDI flows on growth into account. Using a variety of econometric techniques on a sample of developing countries, we find that the volatility of such flows has a consistent negative effect on growth. There are a number of reasons why volatility of FDI inflows may be negatively associated with growth. A first is that volatility itself has a negative effect on growth. The recent endogenous growth literature on FDI provides some arguments why this might be so. This literature shows that FDI positively affects growth by decreasing the costs of R&D through stimulating innovation. If FDI inflows are uncertain, costs of R&D are uncertain, which negatively affects incentives to innovate. While FDI is considered to be less volatile than other private flows, it is possible that sudden changes in the volume of FDI inflows can have a destabilising impact on the economy.

A second possibility might be that the volatility of FDI flows is a proxy for economic or political uncertainty; FDI volatility may reflect underlying uncertainty (political and economic) in a country. Lensink and Morrissey (2000) and Guillaumont and Chavet (1999) suggest that economic uncertainty is an important determinant of both growth and the productivity of investment in developing countries. By 'economic uncertainty' they refer to the tendency of some developing countries to be particularly vulnerable to shocks that have the immediate effect of reducing income and, if recurrent, tend to reduce growth (or constrain the ability of an economy to reach its steady state growth rate). These shocks may be external, such as terms of trade shocks or financial crises induced by the volatility of capital flows, or 'acts of nature', such as severe drought or floods. Aizenman and Marion (1999) find that indicators of macroeconomic volatility have a robust, significant and negative effect of levels of private investment. If we conjecture that FDI has similar determinants to private investment, then FDI volatility may be a proxy for growth-retarding instability.

The aim of this paper is to examine the impact of FDI on growth in developing countries, specifically accounting for volatility. Section 2 briefly reviews some of the relevant existing literature on FDI. Section 3 presents a model incorporating volatility of FDI. The data and measures used are described in Section 4 and the results are discussed in Section 5. The conclusions are in Section 6.

2. A Brief Overview of the Literature

The contribution of FDI to economic growth has been debated quite extensively in the literature. The 'traditional' argument is that an inflow of FDI improves economic growth by increasing the capital stock, whereas recent literature points to the role of FDI as a channel of international technology transfer. There is growing evidence that FDI enhances technological change through technological diffusion, for example because multinational firms are concentrated in industries with a high ratio of R&D relative to sales and a large share of technical and professional workers (Markusen, 1995). Multinational corporations are probably among the most technologically advanced firms in the world. Moreover, FDI not only contributes to imports of more efficient foreign technologies, but also generates technological spillovers for local firms.

In this approach, technological change plays a pivotal role in economic growth and FDI by multinational corporations is one of the major channels in providing developing countries (LDCs) with access to advanced technologies. The knowledge spillovers may take place via imitation, competition, linkages and/ or training (Kinoshita, 1998; Sjoholm, 1999). Although it is in practice rather difficult to distinguish between these four channels, the underlying theory differs.

The *imitation* channel is based on the view that domestic firms may become more productive by imitating the more advanced technologies or managerial practices of foreign firms (the more so the greater the technology gap). In the absence of FDI, acquiring the necessary information for adopting new technologies is too costly for local firms. Thus, FDI lowers the cost of technology adoption and may expand the set of technologies

available to local firms. The *competition* channel emphasises that the entrance of foreign firms intensifies competition in the domestic market, encouraging domestic firms to become more efficient by upgrading their technology base.

The *linkages* channel stresses that foreign firms may transfer new technology to domestic firms through transactions with these firms. By purchasing raw materials or intermediate goods a strong buyer-seller relationship may develop that gives rise to technical assistance or training from the foreign firm to the domestic firm. Finally, the *training* channel arises if the introduction of new technologies requires an upgrading of domestically available human capital. New technologies can only be adopted when the labour force is able to work with them. The entrance of foreign firms may give an incentive to domestic firms to train their own employees. If labour moves from a multinational to a local firm (through labour turnover), the physical movement of workers causes knowledge to move between firms.

Empirical evidence that FDI generates positive spillovers for local firms is mixed (see Saggi, 2000, for a survey). Some studies find positive spillover effects, some find no effects and some even conclude that there are negative effects (on the latter see Aitken and Harrison, 1999). This does not necessarily imply that FDI is not beneficial for growth (for a survey of FDI and growth in LDCs, see De Mello and Luiz. 1997). It may be that the spillovers are of a different nature. Aitken *et al* (1997), for instance, point to the importance of the entry of multinationals for reducing entry costs of other potential exporters. Moreover, FDI may also contribute to growth by means of an increase in capital flows and the capital stock.

Some recent studies have argued that the contribution of FDI to growth is strongly dependent on the circumstances in recipient countries. Balasubramanyam *et al* (1996) find that the effect on growth is stronger in countries with a policy of export promotion than in countries that pursue a policy of import substitution. In a very influential paper, Borensztein *et al* (1998) suggest that the effectiveness of FDI depends on the stock of

human capital in the host country. Only in countries where human capital is above a certain threshold does FDI positively contribute to growth.

Investment, Volatility and Uncertainty

Most theoretical analysis of the relationship between uncertainty and investment is based on how the expected marginal revenue product of capital is affected by the uncertain variable. Under the assumptions of risk neutrality and a convex profit function, Jensen's inequality ensures that the effect of uncertainty on investment is positive (Hartman, 1972); if one introduces risk aversion the sign on the effect is ambiguous (Zeira, 1987). Caballero (1991) derives a negative effect of uncertainty on investment by introducing imperfect competition and/or decreasing returns to scale. Aizenman and Marion (1999) show that under generalized expected utility (disappointment aversion) and/or market imperfections, one can derive a negative link between investment and volatility. However, there is no general theoretical prediction on the sign of the relationship.

Where the issue is addressed, empirical studies consistently find a negative effect of uncertainty (measured in various ways) on investment. Serven (1998) uses seven measures of uncertainty for five variables (such as growth, terms of trade) and finds evidence for all having a negative impact on levels of private investment for a large sample of developing countries. Aizenman and Marion (1999) use four measures of volatility (government spending, money growth, real exchange rate and an index of all three) and also find a significant, negative impact on private investment for a sample of developing countries. Interestingly, volatility has no significant effect on total investment, and is significantly negatively related to public investment, according to their results. One implication is that if macroeconomic volatility has an adverse impact on growth via its effect on investment this must be through the effect on private investment (in this scenario, it is implied that private investment is more productive, in terms of enhancing growth, than public investment). Thus, volatility of private investment (or FDI in our case) may have a negative impact on growth.

A number of recent papers have begun to address aspects of risk and vulnerability in the context of the aid-growth relationship (and we note that investment is the principal mechanism through which aid enhances growth). Lensink and Morrissey (2000) argue that aid instability, measured as a residual of an autoregressive trend estimate of aid receipts, can proxy for two forms of uncertainty that may be growth-reducing. First is recipient uncertainty regarding future aid receipts, which may have adverse effects on investment. Second, is economic uncertainty, as the incidence of shocks will tend to attract unanticipated aid, hence increase measured instability of aid flows. Lensink and Morrissey (2000) find that the coefficient on the aid instability measure is negative and significant and infer that economic uncertainty is growth-retarding. Guillaumont and Chauvet (1999) address the implications of including a measure of the 'vulnerability' of the economic environment (or economic uncertainty) in an aid-growth regression. They find that growth is lower in more vulnerable economies, i.e. where macroeconomic volatility is greater. Dehn and Gilbert (1999) look specifically at instability of commodity prices and find evidence that vulnerability to commodity price variability reduces growth, although much depends on how governments respond. Thus, in addition to the potential direct negative effect on growth, volatility of FDI may also proxy for other factors that retard growth.

3.   Theoretical Framework

In this section we present a simple endogenous growth model in which FDI has a positive effect on growth, whereas the volatility in FDI flows has a negative effect. In the model FDI, as well as the volatility in FDI, affects growth via the cost of innovation. The model is in line with the recent theories emphasising the importance of FDI in enhancing technological change through technological diffusion. This model provides an illustrative framework, which explains a possible channel by which the volatility in FDI flows negatively affect growth.

Using the framework of the technological change models (see chapters 6 and 7 of Barro and Sala-I-Martin, 1995) it is possible to present a formal model which shows how FDI may increase growth. We use a model with an expanding variety of products, adapted from

Barro and Sala-i-Martin (1995, chapter 6) and following Borensztein *et al* (1998), so that we can be brief about its structure.[10]

The model assumes that technical progress is represented through the variety of capital goods available. There are three types of agents in the model: final goods producers, innovators and consumers. Each final goods' producer rents *N* varieties of capital good from specialised firms that produce a type of capital good (the innovators). The producer has monopoly rights over the production and sale of the capital goods. The purchase price P_j of the capital good is set by optimising the present value of the returns from inventing (and producing in several periods), *V(t)*. This leads to a fixed mark-up over production costs. Barro and Sala-I-Martin (1995: 218), assuming free entry of inventors, show that in equilibrium with positive R&D (at cost η) and increasing *N*, the (constant) rate of return (interest rate, *r*) is given by:

$$r = (1/\eta)LA^{1/(1-\alpha)}(\frac{1-\alpha}{\alpha})\alpha^{2/(1-\alpha)} \tag{1}$$

where α measures capital's share of income (coefficient in Cobb-Douglas production function) and *L* is labour input.

We can now introduce FDI. The costs of production contain two parts. Each period there are fixed maintenance costs, assumed equal to 1. In addition there are fixed set up costs (R&D costs, η). The costs of discovering a new variety of a good (costs of innovation) are assumed to be the same for all goods. Moreover, assume that the costs of discovering new goods depend on the ratio of goods produced in other countries to those produced domestically. This ratio is a proxy for FDI. A higher ratio of goods produced in other countries, and so more FDI, would lead to a decline in the costs of innovation. This reflects

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[10] A more complete derivation of the model and a comparison of our results (for a sample including developed countries) with those of Borensztein *et al* (1998) can be found in Lensink and Morrissey (2001).

the idea that it is cheaper to imitate than to innovate (Borensztein *et al*, 1998), and that the possibility to imitate increases if more goods are produced in other countries (i.e. when FDI is higher). The costs of discovering a new good can be modelled as (using FDI = *F*): η =*f(F)*, where $\partial\eta/\partial F < 0$

To account for uncertainty with respect to *F*, we assume that *F* is stochastic, and modelled as $F = \mu(F)+\varepsilon$, where $\mu(F)$ is the mean of FDI and ε is an error term with $\varepsilon \sim N(0, \varepsilon^2)$. The certainty equivalent of the expected value of FDI is given by $E(F)= \mu(F)-0.5B\sigma^2(F)$ where *B* is the coefficient of absolute risk aversion (*B* is positive for risk-averse innovators) and $\sigma^2(F)$ refers to the variance in FDI inflows. Taking into account the certainty equivalent value of FDI, and assuming that the rate of return on assets (*r*) is constant and there is free entry, (1) can be written as:

$$r = (\frac{L}{f[\mu(F)-0.5B\sigma^2(F)]})A^{1/(1-\alpha)}(\frac{1-\alpha}{\alpha})\alpha^{2/(1-\alpha)} \qquad (2)$$

Equation (2) shows that an increase in FDI leads to an increase in *r* (remember $f'(F)<0$) whereas an increase in the variance of FDI leads to a decrease in *r*. To introduce the link to economic growth we close the model by considering behaviour of households. Households maximise a standard inter-temporal utility function, subject to the budget constraint. This gives the well-known Euler condition for the growth rate of consumption, $g_C = (1/\theta)(r - \rho)$, where $-\theta$ is the elasticity of marginal utility and ρ is the discount rate. In the steady state the growth rate of consumption equals the growth rate of output, *g*.

Using the expression for *r* from (2) we finally get:

$$g = (1/\theta)[(\frac{L}{f[\mu(F)-0.5B\sigma^2(F)]})A^{1/(1-\alpha)}(\frac{1-\alpha}{\alpha})\alpha^{2/(1-\alpha)} - \rho] \qquad (3)$$

It is now easy to see that an increase in FDI leads to an increase in the growth rate of output (*g*). An increase in FDI lowers set-up costs (for technology adaptation) and raises the return on assets (*r*). This leads to an increase in saving and so a higher growth rate in consumption and output. However, an increase in the volatility of FDI negatively affects growth as it decreases the certainty equivalent value of FDI and consequently increases set-up costs and decreases the rate of return on assets.

4.   Data and Measures of Uncertainty

In this paper we use World Bank data on the FDI/GDP ratio (*GFDI,* in percentages), as this provides wide coverage for a reasonably long period (1975-97). More importantly, for our purposes, the *GFDI* data is annual (this is essential to calculate volatility). We have observations for a total of 67 developing countries (not all countries are used in all regressions). We use the average value of *GFDI* for the 1975-1998 period in the cross-section estimates and average values for the sub-periods in the panel estimates.

For our cross-section estimates volatility of *GFDI* (*UGFDI*) is measured by taking the standard deviation of errors from the autoregressive equation for *GFDI* with lagged values (three years) and a time trend. This equation is estimated for all countries over the 1975-1997 period. This is, admittedly, only an approximate measure of volatility, although it is standard in the literature (see Lensink and Morrissey, 2000). Given that the time series available are rather brief, more sophisticated measures of volatility are not justified. We also use a relative measure of volatility (*RATIO = UGFDI/GFDI*). For our panel estimates the volatility in FDI is estimated similarly. However, in order to have enough degrees of freedom we do not take into account the second and third order autoregressive terms in the autoregressive equation for *GFDI*. We estimate this equation for all countries, as well as all sub-periods, distinguished in the panel estimates.

Table 1: Descriptive Statistics, Cross-Section Data

	GRO	*LNGDPPC1*	*LNSEC1*	*GFDI*	*RATIO*
Mean	1.000	7.219	2.537	0.813	0.559
Median	0.896	7.202	2.565	0.498	0.465
Maximum	6.364	8.967	4.127	0.498	0.465
Minimum	-3.701	5.832	0	0.008	0.177
Std. Dev	1.892	0.748	0.990	1.035	0.348
Skewness	0.184	0.352	-0.559	2.672	2.193
Kurtosis	3.471	2.599	2.748	10.748	9.160
Observations	67	67	67	67	67

Note: statistics are based on averages used in cross-section estimates. They refer to statistics with common samples.

The dependent variable in the basic cross-section regressions is the per capita growth rate of GDP over the 1970-1998 period (*GRO*). In the panel estimates we distinguish three periods: 1970-1980; 1980-1990 and 1990-1998. Per capita growth rates are calculated for these sub-periods. Following the empirical growth literature, a number of 'standard' explanatory variables are included in addition to the FDI variables. The most important of these are the initial values of GDP per capita (*LNGDPPC1*) and the secondary school enrolment rate (*LNSEC1*), both measured in logs (for 1970 in the cross-section estimates and for 1970; 1980 and 1990 in the panel estimates). Other variables are the black market premium (*BMP*) and government consumption expenditure as a share of GDP (*GOV*). A range of political and institutional indicators are also used in estimating the instruments equations; these are discussed below when introduced. Definitions and sources for all variables are provided in Appendix A. Table 1 presents descriptive statistics of the main variables used in the analysis and Table 2 gives a correlation matrix.

Table 2: Correlation Matrix, Cross-Section Data

	GRO	*LNGDPPC1*	LNSEC1	*GFDI*	*RATIO*
GRO	1.000				
LNGDPPC1	-0.047	1.000			
LNSEC1	0.399	0.659	1.000		
GFDI	0.033	0.348	0.121	1.000	
RATIO	-0.244	0.050	0.143	0.147	1.000

Note: As for Table 1.

5. Econometric Results

We begin with a simple OLS growth regression including foreign direct investment. We use a linear version of the equation derived in Section 3 and estimate variants of the following general equation:

$$g = c_0 + c_1 FDI + c_2 Volatility + c_3 H + c_4 Y_0 + e \qquad (4)$$

As indicated in Section 4, FDI is as a ratio of GDP, two measures of volatility are used, H is the measure of human capital and Y_0 is initial income. Where appropriate, other control variables are included in the regression, as indicated in the tables of results.

Table 3 shows that FDI has a positive effect on growth, although this result is not robust and only weakly significant, whereas volatility of FDI has a negative effect, as predicted. The latter holds both for *UGFDI* and *RATIO* (this relative measure is the preferred indicator of volatility as *UGFDI* is highly correlated with FDI) and is consistently significant. The coefficient on initial GDP is negative and significant, suggesting convergence, while that on initial education is positive and significant. The main results

are robust to including *BMP* and *GOV*. The explanatory power, at almost 50%, is quite good for such types of regressions.

Table 3: FDI and Growth: OLS Cross-Country Regressions

	1	2	3	4	5	6
	-1.550	-1.181	-1.447	-1.389	-1.353	-1.292
LNGDPPC1	(-4.83)	(-3.46)	(-4.17)	(-3.81)	(-3.75)	(-3.67)
LNSEC1	0.927	0.699	0.829	0.828	0.830	0.947
	(2.56)	(1.93)	(2.34)	(2.34)	(2.35)	(2.43)
GFDI	0.386	1.480	0.319	0.277	0.464	0.944
	(1.60)	(4.11)	(1.22)	(0.98)	(1.87)	(1.72)
UGFDI		-2.529				
		(-3.84)				
RATIO			-1.092	-1.110	-1.008	-1.048
			(-2.33)	(-2.31)	(-2.06)	(-2.09)
BMP				-0.002		-0.002
				(-1.37)		(-1.40)
GOV					-0.081	-0.079
					(-1.62)	(-1.58)
*GFDI*LNSEC1*						-0.209
						(-1.25)
Constant	10.828	8.878	11.137	10.828	11.433	10.806
	(4.32)	(3.53)	(4.36)	(4.15)	(4.69)	(4.54)
ECA	-0.895	-0.786	-1.125	-0.727	-1.266	-0.996
	(-1.23)	(-1.25)	(-1.55)	(-0.98)	(-1.61)	(-1.18)
LAC	-0.893	-.999	-1.112	-1.156	-1.406	-1.370
	(-1.89)	(-2.08)	(-2.14)	(-2.17)	(-2.43)	(-2.34)
SSA	-2.123	-2.080	-2.255	-2.155	-2.101	-2.034
	(-2.98)	(-3.02)	(-3.15)	(-2.95)	(-2.96)	(-2.76)
R^2 (adjusted)	0.41	0.49	0.44	0.45	0.47	0.47
F	8.88	10.15	8.56	7.62	8.41	6.92
N	68	68	67	67	67	67

Notes: Estimates are simple OLS; *t*-statistics in parenthesis based on White Heteroskedasticity-Consistent Standard Errors. Only significant region dummies are included – former communist economies (ECA), Latin America and Caribbean (LAC) and sub-Saharan Africa (SSA).

Borensztein *et al* (1998) argue that human capital (an educated labour force) is necessary for new technology and management skills to be absorbed. They include the interactive term *FDI.H* to capture this effect. They find that the coefficient on FDI is negative (when significant) but the coefficient on the interaction term (*FDI.H*) is positive and consistently significant. This is interpreted as implying that FDI has a positive impact on growth but this is only realised when *H* is above some critical level (estimated as 0.52); at low levels of *H* FDI has a negative impact on growth. The last column in Table 3 presents an estimate in which we take the interaction of FDI and our schooling variable into account. It appears that our basic result still holds: FDI has a positive effect on growth and the volatility in FDI has a negative effect. However, the interaction term between schooling and FDI is insignificant.[11] Lensink and Morrissey (2001) present results for the same regression but with a sample also including some 20 developing countries. The coefficient on *GFDI* is robustly positive and significant, while the regional dummies are more significant. Otherwise the results are unaltered.

Panel Estimates

A major drawback of the cross-section estimates in Table 3 is that time series properties are not taken into account; they should be interpreted as representing aggregate correlations over the long period. We therefore run regressions for a panel in which three, roughly 10-year, periods are considered (1970-1980; 1980-1990; 1990-1998). Using panel estimates, we are able to address fixed effects, an important omitted variable in cross-country growth regressions. Table 4 presents the results.

The results concerning the volatility of FDI are consistent with the cross-country estimates: volatility negatively affects growth and the significance is robust. However, the coefficients of *GFDI* and human capital are not robust and mostly insignificant. There is no evidence that *GFDI* determines growth, in contrast to Lensink and Morrissey (2001) who find the coefficient to be positive and significant when developed countries are

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[11] Lensink and Morrissey (2001) present a variety of attempts to estimate the Borensztein *et al* (1998) model, using the same variables as they employ but not with an identical sample. They fail to find a significant coefficient on the interactive term.

included. On the two occasions when the coefficient on schooling is significant, the sign is negative. The reason might be that there simply is not enough variation in *LNSEC1* over periods in the panel and that the variable behaves like a fixed effect (especially as initial period GDP is included).

Table 4: FDI and Growth: Panel Regressions

	1	2	3	4	5	6
LNGDPPC1	-6.336	-6.108	-5.626	-5.072	-5.284	-4.953
	(-8.50)	(-7.18)	(-6.51)	(-5.64)	(-6.46)	(-6.89)
LNSEC1	-0.861	-0.036	-0.123	-0.279	-0.234	-1.012
	(-2.91)	(-0.10)	(-0.31)	(-0.71)	(-0.59)	(-2.45)
GFDI	0.213	0.903	0.255	0.361	0.236	-0.632
	(0.99)	(2.19)	(1.08)	(1.34)	(0.99)	(-1.62)
UGFDI		-2.387				
		(-1.94)				
RATIO			-2.676	-2.641	-2.272	-1.867
			(-5.03)	(-5.21)	(-3.53)	(-2.81)
BMP				-0.003		-0.003
				(-3.24)		(-3.33)
GOV					-0.106	-0.163
					(-1.40)	(-2.11)
*LNSEC1*GFDI*						0.470
						(2.06)
R^2 (adjusted)	0.51	0.49	0.47	0.53	0.47	0.56
F	161.62	88.40	78.15	66.17	58.28	48.11
N	224	183	166	159	165	158

Notes: t-values in parenthesis are based on White Heteroskedasticity-Consistent Standard Errors. All estimates incorporate fixed effects.

The interesting results are in column 6. We obtain a result partly in line with Borensztein *et al* (1998) as the interactive term is significant and positive and the coefficient on *GFDI* is negative, but not significant. However, the coefficient on schooling is significant and negative. Note that the volatility in FDI is still significantly negative, although FDI is no longer significant. The reason might be that due to including the interactive term a lot of multicollinearity enters the model, making the independent FDI variable insignificant. Consequently, we should not draw strong conclusions from theses results. The suggestion

is that developing countries require both human capital and FDI together if either is to contribute to growth. It is worth remarking that column 6 does not represent an improvement over the regression in column 4. Taking the latter as the preferred regression, we could conclude that there appears to be convergence (or slowing down of growth) among developing countries and neither human capital nor FDI have contributed to growth. The principal factors we identify as retarding growth in developing countries are *BMP* (a measure of policy distortions) and the volatility of FDI. The latter can be interpreted as a proxy for factors causing economic instability.

Incorporating Instruments

A potential problem with the estimates presented above is that FDI is in principle endogenous. This implies that OLS regressions are biased. The technique of instrumental variable (IV) estimation can be used to address this problem. The issue then is to find instruments for *GFDI* and volatility variables. We note that the IV technique introduces problems of its own. In particular, it is difficult to find instruments that are both good at predicting the variable of concern (FDI and its volatility) yet are not determinants of the dependent variable. Furthermore, and consequently, IV estimates tend not to be robust to choice of instruments.

There is a recent literature from proponents of a so-called 'legal based view' that may be helpful in deciding which instruments can be used. These writers point to the importance of establishing a legal environment in which financial markets can develop effectively (La Porta *et al.* 1997; Levine 1997; Levine *et al* 1999). The legal system determines the overall level and quality of financial services and hence improves the efficient allocation of resources and economic growth. Indirectly, the legal system is probably also important in explaining FDI inflows as better legal systems may improve protection of foreign investors. Similarly, the nature of the regulatory environment may also be an important determinant of the attractiveness of a country to foreign investors.

Following this literature, we consider as instruments indicators of the legal system and the regulatory environment. Six indicators for the regulatory environment or 'governance' are

explored in Lensink and Morrissey (2001). Here we use only one of these - *GRAFT* is an indicator that measures perceptions of corruption, interpreted as the exercise of public power for private gain. This would be expected to be relevant to investment in developing countries, and performs reasonably well in Lensink and Morrissey (2001). The limited availability of such data implies that the IV estimates can only be conducted for the cross-section.

Table 5: FDI and Growth: 2SLS Regressions

	1	2	3	4	5	6
LNGDPPC1	-1.648	-1.057	-1.236	-0.952	-0.941	-0.702
	(-4.92)	(-1.84)	(-3.47)	(-1.68)	(-1.58)	(-1.05)
LNSEC1	0.932	0.655	0.638	0.613	0.588	0.756
	(2.26)	(1.47)	(1.45)	(1.39)	(1.23)	(1.36)
GFDI	0.479	0.301	1.743	0.247	0.178	0.933
	(1.80)	(0.90)	(3.53)	(0.67)	(0.38)	(0.86)
RATIO		-4.357		-4.646	-5.306	-5.939
		(-1.83)		(-1.86)	(-1.78)	(-1.53)
UGFDI			-2.754			
			(-2.83)			
BMP				-0.001		-0.001
				(-0.64)		(-0.54)
GOV					0.032	0.064
					(0.33)	(0.53)
LNSEC1 **GFDI*						-0.388
						(-0.78)
Constant	11.514	10.535	9.337	10.153	10.043	8.029
	(4.25)	(3.38)	(3.42)	(3.22)	(3.03)	(2.03)
R^2 (adjusted)	0.38	0.28	0.48	0.36	0.48	0.07
F	7.55	5.28	7.33	4.52	10.40	2.92
N	62	56	57	56	56	56

Notes: Instrument list: (1) *LNGDPPC1, LNSEC1, GFDI1, GRAFT* and a constant. (2) same as (1) but includes *UGDFI1/GFDI*. (3), same as (1) but includes *UGFDI1*. (4) same as (2) but includes *BMP*. (5) same as (2) but includes *GOV*. (6) same as (2) but includes *GOV, BMP* and *LNSEC1*GFDI1*. In all equations significant regional dummies (ECA, LAC and SSA) are taken into account as in Table 3. The *t*-values are based on White Heteroskedasticity-Consistent Standard Errors.

Consequently, we use *GRAFT*, *LNGDPPC1*, the lagged value for *GFDI* (*GFDI1*) as well as the lagged value for the relative uncertainty (*UGFDI1/GFDI*) as instruments for *GFDI* and *RATIO* in 2SLS regressions. Table 5 presents the results. Again, FDI has no significant effect on growth, but nor do any of the variables in a robust manner. The use of instruments has given results that are generally weaker than those found earlier, as is often the case with IV techniques. Furthermore, the results confirm the sensitivity of parameter estimates to choice of instruments. However, volatility of FDI has a consistently negative effect on growth, it is usually weakly significant and the coefficient is reasonably stable. The evidence for convergence among developing countries is also reasonably consistent. These results are broadly comparable to those of Lensink and Morrissey (2001); although the significance of FDI increases, the inclusion of developed countries in the sample does not alter the pattern of results.

The coefficients on instrumented *RATIO* in Table 5 are much higher than in Table 3 but only significant at the 10% level, probably because the instrument regression is a poor fit. The decline in significance of the coefficients on *RATIO* suggests that it is not FDI volatility *per se* that retards growth, but that such volatility is itself a proxy for unobserved factors that retard growth. In column 3 (Table 5), when *UGFDI* (not instrumented) is included, the striking effect is the increased size of the coefficient on *GFDI*. This may simply be because the high correlation between *GFDI* and *UGFDI* persists even when we instrument for the former; the broad pattern of results is unaffected. The results in columns 4 and 5 are more difficult to interpret, but seem to suggest that *BMP* and *GOV* do not have an independent effect on growth other than their effect here picked up by FDI and its volatility (when they are included as instruments). The low explanatory power for column 6 reinforces the earlier argument that the inclusion of the interactive introduces excessive multicolinearity.

6   Conclusions

This paper contributes to the literature on FDI and economic growth in developing countries by incorporating effects due to the volatility of FDI inflows. Volatility was

introduced into the model as affecting the expected costs (returns) of innovation, and in this way is predicted to have a negative effect on growth. We estimate a standard growth model including FDI and volatility using cross-section, panel data and instrumental variable techniques. Volatility of FDI is found to have a consistent negative impact on growth, and this result is quite robust. The pattern of results suggests that there appears to be convergence (or slowing down of growth) among developing countries but neither human capital nor FDI have contributed to growth. The principal factors we identify as retarding growth in developing countries are the black market premium (a measure of policy distortions) and the volatility of FDI. The latter can be interpreted as a proxy for factors causing economic instability. One possibility is that economies with high levels of economic uncertainty tend to have lower and/or more variable growth rates, and may also appear less attractive to foreign investors. One issue to be pursued in future work is to examine the underlying reasons for the volatility of FDI.

A general problem that plagues cross-country growth regressions is potential endogeneity between growth and the variables of concern, in our case FDI. We attempted to address this by instrumenting for FDI and volatility, but the resolution is only partial. Future work can attempt to find better instruments for FDI, and especially volatility. A particular problem with what we attempted here is that we were only able to instrument for the 'long-run' as data on instruments was not available for the panel sub-periods. One option for future work is to eschew instruments in favour of using lagged values (on the basis that current growth is not a determinant of past values of FDI and its volatility). In order to do this while preserving degrees of freedom, we need to develop the time series dimension of the data (the measure of volatility is the major constraint here).

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Appendix A: Variables Used in the Study

Basic Variables

BMP = the average black market premium (%) for the 1970-1997 period. Source: Easterly and Yu (1999).

GFDI= the average gross foreign direct investment over GDP ratio over 1975-1997 period. Source: World Bank (1999).

GFDI1: lagged value for GFDI. As no data are available for GFDI before 1975, we took first available observation.

GOV = The average value of government consumption as a percentage of GDP for the 1970-1997 period. Source: World Bank (1999).

GRO*:* the average real per capita growth rate over 1970-1998 period. Calculated from real GDP *per capita* data in constant dollars. Source: Easterly and Yu (1999). Original source: Penn World Table 5.6 (Summers-Heston data). Missing data calculated from 1985 GDP per capita and GDP per capita growth rates (Global Development Finance & World Development Indicators).

LNAREA: a log value of area (the size of the country). Source: Easterly and Yu (1999).

LNGDPPC1 = The logarithm of the 1970 value of real GDP per capita in constant dollars (international prices, base year 1985). Source: Easterly and Yu (1999). Original source: Penn World Table 5.6.

LNSEC1= log of The 1970 secondary school enrolment rate. Source: Easterly and Yu (1999). Original source: Global Development Finance & World Development Indicators.

UGFDI= "variability" or uncertainty in GFDI, measured by taking standard deviation of errors of the equation GFDI= a_1 GFDI(-1)+ a_2 GFDI(-2) + a_3 GFDI(-3)+ a_4 TREND + C + e. This equation is estimated for all countries over the 1975-1997 period.

UGFDI1: is the lagged value of UGFDI. Since data for GFDI are not available before 1975, this is calculated by calculating the standard deviation of the error terms of an regression of GFDI on a constant, a trend, GFDI(-1), GFDI(-2) and GFDI(-3) for the 1975-1985 period.

RATO = UGFDI/GFDI.

Governance indicators

The six aggregate governance indicators were kindly provided by Pablo Zoido-Lobaton. See Kaufmann, Kraay and Zoido-Lobaton (1999) for an extensive description. Governance is measured on a scale of about -2.5 to 2.5 with higher values corresponding to better outcomes. The data are based on data for 1997 and 1998. The variables are:

1) *GOVEFF* = An indicator of the ability of the government to formulate and implement sound policies. It combines perceptions of the quality of public service provision, the quality of the bureaucracy, the competence of civil servants. the independence of the civil service from political pressures, and the credibility of the government's commitment to policies into a single grouping.

2) *GRAFT* = This indicator measures perception of corruption: the exercise of public power for private gain.

3*) RULEL* = Indicator which measures the extent to which agents have confidence in and abide by the rules of society. These include perceptions of the incidence of both violent and non-violent crime, the effectiveness and predictability of the judiciary, and the enforceability of contracts.

4) *PINST* = This index combines indicators which measure perceptions of the likelihood that the government in power will be destabilized or overthrown by possibly unconstitutional and/ or violent means.

5) *REGBURDEN*= An indicator of the ability of the government to formulate and implement sound policies. It includes measures of the incidence of market-unfriendly policies such as price controls

or inadequate bank supervision, as well as perceptions of the burdens imposed by excessive regulation in areas such as foreign trade and business development.

6) *VOICE* = This index includes indicators which measure the extent to which citizens of a country are able to participate in the selection of governments.

Legal Origin Indicators
The five legal system indicators are obtained from Easterly and Yu (1999). They are zero-one dummies.

1) *LEGBR* = National legal system from British origin.
2) *LEGFR* = National legal system from French origin.
3) *LEGGER* = National legal system from German origin.
4) *LEGSC* = National legal system from Scandinavian origin.

Table A1. Correlation Matrix Governance Indicators

	GOVEFF	GRAFT	RULEL	PINST	REGBURD	VOICE
GOVEFF	1.000					
GRAFT	0.929	1.000				
RULEL	0.890	0.877	1.000			
PINST	0.794	0.750	0.877	1.000		
REGBURD	0.761	0.684	0.744	0.682	1.000	
VOICE	0.768	0.758	0.715	0.685	0.751	1.000

Countries in the sample
All countries for which FDI data are given in World Bank (1999).