Volatility of Resource Inflows and Domestic Investment in Cameroon

By

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## Contents

List of tables and figures.................................................................................................................... iv  
Abstract.................................................................................................................................................. v  
Acknowledgements.......................................................................................................................... vi  

1. Introduction ........................................................................................................................................... 1  
3. Literature review .............................................................................................................................. 10  
4. Theoretical framework and specification of the model............................................................. 14  
5. Estimation issues, data sources and variable measurement ................................................... 20  
6. Empirical results..................................................................................................................................... 23  
7. Summary and policy implications..................................................................................................... 37  

   Notes................................................................................................................................................... 39  
   References............................................................................................................................................. 40  
   Appendixes......................................................................................................................................... 43
List of tables & figures

Tables

Table 1: The evolution of investment and resource inflows (annual averages -% of GDP) ........................................... 6
Table 2: Volatility of inflows in the different subperiods ........................................... 24
Table 3: Weighted inflow volatilities ........................................................................ 24
Table 4: Correlations between the different components of inflow volatility .... 25
Table 5: Tests of validity of the instruments .............................................................. 26
Table 6: Hausman test results ................................................................................. 26
Table 7: Total resource flows and private domestic capital formation .......... 28
Table 8: Export revenue and private domestic capital formation ....................... 29
Table 9: Official flows and private domestic capital formation ......................... 30
Table 10: Foreign direct investment and private domestic capital formation ..... 31
Table 11: Other private capital flows and private domestic capital formation .... 32
Table 12: Total resource flows and public capital formation ............................. 34
Table 13: Export revenue and public capital formation ......................................... 34
Table 14: Official flows and public capital formation ........................................... 35
Table A1: Results of unit root tests ...................................................................... 44

Figures

Figure 1: Savings gap and fixed capital formation in Cameroon, ..................... 2
19702000 (% of GDP)
Figure 2: Volatility of resource flows and fixed capital formation in .......... 4
Cameroon, 19702000 (% of GDP)
Figure A1: Evolution of resource inflows (as%GDP) ......................................... 43
Abstract

Cameroon is a small open economy that relies on the export of a few primary products for its foreign exchange earnings. The low rate of savings cannot meet the investment requirements, and investment has been declining despite many years of economic reform. There is consequently a resource gap that has to be filled by both official and private resource inflows, but these resource inflows have similarly been declining. They have also become highly volatile, thus undermining their positive effects on capital formation and consequently on economic growth and poverty reduction. This study examined the effect of resource inflows and their volatility on domestic investment in Cameroon.

The results show that inflow volatility is high and that export revenue volatility is the prime mover of aggregate volatility. There is no evidence of inflow volatilities reinforcing or offsetting each other. Aggregate resource flow is important for both public and private domestic investment, while its volatility is detrimental. When total resource flows is disaggregated into export revenue, official flows, foreign direct investment and “other private flows”, only export revenue and “other private flows” significantly affect private investment, indicating that the impact on investment varies depending on the type of inflow. The volatility of official flows and export revenue hurts investment directly, but also negates the influence of the other inflows on both private and public investment.

The study suggests that government make more efforts to attract more resource flows into the country and, especially, to reduce their volatility. Diversifying export supplies to minimize price fluctuations, complying with aid conditionalities (this should be facilitated with the country ownership of the poverty reduction strategy), developing a robust and transparent financial sector and stock exchange, and avoiding frequent and unpredictable policy shifts are among the actions that can go a long way to reduce resource flow volatility. Domestic investment, and consequently growth and poverty reduction, should be the main beneficiaries.
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1. Introduction

After almost a decade and half of reforms under the auspices of the Bretton Woods institutions, economic growth in Cameroon is still far below expectations. The encouraging growth of the late 1990s failed to reach the level necessary to have a significant impact on poverty. On a per capita basis, growth has been modest indeed: In 2000, for example, real GDP growth rate stood at 4.15%, while the population growth rate was 2.82%. This is not sufficient to meet the Millennium Development Goal target of attaining and sustaining the average real GDP growth rate of 7% per annum required to halve poverty by 2015 (UNECA, 1999: 5). Compared to the Southeast Asian average growth rate of 6.7% per annum between 1990 and 1997 (Mlambo and Oshikoya, 2001), growth performance in Cameroon has a long way to go.

A number of empirical studies (Collier and Gunning, 1999; Khan and Reinhart, 1990) have identified investment as one of the essential components or requirements of GDP growth on the African continent. In Cameroon private investment has been shown to have a “large, statistically significant, and robust” effect on economic growth Ghura (1997, P.27). This explains why the structural adjustment programme adopted in 1988, privileged the creation of an appropriate incentive structure for private sector investment. The aim was to stimulate domestic investment and to attract foreign investment.

Gross fixed capital formation in Cameroon has actually declined steadily over the years, falling from 25% of GDP in the early 1980s to 14.30% in 1992 and 16.45% in 2000. The trend of foreign direct investment (FDI) to Cameroon has not been much different. FDI declined from a peak of US$290 million in 1989 to only US$110 million in 2000. Even the 1994 devaluation had only a timid impact on capital formation. UNECA (2001: 7) reports a similar trend for Africa, whose FDI share decreased from 2.0% to 1.3% of global FDI between 1997 and 1998. As a share of FDI to the developing world, sub-Saharan Africa received only 4.3% in 1999, down from 10.5% in the 19811989 period (Ndikumana, 2003).

The low rate of domestic savings has been identified in the literature as one of the constraints to capital formation in developing countries. In Cameroon the savings gap
(the difference between investment and savings) has been high as shown in Figure 1. It peaked at 22.14% of GDP in 1978, though on average it was 9.46% of GDP between 1970 and 2000. The drastic drop in the gap after 1979 is a result of the high domestic saving accruing from the oil boom. This fall in the savings gap had a positive effect on both public and private capital formation starting from the early 1980s. The subsequent reduction in the gap after 1986 was due to the rapid fall in investment resulting from the economic crisis. Both public and private capital formation fell drastically during this period (Figure 1). The existence of a savings gap throughout the study period indicates how Cameroon has relied on foreign resource flows to realize its investment requirements. Such resources come to supplement domestic savings and relieve the liquidity constraint. They have therefore been identified as one of the factors favouring domestic investment and growth in developing countries.

**Figure 1: Savings gap and fixed capital formation in Cameroon, 1970-2000 (% of GDP)**

The low level of domestic savings is likely to remain so, mainly because of low incomes, as well as weak institutional capacity. Equally, the capacity to generate larger volumes of foreign exchange from exports is likely to remain low for as long as Cameroon remains dependent on the export of a few primary commodities. This implies that Cameroon will still have to rely on resource inflows (both official and private) to finance its development. Other things being equal, these resources are expected to close the resource gap, and thus stimulate investment and economic growth.

According to the UNECA (2001) and the World Bank (2001b), if the 7% average annual growth rate needed to reach the MDG target of reducing poverty by half by 2015 is to be met, domestic investment will have to be increased by 50% and aid by 20%. But net official flows to Cameroon have been falling since 1995 to reach just 4.22% of GDP in 2000. Net private flows were 5% of GDP in 1990 and remained negative for most of the 1990s. Given Cameroon’s low saving rates, it is important to understand how resource inflows can translate into capital formation.
The main issue here is not only that the quantity of resource flows into Cameroon has been declining but also that such resource inflows have become increasingly volatile. The literature raises questions about the volatility of resource flows to developing countries and how this can affect economic performance. The volatility of official flows affects fiscal behaviour, for example, and lowers both public and private investment according to Lensink and Morrissey (1999). Aid flows are equally reported to be more volatile than domestic fiscal revenues and thus pose challenges for short-term fiscal management (Bulíø and Hamann, 2001; Gemmell and McGillivray, 1998). Private capital flows are also known to be volatile, especially portfolio flows and other short-term debts as was the case during the Asian crisis (Loungani and Razin, 2001). This feature of resource inflows can indirectly offset some of their beneficial effects on both investment and growth. It is therefore important not only to examine the effect of resource inflows on investment, but also how the volatility of such resources impacts on public and private investment.

For Cameroon, the aggregate resource inflow volatility index (including export revenue) was above 3.5 (for the two methods we use to compute the index in this paper as shown below). We could not obtain aggregate volatility indexes in the literature to compare our results, but we disaggregate our inflow variables and calculate the volatility of official flows for which we could find some comparable indexes in the literature. Our index for official flow volatility is 1.20 (an average of our two indexes). Gemmel and McGillivray (1998) had 0.99 for developing countries (between 1976 and 1994), while Collier (1999) had 0.35 for 39 African countries (1970-1995). A comparison of these indexes reveals that aid flows to Cameroon are more volatile than the average for Sub-Saharan Africa, and also that for developing countries.

As we show later in the paper, official flow volatility in Cameroon is high, but much lower than that of export revenue. Aggregate resource inflow volatility is expected to have a negative impact on the economy. Figure 2 shows how aggregate inflow volatility has evolved with both public and domestic private fixed capital formation. Total inflow volatility was high in the second economic phase (1978-1986), and it was during this period that domestic private capital formation started its downward trend. Public capital formation also started declining after only a few years. That was the beginning of the economic crisis. A more systematic relationship is established between volatility and fixed capital formation by the econometric analysis.
This paper thus attempts to investigate whether resource inflows, and especially resource inflow volatility, have any significant effect on domestic investment (both public and private) in Cameroon. First, we break down inflows into official, private (FDI and others) and export revenue in order to see how differently they affect domestic investment. Second, we examine how some inflow components can reduce or exacerbate the impact of inflow volatility on domestic investment. Finally, we try to see whether the various inflow volatilities offset or reinforce each other, and how they each contribute to total inflow volatility.

The rest of the paper is organized as follows: Section 2 compiles some stylized facts on the evolution of capital formation (both public and private), the various components of resource flows and real GDP during the various economic phases identified. Section 3 discusses the theoretical and empirical literature, and Section 4 presents the theoretical framework and the specification of the estimable model. The method of estimation is examined in Section 5, which also defines the variables and provides the source of the data used. Section 6 summarizes the empirical results, while Section 7 draws conclusions and makes some recommendations meant to improve the impact of resource inflows on domestic investment.

In this section, we divide the recent economic history of Cameroon into four subperiods starting from 1970. The division is a function of major economic events witnessed by the country or some major economic policy changes made by the government and how both investment and resource inflows evolved.

The pre-oil era (1970-1977)

During this subperiod, the primary sector especially agriculture was the mainstay of the economy. It was the principal source of economic growth, employment and foreign exchange earnings for the economy through the export of primary crops like cocoa, coffee and cotton. Average annual export revenue for the period was 132.72 billion CFA francs, representing 26.76% of GDP. Net official capital flows were an average of 5.35% of GDP, while net private flows represented 3.87% (FDI being only 0.56%). The need for resource flows was quite high at this time, as the savings-investment gap was really important. It peaked at 22.14% in 1978, although the annual average for this period was 9.14% of GDP. Real GDP grew at an average of 4.42% per year during this period, due essentially to the agricultural sector. (Refer to Table 1 for the details.)
As far as capital formation was concerned, the government’s share as a ratio of GDP was low as it averaged just 2.41% per year for the period. The domestic private sector was higher and stood at 15.01% of GDP a year. Public fixed capital formation was less than 13% of total fixed capital formation during this subperiod. This was a continuation of the colonial economic policy where government investment was concentrated on basic infrastructure like road and rail transport.

The oil boom era (1978-1986)

As oil became the main source of foreign exchange the economy witnessed an important shift. The share of the secondary sector (including mining) rose from 19% in the previous period to 28%. Real GDP rose rapidly at an average annual rate of 8.3% the highest throughout the study period. The contribution of the oil sector to government revenue moved from 9% in 1980 to 41% in 1985. Total export revenue increased more than threefold to an average of CFAF730.49 billion. The share of export revenue in GDP consequently increased to 31.50%. In relation to the previous period, net official flows more than tripled to 80.04. FDI also increased substantially, but other private flows were on the decline (-1.93% of GDP) against 5.39% in the previous period.

With resources from the oil sector and other inflows, the government increased its capital expenditure. Public enterprises like railway, urban transport, air transport and shipping were created and regularly supported with government subsidies. Government investment was not limited to physical infrastructure, but also to the manufacturing sector of the economy, especially in agro-industrial complexes like SOCAPALM (production of palm oil), CAMSUCO (sugar), CDC (palm oil, rubber and tea) and others. In fact, Cameroon had opted for the import-substitution industrialization strategy, whereby a strong industrial base was seen as the only means of spurring the other sectors of the economy and achieving economic progress. Public investment

<table>
<thead>
<tr>
<th>Period</th>
<th>GI</th>
<th>DPI</th>
<th>OF</th>
<th>FDI</th>
<th>OPF</th>
<th>XR</th>
<th>Real GDP Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970–1977</td>
<td>2.41</td>
<td>15.01</td>
<td>5.35</td>
<td>0.56</td>
<td>3.50</td>
<td>26.76</td>
<td>4.42</td>
</tr>
<tr>
<td>1978–1986</td>
<td>6.12</td>
<td>16.10</td>
<td>4.03</td>
<td>1.22</td>
<td>1.93</td>
<td>31.50</td>
<td>8.30</td>
</tr>
<tr>
<td>1970–2000</td>
<td>4.02</td>
<td>14.11</td>
<td>5.19</td>
<td>1.10</td>
<td>0.38</td>
<td>26.83</td>
<td>3.44</td>
</tr>
</tbody>
</table>

GI = gross government fixed capital formation, PI = gross private domestic fixed capital formation, OF = net official flows, FDI = net foreign direct investment, OPF = net other private flows, XR = export revenue, all as percentages of GDP.
Source: IMF (WEO) and OECD (DAC) databases, and author’s calculations.
consequently rose sharply during this period. The public investment GDP ratio stood at 6.12% annually, up from 2.41% for the previous period (almost tripling). It ended the period at about 10.50% of GDP. Domestic private capital formation did not benefit as much from the oil boom. The yearly average increased, however, to 16.10% of GDP within the subperiod, up from 15.01%. It was in this subperiod that domestic private capital formation reached its peak of 18.08% in 1981, and it was also during this subperiod that it started its long downward trend. Notwithstanding, about 73% of all capital formation in the country during these years was carried out by the private sector.

The era of economic crisis (1987-1993)

Continuous decline in the prices of Cameroon’s primary export commodities, especially crude oil, cocoa and coffee characterized this period. The immediate consequence was a fall in export earnings. The ratio of export revenue to GDP dropped to 18.71, down from 31.50 in the previous period. Real GDP growth took a downward trend and was negative throughout the period, with an annual average of -3.99%. Economic activity shrank in most areas, especially in construction and public works, but also in the production of cash crops like coffee and cocoa. The real effective exchange rate is also reported to have grossly appreciated during this period by some 40% (Ghura, 1997) owing especially to the appreciation of the French Franc. The fiscal balance, which was positive during the previous period, became negative and averaged more than 6% of GDP.

The deficit was financed from external borrowings. Net official flows more than doubled to CFAF160.89 billion compared to the previous period. This was a consequence of the structural adjustment reforms Cameroon agreed to with the Bretton Woods institutions. On adoption of these measures, Cameroon signed the first standby accord with the International Monetary Fund (IMF) in 1988 worth SDR 62 million. This was followed by a rescheduling of debt by the Paris Club and the first structural adjustment lending (SAL) from the World Bank worth US$150 million in 1989 (World Bank, 2001a). The debt stock rose rapidly as Cameroon accumulated both domestic and external arrears. Unlike the official capital flows, the gloomy economic environment had a serious negative impact on private capital flows. FDI declined but remained positive, while “other private capital flows” were more seriously affected. Their average for the period was negative (-2.28% of GDP). In fact, net private capital flows were negative for most of the period, meaning that more private capital was going out of the country than was flowing in. This phenomenon of capital flight has been reported in several sub-Saharan African countries, and Ajayi (2000) observes that among other effects, it reduces the rate of capital accumulation.

Capital formation suffered from the economic crisis as well. The huge official inflows did not prevent the public investment GDP ratio from plummeting to an annual
average of 5.81%. The ratio started the period (1987) at 11.04% and ended (1993) at 1.82%. The adjustment programme actually discouraged the state from engaging in any productive activity. Domestic private capital formation was similarly strongly hit by the crisis. Its ratio with respect to GDP declined to an annual average of 11.22%, but fell below 10% in some years, down from more than 18% in 1981, a situation that accounts for the massive outflow of capital (net outflow of more than CFAF30 billion annually). The morose economic environment created uncertainty not only among foreign investors, but also among local investors who preferred to keep their resources more securely out of the country.

The post-devaluation era (1994-2000)

Given the magnitude of the macroeconomic imbalances, it became clear by the end of 1993 that internal adjustment alone had not been sufficient to put the economy back on its rails. The adjustment had failed to restore external competitiveness, as nominal domestic prices showed considerable downward rigidity. Similar circumstances prevailed throughout the CFAF zone, and to remedy the situation, the CFAF which was pegged to the French Franc in 1948 was reluctantly devalued by 50% in January 1994. Devaluation was seen as the last attempt to bring the economy out of the crisis, as it was believed that the real exchange rate was highly over-valued.

Important financial assistance accompanied reforms recommended by the international donor community. Net official flows almost doubled to CFAF 311.12 billion in 1994-2000 (6.89% of GDP), up from 4.78% for the previous period. The resources were meant to encourage the reform process and reduce the pains of adjustment. Devaluation had a similar positive effect on FDI, but other private capital flows remained sceptical of the economic environment, which was still not attractive enough to prevent capital flight and attract more private capital. The GDP responded positively and the export sector recorded strong gains as the devaluation improved the competitive position of the country. Real GDP growth turned round from an average decline of 3.99% during 1987-1993 to an average growth of 3.50% during 1994-2000. Export revenue jumped to CFAF1.3 trillion, a more than 100% increase from the preceding period. As a ratio of GDP, export growth was less spectacular, from 18.71% in the previous period to 26.33%.

Private domestic capital formation reacted positively to the incentive structure provided. In absolute terms, it increased to an annual average of CFAF648.02 billion, up from CFAF387.64 billion in the previous period. As a percentage of GDP, the response was not that vigorous, as it went from 11.22% to 13.42%. Private investors remained hesitant, as evidenced by the continuous private capital outflows. Public capital formation continued its downward trend, averaging only 1.39% of GDP against 5.81% for the previous period, and actually decreased from an average of CFAF208 billion to only CFAF68.31 billion. This can be partly explained by the downsizing of the public sector recommended in the structural adjustment package. The role of the government was now limited to creating a conducive environment for private sector investment. But a public investment-GDP ratio of less than 1.5% appears to be too low to create an appropriate incentive structure to attract private investment, especially
FDI. The dilapidated road infrastructure in the country is testimony of low government investment.

Overall, one fact that stands out very clearly is that in Cameroon, capital formation has essentially been carried out by the private sector even though recent performance has not been encouraging. More than 76% of all domestic capital formation between 1970 and 2000 has been private. The oil boom and the import-substitution policy notwithstanding, public capital formation never attained 50% of all capital formation. This is in contrast to a country like Nigeria, for example, where in 1976, public capital formation was three times that of the private sector (Busari and Fashanu, 1998). Cameroon depends increasingly on official capital flows, and to a lesser extent on FDI flows. The performance of the other private capital flows has been disappointing. Indeed, for 11 consecutive years (1989 to 1999), net other private capital flows were negative. Cameroon’s problem is therefore not limited only to attracting foreign capital, but also to preventing massive capital flight. The evolution of official and private capital flows (FDI and others), and export revenue is presented in Figure A1 of the Appendix.
3. Literature review

Resource inflows and investment: A review of the theoretical literature

Much is in the literature on the impact of various forms of resource inflows on the economic performance of the recipient economy. A majority of the studies examine the impact of inflows on growth, but more recently, the effect on poverty reduction has also become a subject of interest. Most of the studies acknowledge that inflows affect growth through their impact on investment (Gomanee et al., 2002; Lensink and Morrissey, 1999; Hansen and Tarp, 2000; Stordel, 1990). Resource inflows affect domestic investment differently depending on the type of inflows. In this paper, we examine how official flows, private flows and export earnings and their volatility are expected to affect domestic investment.

According to Bulio and Lane (2002) and Gomanee et al. (2002), poor countries lack sufficient resources to finance investment and import capital goods and technology. Aid to finance investment can directly fill the savings investment gap and, because it is in the form of hard currency, can fill the foreign exchange gap. As official flows are issued to government, they can also fund government spending and compensate for a small domestic tax base. On the other hand, shortfalls in official flows (unexpected and signs of instability) are most likely to be followed by a reduction in government spending, and sometimes by an increase in taxes, or both. Bulio and Hamann (2001) argue that a typical aid-receiving country that is unable to offset an unexpected non-disbursement of aid by borrowing, may resort to costly, and possibly inefficient, swift fiscal adjustments. Incomplete adjustment to the shortfall in aid is likely to crowd out private investment and/or create inflationary pressures. According to Bulio and Lane (2002), conditionality is a major source of aid volatility. This not only applies to the conditions attached by bilateral donors, but frequently, the requirement that aid recipients have the seal of approval of an on-track IMF-supported programme. Pallage and Robe (2001) add that highly volatile aid is obviously less beneficial to recipient countries than a similar mean level of aid delivered in a less volatile form.
Feldstein (1994) and the World Bank (2001b) argue that the relationship between private capital inflows and investment is complex and ambiguous. Access to foreign capital can allow one firm to increase investment, but that firm’s expansion may induce another to reduce investment or shut down completely. The composition of capital flow is important in determining the relationship between private capital flows and investment. FDI (which is less volatile) is expected to have a greater impact on investment and growth as it contributes to the spread of best practices in corporate governance and allows transfer of technology. It equally limits the ability of the local government to pursue bad policies that might hurt even domestic investors. On the other hand, portfolio flows and other private flows are driven by speculative considerations and are often very volatile. They are subject to reversals at the first sign of trouble, and consequently may not influence domestic investment (Loungani and Razin, 2001). The World Bank (2001b) adds that the relationship between private capital flows and investment may equally depend on the absorptive capacity of the domestic economy, which includes not just the macroeconomic policy framework but also political stability, the health of the financial system, the educational attainment of the work force, the quality of physical infrastructure, the efficiency of government services, and the degree of corruption.

Lensink and Morrissey (2001) argue that the volatility of private capital flows might be a reflection of underlying economic or political uncertainty in the economy, with its negative impact on investment and growth. The literature also notes that although FDI is less volatile than other private flows, it is possible that sudden changes in the volume of FDI inflows can have a destabilizing impact on the economy (Klein et al., 2001).

As far as export earnings instability is concerned, it is believed to increase uncertainty and reduce business confidence. According to Ghirmay et al. (1999) and Love (1989), export instability results in income instability, which makes estimation of expected returns on investment difficult, generating risks and uncertainty for entrepreneurs. In addition, government revenue is often directly linked to export revenue, implying that instability in the latter will lead to instability in the former and thus reduced public investment. Export instability may also affect investment through its impact on imports. This argument stresses the binding nature of the foreign exchange constraint facing many developing countries. It is widely accepted that growth in developing countries requires modern technological inputs often embodied in imported capital goods, as these countries lack any substantial domestic industrial and capital goods capacity.

Resource inflows and investment: A review of the empirical literature

Empirical studies have examined the relationship between investment and inflows, including aid, private inflows and export revenue. One strand of studies has looked at the relationship between aid and investment. Lensink and Morrissey (1999), Hansen and Tarp (2000), Dollar and Easterly (1999) and Feyzioglu et al. (1996) all find a positive relationship between aid and domestic investment. Dollar
and Easterly add that this relationship is only significant in a good policy environment. Feyzioglu et al. (1996) conclude that a dollar given in aid to developing countries causes government spending to increase by a dollar. Of this, roughly one-quarter is spent on capital expenditure. Nyoni (1997) reports that booms in aid inflows were marked by record highs in domestic investment in Tanzania. On aid volatility, the World Bank (2001b) affirms that aid works principally by increasing domestic investment, but that volatility in aid flows dampens domestic investment. Bulio and Lane (2002) and Gemmell and McGillivray (1998) show that aid is significantly more volatile than domestic fiscal revenues and thus poses challenges for short-term fiscal management. Lensink and Morrissey (1999) find that volatility of aid receipts affects fiscal behaviour and lowers both public and private investment.

A similarly wide range of empirical studies has examined the relationship between private capital flows and investment. These studies generally find a positive relationship between capital inflows and investment. Mishra et al. (2001) conclude from their analysis that a 1% increase in capital inflows to Africa boosts investment by more than 1%. The type of capital flow is important, however. Long-term capital flows (World Bank, 2001b) are strongly and positively related to domestic investment, while short-term flows have little or no such relationship. Further, whereas certain types of long-term flows, such as FDI, are clearly associated with increases in investment, the relationship between portfolio flows and investment, although typically positive, has been less robust. Feldstein (1994) finds that a dollar of capital inflows or outflows tends to be associated, respectively, with a one-dollar rise or fall in domestic investment. Lensink and Morrissey (2001) show that while FDI positively affects growth, FDI volatility has a consistent negative impact on growth.

The empirical literature on export earnings instability and investment is scanty. Much is written on the effect of export earnings instability on economic growth, although still maintaining that investment provides the link between the two (Stordel, 1990; Dawe, 1996). Other export instability and growth studies that find a negative relationship include Sinha (1999) and Gyimah-Brempong (1991). Among the studies that specifically examine the relationship between export earnings instability and capital formation are those of Dawe (1996), Stordel (1990) and Love (1989). Stordel, for example, estimates separate equations for each of the 12 developing countries selected, as he argues that investment behaviour is likely to vary slightly because of structural differences among the countries. His results show that fluctuations in export earnings negatively affect investment in 7 of the 12 countries in the sample. The relationship is particularly significant for those countries characterized by a small domestic market and a strong dependence on exports of very few primary commodities or unprocessed goods.

**Cameroon-specific studies**

To the best of our knowledge, only a few studies have been published on the determinants of investment in Cameroon despite its recognized impact on economic growth. Some of these papers are: Mbanga and Sikod (2001), Zeufack (1997) and Fielding (1995).
Zeufack (1997) uses firm-level data to examine the effect of high demand uncertainty on the investment behaviour of local and foreign private firms in Cameroon. He uses a panel of 68 manufacturing firms from the period 1988/89 to 1991/92 representing 16% of the firms in the sector. The sample is divided into 36 local and 32 foreign private enterprises. He uses a fixed effect double-within investment model. The anticipated effective production level of the firm is used to measure demand uncertainty. The results show that demand uncertainty negatively affects investment, and that this is linked to the ownership structure of the firm. Foreign private investors are more sensitive to demand uncertainty than their domestic counterparts. The other significant determinants of private investment are profitability and lagged capital stock. The similarity between Zeufack’s paper and ours is that he shows the impact of demand uncertainty on the investment behaviour of local and foreign entrepreneurs. But while he focuses on the effect of demand uncertainty on firms (micro-level), we are looking at uncertainty resulting from variability of foreign resource flows at the macroeconomic level. We do expect to have similar results, however a negative relationship between uncertainty resulting from inflow volatility and domestic capital formation.

Fielding (1995) sets out to verify the assertion by Devarajan and de Melo (1987) that the saving of Cameroon oil revenue in American banks was a wise decision as it kept the stock of credit to the economy low, thus avoiding a spending boom and an appreciation of the real exchange rate (Dutch disease). He uses a financial repression investment model applying cointegration analysis. After showing that investment significantly depends on bank credits, he goes further to calculate the real rate of returns for keeping oil revenue out of the country and making it available at home for domestic credit. The real rates of return are 23% and 36%, respectively. Thus his conclusion that directing the oil revenue towards domestic investment would probably have been a better policy than using it to buy foreign assets. Fielding limits his study to the inflow of oil revenue. The effect of the inflow of oil revenue might not even be felt if this is more than compensated by the inflow of official assistance and private capital flows or other export revenues, excluding oil. Therefore, an analysis of the effect of oil revenue (even export revenue) on the domestic economy should take into consideration the other types of inflows. Unlike Fielding, we try to show that other resource flows (and not only export earnings) influence domestic investment, and that the volatility of such flows might also be important.

Mbanga and Sikod (2001) aim at showing that debt and debt-service payments (resource outflows) are deleterious to investment. Using ordinary least squares, they estimate a reduced-form investment function for both public and private investment with time series data from 1970 to 1998. They find that debt and debt-service payments harm private investment, while the internal debt burden and external debt service negatively affect public investment. Ndikumana (2000) finds similar results for private investment in sub-Saharan Africa. Our aim in this paper is to see whether these resources promote investment when they flow into the country. That is, to establish that while outflows harm investment, inflows promote investment. Unlike Mbanga and Sikod, we are concerned not only with official flows, but also with private flows and export earnings.
14

4. Theoretical framework and specification of the model

Modelling domestic private fixed capital formation

The difficulties in applying a strict neoclassical investment model in developing countries have been outlined in the literature (see for example Blejer and Khan, 1984; Wai and Wong, 1982). We present here a modified version that draws substantially from the works of Stordel (1990), Blejer and Khan (1984), and Wai and Wong (1982). The model has been modified to place greater emphasis on the effects of resource constraints facing firms in Cameroon and other developing countries. It is built around a partial adjustment mechanism that explains capital formation as follows:

\[ K_t - K_{t-1} = I_t = \hat{\alpha}_t (K_{d,t} - K_{t-1}) \]  

(1)

where \( I_t \) is net investment, \( K_{d,t} \) is the desired capital stock, \( K_{t-1} \) is the capital stock of the economy at the beginning of the period \( t \), and \( \hat{\alpha}_t \) is an adjustment coefficient that is allowed to vary over time. \( K_{d,t} \) and \( \hat{\alpha}_t \) are both endogenously determined. The first results from the optimization of the capital stock and the second reflects the optimal adjustment path leading to the desired capital stock level. \( \hat{\alpha}_t \) is assumed to vary systematically with economic factors that influence the ability of private investors to achieve the desired level of investment. Equation 1 says that change in actual capital stock will respond only partially to the difference between desired \( K \) and past values of \( K \). In any given period a desired level of capital may not be completely realized (as actual capital in the next period) because of technical and procedural constraints.

Also, rigidities in the financial markets may exert a significant influence on the process of adjustment to \( K_{d,t} \). The low level of development of these markets adds importance to the need for external financial resources for investment purposes. Stordel (1990) notes that the principal constraint to investment in developing countries is the
quantity of financial resources rather than their costs. We therefore assume that the rate of adjustment is constrained not only by the quantity of local bank credit to the private sector \((CRP)\), but also by the quantity of resources flowing into the country. These resources can be broken down into official flows \((OF)\), foreign direct investment \((FDI)\) and other private flows \((OPF)\), and export revenue \((XR)\). The adjustment coefficient is then given as:

\[
\hat{a}_t = f(CRP_t, OF_t, FDI_t, OPF_t, XR_t)
\]

(2)

Bank credits are said to be an important source of financing investment for enterprises in developing countries in which equity financing is not yet developed. Where financial markets are repressed, credit policy affects investment directly through the stock of available credit. The positive impact of credit availability on investment has been confirmed in many empirical studies (Blejer and Khan, 1984; Wai and Wong, 1982; etc.).

There are a number of channels through which \(OF\) affect private investment though they are delivered essentially to government. First, \(OF\) improve infrastructure, as they are very often meant for public capital expenditure. And public investment has been shown to crowd in private investment. Second, aid flows can lower the rate of taxation as they make up for part of government revenue. Gemmell and McGillivray (1998) show that for some developing countries, increased aid precedes (Granger-causes) tax reductions. Such reductions lower the tax constraint on private investment. The third possible channel through which aid flows can influence private capital formation is their effect on government borrowing from the financial sector. Less aid may increase public borrowing and consequently crowd out private sector borrowing, especially in a system of credit rationing where public liquidity requirements are given priority. Fourth, aid conditioned on the level of reform improves the business environment for private investment. Dollar and Easterly (1999) show that in a good policy environment, aid crowds in private investment. Finally, increased inflows may lead to an appreciation of the currency \((Dutch disease)\). This has a positive effect on investment as the import of capital goods becomes cheaper, especially in developing countries with no capacity to produce most of the capital goods required. \(OF\) therefore help reduce a number of constraints to private investment, thus facilitating adjustment to the desired capital stock.

The channels through which \(XR\) affects private capital formation are similar to those of \(OF\) as both come in the form of additional foreign exchange. Imports are the primary source of machinery, equipment and other essential items for investment, and export earnings and aid are the principal determinants of the capacity to import. Export revenue is an important component of government revenue in Cameroon. Increased \(XR\), as was the case with \(OF\), can contribute to improve infrastructure, lower taxes, reduce public borrowing and appreciate the currency. The consequence is increased private investment through the adjustment coefficient as discussed above.

As far as private capital flows \((PF)\) are concerned, their impact on domestic private capital formation is ambiguous, as noted by Feldstein (1994) and the World Bank (2001b). Access to international bank loans will permit local firms to purchase equipment for investment. Firms that cannot raise enough funds locally will turn
to the international financial market. But the expansion of some firms with access
to international financial market may push other firms to reduce investment or shut
down completely. Secondly, PF in the form of FDI, is expected to impact on domestic
private investment through the spread of best practices, transfer of technology and
subcontracting to local firms. But increased FDI can also harm domestic investment
as local firms cannot compete with huge multinational corporations and are forced to
close down. It is therefore difficult to predict the sign of the effect of PF (both FDI
and other private flows) on the coefficient of adjustment, and consequently on domestic
private investment.

Resource inflows are important for private capital formation, but the manner in
which these resources are delivered is equally important, and can to a large extent
determine their effectiveness in influencing investment. It is generally accepted
in economic literature that the volatility of economic variables affects economic
performance. We therefore assume that the volatility of the various inflow sources
has an influence on the process of adjustment of the capital stock to the desired level.
The coefficient of adjustment is then given as:

\[ \hat{\alpha}_t = f(CRP_t, OF_t, FDI_t, OPF_t, XR_t, OFV_t, FDIV_t, OPFV_t, XRV_t) \] (3)

where \( OFV_t, FDIV_t, OPFV_t, \) and \( XRV_t \) are the volatilities of official flows, FDI, other
private flows and export revenue, respectively.

Unexpected shortfalls in aid (signs of instability) are likely to be followed by swift
and possibly inefficient fiscal adjustments. This can lead to a reduction in government
spending, especially investment expenditures, which are associated with lesser political
and social risk than recurrent expenditures. The positive influence of government
investment on private investment is thus reduced. If the government fails to cut
expenditure, it may increase taxes or borrow from the domestic market. An increase in
taxes will reduce profit prospects and consequently private capital formation. Moreover,
government borrowing will crowd out private investors. Therefore, the volatility of
official flows \( (OFV) \) is expected to reduce the speed of adjustment.

The volatility of private capital flows has a negative effect on investment, the
Asian crisis of the late 1990s being a good example. It is also argued that the volatility
of private capital flows might be a reflection of underlying economic or political
uncertainty in the economy, which affects foreign as well as domestic investors.

As far as export revenue volatility is concerned, it is believed to increase
uncertainty and reduce business confidence. It leads to income instability, which
makes estimation of expected returns on investment difficult, generating risks and
uncertainty for entrepreneurs. On the other hand, \( XRV \) can have a positive effect on
savings (precautionary motives). The higher savings might have a positive influence
on investment. Secondly, government revenue is often directly linked to export
revenue implying that instability in the latter will lead to instability in the former
and thus reduced public investment. And public investment is known to complement
private investment. Thirdly, it was argued above that export revenue is important for
import of capital goods. Volatility of export revenue will be transmitted to imports
and consequently to investment. The effect of \( XRV \) on the adjustment coefficient, and
consequently on domestic private capital formation, cannot be ascertained in advance,
but only after empirical analysis.
In addition to these variables, which stress the resource constraints facing firms in Cameroon, other factors are assumed to affect the coefficient of adjustment: Public investment, debt overhang, macroeconomic uncertainty and the real exchange rate (RER). Public investment (GI) in infrastructure like transport, communication, energy and irrigation can complement or crowd in private sector investment. Such projects tend to reduce the cost of production and raise the rate of return on private capital, thus increasing the speed of adjustment to the desired capital stock. On the other hand, public investment that results in large fiscal deficits will raise interest rates. This is expected to have a negative impact on the speed of adjustment and subsequently to crowd out private capital formation. Cameroon’s huge external debt (DEBT) is expected to have a negative effect on the adjustment coefficient, as investors perceive that future taxes may have to be increased so as to finance large external transfers to service the debt (problem of debt overhang). Such a perception raises uncertainties on future returns to investment.

Apart from the uncertainty created by the volatility of resource inflows, macroeconomic uncertainty is also understood to influence private investment. We measure macroeconomic uncertainty in this paper with the inflation rate. High and unpredictable inflation distorts the information content of relative prices and increases the risk of long-term investment. If inflation is anticipated, the cost of capital will rise, thus lowering investment. In an empirical study, Greene and Villanueva (1991) found that a high inflation rate has a negative impact on investment in a group of developing countries.

The RER plays an ambiguous role as it affects investment through several channels that operate in different directions. It affects investment adversely through the cost of imports of capital goods and its financial repercussions, and positively through its impact on exports. Cameroon imports a larger proportion of its investment goods. An over-valued RER will hurt domestic investment as it makes imports more costly. On the other hand, it will have a positive impact on export earnings, which are likely to increase investment. Unfortunately, we cannot include RER in the private investment equation because of insufficient data.

The coefficient of adjustment is now written as:

$$\hat{a}_t = f(CRP_t, OF_t, FDI_t, OPF_t, XR_t, OFV_t, FDIV_t, OPFV_t, XRV_t, GI_t, DEBT_t, INF)$$

This specification does not include all the determinants of the coefficient of adjustment found in the literature. One such variable is the user cost of capital, which is considered very important in the neoclassical framework. The user cost of capital is regularly measured in the empirical literature by the real interest rate. However, the pervasive role of interest rate controls and credit rationing render observed interest rates uninformative as to the true marginal cost of funds. A number of studies have failed to find any significant relationship between investment and the real interest rate (Jenkins, 1998; Mlambo and Oshikoya, 2001). We therefore include the quantity of financial resources, but not its cost in our investment equation. The cost of labour is also an important determinant of the coefficient of adjustment as it influences the cost of production, and consequently the profitability of investment. Unfortunately, data limitations preclude the inclusion of labour costs in Cameroon among our independent variables.
Following the accelerator model, the desired stock of capital is assumed to be proportional to expected output ($Q^e$):

$$K_d^t = f(Q^e)$$

(5)

An expected higher output by requiring more inputs will induce a higher desired capital stock.

Combining equations 1, 4 and 5 gives the expression for domestic private capital formation ($DPI$) that will be estimated as follows:

$$DPI_t = f(CRP_t, OF_t, FDI_t, XR_t, OFV_t, FDIV_t, OPF_t, XRV_t, CRG_t, DEBT_t, INF_t, Q^e)$$

(6)

Equation 6 constitutes the main model from which a number of variants will be tested. Interaction terms will be introduced to see how volatility influences the impact of the inflow and other variables on private investment.

**Modelling public capital formation**

Governments do not have the same objective of maximizing profits or optimizing a desired capital stock as a private firm. Thus the modelling framework presented above for private investment does not provide a good motivation for public sector investment. The model for public investment that we specify here is an adaptation of a framework used by Jenkins (1998), which derives from models of financial constraints or repression.

Public investment will be financially constrained by domestic savings and resources flowing into the country:

$$GI_t = f(S_t, RF_t)$$

(7)

where $GI_t$ is public fixed capital formation, $S_t$ is gross domestic savings and $RF_t$ is net resource flows. Domestic savings are proportional to the amount of credit accorded to both the private and the public sectors by the banking system. $GI_t$ is therefore related to the amount of public borrowing from the banking sector ($CRG_t$). Because local borrowing is not sufficient to cover government deficits, government still has to rely on external resource flows. These resources take the form of official flows ($OF_t$) and export revenue ($XR_t$). Such foreign exchange flows are important as they help to cover government deficits and help finance government expenditure (including investment). Government investment is then specified as follows:

$$GI_t = f(CRG_t, OF_t, XR_t)$$

(8)

Apart from the quantity of resources flowing into a country, the volatility of such flows can also be important in determining public investment. Shortfalls in official flows (either expected or unexpected) are most likely to be followed by some fiscal adjustments, either a reduction in government spending or an increase in taxes or borrowings. An unexpected reduction in public spending is more likely to affect capital
than consumption expenditure. The political and social costs of curtailing consumption expenditure may be too high for the government to bear. The volatility of official flows (OFV) is therefore more likely to harm public investment.

Government revenue is often directly linked to export revenue in the form of export taxes and royalties from the mining sector of the economy. Export revenue volatility (XRV) will likely lead to volatility in government revenue and thus reduced public investment. Debt payments by the government reduce the amount of money available for government expenditure, including investment expenditure. An increasing debt burden is thus expected to have a negative impact on government investment. In the same manner, if the government allocates more of its expenditure to consumption, public investment will be reduced. Government consumption (GCON) is therefore expected to influence government investment negatively. From this, our main model from which a number of variants will be estimated can be written as shown in Equation 9:

\[ G_{It} = f(CRG_{\tau}, OF_{\tau}, XRV_{\tau}, DEBT_{\tau}, GCON_{\tau}) \]  

(9)
5. Estimation issues, data sources and variable measurement

Some estimation issues

A critical assumption of ordinary least squares (OLS) is that there is zero correlation between the error term and any explanatory variable. If this is violated, the latter is endogenous; OLS estimates will not be consistent and instrumental variable (IV) techniques are required. In this study, we use the Hausman test to determine if our regressors are endogenous (especially the inflow variables). A test is necessary, as Pindyck and Rubinfeld (1997) note that if there is endogeneity, OLS will generate inconsistent estimators, while IV will provide both consistent and efficient estimators. On the other hand, the use of IV in the absence of endogeneity leads to consistent but inefficient estimators, while OLS gives both consistent and efficient estimators. Another concern here is that IV estimates tend to be sensitive or not robust to the choice of instruments. This reinforces the need for an endogeneity test, as the IV method may not be required. Lensink and White (1999), Burnside and Dollar (2000), and Dalgaard et al. (2002) test for the endogeneity of aid in growth regressions and find that the OLS estimates do not deviate significantly from IV estimates.

In order to carry out the Hausman specification test, we run two OLS regressions. Let us assume that we are estimating an investment function, and one of the regressors $X$ is suspected to be endogenous. In the first regression, we regress the suspect variable on the remaining regressors and instruments (the reduced form) and retrieve the residuals. Then in the second regression, we estimate the investment equation including the residuals from the first regression as an additional regressor. If the coefficient on the residual regressor is not significantly different from zero, then $X$, the suspect variable is not endogenous. OLS estimates will be consistent. Otherwise, we will use IV. The “fitted” values of aid (from the reduced form equation) will then replace $X$ in the investment equation. Fitted $X$ is not correlated with the disturbance term. IV should now provide consistent and efficient estimators.

We avoid spurious regression that might result from running regressions with non-stationary variables by first studying the time series characteristics of all the variables. A
spurious regression will indicate a statistically significant relationship between variables in the model, when in fact this is just evidence of contemporaneous correlation. The augmented Dickey Fuller (ADF) test will be used for this investigation.

If the unit root test reveals that our variables are non-stationary, we will test for cointegration. In a regression involving non-stationary variables, spuriousness can only be avoided if a cointegrating relationship is established between the variables. Therefore, if two or more variables can be linked together to form an equilibrium relationship spanning the long run, then even though the variables themselves may contain stochastic trends they will nevertheless move closer over time and the difference between them will be stable. To test for cointegration, we run our regressions and apply the ADF test to the residuals. If the residuals are stationary, then we conclude for cointegration of variables used in the model.

To test the possibility of various inflow volatilities offsetting (counteracting) or complementing each other, we calculate their correlation coefficients. A negative correlation coefficient will imply that inflows counteract each other and consequently reduce the negative impact on investment. A positive coefficient, on the contrary, implies that inflows move together, reinforcing shortfalls and windfalls. The importance of the correlations will be judged by the significance of the correlation coefficients at the conventional levels (1, 5 and 10%). Gemmell and McGillivray (1998) use the correlation coefficient for a similar analysis, while Collier (1999) prefers the covariance.

We probe further into the interrelationship between the various inflows by examining whether the effectiveness of an inflow in influencing investment is affected by the volatility of the other inflows. We use interaction terms for this purpose.

**Data sources and definition of variables**

The main data source for this study is the IMF’s World Economic Outlook (WEO) database. This has provided data for GDP, gross fixed capital formation (both public and private), foreign direct investment, export revenue and the debt stock. We subtracted FDI from net private capital flows to get our series for other private capital flows. Data on net credit\(^8\) to government and the private sector were obtained from World Bank sources. Data on net official flows (ODF) came online from the website of the Development Assistance Committee of the Organization for Economic Cooperation and Development (DAC/OECD). We use annual data from 1970 to 2000 for this study.

For the measurement of volatility, Gyimah-Brempong (1991) notes that there is no general agreement on the method of measurement. Some authors use more than one method of measurement so that their results are not dependent on any one volatility index. A number of ways of measuring volatility are found in the literature: Stordel (1990) proposes the use of a three-year moving average of the coefficient of variation. Dawe (1996) and Sinha (1999) use the absolute value of the deviations from a five-year moving average. Ghirmay et al. (1999) prefer the squared deviation from the exponential trend. Serven (1998) uses the generalized autoregressive conditional heteroscedasticity (GARCH) specification. Lensink and Morrissey (2001) estimate an
autoregressive equation, and obtain volatility as the standard deviation of the residuals. We use two volatility measures in this study so that our results are not dependent on one index.

The first volatility index of interest is that used by Lensink and Morrissey (2001). It is obtained by first estimating the following autoregressive equation:

$$y_t = \alpha_0 + \alpha_1 T + \alpha_2 y_{t-1} + \alpha_3 y_{t-2} + \alpha_4 y_{t-3} + e_t$$  \hspace{1cm} (10)

where $y_t$ is the variable of interest, $T$ the trend, and $e_t$ the error term. We use only two lags because of the smallness of our sample. The equation is estimated by OLS, and volatility is obtained as the standard deviation of residuals:

$$\text{Volatility I: } \hat{V}_{yt} = \text{STDEV}(\hat{e}_t)$$  \hspace{1cm} (11)

where $\hat{V}_{yt}$ is the volatility of $y_t$.

The next volatility measure we use is given as a three-year moving standard deviation of the variable of interest, given as:

$$\text{Volatility II: } \hat{V}_{yt} = \text{STDEV}(y_{t-1}, y_t, y_{t+1})$$  \hspace{1cm} (12)

Many studies on the effectiveness of aid in developing countries have used the conventional concept of official development assistance (ODA). ODA, as defined by the DAC/OECD, includes only concessional inflows, which convey a grant element of at least 25%. This definition fails to include non-concessional flows: Regular loans from the World Bank and the African Development Bank and the standby agreements and extended facility loans of the IMF. Our definition of aid in this paper is what the OECD/OECD refers to as official development financing (ODF), defined as the sum of the recipient’s receipt of bilateral ODA, grants, and concessional and non-concessional development lending by multilateral financial institutions, and other official flows for development purposes that have too low a grant element to qualify as ODA. From this definition, ODF certainly includes overdrafts from the French treasury (for Cameroon and other CFA Zone countries). What is of interest to us is the total amount of official resource flows to the country, rather than their concessional or non-concessional nature. Therefore, aid or official flows in this paper mean ODF.

Since expected output ($Q^e_t$) is not observable, it has to be generated. We use the general distributed lag method in which expected output is a function of its past values as follows:

$$Q^e_t = g_0 + \hat{g}_1 \log Q^e_{t-1}, \quad t = [1, \ldots n].$$  \hspace{1cm} (13)

Given that our sample size is small, we use only the first three lags. Output is measured by real GDP.

Gross fixed capital formation is given as public and private. To obtain gross private domestic fixed capital formation, we subtracted FDI from total gross private fixed capital formation. Resource flows are given as net values: Net official flows and net private flows. All the variables are measured as ratios of GDP.
6. Empirical results

Volatility of resource inflows

Volatility indexes for aggregate inflow and its various components are presented in Table 2. The two parts of the table present the two methods of measuring volatility. The volatilities, given for each of the subperiods identified above, are obtained as the simple arithmetic mean of the volatility index for the given period. Considering the whole study period (1970-2000), export revenue was the most volatile of the inflows, followed by “other private flows”, and official flows. FDI is the least volatile of all the inflow components, a result that is consistent no matter the method of calculating volatility.

Concerning the economic phases, the most volatile period as indicated by aggregate inflow volatility was the post-devaluation era (1994-2000). It was also consistently the period with the highest volatility of official inflows. Official flows were equally highly volatile during the crisis period (1987 to 1993). These two subperiods were characterized by the adoption of the structural adjustment programme (SAP) and the tying of aid flows to the implementation of reforms (conditionalities). Much of the committed aid was delayed or not disbursed at all because of interruptions in the reform programme or backtracking. Aid delivery was consequently more volatile during this period. The 1970-1977 era is also robustly indicated as the period during which “other private flows” was most volatile. The other results are not robust to the method of measuring volatility.

Table 2 shows only the extent to which the various inflow components are volatile; it does not indicate the contribution of each inflow volatility to aggregate or total resource inflow volatility. To do this, we need to weight the volatilities with the various inflow levels. The importance of inflow volatility depends on the contribution of that inflow to total resource flows. An inflow might be very volatile, but if its share in total resource flows is insignificant it will contribute very little to aggregate volatility. Table 3 presents the weighted averages of the inflow volatilities.
The table shows that most of the volatility of aggregate resource flows is attributed to export revenue. Export revenue alone contributes more than 60% of all volatility (Volatility I).

Table 2: Volatility of inflows in the different subperiods

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>a) Volatility I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net official flows</td>
<td>0.897</td>
<td>0.456</td>
<td>1.377</td>
<td>2.242</td>
<td>1.168</td>
</tr>
<tr>
<td>Net FDI</td>
<td>0.396</td>
<td>0.460</td>
<td><strong>0.638</strong></td>
<td>0.153</td>
<td>0.445</td>
</tr>
<tr>
<td>Net other private flows</td>
<td><strong>2.229</strong></td>
<td>1.930</td>
<td>1.973</td>
<td>1.668</td>
<td>1.945</td>
</tr>
<tr>
<td>Export revenue</td>
<td><strong>4.019</strong></td>
<td>3.812</td>
<td>3.094</td>
<td>3.475</td>
<td><strong>3.447</strong></td>
</tr>
<tr>
<td>Total resource flows</td>
<td>1.459</td>
<td>3.869</td>
<td>3.775</td>
<td><strong>4.833</strong></td>
<td>3.696</td>
</tr>
<tr>
<td>b) Volatility II</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net official flows</td>
<td>0.978</td>
<td>0.661</td>
<td>1.491</td>
<td><strong>2.075</strong></td>
<td>1.239</td>
</tr>
<tr>
<td>Net FDI</td>
<td>0.521</td>
<td><strong>0.557</strong></td>
<td>0.548</td>
<td>0.158</td>
<td>0.461</td>
</tr>
<tr>
<td>Net other private flows</td>
<td><strong>2.466</strong></td>
<td>1.851</td>
<td>2.359</td>
<td>1.791</td>
<td>2.097</td>
</tr>
<tr>
<td>Export revenue</td>
<td>2.254</td>
<td><strong>2.599</strong></td>
<td>2.237</td>
<td>2.198</td>
<td><strong>2.348</strong></td>
</tr>
<tr>
<td>Total resource flows</td>
<td>2.291</td>
<td>4.004</td>
<td>3.391</td>
<td><strong>4.555</strong></td>
<td>3.661</td>
</tr>
</tbody>
</table>

The table shows that most of the volatility of aggregate resource flows is attributed to export revenue. Export revenue alone contributes more than 60% of all volatility (Volatility I).

Table 3: Weighted inflow volatilities

<table>
<thead>
<tr>
<th>Inflows</th>
<th>Net official flows</th>
<th>Net FDI</th>
<th>Net other PFs</th>
<th>Export revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volatility I</td>
<td>1.23</td>
<td>0.37</td>
<td>0.63</td>
<td>3.69</td>
</tr>
<tr>
<td>Volatility II</td>
<td>1.37</td>
<td>0.38</td>
<td>0.82</td>
<td>2.56</td>
</tr>
</tbody>
</table>

This is not surprising, as export revenue has already been shown to be the most volatile of all the resource flows, and more especially made up more than 75% of resource flows to Cameroon. Net official flow volatility is the next most important cause of aggregate volatility. It contributes more to aggregate volatility than “other private flows” despite being less volatile, because the level of official flows was more important than those of other private flows. FDI remains the least volatile and the smallest contributor to aggregate inflow volatility. The figures in the table for the two volatility indexes are different, but lead to the same conclusion about the contribution of the different inflow components to total inflow volatility. Export is the most important and FDI is the least important.
Correlation of components of inflow volatility

The objective of calculating the correlation coefficient between the volatilities of the different inflows is to examine their co-movement, i.e., to see whether they counteract (offset) or reinforce (complement) each other. Table 4 presents the simple correlation coefficients and their t-ratios in parentheses. A comparison of the t-ratios and the critical values shows no significant co-movement between any of the components of inflow volatility at the conventional levels (1, 5 and 10%). Most of the t-ratios are in fact less than unity in absolute terms, implying that most of the inflow volatilities are completely independent of each other neither complementing nor counteracting each other. This is good news in that the volatility of one inflow component is not reinforced by that of the other inflow. It is equally not very good news as the volatility of an inflow component cannot be offset by the volatility of the other components. There is therefore no relationship between the movements of the volatilities of the various inflow components. We will investigate (through the use of interactive variables) whether the inflow levels can reduce or eliminate the harmful effect of the volatility of some inflow components on domestic private investment and public investment.

Table 4: Correlations between the different components of inflow volatility

<table>
<thead>
<tr>
<th></th>
<th>Net official flows</th>
<th>Net FDI</th>
<th>Net other private flows</th>
<th>Export revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net official flows</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net FDI</td>
<td>0.024 (0.140)</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net other private flows</td>
<td>0.129 (0.653)</td>
<td>0.202 (1.311)</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>Export revenue</td>
<td>0.248 (1.498)</td>
<td>-0.280 (-1.6013)</td>
<td>0.130 (0.689)</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net official flows</td>
<td>-0.020 (-0.132)</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net FDI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net other private flows</td>
<td>0.087 (0.461)</td>
<td>0.198 (1.201)</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>Export revenue</td>
<td>0.259 (1.558)</td>
<td>-0.102 (-0.559)</td>
<td>-0.068 (-0.362)</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Note: The t-ratios are in parentheses. The 99, 95 and 90% critical values are, respectively, 2.763, 2.048 and 1.701.

Unit root tests

We carry out the unit root test using the ADF test (Table A2 in the Appendix). Most of the variables have a unit root I(1). The test results are not robust to the methods of computing volatility. Some of the inflow volatilities are I(0) under one method and I(1) under the other. We cannot therefore estimate the equations with the variables in their levels without the risk of obtaining spurious regressions except if they are cointegrated. To carry out the cointegration test, we run the regressions and test the residuals for unit roots. If the residuals are stationary, we conclude for the cointegrations of the variables in the regression. We still use the ADF test for our cointegration investigations.
Hausman test for endogeneity of regressors

As described above, we carry out a Hausman specification test to see if total resource flows and its various components are endogenous. One of the major problems in this exercise is the choice of instruments. The search for instruments becomes more arduous when dealing with single-country time-series studies, as is our case here. For this study, we have used as instruments the first three lags of the variables concerned. These are used as instruments by (among others) Dalgaard et al. (2002) and Hansen and Tarp (1999). The smallness of our sample explains the use of only the first three lags. Table 5 indicates that the instruments used are valid for all the variables instrumented, as all the F-statistics are significantly different from zero.

The results of the endogeneity tests presented in Table 6 show only the results of the residual regressors (coefficient and t-ratio). It is the significance of the residual regressor that determines whether the variable in question is endogenous. From the table, the residuals are all non-significant. Total resource flows and export revenue show some degree of endogeneity (reading the size of the t-statistic), but are not significant using the conventional confidence levels. All the inflow components are consequently treated in our regressions as non-endogenous (all the equations are estimated using OLS).

### Table 5: Tests of validity of the instruments

<table>
<thead>
<tr>
<th>Variable instrumented</th>
<th>F-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total resource flows</td>
<td>8.583**</td>
</tr>
<tr>
<td>Export revenue</td>
<td>6.942**</td>
</tr>
<tr>
<td>Official flows</td>
<td>3.099**</td>
</tr>
<tr>
<td>Foreign direct investment</td>
<td>2.596*</td>
</tr>
<tr>
<td>Other private flows</td>
<td>4.979***</td>
</tr>
</tbody>
</table>

Note: ***, **, and * indicate significance at 1, 5 and 10%, respectively. Eviews provides the probability values of the F-statistics. The F-statistic is obtained by regressing the instruments on the variable concerned. The first three lags of each variable are used as instruments, except for foreign direct investment, which had a significant F-statistic only when the first two lags were used.

### Table 6: Hausman test results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total resource flows</td>
<td>-0.245</td>
<td>-1.429</td>
</tr>
<tr>
<td>Export revenue</td>
<td>0.968</td>
<td>1.631</td>
</tr>
<tr>
<td>Official flows</td>
<td>0.286</td>
<td>0.154</td>
</tr>
<tr>
<td>Foreign direct investment</td>
<td>-0.320</td>
<td>-0.126</td>
</tr>
<tr>
<td>Other private flows</td>
<td>-0.455</td>
<td>-1.335</td>
</tr>
</tbody>
</table>

Note: The instruments used are the first three lags of each variable.

### Regression results for private domestic fixed capital formation

Here we present the results of our regression analysis on the relationship between gross fixed private domestic capital formation and resource inflows and their volatilities. The results for total resource flows are presented, followed by those
for its various components, as the literature holds that the effect of resource inflows on domestic investment is different depending on the type of inflow.

Table 7 presents the results for aggregate resource flows. As expected, the results show a strong positive relationship between total resource flows and private domestic capital formation. Total resource flows therefore supplement domestic savings and help spur private capital formation. The volatility of total resource flows has a negative and significant effect on private capital formation as hypothesized. When we interact total resource flows with the volatility of its different components, only export volatility and official flow volatility are significant and carry the expected sign. The volatility of the private flows does not seem to influence the impact of total flows on private fixed capital formation. Increased volatility of export revenue and official flows will therefore eliminate the positive effect of total flows on private domestic investment.

Credit to the private sector and expected output also have a positive significant influence on capital formation. The debt overhang, as expected, hurts capital formation. Government investment is not significant, and even carries a negative sign in all the regressions. Our proxy for macro instability (the rate of inflation) is not significant and has an unstable sign. The overall performance of the regression is good, as more than 65% (adjusted R-squared) of changes in private domestic capital formation are explained by the variables included. The variables are cointegrated and the test for the overall validity of the model (F-statistic) is significant at the 1% level.
We now examine separately the effects of the various inflow components and their volatilities on private domestic capital formation in Cameroon. The results for exports revenue very much mimic those of total resource flows (Table 8). It should be recalled that export revenue constitutes the bulk of total inflows, and equally contributes to most of the aggregate inflow volatility. While export revenue strongly and positively influences private capital formation, its volatility has a significant negative impact. When export revenue is interacted with the volatility of the other inflows, only the volatility of official flows has a negative and significant coefficient. The volatility of the private flows has no influence. Therefore, while export revenue promotes investment, its volatility constitutes a significant income risk to investors as it makes estimation of expected returns on investment difficult, and thus reduces investment. It might also affect the import of capital goods for investment.

### Table 7: Total resource flows and private domestic capital formation

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total resource flows</td>
<td>0.1860*** (4.5920)</td>
<td>0.2377*** (6.6310)</td>
<td>0.1974*** (5.0107)</td>
</tr>
<tr>
<td>Volatility of official flows × FDI</td>
<td>-0.0256*** (-3.9387)</td>
<td>-0.0243*** (-3.6878)</td>
<td>-0.0148* (-1.7855)</td>
</tr>
<tr>
<td>Volatility of official flows ×x</td>
<td>-0.0134** (-2.1886)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volatility of FDI ×</td>
<td>-0.0064 (-1.4512)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Credit to private sector</td>
<td>0.1333*** (2.9891)</td>
<td>0.1451*** (5.9312)</td>
<td>0.1695*** (3.3616)</td>
</tr>
<tr>
<td>Total outstanding debt</td>
<td>-0.0948 (-1.1783)</td>
<td>-0.0621 (-0.9569)</td>
<td>-0.1405 (-1.2969)</td>
</tr>
<tr>
<td>Public capital formation</td>
<td>0.0318* (1.8207)</td>
<td>0.0409** (2.7100)</td>
<td>0.0334* (2.0407)</td>
</tr>
<tr>
<td>Expected output</td>
<td>0.0008 (0.0251)</td>
<td>-0.0402 (-0.9895)</td>
<td>-0.0206 (-0.6558)</td>
</tr>
<tr>
<td>Inflation</td>
<td>8.5085*** (5.1996)</td>
<td>5.7984*** (4.2646)</td>
<td>6.5558*** (3.2756)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.7286</td>
<td>0.8555</td>
<td>0.9092</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.6579</td>
<td>0.7993</td>
<td>0.8378</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>10.2956***</td>
<td>15.2192***</td>
<td>12.7370***</td>
</tr>
<tr>
<td>F-statistic</td>
<td>-3.21867**</td>
<td>-3.1073**</td>
<td>-3.8682***</td>
</tr>
</tbody>
</table>

**Note:** For the regression analysis, we use the volatility index obtained as the standard deviation of the residuals from an autoregressive equation. The other volatility index did not produce significantly different results. The two are indeed highly correlated.

The dependent variable is gross fixed private domestic capital formation. The t-statistics in parentheses are based on heteroscedasticity-consistent standard errors. ***, ** and * indicate significance at 1, 5 and 10%, respectively.
Export revenue volatility can actually result from three sources: Fluctuations in export prices, export quantities and the exchange rate. Exporters in Cameroon have no influence on export prices (determined by international market conditions) or on the exchange rate (Cameroon belongs to a monetary union and cannot unilaterally change the exchange rate). They can only determine the quantity exported. Their influence on revenue volatility is thus very limited. A likely strategy should be to diversify to many export commodities. With a broad export base, there is a possibility that the volatilities of some of the numerous export prices can counteract or offset each other, thus reducing revenue volatility. Credit to the private sector, debt overhang, government capital formation (negative and insignificant) and inflation maintain the results obtained above for total resource flows. Expected output has a significant coefficient in only one of the three equations estimated. The diagnostic tests, as above, confirm the validity of the model and the variables used are cointegrated.

### Table 8: Export revenue and private domestic capital formation

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Export revenue ( )</td>
<td>0.1940*** (4.4608)</td>
<td>0.2290*** (4.3170)</td>
<td>0.1978*** (3.5557)</td>
</tr>
<tr>
<td>Volatility of</td>
<td>-</td>
<td>-0.1937** (-2.4822)</td>
<td>-0.2653** (-2.3533)</td>
</tr>
<tr>
<td>Volatility of official flows ×</td>
<td>-</td>
<td>-</td>
<td>-0.0130** (-2.2357)</td>
</tr>
<tr>
<td>Volatility of FDI ×</td>
<td>-</td>
<td>-</td>
<td>0.0425 (1.3331)</td>
</tr>
<tr>
<td>Volatility of other private flows ×</td>
<td>-</td>
<td>-</td>
<td>0.0047 (1.2001)</td>
</tr>
<tr>
<td>Credit to private sector</td>
<td>0.1708*** (3.5458)</td>
<td>0.1563*** (3.9616)</td>
<td>0.2008** (2.8517)</td>
</tr>
<tr>
<td>Total outstanding debt</td>
<td>-0.0192*** (-2.7883)</td>
<td>-0.0139* (-1.9754)</td>
<td>-0.0156* (-2.1108)</td>
</tr>
<tr>
<td>Public capital formation</td>
<td>-0.0366 (-0.3995)</td>
<td>-0.0040 (-0.0400)</td>
<td>-0.0437 (-0.2972)</td>
</tr>
<tr>
<td>Expected output</td>
<td>0.0151 (0.9296)</td>
<td>0.0076 (0.4946)</td>
<td>0.0284* (2.0298)</td>
</tr>
<tr>
<td>Inflation</td>
<td>0.0043 (0.1148)</td>
<td>-0.0195 (-0.4927)</td>
<td>0.0243 (0.6460)</td>
</tr>
<tr>
<td>Constant</td>
<td>9.3097*** (6.2836)</td>
<td>7.8956*** (4.6948)</td>
<td>6.8640*** (2.8908)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.6874</td>
<td>0.7583</td>
<td>0.8444</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.6089</td>
<td>0.6814</td>
<td>0.7472</td>
</tr>
<tr>
<td>F-statistic</td>
<td>8.7848***</td>
<td>9.8611***</td>
<td>8.6830***</td>
</tr>
<tr>
<td>ADF</td>
<td>-3.5160**</td>
<td>-3.9319***</td>
<td>-3.5979**</td>
</tr>
</tbody>
</table>

Note: The dependent variable is gross fixed private domestic capital formation. The t-statistics in parentheses are based on heteroscedasticity-consistent standard errors. ***, ** and * indicate significance at 1, 5 and 10%, respectively.

The results of the influence of official flows on private domestic capital formation are presented in Table 9. Against our expectations, official flows have a negative, though not significant, effect on private domestic investment. Official flows are normally expected to lead to lower taxes, improve infrastructure, reduce government borrowing, induce reforms and consequently encourage private investment. Their effect on private investment is indirect, however, as they are delivered to government and not private investors. Since official flows are largely used to finance government investment, we dropped public investment from the regressions with the hope of improving the
coefficient of official flows. This failed even to change the sign of the coefficient, which remains negative in all the equations estimated. Dollar and Easterly (1999: 571) found a negative coefficient when they regressed private investment on the aid/GDP ratio. Their coefficient became positive and significant when the aid/GDP ratio was interacted with an economic policy index. The implication was that aid would have a significant impact in a good policy environment.

Perhaps a further disaggregation of official flows into bilateral/multilateral and concessional/non-concessional might help unravel the relationship between official flows and domestic private investment, but this requires further investigation into the impact of the various categories of official flows. The volatility of official flows produced the expected negative and significant coefficient. When we interact official inflows with the volatilities of the other inflows, only the volatility of export revenue influences the relationship between official flows and private capital formation. The volatilities of the private flows are not important. As for the other determinants of private domestic capital formation, credit to the private sector remains a strong determinant. The negative effect of debt burden also continues to be significant. At least 50% (adjusted R-squared) of all variation in private capital formation is explained in all the regressions.

Another unexpected result comes from the relationship between FDI and private domestic capital formation (Table 10). Theory predicts that FDI will spill over to domestic firms in the form of best management practices, transfer of technology and even subcontracting. The FDI coefficient is negative, however, though not significant.

### Table 9: Official flows and private domestic capital formation

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net official flows ( )</td>
<td>-0.4028 (-1.2063)</td>
<td>-0.4782 (-1.4710)</td>
<td>-0.5183 (-1.1521)</td>
</tr>
<tr>
<td>Volatility of official flows</td>
<td>-</td>
<td>-0.6882** (-2.7693)</td>
<td>-0.6612* (-1.8666)</td>
</tr>
<tr>
<td>Volatility of export revenue ×</td>
<td>-</td>
<td>-</td>
<td>-0.0477* (-1.9784)</td>
</tr>
<tr>
<td>Volatility of FDI ×</td>
<td>-</td>
<td>-</td>
<td>0.1430 (0.4218)</td>
</tr>
<tr>
<td>Volatility of other private flows ×</td>
<td>-</td>
<td>-</td>
<td>-0.0356 (-0.7915)</td>
</tr>
<tr>
<td>Credit to private sector</td>
<td>0.2320** (2.7802)</td>
<td>0.1891** (2.7640)</td>
<td>0.2239** (2.6656)</td>
</tr>
<tr>
<td>Total outstanding debt</td>
<td>-0.0147* (-1.8792)</td>
<td>-0.0144* (-1.7933)</td>
<td>-0.0136* (-1.7707)</td>
</tr>
<tr>
<td>Expected output</td>
<td>-0.0275 (-0.6047)</td>
<td>-0.0736 (-1.3197)</td>
<td>-0.0040 (-0.0789)</td>
</tr>
<tr>
<td>Inflation</td>
<td>0.0644 (1.0487)</td>
<td>0.0737 (1.1319)</td>
<td>0.1424 (1.5087)</td>
</tr>
<tr>
<td>Constant</td>
<td>15.598*** (8.4944)</td>
<td>17.991*** (7.2108)</td>
<td>14.2085*** (5.4565)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.6011</td>
<td>0.6433</td>
<td>0.6844</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.5053</td>
<td>0.5320</td>
<td>0.5577</td>
</tr>
<tr>
<td>F-statistic</td>
<td>5.7083***</td>
<td>6.2689***</td>
<td>5.8734***</td>
</tr>
<tr>
<td>ADF</td>
<td>-2.7890*</td>
<td>-2.8768*</td>
<td>-2.7987*</td>
</tr>
</tbody>
</table>

Note: The dependent variable is gross fixed private domestic capital formation. The t-statistics in parentheses are based on heteroscedasticity-consistent standard errors. ***, ** and * indicate significance at 1, 5 and 10%, respectively.
This result seems to be validating the hypothesis that FDI from huge multinational firms might force local firms to close down. Some authors refer to this as the “market stealing” effect that is, foreign firms acquire market share at the expense of domestic firms and force them to shut down. FDI volatility has the expected negative sign, but is not significant. The interaction of FDI with the volatilities of the other inflows produces only one significant coefficient. Official flow volatility reinforces the negative relationship between FDI and domestic capital formation. Credit to the private sector and debt overhang remain robust as with the previous inflows. Public investment, inflation and expected output equally stay insignificant. The ADF test is significant for all the regressions. The explanatory power of the model is low and even falls below 50% (adjusted R-squared) for one of the regressions.

Table 10: Foreign direct investment and private domestic capital formation

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net foreign direct investment</td>
<td>-0.3886 (-0.5766)</td>
<td>-0.3929 (-0.5538)</td>
<td>-0.6103 (-0.7757)</td>
</tr>
<tr>
<td>Volatility of</td>
<td>–</td>
<td>-0.4667 (-0.5270)</td>
<td>0.1409 (0.1276)</td>
</tr>
<tr>
<td>Volatility of export revenue ×</td>
<td>–</td>
<td>–</td>
<td>0.1308 (1.3966)</td>
</tr>
<tr>
<td>Volatility of official flows ×</td>
<td>–</td>
<td>–</td>
<td>-0.4768 (-2.0364)</td>
</tr>
<tr>
<td>Volatility of other private flows ×</td>
<td>–</td>
<td>–</td>
<td>-0.1589 (-1.4925)</td>
</tr>
<tr>
<td>Credit to private sector</td>
<td>0.2739*** (3.4887)</td>
<td>0.2546*** (3.8401)</td>
<td>0.2510*** (3.6587)</td>
</tr>
<tr>
<td>Total outstanding debt</td>
<td>-0.0283** (-2.4823)</td>
<td>-0.0306** (-2.4074)</td>
<td>-0.0280* (-2.0756)</td>
</tr>
<tr>
<td>Public capital formation</td>
<td>-0.1970 (-1.4302)</td>
<td>-0.1936 (-1.2414)</td>
<td>0.2095 (-1.1074)</td>
</tr>
<tr>
<td>Expected output</td>
<td>0.0427 (1.3267)</td>
<td>0.0395 (1.2946)</td>
<td>0.0484 (1.3832)</td>
</tr>
<tr>
<td>Inflation</td>
<td>0.0831 (1.1223)</td>
<td>0.0812 (1.0732)</td>
<td>0.1034 (1.5796)</td>
</tr>
<tr>
<td>Constant</td>
<td>14.3842**** (14.9360)</td>
<td>14.834**** (10.6190)</td>
<td>13.690**** (7.7002)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.5544</td>
<td>0.5772</td>
<td>0.6699</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.4998</td>
<td>0.5131</td>
<td>0.5248</td>
</tr>
<tr>
<td>F-statistic</td>
<td>4.7013***</td>
<td>4.9361***</td>
<td>3.2481**</td>
</tr>
<tr>
<td>ADF</td>
<td>-2.9107*</td>
<td>-2.7330*</td>
<td>-2.6737*</td>
</tr>
</tbody>
</table>

Note: The dependent variable is gross fixed private domestic capital formation. The t-statistics in parentheses are based on heteroscedasticity-consistent standard errors. ***, ** and * indicate significance at 1, 5 and 10%, respectively.

Table 11 presents the results of the relationship between private domestic capital formation and “other private capital flows”. This variable has a positive and significant impact on private capital formation. Other private capital flows are made up essentially of international bank loans and less of portfolio flows because of the non-existence of a stock exchange in the country at the time. Despite being relatively high, the volatility of this variable is not significant in the regression results. Even though it has the expected negative sign, its share of total resource flows is so small that its volatility has no effect.
Volatility of Resource Inflows and Domestic Investment in Cameroon

on private capital formation. When other private capital flows are interacted with the volatilities of the other inflows, only official flows carry a significant coefficient. Credit to the private sector and debt overhang have a significant relationship with private capital as usual. Government capital formation, inflation and expected output are not significant. At least 51% of the variation of private capital formation is explained by the few variables included. The variables are equally cointegrated.

Table 11: Other private capital flows and private domestic capital formation

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net other private capital flows</td>
<td>0.1789*</td>
<td>0.1720*</td>
<td>0.1560*</td>
</tr>
<tr>
<td>Volatility of export revenue ×</td>
<td>–</td>
<td>-0.1217 -0.975</td>
<td>-0.1252 -0.4148</td>
</tr>
<tr>
<td>Volatility of official flows ×</td>
<td>–</td>
<td>–</td>
<td>-0.0243 -0.3990</td>
</tr>
<tr>
<td>Volatility of FDI ×</td>
<td>–</td>
<td>–</td>
<td>0.0602* -2.0919</td>
</tr>
<tr>
<td>Credit to private sector</td>
<td>0.2186** (2.7020)</td>
<td>0.2203* (1.9824)</td>
<td>0.2167* (1.7912)</td>
</tr>
<tr>
<td>Total outstanding debt</td>
<td>-0.0187* (-1.8576)</td>
<td>-0.0206* (-2.0336)</td>
<td>-0.0143 (-0.8191)</td>
</tr>
<tr>
<td>Public capital formation</td>
<td>-0.1781 (-1.6174)</td>
<td>-0.1497 (-1.1993)</td>
<td>-0.1250 (-0.7864)</td>
</tr>
<tr>
<td>Expected output</td>
<td>0.0309 (1.4877)</td>
<td>0.0447* (1.9525)</td>
<td>0.0491 (1.4348)</td>
</tr>
<tr>
<td>Inflation</td>
<td>0.0710 (1.1781)</td>
<td>0.0884 (1.4620)</td>
<td>0.0988 (1.6826)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.6229</td>
<td>0.6440</td>
<td>0.6780</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.5274</td>
<td>0.5326</td>
<td>0.5079</td>
</tr>
<tr>
<td>F-statistic</td>
<td>5.3580***</td>
<td>3.7651**</td>
<td>3.5894**</td>
</tr>
<tr>
<td>ADF</td>
<td>-2.6532*</td>
<td>-2.7583*</td>
<td>-2.7154*</td>
</tr>
</tbody>
</table>

Note: The dependent variable is gross fixed private domestic capital formation. The t-statistics in parentheses are based on heteroscedasticity-consistent standard errors. *** and * indicate significance at 1, 5 and 10%, respectively.

To summarize, an examination of the separate effects of the various inflow components on private domestic capital formation has been useful, as the various inflows do not affect private investment in the same way. Total resource flows significantly influence private domestic investment. When this is disaggregated, export revenue and “other private capital flows” have a significant impact on private domestic capital formation, but official flows and FDI do not. They even carry negative (though insignificant) coefficients. The volatilities of all the inflow components negatively affect private capital formation, except FDI volatility, which is not significant, but then we established earlier that FDI was the least volatile of all the inflows. When we interact the levels of inflows with the volatilities of the other inflows, it comes out that official flow volatility and export revenue volatility not only hurt private investment directly, they also affect the way total flows and other inflow components influence investment. Official inflow volatility significantly influences the behaviour of total resource flows, export flows and the private flows towards investment. Export volatility has the same
effect on total flows and official flows. A reduction in these volatilities will therefore have a direct positive effect on private investment, and will also increase the impact of the other inflows on investment.

The results of the other investment determinants are mixed. Credit to the private sector consistently and significantly influences private investment in Cameroon. This is a confirmation of the results of Ndikumana (2000) and Fielding (1995). Similarly, debt overhang is significantly harmful to private investment (a corroboration of results obtained by Mbanga and Sikod, 2001). Expected output is not consistent as it is significant only when the inflows are aggregated. Public investment and the rate of inflation appear consistently not related with private domestic investment. The overall performance of the private domestic investment model is satisfactory. At least 50% of the variation in private investment is explained by the independent variables included in the model. The only exception is with FDI, where the adjusted R-squared is below 50%. The ADF test shows that all the variables included in the model are cointegrated. The F-statistic is significant for all the regressions in the model.

Regression results for public fixed capital formation

For public fixed capital formation, we first examine the effect of total resource flows, before disaggregating this into official flows and export revenue. In addition to the resource flow variables, we examine the influence of banking sector credit to government, the debt burden and government consumption on public capital formation in Cameroon. Total resource flows have a positive and significant impact on government investment (Table 12). This was expected, as these flows provide the government with financial resources to carry out its investment projects. The volatility of these flows has a negative and significant effect on public capital formation. This was equally expected, as shortfalls in anticipated inflows can lead to abrupt and inefficient fiscal adjustments that will likely hurt public investment. In Cameroon, this effect is manifest in government projects that are uncompleted and abandoned because of lack of financial resources.

When total resource flows are interacted with the volatilities of official flows and export flows, we obtain negative and significant coefficients. These volatilities therefore counteract the positive influence of total resource flows on public investment. Credit by the banking sector to the government has no significant effect on government investment, but has the right sign. As expected, government consumption significantly hurts government investment. Public resources are used more for consumption than for investment. The debt burden has the expected negative and significant influence on public investment, a logical result since debt repayments deprive the government of resources for investment requirements. The explanatory power of these regressions is low, with only 32% (adjusted R-squared) of the changes of the dependent variable explained in the second regression. The other diagnostic tests are valid.
Table 12: Total resource flows and public capital formation

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total resource flows</td>
<td>0.1188* (2.0261)</td>
<td>0.1408* (2.0592)</td>
<td>0.1425* (2.1787)</td>
</tr>
<tr>
<td>Volatility of</td>
<td>-</td>
<td>-0.1202* (-1.9979)</td>
<td>-0.2391* (-1.1408)</td>
</tr>
<tr>
<td>Volatility of export</td>
<td>-</td>
<td>-</td>
<td>-0.0114* (-1.8013)</td>
</tr>
<tr>
<td>revenue ×</td>
<td>-</td>
<td>-</td>
<td>-0.0246** (-2.1763)</td>
</tr>
<tr>
<td>Volatility of official</td>
<td>-</td>
<td>-</td>
<td>-0.0246** (-2.1763)</td>
</tr>
<tr>
<td>flows ×</td>
<td>-</td>
<td>-</td>
<td>-0.0246** (-2.1763)</td>
</tr>
<tr>
<td>Credit to government</td>
<td>0.2342 (1.0091)</td>
<td>0.2479 (1.0944)</td>
<td>0.2983 (1.4088)</td>
</tr>
<tr>
<td>Total outstanding debt</td>
<td>-0.0467*** (-3.2441)</td>
<td>-0.0486 (-2.9860)</td>
<td>-0.0509*** (-3.7875)</td>
</tr>
<tr>
<td>Government consumption</td>
<td>-0.1415* (-1.7236)</td>
<td>-0.2229* (-1.9586)</td>
<td>-0.2667* (-2.0534)</td>
</tr>
<tr>
<td>Constant</td>
<td>12.1710*** (4.3034)</td>
<td>14.387*** (3.2508)</td>
<td>15.877*** (3.9894)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.4375</td>
<td>0.4698</td>
<td>0.5851</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.3443</td>
<td>0.3275</td>
<td>0.4238</td>
</tr>
<tr>
<td>F-statistic</td>
<td>4.4796***</td>
<td>3.0178**</td>
<td>3.6270**</td>
</tr>
<tr>
<td>ADF</td>
<td>-2.7618*</td>
<td>-3.3539**</td>
<td>-3.3084**</td>
</tr>
</tbody>
</table>

Note: The dependent variable is gross fixed public capital formation. The t-statistics in parentheses are based on heteroskedasticity-consistent standard errors. ***, **, and * indicate significance at 1, 5 and 10%, respectively.

Table 13 shows that the export revenue component of resource flows has a positive and significant effect on public capital formation. The volatility of export revenue has a negative and significant effect on government investment. Highly volatile exports might push the government to make swift and costly fiscal changes that harm public investment. An interaction of export revenue with official flow volatility produces a negative and significant coefficient. Volatile official flows will therefore affect the way export revenue promotes public investment. As with total resource flows, government credit is not significantly important. The debt burden and government consumption significantly hamper government investment activities. The measurement for the goodness of fit (adjusted R-squared) shows that less than 30% of the change in government investment is explained by the variables included in the model.

Table 13: Export revenue and public capital formation

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Export revenue</td>
<td>0.1591* (1.8566)</td>
<td>0.1666* (1.7728)</td>
<td>0.1696* (1.8695)</td>
</tr>
<tr>
<td>Volatility of</td>
<td>-</td>
<td>-0.1314* (-1.9985)</td>
<td>-0.0796* (-1.7866)</td>
</tr>
<tr>
<td>Volatility of official</td>
<td>-</td>
<td>-</td>
<td>-0.0232* (-1.8606)</td>
</tr>
<tr>
<td>flows ×</td>
<td>-</td>
<td>-</td>
<td>-0.0232* (-1.8606)</td>
</tr>
<tr>
<td>Credit to government</td>
<td>0.0775 (0.3331)</td>
<td>0.1085 (0.4310)</td>
<td>0.0563 (0.2255)</td>
</tr>
<tr>
<td>Total outstanding debt</td>
<td>-0.0463*** (-3.3127)</td>
<td>-0.0475*** (-3.3763)</td>
<td>-0.0399*** (-3.0845)</td>
</tr>
<tr>
<td>Government consumption</td>
<td>-0.2126* -2.0564</td>
<td>-0.2181* -2.0712</td>
<td>-0.2163* -1.9384</td>
</tr>
<tr>
<td>Constant</td>
<td>13.071*** (3.8369)</td>
<td>13.863*** (3.6953)</td>
<td>14.027*** (3.8223)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.3689</td>
<td>0.3768</td>
<td>0.4300</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.2918</td>
<td>0.2399</td>
<td>0.2813</td>
</tr>
<tr>
<td>F-statistic</td>
<td>3.7996**</td>
<td>3.7806**</td>
<td>3.8924**</td>
</tr>
<tr>
<td>ADF</td>
<td>-2.6738*</td>
<td>-2.8802*</td>
<td>-2.8759*</td>
</tr>
</tbody>
</table>

Note: Total resource flows here are obtained by summing official flows and export revenue. These are the only inflows expected to influence government investment directly. Private flows are excluded. The dependent variable is gross fixed public capital formation. The t-statistics in parentheses are based on heteroskedasticity-consistent standard errors. ***, ** and * indicate significance at 1, 5 and 10%, respectively.
Results of the influence of official flows on government investment in Cameroon are summarized in Table 14. They show a positive and significant influence of official flows on public capital formation. As with export revenue, official inflows provide the government with financial resources to carry out its investment projects. Official flow volatility is detrimental to public investment. The interaction of official flows with export volatility negatively affects public investment. Export volatility therefore damps the effect of official flows on public capital formation. As shown in Table 14, external debt and government consumption remain negative and significant, while credit to the public has no significant effect on government investment. The diagnostic tests mimic those in Table 14. The adjusted R-squared continues to be very small for the public investment regressions.

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net official flows (</td>
<td>0.3793 (1.9918)</td>
<td>0.5994* (2.0138)</td>
<td>0.6857* (1.7356)</td>
</tr>
<tr>
<td>Volatility of</td>
<td>-</td>
<td>-0.6191* (-1.9975)</td>
<td>-0.5984* (-1.7428)</td>
</tr>
<tr>
<td>Volatility of export revenue ×</td>
<td>-</td>
<td>-</td>
<td>-0.0586 (-1.4938)</td>
</tr>
<tr>
<td>Credit to government</td>
<td>-0.0851 (-0.3062)</td>
<td>-0.0277 (-0.1085)</td>
<td>-0.1251 (-0.4892)</td>
</tr>
<tr>
<td>Total outstanding debt</td>
<td>-0.0241** (-2.2270)</td>
<td>-0.0128* (-1.7920)</td>
<td>-0.0133* (2.0262)</td>
</tr>
<tr>
<td>Government consumption</td>
<td>-0.1197* (-1.9594)</td>
<td>-0.0886* (-1.8882)</td>
<td>-0.0558* (-1.7992)</td>
</tr>
<tr>
<td>Constant</td>
<td>8.6532*** (4.7838)</td>
<td>9.2086 (5.5521)</td>
<td>9.6975 (6.0954)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.3954</td>
<td>0.4470</td>
<td>0.4942</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.3139</td>
<td>0.3326</td>
<td>0.3598</td>
</tr>
<tr>
<td>F statistic</td>
<td>3.0564**</td>
<td>3.0504**</td>
<td>3.3938**</td>
</tr>
<tr>
<td>ADF</td>
<td>2.7113*</td>
<td>-2.6588*</td>
<td>-2.6510*</td>
</tr>
</tbody>
</table>

Note: The dependent variable is gross fixed public capital formation. The t-statistics in parentheses are based on heteroscedasticity-consistent standard errors. ***, ** and * indicate significance at 1, 5 and 10%, respectively.

To summarize, the results show that total resource flows and both its components (export revenue and official flows) positively and significantly influence public capital formation. They provide the government with the financial resources necessary to carry out its investment projects. The volatility of these resources consistently hurts public investment. What is more disturbing is that both export and official flow volatilities not only affect public investment, but actually negate the influence of official flows and export revenue, respectively, on public investment. There is therefore a possibility that volatility might actually make resource flows to have a detrimental effect on public investment. For example, aid promises can actually make the government initiate more projects than would have been the case without such pledges. Failure or delays in delivery can compromise the realization of such projects and even the abandonment of those begun.

Credit to the government consistently has no significant relationship with public investment. Such credits might have been used essentially for government consumption, while relying on external aid for investment. Aid generally targets investment, and not government consumption expenditure.
This raises the issue of aid fungibility. If donors restrict the use of aid funds on investment projects only, the government can cancel own-financed investment projects and borrow from the banking sector to finance its consumption. This provides an explanation for the significant and negative impact of government consumption on public investment. The Debt burden equally appears as a significant deterrent to public investment. This corroborates the results of Mbanga and Sikod (2001). Debt payments deprive the government of investment resources. The public investment model does not perform very well in terms of goodness of fit. In some of the regressions, the regressors included explain less than 25% of the changes in the dependent variable. This is however not very worrying as our objective was not to identify the determinants of public investment, but to examine the influence of resource flows and their volatility. The F-statistic is significant for all the regressions. The ADF test applied to the regression residuals reveals that all the variables included are cointegrated.
7. Summary and policy implications

Our main objective in this paper was to examine the effect of resource inflows and inflow volatility on domestic (both public and private) capital formation in Cameroon. This objective is set in the context of declining and volatile resource inflows, and also declining capital formation. The importance of capital formation to growth and poverty reduction is well documented in the literature.

The results indicate that resource flows to Cameroon are very volatile compared to the average for developing countries. The most volatile of the resource flows is export revenue, followed by other private flows, official flows and then FDI, in that order. The most volatile period among the four identified in the study is the post-devaluation period. These results are relevant to the method of computing the volatility index. The volatility of official flows is to a large extent responsible for the high aggregate volatility of this period. In order to assess the contribution of each inflow volatility to aggregate volatility, the volatilities are weighted by the inflow levels. Export revenue comes out as the prime mover of aggregate resource flow volatility, followed by official flows, other private flows and FDI in that order. A simple correlation analysis of the inflow volatilities shows no evidence of significant correlation between the volatilities. This implies that they can neither reinforce nor counteract each other.

In our regression analysis, we examine the influence of resource flows and volatility on both private domestic capital formation and public capital formation. First, concerning private domestic capital formation, total resource flows are very important. When this is disaggregated, only export revenue and other private flows significantly influence private domestic investment. Official flows and FDI show no significant relationship with private domestic investment. Aggregate inflow volatility significantly undermines private domestic investment, a result mirrored by the volatilities of export revenue, official flows and other private flows. FDI volatility is not significant.

An interaction of resource flows with volatilities shows that official flow volatility dampens the effectiveness of total resource flows, export revenue, FDI and “other private flows” in promoting private investment. Export revenue volatility has a similar effect on total resource flows and official flows. As concerns the other investment
determinants included in the model, credit to the private sector promotes private investment, while debt overhang is deleterious to private investment. Public investment and expected output do not appear important.

Concerning public investment, total resource flow is important. Its disaggregated components (export revenue and official flows) are also effective in promoting public capital formation. Aggregate volatility and the volatilities of export revenue and official flows are all detrimental to public capital formation. Official flow volatility reverses the positive influence of aggregate flows and export revenue on public capital formation. In the same way, export volatility overturns the effect of aggregate flows and official flows on public investment. Government consumption and the debt burden both have detrimental effects on public capital formation.

A number of policy suggestions come out of this study, with the aim of making resource flows more effective for promoting both public and private capital formation. There is need to raise exports, as export revenue is very important for both public and private investment. In order to reduce export volatility, the export base should be diversified so as to reduce over-reliance on a few primary commodities (like cocoa, coffee and rubber), especially as oil is becoming less important in export revenue. Attempts should be made to export more manufactured goods, especially to the central African subregion. Diversification is recommended as a remedy to export revenue volatility since Cameroon can neither change the export price nor the exchange rate (other causes of export revenue volatility).

Official flows can be made to have a significant effect on private investment by improving the policy environment. This follows from recent literature emphasizing the importance of policy for aid effectiveness. Government adherence to the conditions regularly attached to official flows can reduce their volatility. Donors are also called upon to reduce the extent of conditionality as recommended by the Paris Declaration (Paris High-Level Forum, 2005), as this undermines government policy and makes aid more volatile. This should make aid deliveries more predictable from aid commitments, and prevent recurrent suspensions and cancellations of aid promises. Coordination between the main bilateral and multilateral donors in the sequencing of aid deliveries can also reduce volatility. The advent of the poverty reduction strategy paper (PRSP) can be quite helpful. The ownership dimension of the PRSP means that compliance with conditionality should not be a major problem since Cameroon was actually at the origin of the strategy, with the strong backing of donors. Other donors (especially bilateral) should be brought on board to enhance the coordination of aid delivery.

The attraction of more private flows into the country (especially the “other private flows”) should promote domestic private investment. A well functioning and transparent stock exchange and a liberalized financial sector can be very helpful in this direction. To stem the volatility of private capital flows, government should avoid frequent and unanticipated policy changes, since foreign investors view them as symptoms of domestic policy deficiencies.
Notes

1 It is indeed difficult to compare these indexes. First, aid is not measured in the same way Collier uses aid per capita, while we use both concessional and non-concessional official flows as a ratio of GDP. Gemmel and McGillivray also use this approach, but do not scale it with the GDP. Second, while Collier measures volatility as the coefficient of variation (CV) of aid per capita, Gemmel and McGillivray compute it as the CV of the first difference of aid. We use two other methods as described below. Third, the period during which volatility is measured is also important, and these studies do not cover the same period.

2 Investment refers to gross fixed capital formation.

3 There is a possibility that the revenue from the oil boom led to some “spurious growth” of the GDP. This can happen when higher government revenues are used to finance higher expenditure in the form of higher wages to civil servants (leading to higher wages), when in fact their productivity has not changed or is even declining.

4 The international price of crude oil fell by two-thirds between 1986 and 1988, while the prices of coffee and cocoa fell by one-half and one-third, respectively. Terms of trade declined consequently by nearly 40% (Ghura, 1997).

5 The spike in 1994 (13.57%) of net official flows is partly attributable to the 1994 devaluation.

6 It is also worth noting that subsequent spending of aid on imports can make the currency move in the opposite direction.

7 Jenkins (1998) used the framework to model private and not public investment.

8 This modified Hausman specification test is suggested by Pindyck and Rubinfeld (1997: 353

4) and in EViews help menu.

9 The ideal situation would have been to use only medium- and long-term credit as a determinant of investment. We could not lay hands on such data.

10 The definition of ODF is taken from the “Glossary of Terms and Concepts” from the OECD website. http://www.oecd.org/glossary/0,2586,en_2649_33721_1965693_1_1_1_1,00.html
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Appendixes

Figure A1: Evolution of Resource Inflows (as % of GDP)

- a) Net Official Inflows
- b) Net Foreign Direct Investment
- c) Net Other Private Capital Inflows
- d) Export Revenue
<table>
<thead>
<tr>
<th>Variables</th>
<th>ADF stat.</th>
<th>Critical value</th>
<th>Order of integration</th>
<th>Level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government investment</td>
<td>-2.832</td>
<td>-2.622</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Domestic private investment</td>
<td>-3.512</td>
<td>-2.967</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Net official flows</td>
<td>-4.805</td>
<td>-3.658</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Net foreign direct investment</td>
<td>-2.231</td>
<td>-2.9591</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Net other private flows</td>
<td>-2.549</td>
<td>-1.954</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Export revenue</td>
<td>-5.248</td>
<td>-3.658</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total resource flows</td>
<td>-4.161</td>
<td>-3.696</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Credit to the government</td>
<td>-3.551</td>
<td>-2.959</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Inflation rate</td>
<td>-3.290</td>
<td>-3.657</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Credit to the private sector</td>
<td>-6.0716</td>
<td>-3.658</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Expected output</td>
<td>-3.074</td>
<td>-2.959</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Debt</td>
<td>-4.819</td>
<td>-3.685</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Government consumption</td>
<td>-7.497</td>
<td>-3.675</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Official flow volatility I</td>
<td>-5.507</td>
<td>-3.666</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>FDI volatility I</td>
<td>-3.431</td>
<td>-2.963</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Other private flow volatility I</td>
<td>-2.867</td>
<td>-2.635</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Export revenue volatility I</td>
<td>-4.272</td>
<td>-3.666</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total resource inflow volatility I</td>
<td>-3.763</td>
<td>-3.720</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Official flow volatility II</td>
<td>-4.381</td>
<td>-2.967</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>FDI volatility II</td>
<td>-3.728</td>
<td>-3.666</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Other private flow volatility II</td>
<td>-3.465</td>
<td>-2.985</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Export revenue volatility II</td>
<td>-3.866</td>
<td>-3.675</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Total resource inflow volatility II</td>
<td>-2.882</td>
<td>-2.635</td>
<td>0</td>
<td>10</td>
</tr>
</tbody>
</table>

Note: Apart from the volatility variables, all the others are expressed as a% of GDP. I and II indicate the two methods of measuring volatility discussed in Section 5. The critical values (McKinnon), generated by Eviews, are for the rejection of the hypothesis of a unit root.
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