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# Private Capital Inflows and Macroeconomic Stability in Sub-Saharan African Countries

**by**

**Miyuki Shibata and Oliver Morrissey**

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**The Volatility of Capital Inflows: Measures and Trends for Developing Countries**

by
Miyuki Shibata and Oliver Morrissey

**Abstract**
The 1990s have witnessed an increase in private capital inflows to sub-Saharan African (SSA) countries. Such capital flows are viewed as volatile and hence a threat to macroeconomic stability. A sudden reversal of capital inflows was one factor underlying the East Asian crisis of 1997. This paper begins with a brief review of theories of currency crises in the light of the East Asian financial crisis. From this, a number of 'crisis indicators', such as the rate of domestic credit expansion and level of foreign exchange reserves, are identified. The nature of the exchange rate regime is central to managing capital inflows and vulnerability to crisis. The paper then examines trends in exchange rate regimes and crisis indicators for five SSA countries in the 1990s. While there is evidence of increased pressure for real exchange rate appreciation in the 1990s, none of the indicators suggest that managing private flows poses a problem to the economies. One problem that is identified is the prevalence of large trade deficits that could be exacerbated by exchange rate appreciation.

**Outline**
1. Introduction
2. Theory of Currency Crises: A Brief Review
3. Capital Inflows and Exchange Rate Regimes in SSA: Developments in the 1990s
4. Capital Inflows and Crisis Indicators in SSA
5. Conclusions: Macreoeconomic Policy Implications

# 1 INTRODUCTION

Financial liberalisation, domestic and international, has been implemented in many developing countries in the 1980s and 1990s, partly as a response to the economic adjustment programmes advanced by international organisations, such as the IMF and World Bank. This has been associated with, and partly the cause of, an increased volume of international private capital flows. Net private capital inflows to developing countries increased from about US$50 billion a year during 1987-89 to more than US$150 billion a year during 1995-97 (IMF, 1999). Trends in the composition of capital inflows have also shown a marked characteristic in the 1990s. The ratio of private capital inflows to total inflows increased from 54% in the 1980s to 81% in the 1990s. The composition of private inflows has also changed: the largest share in total private inflows was bank loans at 48% and 30% in the 1970s and 1980s, respectively, but decreased to 23% in the 1990s. Foreign direct investment (FDI) was the largest component of inflows, 34%, in the 1990s. The share of portfolio equity and bonds accounted for about 2% in the 1970s and 1980s, but increased to 20% (9% in portfolio equity and 11% in bonds) in the 1990s. In comparison, official inflows have declined from 34% in the 1970s and 46% in the 1980s to 20% in the 1990s (World Bank, 1999).

The increasing relative importance of private capital inflows, and the changing nature of such inflows, has implications for macroeconomic management. Gabriele *et al* (2000) point to the importance of distinguishing capital inflows and outflows, drawing attention to a surge in offsetting financial transactions, such as capital outflows or reserve accumulation, that may hinder potential positive development through financial liberalisation. The authors also address the changing form of FDI flows in the 1990s - the share of one-off mergers and acquisitions (M&A) has gone up compared to greenfield investment. The authors estimate, using information from UNCTAD and World Bank, that the share of M&A in cumulative total FDI has risen from 22% in 1988-91 to 72% in 1992-97. Gabriele *et al* (2000) warn of the increased volatility in capital flows. According to their measurement, the standard deviation of annual percentage change in total capital flows, African countries show a greater degree of volatility in private capital inflows than Asian or Latin American countries in the 1990s, while volatility has risen globally.

The volume of capital flows to countries in Sub-Saharan Africa (SSA) has also increased sharply in the 1990s. Estimates of the scale of capital flows differ depending on the source of data, from national governments or international organisations (Bhinda *et al*, 1999). There is a tendency for international organisations to underestimate the scale of capital flows given difficulties in collecting and assembling timely data from limited national sources. Nevertheless, the general trends look similar. Flows of FDI to SSA, although only a small fraction of global FDI, tripled between 1992 and 1995, exceeding the growth rates for other developing regions (UNCTAD, 1998). FDI flows are fastest growing for the least developed economies, including Tanzania, Uganda and Ghana. The magnitude may be underestimated in national data, as some of the items that should be classified as FDI are recorded in errors and omissions (Bhinda *et al*, 1999). Another distinctive characteristic of the 1990s inflows regarding FDI is the emergence of new investors. FDI is coming from a wider range of European countries, such as Belgium, Germany and Italy, in addition to the traditionally dominant UK and France. It is further diversified with new sources, such as South Africa, China, Malaysia, Hong Kong, Taiwan and South Korea (Bhinda *et al*, 1999).

The IMF and World Bank report that portfolio equity inflows are also rising fastest in SSA, albeit from a very low base, with the World Bank data showing larger values than that of IMF. This international data may omit large proportions of private flows. The level of net inflows through bank loans has decreased in SSA, although BIS data shows that unguaranteed net short-term flows have risen in Tanzania since 1996 (Bhinda *et al*, 1999). The data on this item are supposed to be substantially under-reported. Transactions of internationally issued bonds have been limited in SSA, reflecting the low credit ratings of the economies in the international financial market.

The picture that emerges, from whatever source, is of increasing private capital inflows to SSA countries, albeit from a very low level (and inflows are still very low). Associated with this is increased exposure to volatility of capital flows. Osei *et al* (2002) show that volatility of capital flows has increased in the 1990s relative to the 1980s, and is greatest for private flows (especially to poorer developing countries). The upshot is that SSA countries that have been successful in attracting private capital inflows have discovered that this tends to undermine their policies to maintain macroeconomic stability. It seems that the increased capital inflows in the 1990s, in the context of a liberalised current account and exchange rate regime but weak capital markets, have been a driving force towards overvaluation (Leape, 1999). The purpose of this paper is to examine the macroeconomic policy implications of increased private capital inflows in a sample of SSA countries – Ghana, Kenya, Malawi, Tanzania and Uganda.

We begin by reviewing theories of currency crises in Section 2. While there is some debate regarding the extent to which the East Asian financial crisis of 1997-98 was truly an exchange rate crisis, volatility of private capital (rapid outflows triggered by a shift in market perceptions) certainly played a role. Section 3 provides an overview of trends in capital inflows to SSA countries and discusses changes in their exchange rate regimes, as all have moved from a fixed to quasi-floating system. We present data on variables identified as indicators of currency crises for the sample of SSA countries over the past two decades in Section 4. This data is used to identify the vulnerability or exposure of such countries to a crisis. In this way, the position of the SSA countries is related to the implications of theories presented in Section 2. Section 5 presents our conclusions where we consider implications for macroeconomic policy.

## 2 THEORY OF CURRENCY CRISES: A BRIEF REVIEW

Two types of model are prevalent in the literature. The so-called first generation models are essentially balance of payments crisis models, based on underlying fundamentals. The second generation models consider the role of information, and argue essentially that signals received by agents that exhibit herd behaviour are sufficient to generate a crisis even if the fundamentals are sound. We review each model in turn. Eichengreen (1999) acknowledges that some propose a third generation of models, but then argues that these are really no more than variants of the second generation models.

*The Balance of Payment Crisis Model*

The model, developed by Krugman (1979) and Flood and Garber (1984), explains the onset of a currency crisis as due to poor macroeconomic performance and inconsistent monetary policy. When the monetary authorities expand the supply of domestic credit in excess of the domestic money demand growth, the economy spends more than it earns. The economy's current account in balance of payments would be negative. A deficit in

the current account, if not counteracted by a surplus in the capital account,[1] means that the supply of the domestic currency exceeds the demand for it. An exchange rate would depreciate to adjust for this imbalance. When an exchange rate is fixed by policy, however, the monetary authorities need to defend the parity by buying off the excess supply of the domestic currency using foreign exchange reserves. A constant credit expansion by the authorities under a fixed exchange rate, therefore, would lead to a gradual and persistent loss of foreign exchange reserves. Since the economic participants know that the authorities' ability to sustain the currency is finite, they anticipate that the currency will be devalued in a finite period of time. Such a loss in confidence in the authorities' monetary position triggers agents to sell the domestic currency before the gradual depletion of reserves would have exhausted them.

The model is based on the monetary approach to the balance of payments and the flexible price monetary approach to the exchange rate. The model holds a small open economy assumption; residents consume a single traded good. Domestic supply is fixed at the full employment level. There are only three assets available to agents who have perfect foresight; domestic money, domestic bonds and foreign bonds. Domestic money is held by domestic residents only, and domestic bonds and foreign bonds are perfect substitutes. Finally, purchasing power parity (PPP) and uncovered interest rate parity (UIP) both hold. The key equations are as follows:

$$(1) \qquad m_t - p_t = \varphi\bar{y} - \alpha IR_t \qquad \varphi, \alpha > 0$$

$$(2) \qquad m_t = \gamma b_t + (1-\gamma) r_t \qquad 0 < \gamma < 1$$

$$(3) \qquad \dot{b} = \mu \qquad \mu > 0$$

$$(4) \qquad p_t = s_t$$

$$(5) \qquad IR = IR^* + \dot{s}_t$$

where $m_t$ is the nominal money supply, $p_t$ is the domestic price level, $\bar{y}$ is the full-employment output, $IR_t$ is the domestic interest rate, $b_t$ is the domestic credit created by the monetary authorities, $r_t$ is the domestic currency value of foreign exchange reserves, and $s_t$ is the nominal exchange rate denominated in domestic currency. An asterisk denotes the foreign country value of the corresponding variable and the dot indicates the rate of change. The lower-case letters denote the natural logarithm of the corresponding variables.

The money demand equation is given in (1), where the real money demand is positively related to the level of output and negatively related to the opportunity cost of holding money (measured by the rate of interest). Setting the money multiplier equal to unity for simplicity, identity (2) shows that the level of money supply is the sum of domestic credit and foreign exchange reserves, where $\gamma$ denotes the initial share of domestic credit in the money supply. The money market is in equilibrium when real money demand equals real money supply. The growth rate of domestic credit is set constant at $\mu$ in (3). Setting the foreign price level equal to unity, which is zero in logs, yields (4). Under the assumption of perfect foresight, the expected change in the nominal exchange rate is $\dot{s}_t$, yielding (5).

1 A deficit in the current account is often financed by a surplus in the capital account. At the time when the first generation model was developed, financial markets in most developing countries were not liberalised and items in the capital account had little relevance to the discussion.

Setting changes in $\bar{y}$ and $IR^*$ equal to zero, and substituting (4) and (5) into (1), the money demand equation is:

(6) $m_t = s_t - \alpha \dot{s}_t$

Assuming an exchange rate fixed at $\bar{s}$, then $\dot{s}_t = 0$, and substituting (6) into (2) yields the foreign exchange reserve equation as:

(7) $r_t = (\bar{s} - \gamma b_t)/(1-\gamma)$

Substituting (3) into (7) gives the rate at which foreign exchange reserves are run down as:

(8) $\dot{r}_t = -\mu / \Theta$

where $\Theta = (1-\gamma)/\gamma$. (8) is the key equation to the first generation crisis model that shows that the rate at which foreign exchange reserves are running down is proportionate to the rate of credit expansion. A stock of foreign exchange reserves will be depleted in a finite period of time with $\mu > 0$. Agents with perfect foresight, therefore, will anticipate the ultimate collapse of the exchange rate parity in a finite period of time. To gain a limited instant profit by having the currency depreciated, speculators would force a currency crisis before this point is reached.

The model also implies that the time of the currency crisis is predicted. To see this, first define the shadow exchange rate, $\hat{s}_t$, as a latent exchange rate that would prevail following a successful attack:

(9) $\hat{s}_t = \gamma(b_0 + \alpha\mu) + \gamma\mu t$

where *t* denotes the number of time periods since time 0. (9) states that $\hat{s}_t$ depreciates at the rate $\gamma\mu t$, and implies that whenever $\bar{s} < \hat{s}_t$, $\bar{s}$ is not feasible. Then the exact time of collapse is predicted by setting $\bar{s} = s_t$, so that:

(10) $t_c = (\bar{s} - \gamma b_0)/\gamma\mu - \alpha$

Since, from (2), $\bar{s} = \gamma b_0 + (1-\gamma) r_0$,

(11) $t_c = \Theta r_0 / \mu - \alpha$

where $t_c$ is the time of collapse. The time of collapse decreases as $\Theta$ falls, as $\mu$ rises, and as $\alpha$ rises. That is, the time of collapse is sooner:

i. the larger is the initial share of domestic credit,
ii. the lower the initial share of foreign exchange reserves,
iii. the higher the rate of the domestic credit expansion, and
iv. the higher the semi-interest elasticity of demand for money.

Until the time of a collapse, the money supply is composed of growing domestic credit and decreasing foreign exchange reserves. The time of collapse depends on the threshold value of the level of foreign exchange reserves. When the reserves reach this point, agents would know that the currency is no longer sustainable and attack immediately before it completely depletes. As long as $\bar{s} > \hat{s}_t$, the fixed exchange rate is depreciated relative to the shadow exchange rate. This fixed exchange rate is sustained because speculators would suffer a capital loss on reserves purchased from the authorities. On the other hand, if the shadow exchange rate is depreciated relative to the fixed exchange rate, speculators would benefit from an instantaneous capital gain and compete against each other for this potential profit.

The principle hypotheses derived from the first generation crisis model are the following three. First, a constant increase in domestic credit by the monetary authorities would lead to a gradual and persistent loss of foreign exchange reserves. With a limited stock of the foreign exchange reserves, it would eventually become apparent to market participants that the authorities' ability to sustain the currency peg is infeasible. Such a loss in confidence in the authorities' position would trigger agents to sell the domestic currency before the foreign exchange reserves are exhausted. Second, the currency attack, therefore, occurs when the level of foreign exchange reserves reaches a certain threshold value where market participants perceive that the fixed exchange rate is no longer sustainable. In other words, the shift in market sentiment is an inevitable consequence of a weak monetary position. A speculative attack would definitely follow once the foreign exchange reserves reach this threshold value. Third, the timing of a crisis is predicted by investigating the behaviour of the monetary authorities' position. Since the authorities' position reflects the economy's internal and external balances, advocates of the first generation crisis models argue that behaviour of macroeconomic fundamentals have an important role to play in explaining the onset of a currency crises.[2]

A limitation of the model is that it does not take capital account transactions into account. With the increased mobility of international capital flows after financial liberalisation, capital account transactions are becoming more and more important to a small open economy. When a surplus in capital account balance offsets a deficit in current account, an economy's external balance may be sustained by increasing international borrowing and decreasing foreign exchange earnings. The dependence on international capital inflows is not sustainable if these inflows have short-term maturity as they are prone to reverse.[3] Should this be the case, the problem is not a gradual depletion of the foreign exchange reserves, but a sudden arbitrary shift of market sentiments that reverse the capital flows. In other words, a currency attack may occur and be successful even if the monetary authorities' position is initially sustainable. The first generation crisis models do not explicitly consider the aspect that brings about a loss of confidence in the authorities' ability to hold exchange rate parity or in the debtor country's ability to repay. The limitation calls for different explanations for a currency crisis.

*The Second Generation Currency Crisis Model*

The second generation model considers the possibility of a crisis in the absence of obvious problems in the balance of payments. While the first generation model sees problems in the dependence on domestic credit created by the monetary authorities, second generation crisis models see problems in dependence on 'volatile' foreign capital (loans with short maturities provided by international private investors). Dependence on this type of capital is dangerous as it is less committed to the recipient economy and therefore more likely to be withdrawn suddenly. Second generation models predict the

2 For example, see Blanco and Garber (1986), Cumby and van Wijnbergen (1989), Eichengreen *et al* (1995), Sachs *et al* (1996), and Kaminsky *et al* (1998).

3 The situation could be worse if an economy's real exchange rate has long been overvalued so that the current account has deteriorated. A continuous high surplus in the capital account, when it is more than offsetting a current account deficit, means that there is an excess demand for the domestic currency. With a fixed exchange rate, appreciation does not adjust for this imbalance. The domestic price level may eventually adjust and the exchange rate appreciates in real terms. A massive persistent capital inflow under a fixed exchange rate implies inflation and real exchange rate appreciation. The latter damages the trading sector. Consumers may shift their consumption towards (cheaper) imported goods. Producers may allocate resources towards non-traded goods, as traded goods are less profitable. If the real exchange rate appreciation persists, the trading sector is weakened and the current account balance deteriorates.

possibility of a crisis even when the economy's monetary position is not obviously weak. A currency crisis can be induced by a shift in market sentiment, regardless of the real state of an economy. The currency crisis would reduce working capital in the economy and make otherwise solvent investment projects insolvent so they may be scrapped. If a shift in market sentiment is triggered by herd-like behaviour, where agents imitate other agents' actions, the individual agent's behaviour contains little informational value and does not reflect the real state of an economy. If the shift in market sentiment causes a capital reversal and consequent currency and financial crisis, the economy bears the unnecessary economic loss.

This section first explains the self-fulfilling crisis model with multiple equilibria. A currency peg may be abandoned, not because of initial weakness but because a collective capital flight weakens the monetary position. Herd behaviour models are then considered. These provide supplemental explanations to the self-fulfilling crisis models, why market sentiments might undergo a sudden shift from one equilibrium to another, and how individual agents manage to co-ordinate such a shift.

Obstfeld's (1996) self-fulfilling crisis model contains three agents: a government who sells foreign exchange reserves to fix its exchange rate, and two private holders of domestic currency, one who continues holding it and the other who sells it to attack the currency. Three states of the government are defined by differing degrees of commitment to the fixed exchange rate regime. The government with high commitment has high foreign exchange reserves (R=20), one with little commitment has low reserves (R=5), and one in the middle has intermediate reserves (R=10). Each agent has a resource of 6 (the numbers are illustrative – it is relative magnitudes that matter). There is a transaction cost of 1 incurred to sell and take a position against the current exchange rate.

Obstfeld (1996) then shows that the extent of the government's commitment to defend the exchange rate peg determines the nature of possible equilibria. Under the high reserve game, when the government has international reserves of 20, each agent cannot affect the exchange rate regime on its own. One agent's selling his own resource of 6 cannot affect the authority's decision of holding the parity. Since it incurs a cost of 1, the unique Nash equilibrium is 'to hold' the currency. Under the low reserves game (when R=5), each agent can break the current exchange rate regime alone with the resource of 6. Therefore, 'to hold' domestic currency is a dominated strategy and the unique Nash equilibrium is 'to sell'. Under the intermediate reserves game (when R=10), neither agent can attack the current exchange rate alone, but if they choose to sell the currency together they can attack the parity. There are two Nash equilibria in the intermediate reserve game, either 'to sell' or 'to hold'. If both agents co-ordinate to sell the domestic currency the fixed exchange rate will collapse. However, if each speculator believes that the other will not sell, then he can not affect the parity on his own. The Nash equilibrium is 'to hold' and the fixed exchange rate regime will survive. Unlike the first generation crisis model, the second generation model shows that there is a middle ground over which fundamentals are neither so strong as to make a successful attack impossible, nor so weak as to make it inevitable. This implies that even a sustainable currency peg may be attacked and even abandoned.

The model hypothesises that economic policy is not predetermined but discretionary. The model stresses the importance of an authority's decision whether to defend a fixed exchange rate by making a trade-off between short-run macroeconomic flexibility and

longer-term credibility (e.g. Ozkan and Sutherland, 1995). The principle hypotheses of the self-fulfilling crisis model are as follows. First, a currency crisis can occur even if there are no problems in the balance of payments. When foreign exchange reserves are neither too strong nor too weak, the economy can move from one equilibrium to another without an obvious shift in macroeconomic fundamentals. If agents perceive, rather than know, that a currency peg is not sustainable and co-ordinate to sell the currency, then the attack can be successful. Second, the monetary authorities' position and their policy stances are interdependent with other agents in the market. A collective attack of the agents weakens the authorities' position. As the agents know that the authorities' policy stance is discretionary, this would, in turn, shake market confidence on a currency peg. Third, a currency crisis, therefore, can occur unexpectedly. As it is a sudden shift in market sentiments that triggers a crisis, the timing is not anticipated by observing macroeconomic fundamentals. Fourth, the dependence on 'volatile' private foreign capital invites higher risk to a currency crisis. As short-term, foreign-denominated private loans are highly mobile, any small shocks may affect market sentiments and trigger a currency crisis.

Herd behaviour models provide explanations for collective action of agents. One approach to herd behaviour is the illiquidity-insolvency model proposed by Radelet and Sachs (1998). The authors first distinguish between illiquid and insolvent borrowers to explain a liquidity crisis. 'An insolvent borrower lacks the net worth to repay outstanding debts out of future earnings. An illiquid borrower lacks the ready cash to repay current debt-servicing obligations, even though this borrower has the net worth to repay the debts in the long term' (Radelet and Sachs, 1998: 7). An illiquidity crisis occurs if a solvent but illiquid borrower is unable to borrow fresh funds from capital markets to meet debt-service obligations. A simple two-period model illustrates the point. An illiquid borrower owes debt $D$ to a large number of existing creditors. The debt service that the borrower needs to make is $\theta D$ for period one, and $(1+r)(1-\theta)D$ for period two, where $r$ denotes the interest rate. The investment project undertaken by the borrower will be returned only in period two. For the project to be solvent, it needs to satisfy the following inequality:

$$(12) \qquad Q_2/(1+r) > \theta D + [(1+r)(1-\theta)D]/(1+r)$$

That is, the present value of the return $Q_2$ needs to be greater than the present value of total debt service payments. Since the project pays back only in period two, the borrower lacks the cash flow to repay $\theta D$ in period one. Typically, the solvent but illiquid debtor would take out a new loan, $L$, in period one to finance the debt service payments. With $L = \theta D$, the total repayment due in the second period is $(1+r)D$. As long as this is less than $Q_2$, the investment project will yield profit and be carried out. There is a restriction on each individual creditor concerning the amount they can lend. If each creditor is identical and faces the same restriction $\lambda$, which is the upper-limit that it can lend, where $\lambda < D$, then it requires at least $n_1$ new creditors to finance a first period loan, where $n_1 = \theta D / \lambda$. If there are not sufficient new lenders, the illiquid borrower will be forced to default as she cannot collect enough cash flow to repay $\theta D > n_1 \lambda$. Each individual new lender, therefore, decides not to lend if there are no other creditors making loans. In such circumstances, the debtor is forced to default, and each creditor demands repayment. The investment project will be scrapped, which incurs a social loss on the economy since the project had an expected return greater than the outlays. In this

model, creditors are interdependent; creditors act on the basis of actions of other creditors, but not on information about debtors' fundamentals.[4]

Banerjee (1992) explains herd behaviour using an asymmetric information model to show why people abandon their own information and join the herd. Among a set of assets $i$ there is a unique $i^*$ that has the physical return $z$ which is positive, and for all other $i \neq i^*$ the return is zero. Everyone in the population ($N$) wants to choose $i^*$ but nobody knows which investment option will yield $i^*$. Some have information with probability $\alpha$, and the probability that the information correctly indicates the true $i^*$ as $i_1$ is $\beta$. Decision-making is sequential: once the first person makes a decision, the next person is allowed to observe that choice, and subsequent agents observe previous choices. The first investor's choice does not constrain the options that subsequent investors can take. Subsequent decision-makers make their decisions on the basis of the history of past decisions and their own information if they have any. The first person follows his own signal if he has one and chooses $\tilde{i}$, otherwise he chooses $i_0$, and the second person does the same. Banerjee (1992) proves that the probability that two people get the same signal and are both wrong is zero, and explores the implications.

- The third person chooses $\tilde{i} \neq i_0$, whether he has a signal or not, if the first and second people have already chosen $\tilde{i}$, and all subsequent decision-makers will do the same.
- If the third decision-maker has a signal $i \neq i_0$ and if $\tilde{i}$ has been chosen by the first and/or second person, then the third person will always choose $\tilde{i}$. All subsequent decision-makers will do the same.
- If the first and second people have disagreed and chosen different $\tilde{i}$ and $\hat{i}$ that are not equal to $i_0$, then the third person follows his own signal and chooses $i_1$.

Herding happens when the first and second people have chosen the same $\tilde{i} \neq i_0$. The third person will abandon his original signal $i_1$ and choose $\tilde{i}$ because the probability that $i^* = \tilde{i}$ is greater than $i^* = i_1$. The third person perceives that the first person had a signal, otherwise $i_0$ would have been chosen, and the signal is at least as good as his own. However, the first person's choice seems better than his own as this decision is supported by the second person. This is more likely to happen when the first person is right than when he is wrong. Consequently, the risk-averse decision-maker will choose to join the herd, which is optimal for the current agent given the play of the game.

Herding matters to an economy as a whole because it may reduce social welfare; the economy may be better off if everybody follows his own signal rather than following the crowd. Herd behaviour increases the probability that no one in the population chooses the right option $i^*$. If everyone had chosen an option according to their own information, then some of them would have chosen the correct option $i^*$, with probability $\alpha\beta$. Herding reduces the probability that future agents discover the truth. The probability that no one chooses the right option $i^*$ is given as;

$$\Pr(i_1 \neq i^*) = [1 - \alpha(1-\beta)]^{-1}(1-\alpha)(1-\beta) \tag{13}$$

4 Diamond and Dybvig (1983) use a similar model to explain bank runs due to the fragility of banking institutions. The bank run is caused by a shift in expectations of depositors about the credibility of the bank.

This probability increases both with smaller $\alpha$, meaning agents are less informed, and smaller $\beta$, meaning that it is less likely that the information is true. The probability will be close to one with sufficiently small $\beta$. The higher the degree of deficiency of information, the more likely that the investors join the herd. The overall result in an economy is socially inefficient; it would be Pareto improving if each investor ignored the actions of the others and followed individual information.

A search model by Caplin and Leahy (1998) explains the collective action of agents with information externalities. The model concerns agents making decisions over two types of investment project. One yields a fixed positive profit *W*, while the other yields a profit that is unknown to investors but potentially greater than *W*. The analysis is not relevant here but there are two important conclusions (for our purposes). First, investors are more selective when uninformed. This indicates that investors tend to wait longer when there is less information about market quality (as would be the case in SSA) and routine behaviour tends to last longer than is optimal. Second, the more agents participate in the market, the longer investors would wait. The key hypotheses derived from the model are that economic agents tend to delay taking actions when there is insufficient information about market quality, and this is more pronounced when there is a larger number of small participants.

The herd behaviour models emphasise that a major factor that causes a sudden shift in market sentiment is information, or lack of it. When information is not readily available about the quality of a market, market participants may take other people's behaviour as a crucial piece of information. Even if each agent has his own information about the state of a market, if other agents' decisions imply a different event, the agent has a motivation to abandon his own signal and his decision tends to be overpowered by the decisions made by the herd. The result is that all agents act collectively. As the agents who follow the herd do not act according to the information they hold, the end result could be that the actions of agents do not reflect the real state of the market. A rapid increase in international capital inflows in an economy, without a prudent financial system to control and monitor these inflows, may leave the economy with little information on the state of the market. The consequent currency crisis following the massive capital reversal may be explained by the fragile conformity of the agents and not necessarily by weak macroeconomic fundamentals.

## 3 CAPITAL INFLOWS AND EXCHANGE RATE REGIMES IN AFRICA: DEVELOPMENTS IN THE 1990S

Financial liberalisation, globally and at a national level, and exchange rate liberalisation have been driving forces behind increased private capital flows. Classical arguments for financial liberalisation are that increased access to international capital enables countries to raise productive investment above level of domestic savings. It also broadens the range of financial assets, allowing financial agents to diversify risks and smooth expenditures, and enables government to redress policy weakness and increase general welfare. The key issue in the 'efficient markets' view is that liberalised financial markets are often so distorted in developing economies that increased access to private flows generates higher costs than benefits. Most developing economies that open their capital accounts have done so without establishing that the economy is strong enough to withstand volatility of international capital flows. We will now consider several impacts on macroeconomic behaviour that surges in capital inflow have generated in SSA.

A sharp increase in capital inflows means an increase in demand for domestic currency. If the excess demand is not sterilized, and if an economy fixes its nominal exchange rates, the domestic currency would appreciate in real terms. Leape (1999) reports that Uganda and Tanzania experienced a significant real exchange rate appreciation in 1994-95, following a surge in capital inflows.[5] Figure 1 depicts real effective exchange rates (REER) of Ghana, Malawi and Uganda for 1990-2000,[6] where an increase indicates appreciation. Uganda exhibits a quite stable REER, whereas Ghana and Malawi exhibit depreciation until 1995 and appreciation thereafter, until about 1998. Real exchange rate appreciation is detrimental to the economy's trading sector. With lower competitiveness for domestic products in international markets, the economy's exports would decrease. On the other hand, lower domestic prices of imports places pressure on domestic import-substituting sectors. Persistent overvaluation of the real exchange rate would give rise to serious problems. It affects domestic resource allocation; more resources are directed to the non-traded sector, damaging the trading sector. Under a fixed exchange rate regime, increased transactions in the parallel (illegal) foreign exchange market are encouraged. The illegal market hinders the effectiveness of exchange rate and monetary policy.

5 Kasekende *et al* (1997) estimate the real exchange rate appreciated by more than 11% between 1994 and 1997 in Uganda, while Kimei *et al* (1997) estimate the cumulative overvaluation was about 20% between 1994 and 1996 in Tanzania (both cited in Leape, 1999).

6 The series is line *re c* of IFS (IMF, 2001). This data is not available for Kenya and Tanzania.

**Figure 1: Real Effective Exchange Rate**

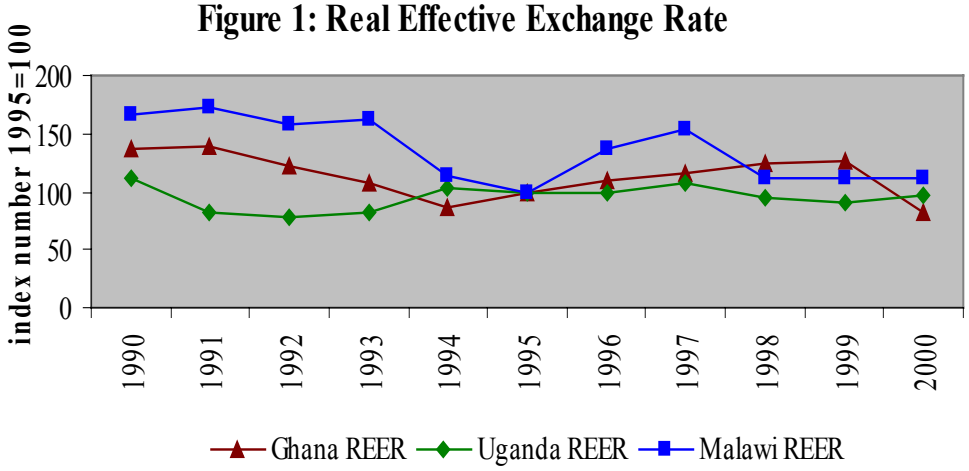



**Figure 2: Nominal Exchange Rate**

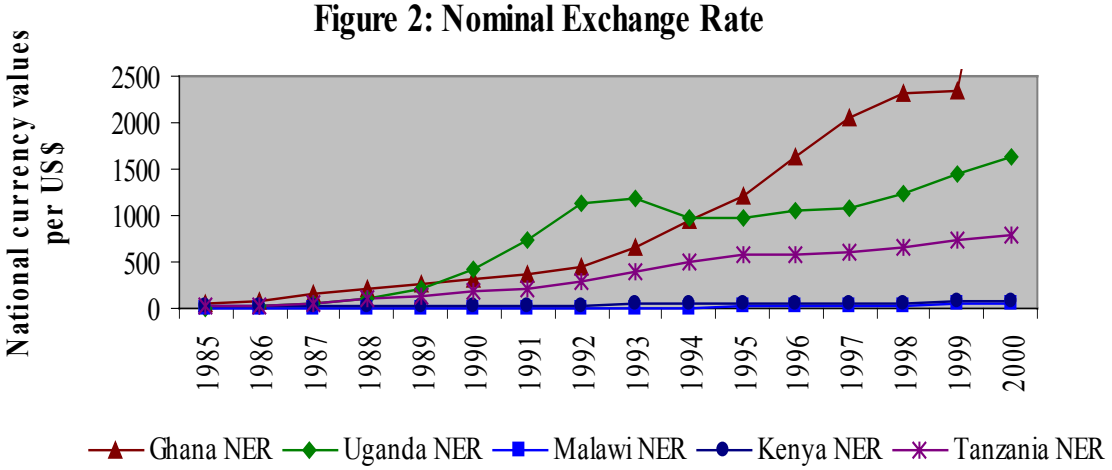



**Figure 3: Consumer Price Index**

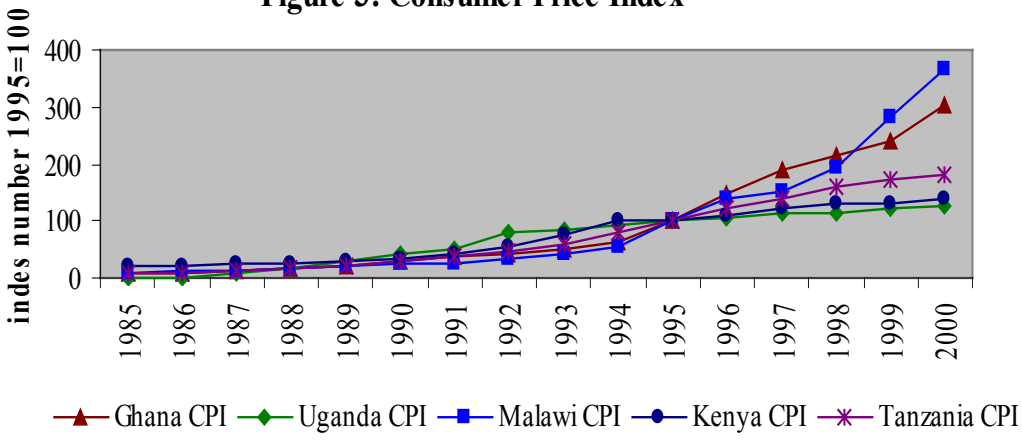


**Figure 4: Treasury Bill Rate**

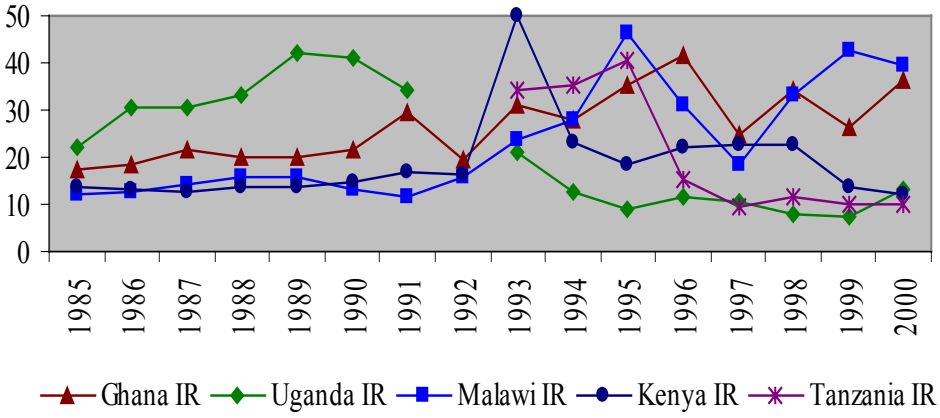



**Figure 5: Imports - goods and services**

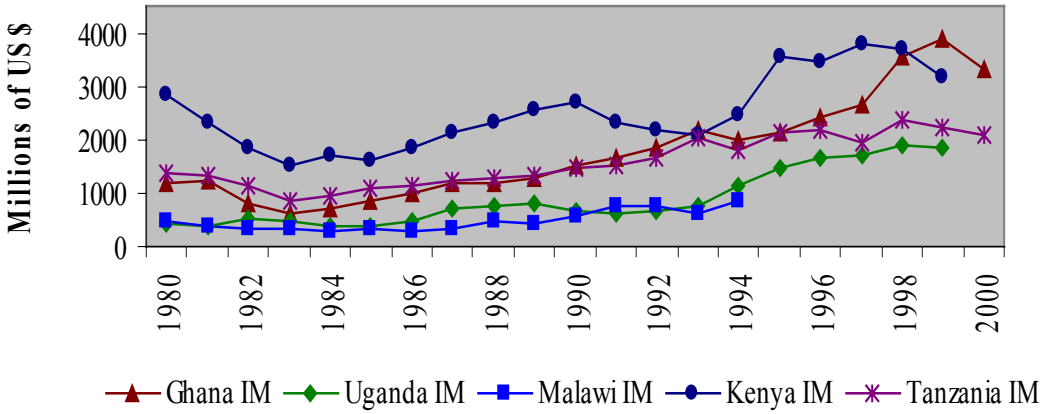
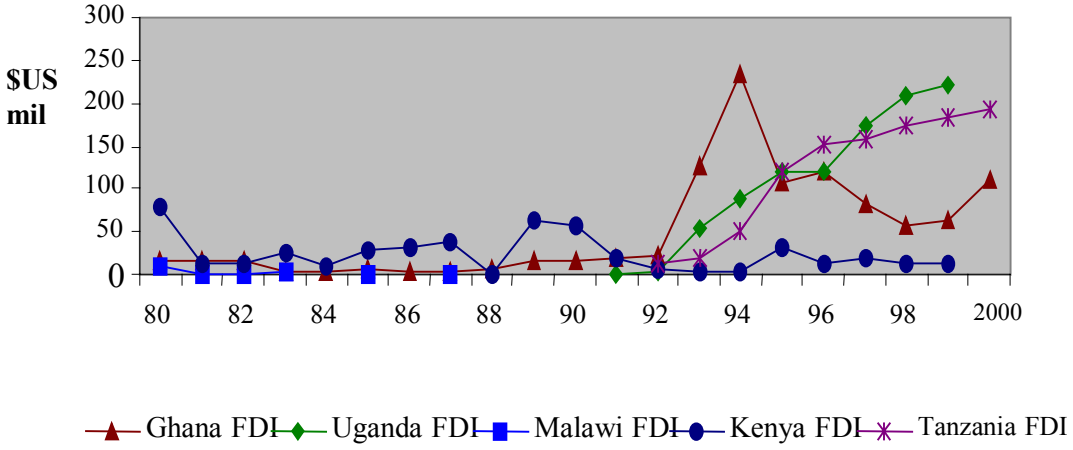



**Figure 6: Direct Investment**



SSA economies have made efforts to liberalise their exchange rate regime, undermining the parallel market. Unification of the foreign exchange market, however, makes nominal prices more volatile, which would discourage investment. Nominal exchange rates and domestic prices become more sensitive to shifts in capital flows. Significant capital inflows, if not sterilized, appreciate the nominal exchange rates (if exchange rates are free to adjust) or increase domestic prices (if exchange rates are less flexible). Figures 2 and 3 depict trends in nominal exchange rates and domestic prices for 1985 to 2000 for Ghana, Kenya, Malawi, Tanzania and Uganda.[7] Most show higher volatility in nominal exchange rates and domestic price series in the1990s. Nominal interest rates have been high and extremely volatile, except for Uganda, after 1992 (Figure 4).[8]

Another issue on hasty financial liberalisation is that the increased capital inflow may encourage more consumption than investment. Given low elasticity of supply in developing economies, this would result in an increase in imports. Khatri *et al*. (1997), cited in Leape (1999), argue that increased imports are often related to direct investment, due to the large imported component of investments in capital equipment and machinery. Figure 5 plots trends of imports of goods and services.[9] Imports show a general upward trend after the mid-1990s (corresponding to the period of increasing FDI, shown in Figure 6).

The benefits of international capital inflows for economic development depend largely on the financial market of recipient countries. The intrinsic problem of the domestic financial market is that information is pervasively asymmetric. That is, one party, usually a lender, has less information than the other party, a borrower, about the financial transaction. Since lenders are not perfectly informed about the risk, moral hazard and adverse selection problems arise. These problems are compounded in developing economies where the transactions of financial intermediaries are inadequately regulated and monitored. Developing economies that have undertaken rapid financial liberalisation before strengthening the domestic financial sector would accumulate risky loans. As we have seen in the previous section, the second-generation crisis models imply that sudden shifts in agents' expectations are likely in a market with information problems.

Dadush and Dasgupta (2001) offer four reasons for why the costs of substantial short-term capital flows are much higher in developing economies than industrial economies. First, developing economies face much greater volatility in capital flows, partly because they are marginally creditworthy borrowers. There is a close relationship between income level and credit rating given by Moody's Investor Service (1998). According to the rating, three quarters of developing economies are below minimum investment grade, and the rest are only marginally creditworthy. Economies that are rated marginally creditworthy are more vulnerable to a piece of news. The presence of information asymmetries as such could lead to herd behaviour in international financial markets. Changes originating in stock market may have a disproportionately large effect on economies with an immature financial sector. African countries are susceptible to sudden shifts in market perceptions because of the lack of good information available to

7 The series for the nominal exchange rate is line *rf*, the annual average domestic currency value per US$, that for consumer price index is line *64,* an index number with the base year at 1995 (IMF, 2001).

8 The data for interest rate is the treasury bill rate of line *60c* of IFS (IMF, 2001).

9 Imports is the sum of goods imports (line *78 ab d*) and services (line *78 ae d*) in millions of US dollars (IMF, 2001). Data for Malawi after 1995 is not available.

potential investors. Of the formal credit rating agencies, Standard & Poor's rates only South Africa, while Moody's also rates Mauritius. The informal agencies have a wider coverage (e.g. Euromoney covers 44 African countries and the Economist Intelligence Unit covers 17), but use subjective and often *ad hoc* criteria that tend to discriminate against SSA (Bhinda *et al*, 1999). This constrains portfolio flows, although privatisation and the establishment of macroeconomic stability have attracted increased foreign investment.

Second, capital flows to developing economies tend to behave pro-cyclically to adverse external shocks. Several studies show that developing countries are more susceptible to external shocks than developed economies due, partly, to the openness of the economy, small shares in the international market and narrow economic base (e.g., World Bank, 1993). Financing adverse shocks with international capital inflows is more difficult in developing economies, as capital flows out rather than in at the time of negative shocks. One explanation given by Dadush and Dasgupta (2001) is the marginal creditworthiness of these economies. It is often the case that credit rationing to the marginally creditworthy becomes tighter under adverse shocks and looser under favourable shocks. Such a change will worsen the access to credit when it is needed, particularly for adjustment to external shocks.

Third, weakness in public finances tends to amplify rather than mitigate shocks in the financial account. At the time of a capital reversal, there is little scope for governments to counteract the impact of the reversal. The government's financial account is often pro-cyclical, due to low revenue levels, large budget deficits, absence of automatic fiscal stabilisers (unemployment insurance and social security expenditures) and less flexible tax policies (Dadush and Dasgupta, 2001). Fourth, the poorest are more vulnerable to shocks as developing countries lack social safety nets. Changes in real output and employment following a capital reversal expose the poorest households to income risk.

Although it is widely acknowledged that the costs of short-term inflows to developing economies may exceed the modest growth benefits, it is difficult to control or eliminate short-term inflows. There is a practical problem in separating short-term capital flows from trade- and direct investment-related payments. Garnaut (2001) argues that an attempt to control the related opportunities for short-term capital flows will increase the transaction costs of growth-enhancing trade and investment. The more integrated a developing economy into the international economy through trade and direct investment, the higher the costs of controlling short-term capital inflows. A regulatory effort has to be made to distinguish between commercial credits, which are related to trade and direct investment, and arbitrage-seeking flows (hot money), which are erratic and easy to reverse.

*Exchange Rate Liberalisation*

All five SSA economies that we study currently adopt a *de jure* independently floating exchange rate regime. However, a fair amount of intervention from the monetary authorities is imposed to correct for instability in nominal exchange rates, so the regimes are *de facto* managed floating. The common features among the five economies are:

- All had a fixed exchange rate regime until the mid 1980s.
- Continuous high inflation resulted in significant real appreciation of exchange rates in the 1980s.

- To protect weakening balance of payment accounts, the governments implemented some controls over current account and stringent controls over capital account transactions.
- As a result, foreign exchange transactions were segmented in two markets, official and informal, and the spreads between the two rates were wide.
- Efforts to narrow the gap between the two market rates started from the mid 1980s or early 1990s. Foreign exchange bureaux were established to conduct spot transactions at freely determined rates, set by weekly auctions convened by the Central Bank. Legalising the parallel market was realised in 1990 in Ghana, Kenya, Tanzania and Uganda[10]. Imports and exports of selected goods were subject to the official fixed rate while the remaining transactions were subjects to the market-determined rate.
- Concomitantly, the official exchange rates were devalued frequently to narrow the spread of the two rates.
- The two markets were unified and the foreign exchange system became basically a market-determined regime. Unification of the two rates took place in 1987 in Ghana, and in 1993 in Kenya, Tanzania and Uganda.
- The *de jure* exchange rate regime has been independent floating since 1992 in Ghana, since 1993 in Kenya, Tanzania and Uganda, and since 1994 in Malawi.

Under a *de jure* floating exchange rate regime, the Central Bank intervenes to reduce exchange rate volatility. Exchange rate systems in the five African economies are intermediate regimes, neither absolute fixed nor floating. Such regimes are prone to a currency crisis. After the recent crises in East Asia, Russia and Brazil, economists' preferences on nominal exchange rate regimes have shifted towards either super-fixed (through a currency board or dollarisation) or fully floating, regimes. 'Experience has repeatedly shown that an adjustable peg or a tightly managed float with occasional large adjustments is a difficult situation to sustain under circumstances of capital mobility … In a situation of high capital mobility, the exchange regime needs to be either a very determined peg … or it needs to be a float where the exchange rate moves regularly in response to market forces' (Eichengreen *et al.* 1998: 3-4). Calvo (1999) offers a theoretical justification for ruling out intermediate regimes by arguing that in a world with high capital mobility and poorly informed market participants, emerging countries are subject to rumours. These uninformed participants may misinterpret events in the global market and will run an unjustified panic. The situation may be mitigated by adopting a very transparent policy stance, such as super-fixed or a clean float (although recent Argentinian experience suggests dangers in so-called super-fixed regimes).

## 4 CAPITAL INFLOWS AND CRISIS INDICATORS IN AFRICA

The economies in SSA are not exceptions to the general trend of increasing private capital inflows to developing countries. They have been exposed to a potentially high risk of volatile international capital inflows. Given the immaturity of the domestic financial sector and rigidity of the economies, a currency crisis is not an irrelevant possibility, even if the shift away from fixed exchange rates provides for greater flexibility. Building on the survey of alternative theoretical models in section 2, this section focuses on identifying the various indicators that may help to anticipate a future crisis. The first generation crisis model stresses inconsistency in macroeconomic policy. Financing the problems in balance of payments may not be feasible with pegged

10 Malawi may be an exception in the sense that it adopted a pegged exchange rate system until 1994 and allowed frequent devaluation since 1982.

exchange rate regimes. Deterioration in domestic macroeconomic fundamentals may be monitored to anticipate a future crisis. Such macroeconomic fundamentals may include items in balance of payment accounts, real exchange rate, and terms of trade. The second generation crisis model focuses on self-fulfilling speculative attacks. Speculative currency attacks would cause a massive capital reversal if the financial sector is vulnerable. A private lending boom and/or excess liquidity in the market, given the components of foreign capital inflows, may reveal the vulnerability of the financial sector.

Growing interest in developing a system that anticipates a currency crisis emerged after the Asian experience of 1997. Kaminsky, Lizondo and Reinhard (KLR, 1998) develop an Early Warning System (EWS) that attempts to forecast the timing of a currency crisis. The system involves monitoring the evolution of a large set of monthly indicators that signal a crisis whenever they move beyond a certain threshold. They identify some 15 indicators based on theoretical priors and on the availability of monthly data (eight are included in our list, numbers 2-9). For each indicator, the optimal threshold is found bivariately by minimising the noise-to-signal ratio[11] to find an optimal threshold percentile for each indicator that applies to all countries.

EWS can be a useful tool for researchers and policy makers if it anticipates a future crisis accurately, but the model developed by KLR has been found to miss many crisis cases and to issue a few false alarms. Berg *et al* (1999) advocate an alternative approach to the EWS that uses a multivariate probit framework. Both models demonstrate that bilateral real exchange rate overvaluation relative to trend, low reserve growth and export growth, high growth of the ratio of M2 to reserves and a large current account deficit are important variables. All of theses are represented in our list of ten indicators (the first and last are additional to KLR and variants of indicators proposed by Berg *et al*, 2000).

We calculate ten indicators for each of the five SSA economies, selected on the basis of data availability and their relevance to the African economy context:

1) the ratio imports to international reserves (*IMR*),
2) deviations of real exchange rate from a deterministic trend (*RER*),
3) the differential between foreign and domestic real interest rates on deposits (*DIR*),
4) the ratio of domestic credit to GDP (*RDCY*),
5) the real interest rate on deposits (*RIR*),
6) the ratio of nominal lending to deposit rates (*RLDR*),
7) the change in the ratio of broad money to gross international reserves ($\Delta M2R$),
8) the ratio of broad money to gross international reserves in level (*M2R*),
9) an index of output (*GDP*),
10) the ratio the current account to exports (*CAX*).

We present descriptive statistics for each indicator as the size of our sample is extremely small (30 annual observations at best) to run any multivariate analysis. We do not hold any underling assumptions regarding the relationship among the indicators. Our aim is not to predict crises, but to assess if there is any evidence of worrying trends in these

11 The noise-to-signal ratio, B/A, is defined as B the number of months in which the indicator issued a bad signal and A the number of months in which the indicator issued a good signal. A bad signal is defined when there is no crisis within 24 months after a signal is issued. A good signal is when there is a crisis within 24 months after a signal is issued.

variables in the 1990s. Dividing the full sample into three sub-periods, we examine if there are any significant differences between the periods 1971-1989, 1990-1994, and 1995-2000. We assume that the financial liberalisation and exchange rate liberalisation in the early- and mid-1990s has resulted in an increase in the volume of capital inflows and hence an increase in exposure to a currency crisis to these economies.

The indicators are presented for each country in Tables 1-5. Data is collected from International Financial Statistics (IMF, 2001) and a detailed description is available in the Appendix. The mean values and standard deviations for the full sample and the three sub-periods are presented, together with the t-statistic for the comparison of the means of sub-periods. The mean values of the first and the second periods, and the second and the third periods are compared, unless otherwise noted. The t-statistic is calculated with an assumption of the equal variances for the two periods if the F-statistic for the null hypothesis of equal variances is not rejected, otherwise we calculate the t-statistic with the different variances in the two periods.

**Table 1: Crisis Indicators for Ghana**

| | Full Sample 1971-2000 | | Period 1 1971-1989 | | Period 2 1990-1994 | | Period 3 1995-2000 | | t-stat P1:P2 | t-stat P2:P3 |
|---|---|---|---|---|---|---|---|---|---|---|
| *Variables* | *Mean* | sd | Mean | sd | Mean | sd | Mean | sd | | |
| *IMR* | 5.59 | 3.03 | 5.14 | 2.52 | 4.88 | 1.63 | 7.67 | 4.83 | -0.21 | 1.23 |
| *RER* | 0.00 | 1.00 | 0.57 | 1.24 | -0.51 | 0.04 | -0.53 | 0.03 | -2.77* | -0.79 |
| *DIR* | -0.35 | 13.54 | 9.81 | 10.32 | -9.55 | 0.90 | -12.84 | 6.18 | -6.16* | -1.04 |
| *RDCY* | 0.24 | 0.06 | 0.25 | 0.06 | 0.21 | 0.05 | 0.24 | 0.04 | -1.51 | 0.74 |
| *RIR* | 5.93 | 12.03 | -2.70 | 9.58 | 12.46 | 0.64 | 17.41 | 6.20 | 5.22* | 1.56 |
| *RLDR* | 1.53 | 0.16 | 1.53 | 0.16 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| *ΔM2R* | 0.12 | 0.72 | 0.16 | 0.81 | 0.10 | 0.73 | -0.02 | 0.16 | -0.14 | -0.37 |
| *M2R* | 8.25 | 9.08 | 11.12 | 10.12 | 2.70 | 1.04 | 2.93 | 1.36 | -3.56* | 0.30 |
| *GDP* | 74.10 | 15.23 | 65.40 | 5.47 | 88.88 | 5.97 | 104.5 | 4.50 | 8.40* | 3.88* |
| *CAX* | -0.14 | 0.27 | -0.05 | 0.31 | -0.29 | 0.11 | -0.22 | -0.11 | -1.65 | 0.99 |

*Notes*: See Table 5.

**Table 2: Crisis Indicators for Kenya**

| | Full Sample 1971-2000 | | Period 1 1971-1989 | | Period 2 1990-1994 | | Period 3 1995-2000 | | t-stat P1:P2 | t-stat P2:P3 |
|---|---|---|---|---|---|---|---|---|---|---|
| *Variables* | *Mean* | sd | Mean | sd | Mean | sd | Mean | sd | | |
| *IMR* | 6.71 | 3.87 | 6.02 | 2.42 | 10.66 | 7.35 | 5.63 | 2.48 | 1.24 | -1.31 |
| *RER* | 0.00 | 1.00 | -0.44 | 0.83 | 1.18 | 0.86 | 0.42 | 0.59 | 3.87* | -1.75 |
| *DIR* | -0.31 | 5.34 | 2.46 | 3.39 | n.a. | n.a. | -6.64 | 3.80 | n.a. | -5.06*[a] |
| *RDCY* | 0.35 | 0.07 | 0.33 | 0.07 | 0.35 | 0.04 | 0.45 | 0.01 | 0.82 | 5.65* |
| *RIR* | 5.04 | 5.14 | 2.88 | 3.82 | n.a. | n.a. | 11.21 | 3.71 | n.a. | 4.66*[a] |
| *RLDR* | 1.81 | 0.49 | 1.75 | 0.49 | n.a. | n.a. | 2.09 | 0.41 | n.a. | 1.54[a] |
| *ΔM2R* | 0.09 | 0.42 | 0.10 | 0.41 | -0.11 | 0.43 | -0.16 | 0.50 | -0.82 | -0.79 |
| *M2R* | 6.46 | 3.84 | 5.36 | 2.34 | 11.10 | 7.76 | 6.85 | 2.18 | 1.47 | -1.07 |
| *GDP* | 64.85 | 30.56 | 48.84 | 23.26 | 93.64 | 1.30 | 104.9 | 3.71 | 8.35* | 6.71* |
| *CAX* | -0.15 | 0.14 | -0.21 | 0.15 | -0.07 | 0.11 | -0.08 | 0.07 | -1.86 | -0.21 |

*Notes*: See Table 5.

**Table 3: Crisis Indicators for Malawi**

| | Full Sample 1971-2000 | | Period 1 1971-1989 | | Period 2 1990-1994 | | Period 3 1995-2000 | | t-stat P1:P2 | t-stat P2:P3 |
|---|---|---|---|---|---|---|---|---|---|---|
| *Variables* | *Mean* | sd | Mean | sd | Mean | sd | Mean | sd | | |
| *IMR* | 9.11 | 6.07 | 8.08 | 5.37 | 11.77 | 7.61 | n.a. | n.a. | 1.17 | n.a. |
| *RER* | 0.00 | 1.00 | 0.67 | 0.44 | 0.06 | 0.84 | -1.17 | 0.74 | -1.88 | -2.59* |
| *DIR* | -2.15 | 5.68 | 2.50 | 2.98 | -5.13 | 3.48 | -6.64 | 5.17 | -4.34* | -0.55 |
| *RDCY* | 0.23 | 0.11 | 0.27 | 0.10 | 0.22 | 0.05 | 0.08 | 0.02 | -1.67 | -5.99* |
| *RIR* | 7.73 | 4.27 | 4.91 | 2.19 | 8.62 | 2.45 | 11.21 | 5.23 | 2.92* | 1.01 |
| *RLDR* | 1.67 | 0.35 | 1.69 | 0.25 | 1.45 | 0.21 | 1.82 | 0.51 | -1.84 | 1.50 |
| *ΔM2R* | 0.15 | 0.68 | 0.18 | 0.59 | 0.42 | 1.14 | -0.19 | 0.37 | 0.64 | -1.23 |
| *M2R* | 4.36 | 3.64 | 4.79 | 3.95 | 5.98 | 3.16 | 1.62 | 0.60 | 0.62 | -3.04* |
| *GDP* | 83.9 | 21.76 | 69.54 | 10.10 | 92.96 | 5.10 | 117.1 | 10.32 | 4.94* | 4.73* |
| *CAX* | -0.49 | 0.30 | -0.45 | 0.28 | -0.59 | 0.36 | n.a. | n.a. | -0.86 | n.a. |

*Notes*: See Table 5.

**Table 4: Crisis Indicators for Tanzania**

| | Full Sample 1971-2000 | | Period 1 1971-1989 | | Period 2 1990-1994 | | Period 3 1995-2000 | | t-stat P1:P2 | t-stat P2:P3 |
|---|---|---|---|---|---|---|---|---|---|---|
| *Variables* | *Mean* | sd | Mean | sd | Mean | sd | Mean | sd | | |
| *IMR* | 28.87 | 48.72 | 47.23 | 59.61 | 7.13 | 1.95 | 4.16 | 2.07 | -1.48 | -2.44* |
| *RER* | 0.00 | 1.00 | 0.67 | 0.44 | 0.06 | 0.84 | -1.17 | 0.74 | -1.89 | -2.59* |
| *DIR* | 5.76 | 6.99 | 8.42 | 6.34 | n.a. | n.a. | -0.45 | 3.90 | n.a. | -3.82*[a] |
| *RDCY* | 0.29 | 0.11 | 0.33 | 0.10 | 0.31 | 0.03 | 0.15 | 0.04 | -0.82 | -7.09* |
| *RIR* | -0.35 | 5.55 | -2.37 | 4.70 | n.a. | n.a. | 5.02 | 3.91 | n.a. | 3.42*[a] |
| *RLDR* | 2.59 | 0.59 | 2.50 | 0.64 | n.a. | n.a. | 2.76 | 0.47 | n.a. | 0.85[a] |
| *ΔM2R* | 0.31 | 1.14 | 0.56 | 1.34 | -0.13 | 0.52 | -0.07 | 0.29 | -1.10 | 0.26 |
| *M2R* | 44.98 | 105.5 | 69.03 | 127.6 | 4.16 | 0.88 | 2.84 | 1.12 | -1.12 | -2.15 |
| *GDP* | 96.79 | 10.16 | 82.37 | 3.15 | 94.10 | 1.91 | 106.3 | 4.67 | 6.71* | 5.82* |
| *CAX* | -0.72 | 0.34 | -0.64 | 0.28 | -1.17 | 0.28 | -0.55 | 0.18 | -3.62* | 4.44* |

*Notes*: See Table 5.

**Table 5: Crisis Indicators for Uganda**

| | Full Sample 1971-2000 | | Period 1 1971-1989 | | Period 2 1990-1994 | | Period 3 1995-2000 | | t-stat P1:P2 | t-stat P2:P3 |
|---|---|---|---|---|---|---|---|---|---|---|
| *Variables* | *Mean* | sd | Mean | sd | Mean | sd | Mean | sd | | |
| *IMR* | 17.53 | 32.85 | 29.28 | 44.19 | 8.41 | 4.77 | 3.14 | 0.54 | -1.03 | -2.46 |
| *RER* | 0.00 | 1.00 | 0.54 | 1.27 | -0.50 | 0.07 | -0.48 | 0.02 | -2.59* | 0.92 |
| *DIR* | 2.55 | 13.62 | 14.79 | 11.99 | -10.32 | 4.71 | -3.05 | 2.50 | -5.31* | 3.29* |
| *RDCY* | 0.18 | 0.08 | 0.21 | 0.06 | 0.11 | 0.03 | 0.04 | 0.01 | -4.57* | -3.16* |
| *RIR* | 2.73 | 12.58 | -7.85 | 12.35 | 13.80 | 4.91 | 7.62 | 2.56 | 4.43* | -2.69* |
| *RLDR* | 1.69 | 0.44 | 1.50 | 0.19 | 1.17 | 0.09 | 2.17 | 0.36 | -2.37* | 6.14* |
| *ΔM2R* | 0.60 | 2.08 | 0.96 | 2.52 | -0.14 | 0.15 | -0.04 | 0.30 | -0.60 | 0.45 |
| *M2R* | 47.50 | 173.5 | 73.27 | 214.9 | 2.21 | 0.37 | 1.41 | 0.26 | -0.60 | -3.83* |
| *GDP* | 70.86 | 18.44 | 55.99 | 5.77 | 78.84 | 8.34 | 103.0 | 4.17 | 5.65* | 3.75* |
| *CAX* | -0.47 | 0.40 | -0.25 | 0.35 | -0.81 | 0.42 | -0.57 | 0.20 | -2.74* | 1.15 |

*Notes*: Data and measures are defined in the Appendix. Mean is simple verage annual value and sd refers to standard deviation. The t-statistic in the final two columns is for the null hypothesis of equal means for the first and the second periods, and for equal means for the second and the third periods. When data are not available (n.a.), we compare the first and the third periods. This applies to the three indicators, *DIR*, *RIR* and *RLDR*, for Kenya and Tanzania (indicated by [a] in tables).

* indicates the rejection of the null hypothesis of equal means at 5% level.

*IMR*: the ratio imports to international reserves

The sustainability of the currency depends on the level of reserves as shock absorbers. A standard rule of thumb in the 1980s was that a country should aim to prevent its reserves from falling below three months' worth of imports (foreign exchange spending). In other words, the import-reserves ratio should be kept below 25 per cent (Williamson, 1988). The indicator is considered useful only when countries have no or limited access to capital markets. In recent periods, the relevance of the indicator to a currency crisis is limited. In our study, only in Tanzania and Uganda did the ratio exceed 25 per cent. In both cases this applied to 1971-89 only, and the ratio has significantly decreased in later periods. Thus, for all countries, reserves appear appropriate (relative to import requirements).

*RER*: deviations of real exchange rate from a deterministic trend

The indicator is measured as the deviation from the mean of the full sample, a negative value implying that the exchange rate appears undervalued (i.e. there should be a real appreciation to restore equilibrium). Pressure for appreciation is apparent in Ghana and Uganda since 1990, although it is slight (and there is no significant difference between the two post-1990 sub-periods). The pressure for appreciation has been apparent in Malawi and Tanzania since 1995, and is significantly different from the previous period. This is a warning sign.

*DIR*: the differential between foreign and domestic real interest rates on deposits

Following financial liberalisation in the 1980s, domestic interest rates have been increased. It appears, although foreign rates were higher prior to the 1990s, the differential is negative for all economies since 1990, (we do not have data for Kenya and Tanzania in 1990-1995). This predicts an increase in capital inflows in the five economies, and should act to discourage capital flight (if savers have faith in the domestic banking system).

*RDCY*: the ratio of domestic credit to GDP

A rapid increase in domestic credit relative to output is an indicator of increased risk in the first generation crisis model. Except for Kenya, where the ratio increased significantly in the third period, no other economies in our study show a significant positive trend in the indicator. In Tanzania and Uganda there is a significant decrease after 1995 compared to the early 1990s. Thus, although (relative) domestic interest rates have risen, this has not been matched by an expansion of domestic lending (except for Kenya). A possible explanation is that the countries are following macroeconomic stabilisation programmes established by the IMF, as restrictions on the growth of domestic credit are a common policy prescription. In none of the countries does the ratio suggest a risk of crisis.

*RIR*: the real interest rate on deposits

The prolonged financial repression is evident in Ghana, Tanzania and Uganda, where the real deposit rates are negative for the first period. All five economies have a positive real interest rate for the later periods, and have a significant increasing trend for all but Uganda (which shows a significant decreasing trend for the third period). The combination of a positive *RIR* and negative *DIR* would be a factor in attracting private capital inflows (and discouraging capital flight). Increased foreign capital is consistent with the lack of evidence of an increase in domestic lending.

*RLDR*: the ratio of nominal lending rates to deposit rates

This ratio is often used as a measure of banking efficiency. The removal of controls on interest rates and of entry barriers following financial liberalisation would lead to greater competition, and consequently lower interest rate spreads for financial institutions. However, developing economies typically show high and persistent spreads even after undertaking financial liberalisation for some time. Gelbard and Leite (1999) generalise the characteristics of SSA countries as being wide interest rate spreads, a limited range of financial products, problematic judicial loan recovery, and a large share of non-performing loans. The computed ratio in our study, where the data are available, indicates an increasing trend for later periods. This is consistent with (increasing) banking inefficiency in SSA countries.

*M2R* and *ΔM2R*: the ratio and change in ratio of broad money to international reserves

The ratio of broad money (M2) to international reserves is used to measure the potential ability of the monetary authorities to buy back domestic currency in the case of capital flight. Conventionally, the ratio of import value of the foreign exchange to international reserves has been used for this purpose. The ratio of M2, as the assets convertible to foreign currencies, to reserves may be more relevant after the financial market is liberalised. Following KLR (1998), we compute the ratio both in percentage change and in level. The expectation of this indicator is that the increased liquidity of domestic assets is risky. The higher the indicator, the higher the possibility of capital flight. None of the five economies generate any worrying signal with the indicator.

*GDP*: an index of output

We would typically expect that economic growth attracts investment and capital inflows. If the growing economy imposes pressure on the foreign exchange market with higher domestic prices, the impact on the exchange rate may be problematic. The index of output has shown a significant positive trend for the five economies in our study, especially in the 1990s. This demonstrates that the economies have been growing, but the rates of growth (while encouraging for development) are not cause for alarm in the sense of financial crises.

*CAX*: the ratio the current account deficit to exports

The ratio is negative when the current account is in deficit. The greater the ratio in absolute terms, the more problematic for an economy as foreign exchange earnings may not be sustainable. In the first generation model, financing a trade deficit may make a currency crisis more likely to occur in the case of a speculative attack. If a trade imbalance is financed by short-term capital inflows to the capital account, this would contribute more to the probability of a crisis, as short-term funds are more prone to reversal. Only in Kenya was the ratio low in the 1990s. The ratio worsened in Ghana, Malawi and Uganda in the 1990s and is quite high, especially for Uganda. In Tanzania, the ratio was at a critical level in the early 1990s (suggesting a collapse in export earnings) but recovered in the latter half of the decade, even if the level remains worrying. There are indications of a potential problem in all economies except Kenya – trade deficits are high relative to export earnings.

In general, all indicators show significant differences across different periods for at least one economy. The *RER* suggests a significant real appreciation for all the economies, except for Kenya. Both *DIR* and *RIR* indicate significant increases in the domestic real

interest rates for all economies, following financial liberalisation, although timing differed. There is evidence that reserves have increased (measured relative to imports or broad money) while the share of domestic credit in GDP has been decreasing in all countries except Kenya. Overall, while there appear to be pressures on the exchange rates in most countries, and the trade deficits are high, there are no indicators of imminent financial crises.

## 5 CONCLUSIONS: IMPLICATIONS FOR MACROECONOMIC POLICY

African countries, including the five studied here, have experienced significant increases in private capital inflows since the late 1980s. The increased capital inflows, given liberalised financial and exchange rate systems, have macroeconomic implications. There is general agreement that increased, and more volatile, private capital inflows played a role in triggering the East Asian financial crisis of 1997-98. In particular, rapid outflows triggered by a shift in market sentiments contributed to the exchange rate crisis. The basic question addressed in this paper is if SSA countries are now more exposed to financial crises?

We began with an overview of models of crises. Models of financial crisis based on exchange rates (first generation) are perhaps the most developed, are clearly applicable, and are instructive for deriving implications for managing capital inflows in SSA. The first generation models predict that a currency collapse is more likely if there is a high and increasing relative share of domestic credit, and a low relative share of foreign exchange reserves. Second generation models allow for market perceptions to show that there can be situations where fundamentals are neither so strong as to make a successful attack impossible, nor so weak as to make it inevitable. Whether an exchange rate is attacked or not tends to depend on perceptions of the relative size of government foreign reserves. Countries with small reserves, especially if small relative to the speculators (and this includes many SSA countries), are more likely to be subject to speculative attack. Herd behaviour models add another important factor: if information about the quality of a market is limited (as would be the case in SSA), market participants will tend to follow the lead of other agents, especially if there are many small market participants.

Section 3 provides an overview of trends in exchange rates and factors related to capital inflows in the SSA countries in recent decades. All five of the countries we consider have moved from a fixed to quasi-floating system whilst experiencing increasing private capital inflows and increased exposure to volatility of capital flows. Capital inflows have become important influences on the exchange rate, money supply, inflation and interest rates. Macroeconomic policy faces a trade-off between appreciation of the exchange rate (this eases debt-servicing costs and import prices but reduces competitiveness and export revenues) and accumulation of foreign reserves (preserving competitiveness at a potential cost of higher inflation). One response in some countries has been to raise reserve requirements, but this acts as a tax on banks and reduces credit to the private sector, that is often already rationed (Leape, 1999). A common fiscal policy response, as promoted for example by the IMF, is to reduce expenditures rather than raise taxes to dampen the demand impact on non-tradables. This is a problematic strategy in SSA countries with relatively low and inefficient levels of public spending supported by official inflows (aid) that also pose similar macroeconomic management problems.

We present data on variables identified as indicators of currency crises for the sample of SSA countries over the past two decades in Section 4. This data is used to identify the

vulnerability or exposure of such countries to a crisis. There is evidence that increased capital inflows have created pressure for a real appreciation. With the exception of Kenya, all countries have a real exchange rate below trend in the late 1990s. The markets should anticipate an appreciation rather than devaluation, so there is no indication of impending exchange rate crises (at least not market driven ones), although the high level of trade deficits looks unsustainable. Financial liberalisation appears to have been associated with increasing real domestic interest rates and this has not been associated with an expansion of domestic credit. In fact, reserves have been rising while domestic credit (relative to GDP) has been falling, implying sound macroeconomic policies according to first generation models.

Financial liberalisation increases the liquidity of domestic borrowers (feeding domestic instability) and the potential for international contagion, thereby shifting policy priorities towards pleasing international investors instead of concentrating on development tasks. Macroeconomic stability is threatened by volatile capital flows controlled by powerful private agents subject to unpredictable herd behaviour. As information quality is relatively low for SSA countries, and there are likely to be many small investors, susceptibility to herd behaviour is a potential problem. Although SSA is minor in terms of global financial flows, a change in sentiments by a few players could have a serious affect on SSA economies. Gabrielle *et al* (2000) argue that this justifies a number of policy reactions. At the national level, countries should consider reintroducing and maintaining or even upgrading capital controls while promoting domestic institutional development in the financial and banking sectors, supervisory and regulatory agencies. At the multilateral level they argue for increased aid, providing a more secure and predictable source of development finance, and that institutions such as the IMF and the World Bank should act in a financially expansive, counter-cyclical fashion to off-set herd behaviour, panic and contagion effects.

One constructive suggestion of Leape (1999) is that SSA countries could follow the practice of many other countries and impose variable deposit requirements (VDRs) – non-interest reserve requirements deposited with the Central Bank but denominated in foreign currency. As they are relatively easy to vary, VDRs are a flexible instrument for managing the impact of inflows on the domestic economy, and an acceptable form of capital control. This is an option to consider, especially as private capital inflows are often difficult to identify and quantify (a small deposit requirement could assist in monitoring flows). In general, however, our analysis suggests that private inflows are not so great as to represent a danger to SSA countries, so broad-ranging capital controls are nor warranted.

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

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## Appendix Data Description

All data from IMF *International Financial Statistics Yearbook 2001*.

*IMR* the ratio of imports to international reserves: the ratio of the sum of imports in goods (line *78a b*) and in services (line *78a e*) to the total reserves minus gold (line *1ld*), both expressed in millions of US dollars (end of period).

*RER* deviations of the real exchange rate from a deterministic trend: deviations are calculated as a distance of an observation from the mean of the real exchange rate series (line *re c*) divided by its standard deviation. As data (line *re c*) are not available for Kenya, real exchange rates are calculated as the nominal exchange rate (line *rf*) multiplied by US CPI (line *64*) divided by Kenya CPI (line *64*).

*DIR* the differential between foreign and domestic real interest rates on deposits: the real interest rates are the nominal deposit rate (line *60l*) deflated by the price level (line *64*), calculated as [(1+deposit rate)/(1+inflation rate)-1]. The foreign real interest rates are subtracted by the domestic real interest rates.

*RDCY* the ratio of domestic credit (line *32*) to GDP (line *99b*), both expressed in the national currencies.

*RIR* the real interest rate on deposits: the real interest rates are the nominal deposit rate (line *60l*) deflated by the price level (line *64*), calculated as [(1+deposit rate)/(1+inflation rate)-1].

*RLDR* the ratio of lending to deposit rates: the ratio of nominal lending rates (line *60p*) to nominal deposit rates (line *60l*).

*ΔM2R* the change in the ratio of broad money to gross international reserves: broad money (line *35l*) is expressed in US dollars using the nominal exchange rates (line *rf*) that is compared to gross international reserves (line *1ld*). The change is measured as the first difference of the series.

*M2R* the ratio of broad money to gross international reserves: the ratio of broad money (line *35l*) to gross international reserves (line *1ld*) as defined above.

*GDP* an index of output: series for industrial production are not available for the five economies in question. GDP volume at constant price with 1995=100 (line *99 bv p*) is used instead.

*CAX* the ratio of the current account to exports: the ratio of the current account (line *78 al d*) to the sum of exports in goods (line *78a a*) and in services (line *78a d*), all expressed in millions of US dollars (end of period).

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## Research Fellows (Internal)

**Simon Appleton** – poverty, education, household economics
**Adam Blake** – CGE models of low-income countries
**Mike Bleaney** - growth, international macroeconomics
**Indraneel Dasgupta** – development theory, household bargaining
**Norman Gemmell** – growth and public sector issues
**Ken Ingersent** - agricultural trade
**Tim Lloyd** – agricultural commodity markets
**Andrew McKay** - poverty, peasant households, agriculture
**Chris Milner** - trade and development
**Wyn Morgan** - futures markets, commodity markets
**Christophe Muller** – poverty, household panel econometrics
**Tony Rayner** - agricultural policy and trade

## Research Fellows (External)

**David Fielding** *(University of Leicester)* – investment, monetary and fiscal policy
**Ravi Kanbur** (*Cornell*) – inequality, public goods – Visiting Research Fellow
**HenrikHansen** *(University of Copenhagen)* – aid and growth
**Stephen Knowles** *(University of Otago)* – inequality and growth
**Sam Laird** (*UNCTAD*) – trade policy, WTO
**Robert Lensink** *(University of Groningen)* – aid, investment, macroeconomics
**Scott McDonald** *(University of Sheffield)* – CGE modelling, agriculture
**Mark McGillivray** *(WIDER, Helsinki)* – aid allocation, aid policy
**Doug Nelson** *(Tulane University)* - political economy of trade
**Shelton Nicholls** *(University of West Indies)* – trade, integration
**Eric Strobl** *(University College Dublin)* – labour markets
**Finn Tarp** *(University of Copenhagen)* – aid, CGE modelling