VULNERABILITY TO CURRENCY CRISES:

A CONTRAST BETWEEN SOUTH AFRICA AND ZIMBABWE IN THE 1990S.

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Abstract

This paper conducts a review of theoretical models of currency crises, distinguishing between first and second generation models. *First generation* models focus on the role of unsustainable government policy in precipitating crisis, whereas *second generation* models are more concerned with the credibility problem facing government, and how private agents can push government into crisis.

Second generation models also imply currency crises can be unpredictable. Despite this, within the literature on currency crises, two separate methodologies exist which might serve as 'early warning' based systems. The first methodology, the multivariate approach, assesses a country's 'vulnerability' to (say) a global shock and hence the conditional likelihood of currency attack. The second methodology, the signalling approach, argues that extreme behaviour of certain indicators is suggestive of an impending crisis.

The multivariate approach is applied to South Africa and Zimbabwe during the Asian crisis of 1997. Their vulnerability is assessed in terms of a simple second generation model developed by Sachs *et al* (1996). It is argued, however, that because Sachs *et al's* (1996) model conceptualises the countries' vulnerability in terms of the 1994 Mexican crisis, it works poorly for a subsequent crisis. The *ex post* nature of much of the literature is stressed.

The signalling approach is applied to South Africa and Zimbabwe by monitoring the behaviour of a number of indicators Kaminsky *et al* (1997) suggest as useful for anticipating currency crises. It is found that these indicators in the 1990s are not only crisis sensitive, but can exhibit extreme behaviour in response to a number of events. Again, it is often only *ex post* that one can claim the extreme behaviour an indicator exhibits is indicative of an impending crisis.

The paper argues that Zimbabwe has been subject to a number of first generation type crises largely precipitated by unsustainable government policies. It also suggests that more sophisticated second generation models should be applied to South Africa, where an acute trade-off appears to exist between disciplined policies and deteriorating external conditions.

South Africa's disciplined policies seem to have allowed it to weather the Asian crisis better than Zimbabwe. The impact of the Mexican and Asian crises for South Africa, however, is slight when compared with the 1996 and 1998 crises it experienced. The effect of the Mexican and Asian crises on Zimbabwe is also muted. Both South Africa and Zimbabwe appear to be more affected by 'local' rather than 'global' crises. Neither is simply victim of indiscriminate capital flows.

The paper concludes by arguing that the literature on currency crises is generally deficient in its ability to *predict* crisis. The multivariate approach makes no attempt to predict the occurrence of a global shock, and furthermore is often *ex post* in its insights. The indicator approach is a-theoretical, and this paper argues unsuited to anticipate second generation crises of the kind that affected South Africa both in 1996 and 1998.

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INTRODUCTION

Currency crises litter the late- twentieth century landscape. And, like litter, they often share the characteristics of being both easily recognisable and difficult to lay blame for. Kaminsky *et al* (1997), surveying 25 empirical studies on currency crises from the 1950s to mid 1990s, note that these studies differ on how a 'crisis' is defined.[1] They point out that this is largely because the studies have had different objectives in mind.[2]

The theoretical literature in fact distinguishes between first and second generation models of currency crisis. In *first generation* models a currency is devalued because the government is running down its reserves. The running down of reserves generally forms the build- up to the crisis, and reflects a violation of a budget constraint. The 'blame' for the crisis rests squarely at the door of unsustainable government policies.

More recent models of currency crisis (i.e. *second generation* models) assume a government has been forced to devalue (or allow the currency to depreciate), because of intense speculative pressure on the currency. Investors expect the currency to be devalued, and trigger the crisis by fleeing the currency. While the running down of reserves might be a consequence of this, 'blame' for the crisis is not necessarily from unsustainable government policies. Rather, it might paradoxically be because the government has explicitly gone out of its way to signal its 'toughness'.

In both situations, however, the government faces a similar problem: the running down of reserves and/or the expectation of devaluation requires it to restore macro- balance through imposing capital controls, or generating the surplus on its current account. The latter might involve inducing a recession (or exacerbating an existing one), or be achieved via a devaluation of the exchange rate. None is without its cost.

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[1]The definition usually involves the *ex post* behaviour of an index of 'exchange market' pressure (or a 'crisis' index). This index commonly includes the depreciation of the exchange rate or of international reserves (or a combination of the two).

Imposing capital controls might seriously undermine long- term credibility of the government's efforts to attract capital inflows; while inducing a recession will result in a loss of output and employment, and might harm the banking sector. A devaluation is often seen as the easy and only option. This, though, has inflationary implications and might result in further capital flight, forcing the country to increase interest rates.

There is therefore some interest in establishing whether countries can avoid having their currencies come under speculative attack. Currency crises can have very real and harmful effects for the countries concerned. One motivation for studying them, especially given the deleterious effect they can have on long- term growth prospects of the countries concerned, is to establish whether there might not be a number of common factors precipitating a crisis. Such knowledge could not only aid the prediction of currency crises, but also facilitate the construction of preventative and remedial policies.

The literature on currency crises in fact provides for two separate methodologies which might underpin an 'early warning' based system for anticipating currency crises. As Kaminsky *et al* (1997) elaborate, the use of multivariate models to estimate the probability of a devaluation, and the more explicit signalling approach which monitors the behaviour of various indicators prior to a crisis, are two approaches available in the empirical literature which might serve this purpose.

This paper will apply both the multivariate approach of Sachs *et al* (1996) and the indicator based approach of Kaminsky *et al* (1997) to the currency crises experienced by South Africa and Zimbabwe through the 1990s. The Kaminsky *et al* (1997) paper built on Kaminsky and Reinhart (1996), which introduced the signalling methodology to the currency crisis literature; whereas the Sachs *et al* (1996) paper not only claimed success in its application to the 1994 Mexican crisis, but provides an example of a simple second

[2] Studies which incorporate reserves often attempt to include unsuccessful attacks on a country's currency. Despite these differences in objective, Krugman (1997) has reassuringly commented that "we all know one [i.e. a crisis] when we see one".

generation model.[3] The Sachs *et al* (1996) paper is also of interest in its attempt to gauge the impact of capital flows on developing countries.

A currency crisis will broadly be understood as either a sizeable percentage devaluation (depreciation) in the currency or in reserves (or a combination of the two) of the country over a short period. A distinction will be drawn between the 'localised' crises South Africa and Zimbabwe experienced, and those that followed the 'global' Mexican peso crisis of December 1994 and the devaluation of the Thai baht in July 1997.

The 'global' crises are useful to our investigation in that certain countries were affected by these crises while others remained relatively immune, thereby providing a possible means of establishing common factors which might have precipitated (or prevented) the crises. The 'Tequila effect' following the devaluation of the Mexican peso in December 1994 was felt both by Argentina and Brazil, and even extended to the Philippines. Similarly, the devaluation of the Thai baht in July 1997 initiated an intense wave of speculative pressure across much of East Asia, forcing a number of countries to devalue and undergo severe macro- contractions.

Part of this paper's concern is the extent South Africa and Zimbabwe were affected by these two 'global' crises, and whether there was a set of 'common factors' precipitating these crises. Second generation models can make better sense of 'contagion' effects following crises such as the Mexican and Asian than that of first generation models.[4]

Nevertheless, this paper will argue that insights from such models are compromised by the *ex post* nature of much of this literature. The bold claim by Sachs *et al* (1996) that a set of common pre- crisis 'fundamentals' could explain the variation in the severity of the currency crises across twenty developing countries following the Mexican peso crisis in December 1994 stumbles when applied to a more recent example of developing country 'contagion'.

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[3] Most second generation models require econometrics beyond the scope of this paper.

[4] First generation models struggle to explain why a number of different countries might be affected at a similar time. This point is explored in more detail in Chapter One.

The Mexican crisis of 1994/5 and Asian crisis of 1997/8[5] have also directed attention towards the possible harmful effects of capital inflows, and ways in which capital inflows might be successfully managed. This in turn has entailed a wider focus than that of finding fault simply with the particular countries afflicted, and has had implications both for global institutions like the IMF and the ideological apparatus under which they have operated.[6]

Nevertheless, the impact of capital flows for South Africa has predominantly expressed itself via 'localised' crises, and Zimbabwe has also undertaken policies which have increased its vulnerability to crisis. Neither is simply victim of indiscriminate capital flows.

This paper will argue that while the 'localised' crises in Zimbabwe were of a *first generation* type, South Africa has been affected by *second generation* type crises. Its explicit attempt to avoid first generation type crises has made South Africa vulnerable to second generation type crisis. The ability of the signalling approach to predict these crises is questioned.

The plan of this paper is as follows.

Chapter One articulates the theoretical literature on currency crises, outlining in particular the distinction between first and second generation models of currency crisis, and the various variables these models suggest are important in understanding a crisis. The model of Sachs *et al* (1996) will be contextualised as a simple second generation model, and the literature on currency crises will also be placed in the wider context of the literature on government credibility.

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[5] And indeed (least one think these crises only affect developing countries) Britain's exit of the Exchange Rate Mechanism (ERM) in 1992.

[6] Thabo Mbeki, at the Non Aligned Movement (NAM) summit in Durban in 1998, expressed in African metaphor the destructive nature of global capital flows for developing countries by stating: "A slight turn by the sleeping elephant, to make itself more comfortable, can result in the complete annihilation of the universe of the colony of ants" (Mbeki, 1998: 121).

Chapter Two outlines the two separate methodologies the literature provides which might underpin an 'early warning' based system for anticipating currency crises. The a-theoretical 'indicator' methodology of Kaminsky *et al* (1997) will be outlined here, and the Sachs *et al* (1996) model also placed in the context of an 'early warning' based system. It will be pointed out that the usefulness of any 'early warning' approach depends on its ability to take cognisance of the Lucas critique.

Chapter Three will apply the methodology of Sachs *et al* (1996) to the Asian crisis of 1997/8 after reproducing their results to the Mexican crisis. Their model in part attempts to incorporate the effects large capital inflows have on developing countries. The chapter will lay some emphasis on the relative position of South Africa and Zimbabwe in the set of developing countries with respect to these two 'global' crises, and compare the impact of these 'global' crises with the volatility that has dogged both South Africa and Zimbabwe's currencies throughout the 1990s.

Chapter Four will argue that a detailed descriptive analysis suggests the relevance of more complex second generation models to the South African experience.[7] The a-theoretical 'indicator' based approach of Kaminsky *et al* (1997) highlights important differences between the crises experienced in South Africa and Zimbabwe, and suggests that the Zimbabwean experience is more congruent with a first generation approach.

The conclusion will highlight the contrast between South Africa and Zimbabwe, and also argue that the 'empirical reality' of both these countries suggests caution against the literature's ability to predict currency crises.

[7] These models will be briefly discussed in Chapter One.

CHAPTER ONE
Theoretical Literature

The purpose of this chapter is to outline the main reasons given in the theoretical literature for a speculative attack on a country's currency. Krugman's (1979) balance of payments model will be used to illustrate a *first generation* model of currency crisis, and Sachs *et al's* (1996) model will be explored to provide an example of a *second generation* model. The distinction between first and second generation models will be discussed, with a particular reference to the role of economic fundamentals. An attempt will also be made to include in the analysis an account of the literature on government credibility.

1.1 First Generation Models

The seminal model on currency crises is that of Krugman (1979). In this model, domestic credit expansion in excess of money demand growth leads to a gradual but persistent loss of reserves, and ultimately to a speculative attack on the pegged currency. The loss of reserves is understood as a consequence of an unsustainable expansionary domestic policy which violates a budget constraint. This suggests that possible indicators of an impending crisis should be a gradual but persistent decline in reserves, and a rapid growth of domestic credit relative to money demand.

Speculators bet against the currency to avoid the capital loss which an eventual running down of reserves (and devaluation) will entail. Attacks on the currency result in the reserves being run down at a faster rate than otherwise would have been the case. While initial attacks against the currency might be unsuccessful, the macro-imbalance contains within it the logic for the country to be forced to abandon the peg.

In Krugman's model the exchange rate does not jump, and there are no capital losses or gains (because rational speculators anticipate away the arbitrage conditions). Berg and Pattillo (1999: 108) suggest, somewhat mischievously, that "the relevance to the type of crises most people have in mind may be limited".

Nevertheless, *first generation* models make the bold claim that currency crises can be predicted. They also focus on the role played by government in precipitating crisis. Flood and Marion (1998:4) describe first generation models of currency crises as "show(ing) how a fixed exchange rate policy combined with excessively expansionary pre- crisis fundamentals push the economy into crisis, with the private sector trying to profit from dismantling these inconsistent policies".

Krugman's model, in particular, took as its cue the experience of the southern cone countries,[8] where expansionary domestic policies were seen as being responsible for the country losing reserves. Thus fiscal imbalance and credit to the public sector might also be possible indicators of an impending crisis as they are indicative of an expansionary policy.

In first generation models private agents simply take advantage of inconsistent government policies. The policies are inconsistent independent of the private agents' actions. Hence economic fundamentals can be understood to play a mechanistic role in generating a crisis. In the first generation sense 'weak fundamentals' are inconsistent in an accounting or logical sense. First generation models thus struggle to explain why a number of different countries might be affected by crisis at a given time. At least, in first generation models it is largely a coincidence that a number of countries have unsustainable government policies at the same time.

1.2 Second Generation Models

Second generation models take their cue from Britain's exit of the Exchange Rate Mechanism (ERM) in 1992. This currency crisis is explained poorly by first generation models since inflationary 'fundamentals' did not appear to push the economy into crisis. Rather, speculators appeared to play a crucial role in triggering the crisis.

[8] The Southern Cone Syndrome refers to the experience in the 1970s of Uruguay, Chile and Argentina who experienced capital flight following financial liberalisation and massive inflows. See, for example, Theron (1998).

In second generation models private agents can make the government policies inconsistent. In doing so, second generation models need not resort to the more mechanistic role 'economic fundamentals' played in earlier models. Rather, private agents' expectations become crucial in determining whether the currency will come under attack. The 'trigger' for attack need not necessary come from the presence of 'weak fundamentals' such as meant in a first generation sense. These models can explore 'contagion' effects following a change in sentiment with respect to (say) developing countries. A downturn in sentiment might expose a number of countries to crisis at a similar time.

The distinction between first and second generation models can perhaps be illustrated by an example. In a second generation model a crisis might occur because a government was perceived as 'weak'.[9] The reason for the perception of 'weakness' might simply be because the government committed itself to a gradual process of trade reform.[10] There is nothing 'fundamental' about a gradual process of trade reform that implies the inevitability of a violation of an accounting identity. Nevertheless, private agents may interpret it as such.[11]

In second generation models 'wet' governments then are not vulnerable simply because they run down reserves (i.e. violate an accounting identity), but also because they are more likely to devalue than bear the output and employment costs associated with restoring macro- balance (for example in response to an outside shock). The logic is circular: because private agents become aware that the government is 'weak' they expect a devaluation; because the government is 'weak' it responds to the expectation (and hence capital outflows) by devaluing.

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[9] Meant here in the sense of being 'populist' or 'inflationary'. Such governments are also referred to as 'wet'. See, for example, Masson (1995).

[10] For a discussion on the importance of the 'big bang' approach in signalling government 'toughness', see Rodrik (1989). For an argument that this view is too simplistic see, for example, Drazen and Masson (1994).

[11] This is not to suggest that private agents are acting irrationally. A 'wet' government is more likely to adopt gradual reforms (if it adopts any reforms). Hence the adoption of 'gradual' reforms might signal a

The signalling literature on government credibility in fact has devoted a great deal of attention to the 'type' of government in determining the expectation that an announced policy will be carried out.[12] See, for example, Kydland and Prescott (1977), where the credible inflation policy hinges on the relative weight government places on inflation and employment. In this model governments which are perceived as 'weak' are unable to reduce inflation even if they are actually committed to such a policy.

It is the private sector's awareness that the government has an incentive to deviate from its *ex ante* policy *ex post* (and the belief that it is a 'weak' government even when it makes assurances otherwise), rather than any change in economic fundamentals *per se*, which create the conditions for persistent inflation.

Similarly, the credibility problem facing a commitment to a pegged exchange rate stems from the government's inability to make a binding commitment to an *ex ante* optimal policy, and this results in private agents making choices which are very different from those which would have been made had the *ex ante* policy been binding. The private agents' actions can then cause government action to deviate *ex post*. It is in relying on the logic of this *time- consistency* problem that economies can be 'pushed' rather than 'pulled' into crisis.

In Obstfeld (1994), for example, investor expectation of a currency collapse leads to higher wages and lower employment, and prompts the government to devalue out of concern for output. In a second model (Obstfeld (1996)) expectation of a currency collapse leads to higher interest rates and the government devalues out of concern for servicing higher public debt.

In a second generation model a crisis could also occur *because* a government in attempting to signal its 'toughness' by being (say) anti-inflationary, causes a sufficient deterioration in the macro-economy that it becomes vulnerable to that deterioration.

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government that cares less about inflation than unemployment, and is willing to inflate the economy for short term gain (i.e. run down reserves).

[12] Persson (1988) undertakes a broad survey of the literature.

Private agents' awareness of that vulnerability can then push the economy into crisis. In other words the commitment to a pegged rate can never be binding if the government faces a trade- off in its objective function, since it will always have an incentive to deviate *ex post*.

For example, Aron and Elbadawi (1999) model the trade- off between exchange rate stability (achieved via higher interest rates to sterilise capital inflows) and capacity utilisation in South Africa, and argue that nominal exchange rate stability in the presence of capital inflows increasingly hurt employment creation. In this case an attempt to signal toughness (through a stable nominal exchange rate) made South Africa vulnerable to speculative attack.

It is important to bear in mind that 'fundamentals' can be 'weak' both because of expansionary domestic policies, and 'weak' because of restrictive domestic policies. The first 'weakness' supposedly encourages a first generation type crisis through its very non sustainability, whereas the second prevents it by signalling government 'toughness'. Nevertheless, signalling government 'toughness' is not necessarily sufficient to ward of a second generation type crisis.

Drazen and Masson (1994) convincingly argue that exclusive focus on the type of government neglects the importance external circumstances have in determining the credibility of an announced policy. At some stage conditions will have deteriorated sufficiently for even a 'tough' government to have an incentive to relinquish its policy.[13]

The classic illustration of this is Britain's exit from the ERM in 1992. Britain had joined the ERM at what was generally regarded as an overvalued rate precisely to signal its anti-inflationary intentions, and reiterated its commitment to bear the costs of reduced output that this peg entailed. Furthermore, when Britain abandoned the ERM it still had a

[13] Developing countries who liberalise rapidly, while signalling their 'tough' intentions, might nevertheless still fail because of the negative developments (for example, in the failure of previously protected sectors) which render the cost too high (even for a tough government).

sizeable quantity of reserves and did not face the borrowing constraints that existed for the southern cone countries two decades earlier.

In the British case the existence of a tough government was insufficient to negate the expectation of devaluation, because of the deteriorating circumstances (particularly in terms of higher than expected unemployment) its tough policies caused. Private agents can become aware of this, and 'push' the economy into crisis. The government, accepting that external circumstances are 'bad', responds to the pressure on its exchange rate by devaluing rather than bearing further output costs. The logic once again is circular: because private agents become aware that the government will not bear the output costs should a speculation occur; a speculation does occur. And in response to the speculation, the government devalues.

Berg and Pattillo (1999: 108) have noted that since "in *second generation* models, a country may be in a situation in which an attack, while not inevitable, might succeed if it were to take place; the exact timing of the crisis would be essentially unpredictable". Nevertheless, as they (1999: 108) suggest, it "may be possible to identify whether a country is in a zone of vulnerability- that is, whether fundamentals are sufficiently weak that a shift in expectations could cause a crisis. In this case, the relative vulnerability of different countries might predict the relative probabilities of crises in response to a shock such as a global downturn in confidence in emerging markets".

Sachs *et al* (1996) attempt to quantify whether emerging markets were differentially treated following the Mexican peso devaluation of December 1994. Their model is essentially second generation in that they argue investors targeted those countries which they suspected would have the most to lose by not devaluing.

Their model will be applied to the 1997 Asian crisis in Chapter Three. It is outlined in some detail below.

1.3 Sachs' *et al* (1996) Model

Assume a government managing a pegged rate E_0 where E_0 is the nominal price of the local currency in US$. Then E_0 is the real exchange rate if the ratio of the domestic to foreign price level is assumed to be one. Let K be the capital outflow induced by investors' expectation of a devaluation and R the reserves the government is willing to commit to defending the peg. Now the rate will remain pegged as long as K is not greater than R. If K>R then the government devalues to establish a new real exchange rate E_t. The target rate E_t reflects a host of structural variables (such as the terms of trade, degree of trade and financial liberalisation, expectations of long- term capital flows) which includes the health of the banking sector.

Summarising the above information mathematically.

$$E_1 = E_0 \text{ when } K < R$$
$$= E_t \text{ when } K > R$$

Further, one can argue that the target rate will be greater than the 'long run' rate if the banking sector is weak[14]

$$E_t = e.\Phi(LB) \qquad \Phi'(LB)>0 \qquad (1)$$

where e is the 'long-run' real rate (essentially the target rate the government would set should the banking sector be sound) and Φ (LB) reflects the health of the banking sector.

Now the devaluation

$$D = (E_1/ E_0) - 1.$$

Thus

$$D = (e/ E_0)\, \Phi(LB) - 1 \text{ if } K > R$$

and

$$D = 0 \text{ otherwise}$$

Hence devaluation is greater the more the exchange rate has appreciated relative to its long run average ((e/ E_0) is high) or the weaker the banking sector (the greater the lending boom (Φ (LB) has been).

Finally, if each investor has an expectation of devaluation such that

$$k_j = 0 \text{ when } p < \chi$$
$$k_j = k \text{ when } p > \chi$$

Then, as long as the probability of there being a devaluation is less than some threshold (i.e. $p < \chi$) investor j will not remove her capital from the country.

By symmetry $K = 0$ if $D < \chi$
$= Nk$ if $D > \chi$

Sachs *et al's* (1996) basic argument is that the cost to countries not to devalue with an unappreciated real exchange rate and moderate bank lending during the capital inflow period was insufficient for investors to fear that they would devalue. A potential devaluation would be insufficient to prompt investors to flee the currency. These countries then did not experience capital outflows following the peso crisis since

$$(e/ E_0)\, \Phi (LB) - 1 < \chi.$$

Because there was no capital outflow no devaluation occurred.

The cost to countries not to devalue with an appreciated exchange rate and a lending boom would be too high to allay investors' fears that they would not devalue. The magnitude of the devaluation would be greater than investors' threshold for keeping

[14] In other words the government would rather devalue than risk a recession when the banking sector is vulnerable to 'bad' loans.

funds in the country. Hence funds would leave the country. However, they would experience a devaluation only if $K=\bar{N}K < R$.

The model is second generation in the sense that it is private agents' expectation of a devaluation (and its size) rather than any 'fundamentals' *per se* which precipitates the crisis.

The following chapter's concern, however, is with the empirical literature on currency crises. It follows the example of Kaminsky *et al* (1997) in trawling the literature, and puts forward their recommendations for an 'early warning' based system. Their 'signalling' methodology is contrasted with the multivariate approach of Sachs *et al* (1996).

CHAPTER TWO
Early Warning Systems

Following Kaminsky *et al* (1997), there are two distinct approaches in the empirical literature on currency crises providing for an 'early- warning' based system. This chapter follows Kaminsky *et al* (1997) in assessing the empirical literature in terms of its ability to anticipate currency crises. Kaminsky *et al* (1997) claim to have built a useful methodology based on 'indicators' which exhibit extreme behaviour prior to a crisis. The model of Sachs *et al* (1996) is an example of an alternative 'early warning' based approach. Both methodologies will be discussed.

Following Kaminsky *et al* (1997) it is prudent to distinguish four different approaches to currency crises in the empirical literature.[15] First, there are studies that are qualitative in nature and, whilst they might suggest the evolution of certain variables in explaining a crisis, conduct no formal tests. Hence there is no means of ascertaining from these studies the usefulness of the variables considered as potential indicators. An example of such a study is Dornbusch *et al* (1995) which stresses the role of an overvalued exchange rate in precipitating a crisis.

Second, there are studies which focus on the stylised facts leading up to and following a crisis, with the idea of comparing pre- crisis behaviour with tranquil non- crisis periods. Frankel and Rose (1996) (discussed later) is such a paper. These studies also attempt to test whether there are systematic differences between the pre- crisis and control period. Whilst these studies have not been concerned with developing indicators *per se*, their approach lends itself to developing an 'indicator' based system.

Third, the methodology of Kaminsky and Reinhart (1996) systematically attempts to develop a set of indicators whose behaviour prior to a crisis can be suggestive of an impending crisis. This approach draws on the literature of predicting turning points in

[15] The four approaches are illustrative rather than exclusive: the paper by Frankel and Rose (1996), for example, finds itself grouped in two categories.

business cycles. Kaminsky *et al* (1997) build on this paper and put forward a number of indicators they claim to have a 'proven' track record in anticipating crises .[16]

Fourth, the multivariate approach attempts to assess the probability of a country's vulnerability to a currency crisis in the event of (say) an exogenous shock. This approach generally has less to say about the timing of an actual crisis than that of the indicator approach. The simple second generation model of Sachs *et al* (1996) is of this ilk.

As Kaminsky *et al* (1997) point out, the use of multivariate models to estimate the probability of a devaluation and the more explicit signalling approach provide two distinct approaches in the empirical literature of what might underpin an 'early warning' based system. An 'early warning' based system is any methodology which should allow policy-makers to predict or anticipate a potential crisis.

Frankel and Rose (1996), for example, use a probit model and annual data to estimate the probability of a currency crash[17] for more than 100 developing countries. These multivariate models have largely drawn on a theoretical model developed by Blanco and Garber (1986), which analysed the Mexican experience in the early 1980s.

2.1 The Signalling approach

Kaminsky and Reinhart (1996) explicitly introduce a 'signalling' approach to the currency crisis literature. They considered 76 currency crises[18] between 1970 and 1996 where a crisis was defined *ex post* by the behaviour of an index of 'exchange market pressure'.[19] The paper then considered 15 indicators[20] whose behaviour when deviating

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[16] The 'indicators' come from a number of different studies. Kaminsky *et al* (1997) survey 25 empirical studies and assess over 100 possible indicators.

[17] They define a currency crash as a nominal exchange rate depreciation of at least 25% that also exceeds the previous year's change by at least 10%.

[18] Included in this non- random sample were 15 developing and 5 developed countries. Interestingly, neither South Africa nor Zimbabwe was included.

[19] This index was a weighted average of monthly percentage changes in the exchange rate and international reserves. A crisis occurred when this index was more than three standard deviations above its mean.

[20] The indicators were chosen both on theoretical and monthly- availability considerations. They are (1) international reserves in U.S. dollars; (2) imports in U.S. dollars; (3) exports in US dollars; (4) terms of

from some 'threshold' level was taken to provide a warning signal about a potential crisis[21] within the next 24 months.

The signalling approach has an advantage for policy-makers attempting to avert a crisis in that it explicitly highlights troublesome indicators (and hence suggests where remedial action might be administered).

The argument of Kaminsky *et al* (1997) is an indicator is considered useful if it exceeds its threshold (and fairly persistently) in the two years prior to an exchange rate crisis.[22] Now, if we accept the proposition that there is a difference in the behaviour of the indicator between the tranquil and the pre-crisis periods, then a 'good' indicator is one that would express this difference in terms of consistently exceeding its threshold in the 24 months prior to a crisis.

In other words, a 'good' indicator is one with a low noise-to-signal ratio, where noise is whenever an indicator exceeded its threshold but was not followed within 24 months by a crisis; and signal is when it was followed by a crisis.

The paper of Kaminsky *et al* (1997) augments Kaminsky and Reinhart (1996) by attempting to 'catch' which variables discussed in the empirical literature are useful as

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trade; (5) deviations of the real exchange rate from a deterministic time trend (in percentage terms); (6) the differential between foreign and domestic real interest rates on deposits; (7) "excess" real M1 balances where excess is defined as the residuals from a regression of real M1 balances on real GDP, inflation, and a deterministic time trend; (8) the money multiplier of M2; (9) the ratio of domestic credit to GDP; (10) the real interest rate on deposits; (11) the ratio of (nominal) lending to deposit rates; (12) the stock of commercial bank deposits; (13) the ratio of broad money to gross international reserves; (14) an index of output; (15) an index of equity prices measured in U.S. dollars. The indicator was defined as the percentage change in the level of the variable with respect to its level a year earlier (except for the deviation of the real exchange rate from trend, 'excess' real M1 balances, and the three interest rate variables).

[21] The 'threshold' level was chosen to "strike a balance between the risks of having many false signals (which would happen if a signal was issued at the slightest possibility of a crisis) and the risks of missing many crises (which would happen if the signal is issued only when the evidence is overwhelming)." (quoted in Kaminsky *et al*, 1997: 17)

[22] The threshold was chosen such that 10% of the time the indicator would exceed the threshold. More rigorously, the 'optimal' threshold is that which minimises the noise to signal ratio B/A where B = signal issued but no crisis within 24 months and A = signal issued and crisis within 24 months. Kaminsky *et al* (1997) constrained the threshold to be the same percentile across countries for each indicator. The 24 month window was selected *a priori*.

potential indicators of currency crisis. Their evaluation criteria are fairly systematic and discussed in some detail in their paper.

What is of interest here is which *empirically* valid indicators Kaminsky *et al* (1997) were left clutching? They (1997: 12) note that there are no clear- cut answers. In fact, attempting to compare variables across such diverse papers is quite heroic. Nevertheless, they argue that

> "an effective warning system should consider a broad variety of indicators; currency crises seem to be usually preceded by multiple economic, and sometimes political, problems. The evidence reviewed here points to the presence of both domestic and external imbalances which span both the real side of the economy and the domestic financial sector" (*Ibid.*).

More particularly, empirical support is confirmed for the use of 11 indicators in providing an early warning system of currency crises. They show that international reserves, the real exchange rate, credit growth, credit to the public sector, and domestic inflation are particularly important; and that there is also support for the trade balance, export performance, money growth, M2/international reserves, real GDP growth, and the fiscal deficit as exhibiting 'abnormal' behaviour prior to a crisis.

Chapter Four will describe the behaviour of these indicators for two 'crisis ridden' countries, South Africa and Zimbabwe. A particular focus of the chapter will be on the difficulty of deciding what 'normal' behaviour is in countries undergoing transition. This descriptive analysis will raise questions about the relevance of an 'indicator' based approach for such countries. It will also caution against the wisdom of placing such countries in an econometric model like that of Sachs *et al* (1996).

A further preoccupation of this paper is the *ex post* insights of much of the literature. This makes it vulnerable to the Lucas critique. The possible endogeneity of policy might render early warning systems ineffective once they have been published (and digested) as

policy makers ensure indicators do not exceed certain thresholds. Berg and Pattillo (1999) argue that the real test is out of sample prediction. Kaminsky *et al* (1997), Sachs *et al* (1996), and Frankel and Rose (1996) all arrive at their conclusions by fitting the data *ex post*.

The following chapter will apply the model of Sachs *et al* (1996) to the Asian crisis. This will highlight the problematic *ex post* nature of the approach of Sachs *et al*, as well as giving an idea of the relative position of South Africa and Zimbabwe with other developing countries. The Sachs *et al* (1996) paper will first be reapplied to the Mexican crisis. Both these crises will then be discussed in relation to the currency crises South Africa and Zimbabwe have experienced in the 1990s.

CHAPTER THREE
Application of a Second Generation Model

This chapter applies the simple second generation model of Sachs *et al* (1996) to the devaluation of the Thai baht in July 1997. An aim here is to stress the shortcomings of any *ex post* model (such as that which Sachs *et al* (1996) applied to the Mexican peso crisis of December 1994) in anticipating a crisis. The chapter also attempts to establish whether there are important differences between the 1997/8 Asian crisis and the 1994/5 Mexican crisis. South Africa and Zimbabwe's 'crisis- ridden decade' will then be discussed, with some stress on how the 'empirical reality' of these two countries can be interpreted.

Sachs *et al* (1996) argue that the variation in the behaviour of an index of exchange market pressure (a crisis index) for 20 developing countries in the six months after the peso devaluation in December 1994 can be explained by a set of pre- crisis 'fundamentals'. The robustness of their results have partly been questioned by subsequent revisions to the data they used.[23]

This section will first attempt to replicate Sachs *et al* (1996) results to the Mexican crisis with the revised IMF data, and then apply that methodology to the 1997 Asian crisis. Comparable data will thus be used to describe both crises. The relative position of South Africa and Zimbabwe amongst the other emerging markets across the two crises will be noted.

[23] See, for example, Berg and Pattillo (1999). The revisions are to the International Financial Statistics (IFS) and the Direction of Trade Statistics data. Both are published by the International Monetary Fund (IMF).

3.1 1994 Mexican Crisis

The model of Sachs *et al* (1996) utilises four variables: a crisis index (IND); a lending boom (LB); a real exchange rate (RER); and a ratio of M2 to Reserves (M2/R). These will now be discussed.

Their crisis index (IND) is calculated as $\theta(\%\Delta E) - (1-\theta)(\%\Delta R)$. $(\%\Delta E)$ refers to the percentage depreciation of the country's currency against the US$ between November 1994 and various months in 1995. Similarly, $(\%\Delta R)$ refers to the percentage increase in total reserves (less gold) between November 1994 and various months in 1995. θ refers to the weight accorded to the currency depreciation component of the index, and $(1-\theta)$ the weight to the reserve component.[24] An increase in the crisis index reflects an increase in 'speculative' pressure on the currency between the two months.

The lending boom (LB) is calculated as the $\%\Delta$(M2/GDP) between 1990 and 1994, after correcting for an inflation bias.[25] M2 is Money plus Quasi- Money. The period 1990 through 1994 is chosen because developing countries experienced large capital inflows over the period. The idea behind this calculation is that countries which show a large lending boom have struggled to sterilise large capital inflows, and hence have banking sectors which are weak in the sense that are likely to have made risky loans. This makes them prone to devalue the currency rather than raise interest rates.[26]

The real exchange rate (RER) calculated compares the average real exchange rate between 1990 and 1994 with its average between 1986 and 1989. The idea behind this is to establish whether the large capital inflows over 1990 through 1994 had any effect on the real exchange rate of each developing country and hence whether a pegged exchange rate might have become overvalued.

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[24] θ equals var(R)/(var(R)+var(E)). The variance for each series is calculated from the percentage monthly change in 10 years of data.

[25] M2/GDP is multiplied by (average monthly inflation for 1994)/(December 1994 inflation).

[26] Note however that Aron and Elbadawi (1999) argue that countries which sterilise large capital inflows make themselves vulnerable to *second generation* type crises as the trade- off between high interest rates and (say) manufacturing output becomes acute.

The RER index is calculated as the weighted sum of the ratio of various foreign consumer price indices to the local price index multiplied by the nominal exchange rate. The foreign consumer price indices are the US, Japan and Germany. The weights are taken from the bilateral trade shares of each developing country with the US, Japan and Europe, and sum to one.

M2/R takes the ratio of M2 to reserves (converted into local currency) for the month of November 1994. This is just prior to the Peso devaluation. The ratio gives an indication of the country's ability to ride a capital outflow.

Table 3.1 1 reports the behaviour of the pre- crisis fundamentals and the crisis index through April 1995.[27] The notation is similar to that previously discussed. (IND) refers to the crisis index. (LB) to the lending boom. (RER) the real exchange rate. (M2/R) to the ratio of M2 to reserves. Columns headed by (S) refer to the results reported by Sachs *et al* (1996: 160) in their Table 1. Columns headed by (R) were calculated using the revised data. Sachs *et al* (1996) also report data for Taiwan. Taiwan has been dropped from the revised calculations, as data for Taiwan is not readily available.[28]

[27] A weighted sum of the percentage change in the exchange rate and reserves between April 1995 and November 1994 has been calculated. We have used April because this month is explicitly reported by Sachs *et al* (1996) in their paper. Their index is actually calculated for Jan95–Dec94, Feb95-Dec94, Mar95-Dec94, Apr95-Dec94, May95-Dec94 and Jun95-Dec94. The results are relatively robust for each 'month'.

[28] This also follows the South African policy of not antagonising mainland China.

Table 3.1 1: 1994 Pre- Crisis Fundamentals

Country	IND (S)	IND (R)	LB (S)	LB (R)	RER (S)	RER (R)	M2/R (S)	M2/R (R)
Argentina	20.2	20.2	57.1	108.4	-48.0	-45.9	3.6	4.1
Brazil	17.7	22.1	68.3	97.5	-29.6	-26.2	3.6	4.0
Chile	-5.7	-5.6	13.3	16.6	-7.5	-13.1	1.4	1.5
Colombia	4.2	4.2	20.5	31.0	9.2	12.3	1.5	1.5
India	-1.2	-0.1	-3.1	-10.3	43.0	57.4	6.3	7.5
Indonesia	1.3	1.3	0.7	11.0	11.8	18.4	4.6	6.1
Jordan	-1.5	-1.6	4.2	3.6	35.5	40.1	2.5	3.9
Korea	-3.7	-3.7	8.4	8.0	-10.3	-13.1	6.5	6.7
Malaysia	-2.6	-2.6	4.0	4.7	9.8	9.6	2.1	2.0
Mexico	79.1	79.3	116.2	146.1	-28.5	-24.0	9.1	9.0
Pakistan	0.7	0.7	-7.7	-3.4	20.4	25.1	6.6	8.9
Peru	-2.9	-2.7	156.1	364.5	-45.4	-45.7	1.5	1.2
Phillipines	7.2	7.2	50.0	61.6	-6.7	-10.9	4.1	4.8
South Africa	1.1	2.2	8.1	13.1	-6.8	-6.9	21.5	50.5
Sri Lanka	0.7	0.7	28.9	32.3	1.2	6.6	2.0	1.9
Thailand	-1.8	-1.8	39.2	42.9	0.2	-5.0	3.7	3.8
Turkey	-2.5	-2.5	-32.8	-14.4	-12.1	-12.5	3.2	4.3
Venezuela	7.6	5.2	-38.5	-49.6	16.2	20.4	1.4	1.8
Zimbabwe	1.6	1.6	55.7	71.4	44.2	45.0	2.6	3.1

Source: IFS

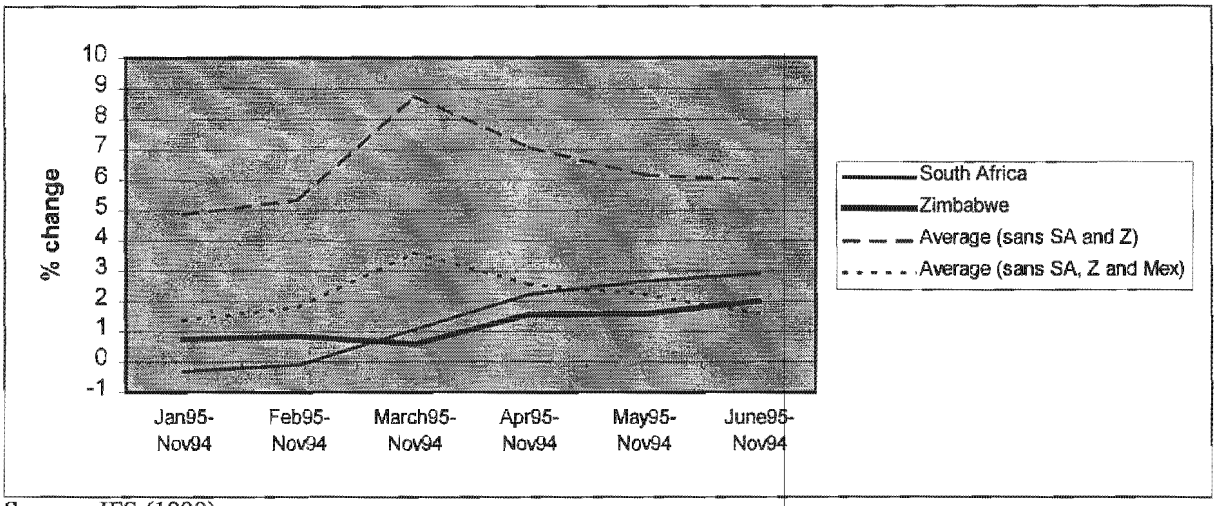
The variable which appears to be most affected by the data revisions is that of reserves (M2/R). The sum of the absolute difference in the ranking of the countries according to the three measures is 19 for M2/R, 12 for LB and 10 for RER.[29] The data revisions have not affected all countries equally. South Africa in particular appears severely affected by the change to reserves. It is also interesting to note South Africa's low levels of reserves when compared with other developing countries.

Both South Africa and Zimbabwe were adversely affected by the peso crisis. South Africa ranks worse than Zimbabwe according to the revised data,[30] but better when the April data from Sachs *et al* (1996) is used. The disparity appears to stem from the

[29] Reserves affect the weighting of the crisis index as well as the indicator M2/R. Reserves are notoriously noisy. Frankel and Rose (1996) on this basis justify discarding reserves from their index.
[30] The crisis index performs worse for SA in five of the six months. See Figure 1.

revision to reserves. Figure 3.1 1 charts in more detail the relative performance of South Africa and Zimbabwe across the relevant period.

Figure 3.1 1: 1994 Crisis Index



Source: IFS (1999)

Sachs *et al's* (1996) second generation model outlined in Chapter One suggests that countries which lack reserves and which have an appreciated exchange rate or have undergone a lending boom are vulnerable to speculative attack. Thus while both South Africa and Zimbabwe appear to be similarly afflicted, one can surmise that the reason behind South Africa's crisis might stem from the appreciation of its exchange rate prior to the crisis. This, when combined with its high ratio of M2/ Reserves, might have hindered its ability to fight a speculative attack. Zimbabwe's vulnerability on the other hand arises from a large lending boom rather than an exchange rate appreciation.

Later, this paper will argue the lack of lending boom despite the capital inflows made South Africa vulnerable to a *second generation* crisis along the lines suggested by Aron and Elbadawi (1999).

Figure 3.1 1 also compares their performance with that of the other 17 countries. It is striking how South Africa and Zimbabwe are initially less affected by the crisis in

comparison with other countries, but that they become more adversely affected as the other countries recover. This suggests that there might be other factors at play in the South African and Zimbabwean case. Chapter Four explores this possibility and stresses the importance of local factors in precipitating crisis.

To develop the econometric approach further we follow Sachs *et al* (1996) and construct a number of dummy variables on the basis of a country's pre-crisis characteristics. The dummies are: weak fundamentals; low reserves; and an interactive dummy for weak fundamentals and low reserves.

$D^{wf}=1$ refers to countries with weak fundamentals. Countries with strong fundamentals are classified as those whose real exchange rate depreciation falls in the highest quartile and whose lending boom falls in the lowest quartile.[31] These are India, Pakistan, and Venezuela. They are assigned a dummy $D^{wf}=O$. With the revised data Jordan is included with the set of 'strong' countries.

$D^{lr}=1$ refers to countries with low reserves. These are countries whose M2/R ratio is above those in the lowest quartile. Sachs *et al* (1996) assign Chile, Columbia, Peru, Sri Lanka and Venezuela $D^{lr}=0$. The classification is the same with the revised data.

$D^{lr} \times D^{wf} = 1$ refers to countries with low reserves and weak fundamentals. Sachs *et al* (1996) assign Chile, Columbia, India, Pakistan, Peru, Sri Lanka and Venezuela $D^{lr} \times D^{wf} = 0$. With the revised data Jordan is included with $D^{lr} \times D^{wf} = 0$. The data revisions thus do not appear to be too severe to the dummy classifications.

Sachs *et al* (1996) then run the following regression. Their results are reported in detail in their paper.

[31] Dropping Taiwan from the sample does not affect the other countries' dummy classification. It does result in our 'quartile' being 5/19 rather than 5/20.

$IND = \beta_1 + \beta_2 (RER) + \beta_3 (LB) + \beta_4 (D^{lr} \times RER) + \beta_5 (D^{lr} \times LB) + \beta_6 (D^{lr} \times D^{wf} \times RER) + \beta_7 (D^{lr} \times D^{wf} \times LB)$

The regression attempts to explain movements in the crisis index with pre-crisis movements in the real exchange rate and lending boom variables. In particular, Sachs *et al* (1996) argue that only countries with low reserves and either an over-appreciated exchange rate or a lending boom would have been targeted by speculators.

The coefficients β_2 and β_3 capture the effect on the crisis index of countries with high reserves ($D^{lr}=0$) and strong fundamentals ($D^{wf}=O$). A priori, β_2 and β_3 should be zero. Any devaluation made by these countries would be insufficient to frighten investors. Hence there was no capital outflow, and thus no devaluation.

The coefficients $\beta_2 + \beta_4$ and $\beta_3 + \beta_5$ capture the effect on the crisis index of countries with low reserves ($D^{lr}=1$) and strong fundamentals ($D^{wf}=O$). For a similar reason the model predicts $\beta_2 + \beta_4 = \beta_3 + \beta_5 = 0$.

Finally, the coefficients $\beta_2 + \beta_4 + \beta_6$ and $\beta_3 + \beta_5 + \beta_7$ capture the effects of countries with weak fundamentals and weak reserves. The model predicts $\beta_2 + \beta_4 + \beta_6 < 0$ and $\beta_3 + \beta_5 + \beta_7 > 0$. Investors would fear the magnitude of these countries' devaluation, flee the currency and thus trigger the crisis.

My attempts at reproducing the results of Sachs *et al* (1996) as well as their results for April are reported in Table 3.1 2 (next page). The first column of reported data refers to the results reported by Sachs *et al* (1996) in their paper. The second column refers to my attempt to replicate Sachs *et al's* (1996) results using the data they report in their paper (i.e. Table 1 (S) data but including Taiwan). The third column uses Sachs *et al's* (1996) data but drops Taiwan. Finally, the fourth column reports the results using the revised data. The dummies have been defined appropriately depending on the data set. Standard Errors are in parenthesis.

Table 3.1 2: 1994 Regression Results

Coefficient	Sachs et al, April	Replicated	Replicated, sans Taiwan	Revised data, sans Taiwan
β_1	-37,039 (36,678)	-3,478 (3,963)	-3,264 (4,09)	-5,621 (4,404)
β_2	6,393 (2,727)	0,621 (0,694)	0,607 (0,714)	0,545 (0,513)
β_3	1,77 (0,95)	0,17 (0,22)	0,164 (0,224)	0,076 (0,078)
β_4	-6,165 (2,276)	-0,604 (0,77)	-0,59 (0,8)	-0,433 (0,53)
β_5	-6,835 (3,954)	-0,667 (2,204)	-0,643 (2,265)	-0,103 (1,141)
β_6	-2,886 (1,542)	-0,250 (0,404)	-0,224 (0,418)	-0,247 (0,3)
β_7	8,895 (4,407)	0,89 (2,19)	0,884 (2,25)	0,368 (1,413)
R-squared	0,69	0,704	0,711	0,704
Adjusted R-squared	0,546	0,567	0,567	0,567

Table 3.1 2 illustrates the coefficients insensitivity to the dropping Taiwan, and relative insensitivity (apart from β_7) to using the revised data. Columns 2, 3, and 4 are all quite similar. The coefficients reported by Sachs *et al* (1996) (i.e. column 1) appear to have been measured more precisely than those reported here. The coefficients are also 'consistently' different by a factor of ten. This appears to be a scale difference. The R-squared across all four columns is similar.

Berg and Pattillo (1999) have argued that Sachs *et al's* (1996) results appear sensitive to revisions to the data. It would appear that difficulty in replicating their results stems rather from a certain obscurity in how Sachs *et al* (1996) reported them. For example, Berg *et al* (1999) appear to have mis-specified Sachs *et al's* (1996) dummy variables in their attempt at replicating their results. Nevertheless, this paper (which has specified the dummies correctly) has still struggled to reproduce Sachs *et al's* (1996) results exactly.

It is possible to test the hypotheses of the model of Sachs *et al* (1996) by imposing a number of restrictions on the data. Wald Tests compare an unrestricted equation with one in which the coefficients are constrained. The idea is to test whether there is a statistical difference between the two. Table 3.1 3 reports the p- values of the various Wald tests conducted on the coefficients. The p- value gives the probability that the imposed restriction and the estimated equation come from the same 'population'.

Table 3.1 3: Wald Tests

Coefficient Restriction	Sachs *et al*, April	Revised data, sans Taiwan
$\beta_2 + \beta_4 = 0$	0,72	0,64
$\beta_3 + \beta_5 = 0$	0,12	0,99
$\beta_2 + \beta_4 + \beta_6 = 0$	0,07	0,44
$\beta_3 + \beta_5 + \beta_7 = 0$	0,04	0,01

While Sachs *et al* (1996) are forced to reject the hypothesis that $\beta_2 = \beta_3 = 0$, the other hypotheses are not rejected. Using the revised data neither the hypotheses $\beta_2 = \beta_3 = 0$ nor $\beta_3 + \beta_5 = \beta_2 + \beta_4 = 0$ is rejected. I am unable, however, to reject the hypothesis that $\beta_2 + \beta_4 + \beta_6 = 0$. Revisions to the real exchange rate thus appear to have somewhat adversely affected the working of the model in that an appreciated exchange rate does not explain subsequent movements in the crisis index.

In both cases, however, the model is not perfect. Sachs *et al* (1996) should not be forced to reject the hypothesis that $\beta_2 = \beta_3 = 0$. This rejection implies strong countries are still vulnerable to crisis.

3.2 1997 Asian Crisis

The following section will apply the model of Sachs *et al* (1996) to the 1997 Asian crisis. Table 3.2 1 illustrates the pre-crisis fundamentals in place prior to the onset of the Asian crisis in mid 1997 and the behaviour of the crisis index for December 1998 through June 1997. The Thai baht was devalued in July 1997.

Table 3.2 1: 1997 pre- crisis fundamentals

	Crisis Index	LB	RER 1996	M2/R
Argentina	-10.9	111.4	-47.59	3.6
Brazil	8.1	63.5	-27.91	3.7
Chile	4.3	36.2	-15.30	1.8
Colombia	18.3	40.2	4.69	2.0
India	9.3	-12.0	64.53	7.5
Indonesia	100.5	21.3	20.74	6.2
Jordan	-0.2	13.7	41.90	4.3
Korea	66.5	17.1	-13.74	6.2
Malaysia	49.0	31.3	7.99	3.7
Mexico	0.6	3.8	-16.50	4.2
Pakistan	9.0	-2.5	28.91	21.4
Peru	-2.9	650.9	-46.17	1.4
Phillipines	40.8	171.1	-15.47	4.9
South Africa	8.0	19.9	-3.13	17.9
Sri Lanka	3.2	30.8	7.24	2.6
Thailand	73.9	56.0	-6.79	4.9
Turkey	25.9	35.0	-8.69	3.1
Venezuela	-6.2	-55.9	16.02	1.0
Zimbabwe	48.3	77.3	45.43	4.7

Source: IFS

The 'pre-crisis fundamentals' have been calculated in a similar way to 1994. LB reflects the % change in M2/GDP between 1990 and 1996; RER compares the average real exchange rate between 1986 through 1989 with that from 1990 through 1996; and M2/R is calculated for the month of June 1997.

Dummy variables have been constructed on the basis of the countries pre- crisis characteristics. $D_{wf97} = 0$ for India, Jordan and Pakistan. $D_{lr97} = 0$ for Chile, Columbia, Peru, Sri- Lanka and Venezuela. The interactive dummy $D_{wf97} \times D_{lr97} = 0$ for Chile, Columbia, India, Jordan, Pakistan, Peru and Venezuela. The classification is thus unchanged from 1994, apart from Venezuela no longer being classified as a 'strong' country with respect to fundamentals.[32]

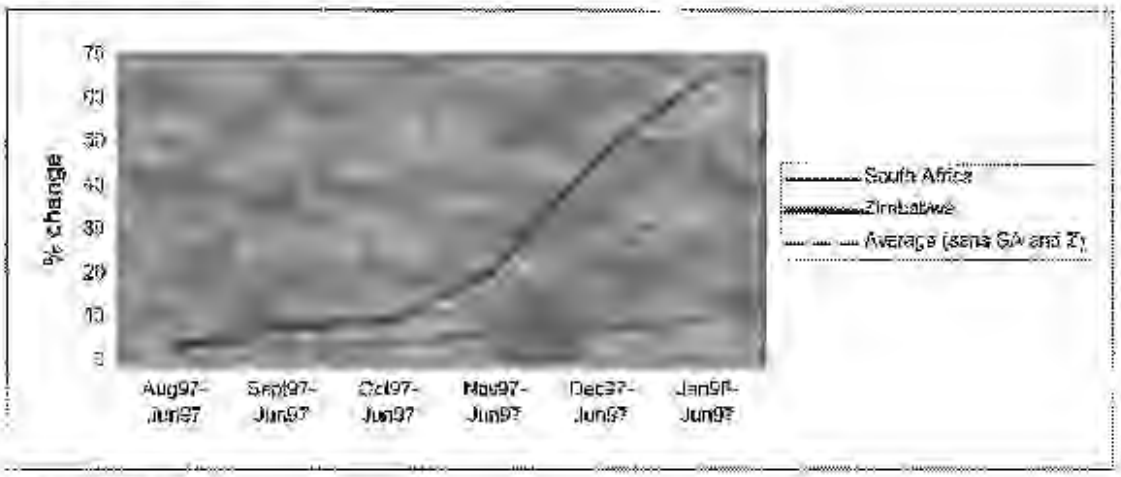
Zimbabwe's vulnerability to crisis is highlighted by the fact that compared with 1994 its lending boom has worsened and its ratio of M2/R has increased. More specifically, its lending boom has deteriorated one position to fourth highest and its reserve position deteriorated 7 positions to sixth worst. Furthermore, its exchange rate no longer shows the largest devaluation among the sample.

On the other hand, South Africa has improved one position in each of the three categories. Its lending boom is now seventh lowest, its exchange rate overvaluation has decrease one position to tenth lowest, and its reserves' position is better than that of Pakistan.

A glance at Table 3.2 1 confirms that Zimbabwe is worse off in terms of the behaviour of the crisis index than South Africa. Figure 3.2 1 confirms how Zimbabwe is consistently above the average of the other 17 countries and South Africa consistently below it through the period under review. Unlike with the Peso crisis, neither South Africa nor Zimbabwe appears to be at odds with the general trend.

[32] Venezuela's real exchange rate depreciation no longer falls within the top quartile of the sample.

Figure 3.2 1: 1997 Crisis Index



Source: IFS (1999)

Zimbabwe was the fifth worst affected country in the aftermath of the Asian crisis (for the month of December). Its position has thus deteriorated by three positions since 1994. South Africa, however, improved its position five places to twelfth worst affected.[33]

The results of the regression run for the crisis period June through December 1997 are reported on the next page. The results for each month are similar. Standard errors are in parenthesis.

[33] According to Sachs *et al* (1995), however, Zimbabwe was the seventh worse affected and South Africa the ninth worse in 1995.

Table 3.2 2: 1997 Regression

Coefficient	June through Dec 1997	Coefficient Restriction	p value
β_1	26,944 (10,52)		
β_2	-0,94 (1,461)	$\beta_2 + \beta_4 = 0$	0,30
β_3	-0,113 (0,120)		
β_4	0,498 (1,465)	$\beta_3 + \beta_5 = 0$	0,67
β_5	-0,583 (1,66)		
β_6	1,291 (0,582)	$\beta_2 + \beta_4 + \beta_6 = 0$	0,03
β_7	0,855 (1,659)		
R-squared	0,38	$\beta_3 + \beta_5 + \beta_7 = 0$	0,36
Adjusted R-squared	0,08		

The model has a poor fit. Furthermore $\beta_2 + \beta_4 + \beta_6 > 0$ is significant and has the 'wrong' sign, and $\beta_3 + \beta_5 + \beta_7$ is not distinguishable from zero. 'Poor fundamentals' do not appear to explain variation in the crisis index.

3.3 Criticism of the Sachs *et al* (1996) approach

This 'mechanical' application of the Sachs *et al* (1996) model to a different crisis is always likely to deliver 'poor' results. Nevertheless, any model which fits the data *ex post* is vulnerable to such a criticism. There is also arbitrariness on the part of Sachs *et al* (1996) in using quartiles as the threshold of the dummy variables. However, minor modifications to the model (including defining the dummies differently) do not appear to improve upon it.

A further problem with Sachs *et al's* (1996) approach is that it treats a number of very different developing countries as separate observations from a stable population. The rest of the chapter (which also introduces Chapter Four) will adopt a more descriptive

approach to understanding the experiences of South Africa and Zimbabwe throughout the 1990s. It will not only highlight the difficulty of lumping a number of developing countries together, but also that in attempting to estimate parameters from such a period.

I am thus making a conscious decision to adopt a descriptive approach to describe the 'empirical reality' of South Africa and Zimbabwe. In part this mirrors the trend in econometrics[34] to move away from an approach which requires increasing technical complexity.[35] It also reflects some reluctance on my part to impose structure on a period, which is very much in flux.

The 'empirical reality' of South Africa and Zimbabwe will be described by examining the behaviour of the indicators suggested by Kaminsky *et al* (1997) as useful anticipators of currency crises. It was felt inappropriate, however, to identify the periods of crisis and thresholds in the systematic way suggested by Kaminsky *et al* (1997), as this might force us to impose too many restrictions on the data.[36]

Like them, though, the variables will generally be in first difference form (i.e. month on previous year's month percentage change). There are a number of reasons for this.[37] Nevertheless, when a currency comes under pressure that pressure is being felt across a few consecutive days, and not averaged over the month and compared to the average one year earlier. Similarly, individuals might react with surprise to the value of an indicator when compared to its value the previous month (which might be large) rather than previous year (which might be inconsequential). Furthermore, when talking about a

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[34] Perhaps best exemplified in the 'a-theoretical' Box- Jenkins type approach to time- series data. This methodology of 'letting the data speak' is in part a response to the Lucas critique, which questioned the wisdom of deriving structural equations from the data. See, for example, Pindyck and Rubinfeld (1991) for an introduction to this methodology.

[35] Deaton (1997) argues that while one can use statistical and econometric fixes to handle less than perfect data, this forces one to rely overtly on supporting assumptions. The alternative is to attempt to let the data rather than the assumptions do the talking by making use of simple descriptive statistics which do not require a Procrustean bed to be lain in.

[36] In particular, it was felt Kaminsky *et al* (1997) treat the data as if it came from a controlled experiment. This point is explored further in the subsequent chapter.

[37] One is to remove seasonality. For the desirable qualities of stationarity, see (for example) Pindyck and Rubinfeld (1991). For a lively discussion of the assumptions underpinning stationarity, see Davidson

currency crisis, individuals are generally preoccupied by large month on month changes (or even day on day changes).

Of course, one hopes a precipitous daily fall will come through in a large 12-month change. Nevertheless, there is a somewhat unsatisfactory fuzziness here. The IMF Staff Country Report (1997) on South Africa, for example, compares month on month and not 12-monthly changes for the exchange rate. Likewise, the 40% depreciation of the Zimbabwe dollar on 14th November 1997 (referred to as 'Black Friday'), while certainly coming across as a crisis at the time, is masked by month on month average data as the currency recovered in the following days due to Reserve Bank intervention.[38]

3.4 Descriptive View of Localised Crises

The periods we have chosen to examine correspond from Stals's August 1989 accession as Governor of the Reserve Bank to mid 1999 for South Africa, and the announcement of the adoption of a structural adjustment programme in the July 1990 Budget Speech for Zimbabwe to mid 1999, depending on data availability. It should be stressed that these are transition periods, where each economy undertook profound market and trade liberalisation reform.[39]

It is highly unlikely that the underlying structure of the economy has been constant over this period. This in part provides us with the justification for not explicitly applying the methodology of Kaminsky *et al* (1997) to these currency crises,[40] and also motivation for

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(1993). Our underlying assumption is that individuals expect the first difference change to be of constant mean. Hence 'abnormal' first difference changes surprise individuals.

[38] It should, however, be reflected in a large decrease in reserves. The Reserve Bank spent US$20 million buying back the currency.

[39] In the South African case, market reform had been discussed since (at least) the Katz Report of 1985. It became a realistic proposition, however, only after the 1994 election. See, for example, Stals (1999).

[40] Their quantification, for example, of a crisis as being when a composite index (of nominal exchange rate and reserves) was more than three standard deviations above its mean is outlined, in some detail, in Chapter 2. For a discussion on the importance of a constant underlying structure when estimating parameters, see (for example) Gujurati (1995). For an analysis of how the changing economic and political environment might have caused econometric relationships in South Africa to become structurally unstable, see (for example) Smit and Wesso (1988).

adopting a descriptive style of analysis which attempts to impose as few restrictions on the data as possible.

Before embarking on the data analysis it is important to qualify the data, and describe how it will be interpreted.

Where possible, monthly data for South Africa and Zimbabwe have come from the International Financial Statistics (IFS) database. The monthly data for South Africa has also been augmented with data from the Reserve Bank Quarterly Bulletin (Revised), and for Zimbabwe from the Quarterly Economic and Statistical Review (published by the Reserve Bank of Zimbabwe). Annual data for both countries was also taken from World Development Indicators. This is complied by the World Bank.

Clearly comparison across different databases is problematic, and attention will be drawn to it when it occurs. It was felt though that certain insights would be lost if there was an exclusive reliance on IFS data and World Development Indicators data. All of these databases, with the exception of the Quarterly Economic and Statistical Review, are available on TSExplorer.

This chapter will conclude by describing the 'crisis- ridden' decade for both countries currencies by viewing the behaviour of the exchange rate and reserves over this period. It has already been mentioned that there is some debate as to how a currency crisis should be defined. It is somewhat dissatisfying simply to argue that 'we all know one when we see one'. This is especially true when looking at monthly averages. Nevertheless, our descriptive approach does not encourage a rigorous definition of a crisis.

3.41 South Africa

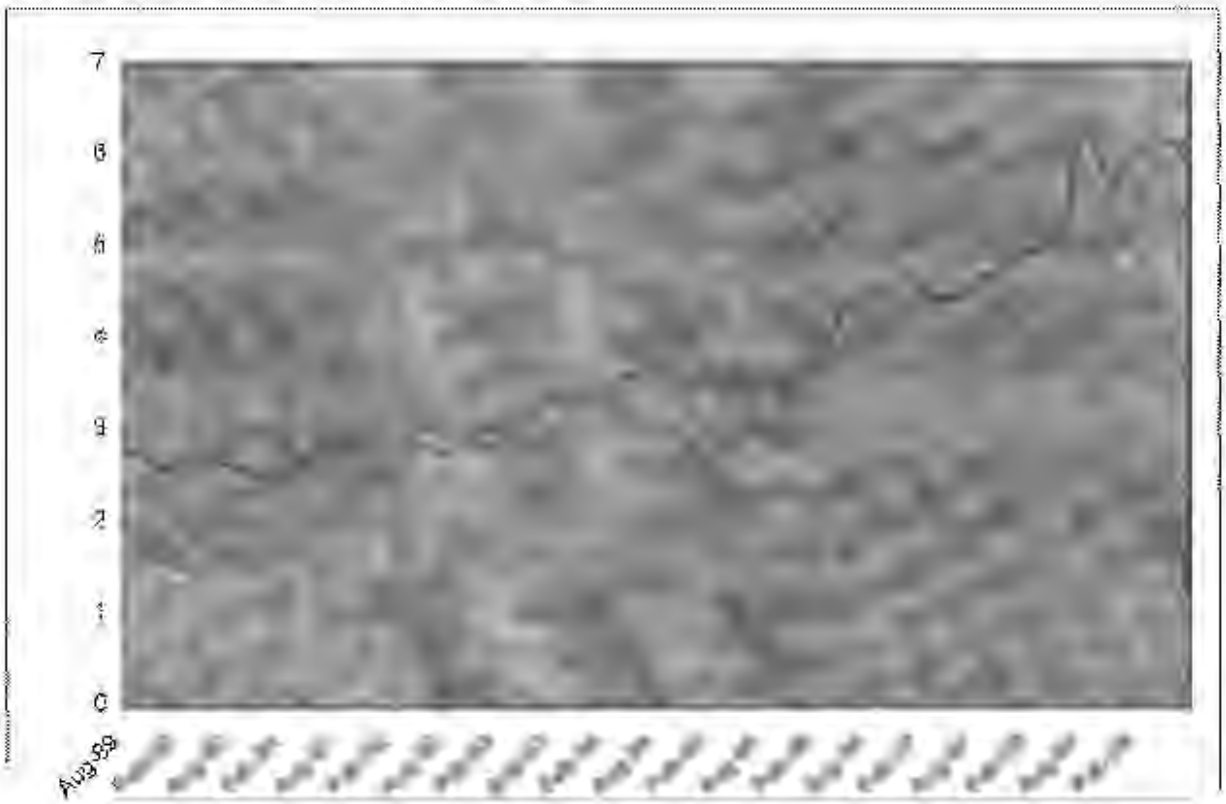
The discussion will first focus on South Africa's exchange rate and reserves. Month on month changes in the exchange rate will first be considered. This will be followed by a

description of month on twelve-month changes in both the exchange rate and reserves. Zimbabwe will then be considered.

Both Aron and Elbadawi (1999) and the IMF Staff Country Report (1997) identify a sharp depreciation in the rand in February 1996, with volatility persisting through July, and further volatility in October 1996 and November 1997. Aron and Eldadawi (1999) further describe a currency crisis beginning in April 1998. They are concerned with month on month changes. These crises will be termed 'local' crises as they fall outside a six- month window of the 1994 Mexican and 1997 Asian crises.[41]

Figure 3.41 1 charts the nominal average rand price of a U.S. $ during Stals's period of tenure of Governor of the Reserve Bank. Data is from the IFS.

Figure 3.41 1: South African Rand price of a US$



Source: IFS (1999)

[41] The six month window is chosen because it falls outside Sachs *et al* (1996) crisis index period.

The 'humps' in the index in 1996 and 1998 are apparent. Prior to the 1996 crisis the rand traded in a range of 3,60-3,65 per U.S. dollar for two years. As discussed in more detail later, Aron and Elbadawi (1999) argue that the existence of an implicit nominal peg created the conditions for a second generation type of currency crisis.

In particular, the lack of a lending boom (which Sachs *et al* (1996) took to show lack of vulnerability to a 'global' crisis) can imply an increasingly untenable trade-off between high interest rates (to sterilise the capital inflows) and (say) economic growth. On this note it is interesting that both the Mexican and the Asian crises appear to get dwarfed by other (local?) crises. The point here is that while the lack of a lending boom might have made South Africa less vulnerable to a developing country type 'panic', it nevertheless created the conditions for a crisis.

There were a number of potential 'triggers' in 1996 to account for the crisis. The sharp fall in the currency in mid- February 1996 coincided with rumours of Nelson Mandela's ill health. The IMF Staff Country Report (1997) also points to the late- March political appointment of the Minister of Finance, and the May decision of the National Party to leave the Government of National Unity.

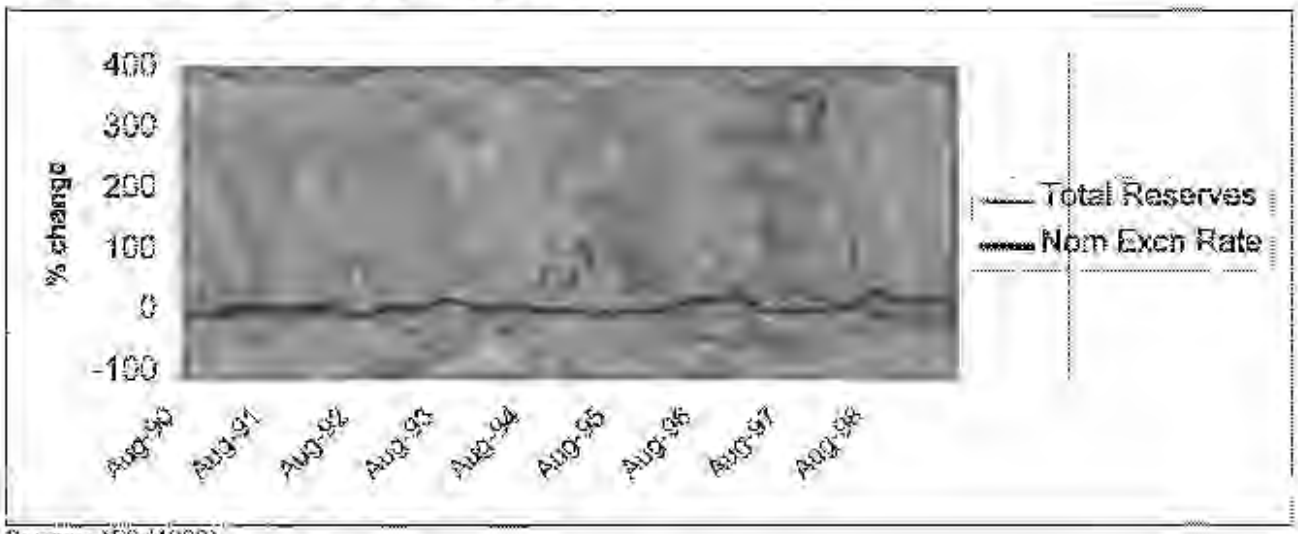
Additional insight can be gained by focusing on the twelve- monthly percentage change in the nominal exchange rate and reserves. This is in line with the definition of crisis used by Kaminsky *et al* (1997) and Sachs *et al* (1996).

The underlying assumption in using the change in reserves to indicate an attack on the currency is that the Reserve Bank can make use of its reserves to ward off an attack.[42] If the defence is successful, then a sole reliance on changes in the nominal exchange rate will not make it apparent that the exchange rate has been under pressure.

[42] Of course, there are other measures available (including capital controls, but also instruments such as the forward book and foreign borrowing) which a Reserve Bank can use to fend off attacks. But measures of 'currency pressure' commonly reduce to monitoring the change in reserves and the nominal exchange rate (see, for example, Sachs *et al* (1996)).

Figure 3.41.2 outlines the degree of 'speculative pressure' facing the South African rand over the period. Like Kaminsky *et al* (1997), the variables are in first difference form (i.e. month on twelve-month change). Total Reserves is from the IFS.

Figure 3.41.2: South African 'speculative pressure'



Source: IFS (1999)

The change in total reserves is much more volatile than the nominal exchange rate.[43] The change in total reserves is positive following the 1994 election, and after the 1996 crisis. This is partly an adjustment to the negative change in reserves prior to the 1994 election and during the 1996 crisis. Nevertheless, the increase in total reserves prior to both the 1996 and 1998 exchange rate crises is somewhat unusual.[44]

The increase in total reserves falls from above 50% in January 1996 to only 12% in February 1996. The change in total reserves is actually negative from April 1996 through February 1997. This indicates the speculative pressure on the currency during the 1996 crisis.

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[43] An implication of this is that any exchange market pressure indexes which weights the two components such that their conditional variance is the same will result in the reserve component having a much smaller weight. (This point has already been mentioned with respect to the Sachs crisis index.). It also lends some force to the argument that the Reserve Bank intervened in the market in an effort to stabilise the nominal value of the rand (for more on this point, see Aron and Elbadawi (1999)).

[44] At least according to *first generation* models of currency crisis. This point will be further explored in the following chapter.

The rate of increase in total reserves picks up after March 1997, and increased tremendously despite of (or because of) the Thai devaluation in July 1997. The increase in total reserves draws breath slightly in September and November 1997, before reaching its peak in December. Subsequently, the rate of increase slows, and whilst it is still large in April 1998, is coming off its December 1997 peak. The change in total reserves only becomes negative in August 1998, the date of the Russian debt fault.

Thus both the 1996 and the 1998 crises are characterised by an initial slowdown in the rate of increase of reserves, and eventually a decrease in reserves. Their build up, however, is characterised by an increase in reserves.

The month on- 12 month percentage depreciation in the nominal average exchange rate climbs from 5% in February 1996 to 27,8% by December 1996. With the recovery of reserves the depreciation falls back to 5% by April 1997. In April 1998 there is a 13% depreciation which peaks in July 1998 at 36,5%. The change remains above 10% depreciation till June 1999. These results, while different from simply looking at the month on last month's change, do not substantially contradict them.

3.42 Zimbabwe

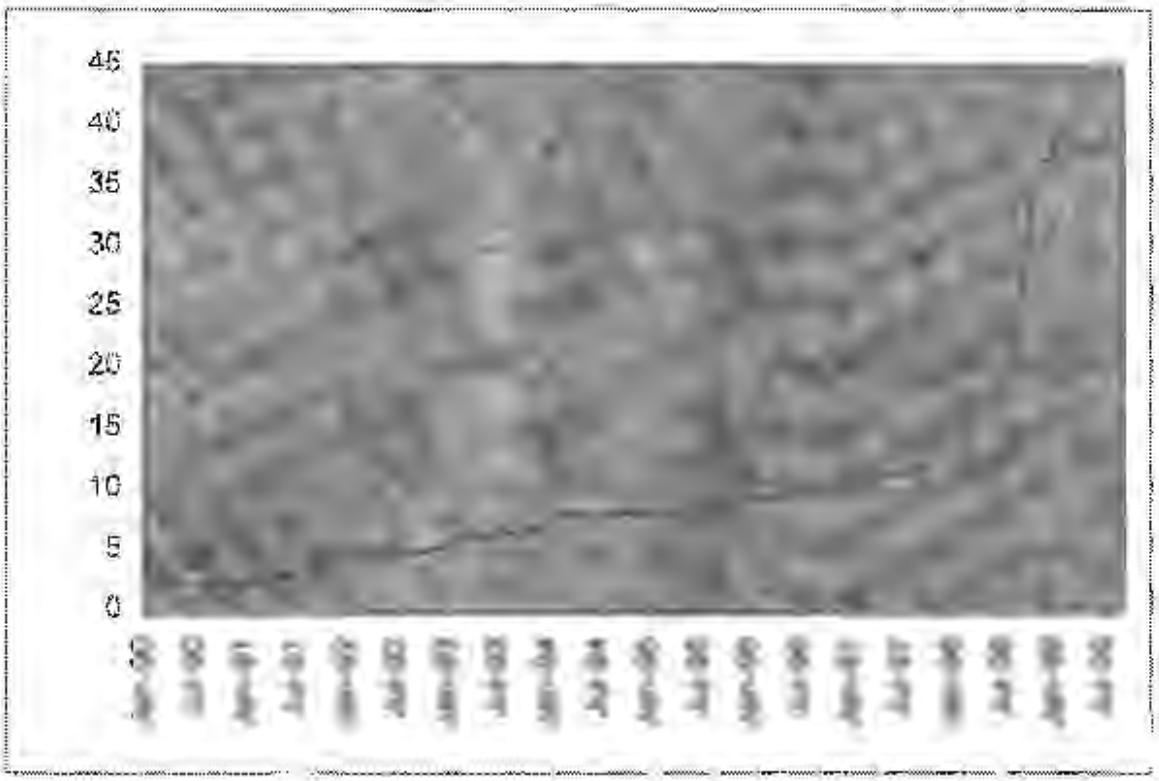
Next will follow a description of the behaviour of the exchange rate and reserves facing Zimbabwe. It will follow the same format as above.

In various Quarterly Economic and Statistical Reviews, the Reserve Bank of Zimbabwe refers to the Zimbabwe dollar's sharp depreciation against the major trading partners in the last quarter of 1997, and renewed speculation against it (after somewhat of a recovery) in the latter half of 1998.

Figure 3.42 1 charts the nominal monthly average Zimbabwe dollar price of a US$ over the entire liberalisation period. While the Zimbabwean dollar is rarely not depreciating against the US dollar, its reaction to the Mexican crisis appears relatively muted. The

Zimbabwean dollar fell precipitously in the latter half of 1997. This paper will nevertheless argue that this was more due to 'local' conditions than Asian fall-out. Both these crises will be loosely understood as 'local' crises.

Figure 3.42 I: Zimbabwe $ price of a US$



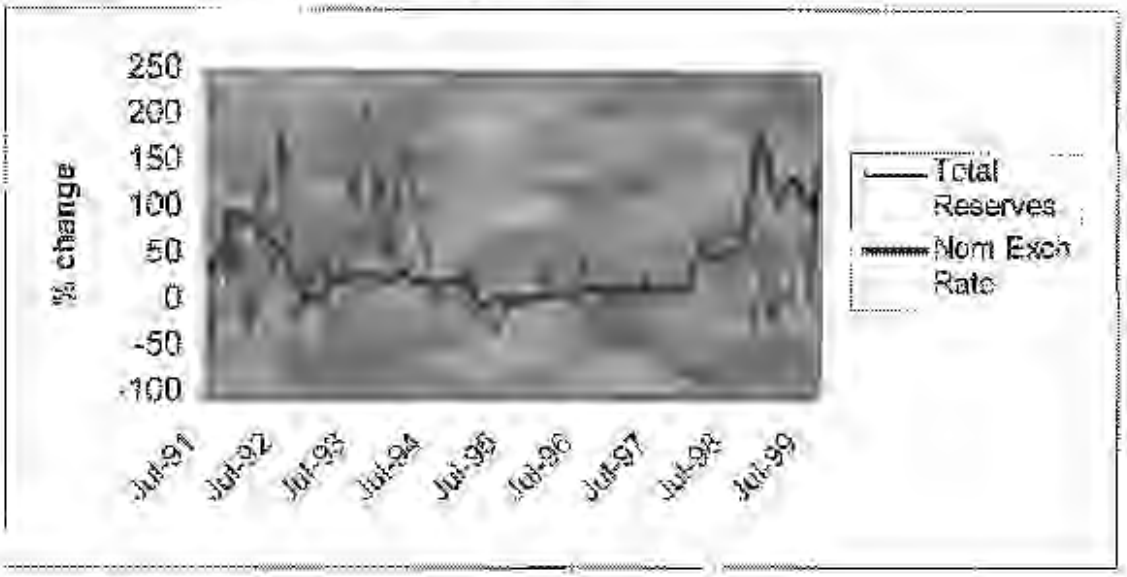
Source: IFS (1999)

Large (above 10 percent) month on month increases occur in November 1997 through January 1998, and August through October 1998. The intention to expropriate 1504 farms was formally announced on 28th November 1997. The crisis also followed shortly after (in August) the announcement of an unbudgeted Z$4 billion compensation to the war veterans lobby. August 1998 corresponds to the Russian debt default. Interestingly, while the 1996 South African crisis hardly affected the exchange rate (the price of a US$ increased by less than 40 Zimbabwe cents between February and June 1996), it fell by over 100 Zimbabwe cents between April and May 1998.[45]

[45]One should rather focus on the rand/ Zimbabwe dollar exchange rate in making this comparison. For instance, the Zimbabwe dollar actually appreciated against the rand in June (by 12,2%). Interestingly, the Reserve Bank cites this first half recovery (and not the Russian default) as a major precipitator of subsequent crisis. See, for example, the Quarterly Economic and Statistical Review (1998).

Figure 3.42.2 repeats the description of the 'exchange rate pressure' facing the Zimbabwe dollar over the period. Again, both the nominal average exchange rate and the total reserves are from the IFS. The data has been first differenced (i.e. 12 monthly changes).

Figure 3.42.2: Zimbabwean 'speculative pressure'



Source: IFS (1999)

The change in total reserves has been very volatile, but generally was positive prior to February 1997. From February 1997 it has been negative, and escalated to an above 50% decrease in August 1997. The decrease peaks in November 1997 following Reserve Bank intervention after 'Black Friday' on November 14th. The decrease remains above 50% till August 1998, when various exchange controls were imposed.[46] The change in reserves subsequently has improved somewhat, although the change has been volatile.

The percentage month on 12-month change in the Zimbabwean dollar has consistently shown a large depreciation over the entire liberalisation period. Following the structural adjustment announcement in the 1990 budget, the Zimbabwean dollar depreciated by less than 30% for the first time in July 1992.

[46] From 25th September statutory reserve requirement ratios of banks were increased from 20% to 25% and those of finance houses from 4% to 5%. Forward contracts were suspended and foreign currency holdings of authorised dealers were reduced from US$5 million to US$2 million or 10% of their capital, which ever is lower. Additional 'demand management measures' introduced in September included increased duty on non-essential imports and a surtax on all imports.

While depreciation remained below 50% until December 1997, single figure depreciation was only observed in October through December 1992, January through October 1995, and April 1996. The latter date is interesting in that it corresponds to the first South African exchange rate crisis.

Depreciation escalated to above 50% from December 1997, peaking at 183% in October 1998 and staying above 100% through July 1999.[47] The peaks in the twelve month change in the average nominal exchange rate depreciation are in October 1991, January 1998 and November 1998. Like South Africa, viewing the change as a 12 month difference does not result in substantial differences from a month on month change (with peaks in November 1991, December 1997 and September 1998).

An interesting distinction between the Zimbabwe currency crises and those in South Africa is that reserves were falling prior to the crises in Zimbabwe. Potentially, then, Zimbabwe offers an experience more in congruence with the theoretical underpinnings of the first generation models of currency crisis. The Reserve Bank in fact describes both the 1997 and 1998 crises as existing in an environment of a deteriorating balance of payments position. Nevertheless, both the currency crises in South Africa and Zimbabwe can be associated with 'trigger' events. Second generation models can make sense of triggers in giving scope for private investors to push the economy into crisis.

The Zimbabwe dollar has also shown a 'marked' depreciation across this period. Second generation models in particular articulate the trade-off facing government in terms of a stable nominal exchange rate. Krugman's first generation model also assumed a pegged rate preceding the crisis.

The following chapter will describe the behaviour of the various indicators suggested by Kaminsky *et al* (1997) as useful in anticipating currency crises. As has been indicated,

[47] The continuing large depreciation is partly a consequence of the magnitude of the August depreciation. Month on month nominal depreciation was 10% in November 1997, 21% in December 1997 and 21% in January 1998. The month on month percentage change was negative in February and March 1998. The currency depreciated 22% in August, 28% in September and 21% in October 1998.

an attempt will be made to distinguish between first and second generation crisis as applicable to the experience of South Africa and Zimbabwe over this period.

One further consideration the period raises is both economies have been subjected to more than one currency crisis over the period. One might then find that the change in a variable appears unusual because it is being compared with its behaviour during a crisis period, or is unusual because it is reacting to the first crisis rather than anticipating the next one.

The 24 month window period prior to the crisis cannot simply be viewed as a build- up to that crisis, as there were a succession of crises in both countries. South Africa experienced a currency crisis in early 1996, and Zimbabwe one in late 1997. Indicators exceeding thresholds during this period thus might be reacting to these crises rather than anticipating the crises in 1998.

Furthermore, the period in general for both countries can be described as one of transition. It therefore might be extremely difficult to arrive at threshold values which signal when an indicator is exhibiting extreme behaviour, since it is unclear what is 'normal' behaviour during a period of transition. The drought in Zimbabwe in 1991/2 and the democratic election in South Africa in 1994 also stand out as extraordinary events, which unduly affected the variables concerned. Kaminsky *et al's* (1997) indicators are not simply sensitive to potential currency crises.

Finally, it is striking how both the effects of the Mexican and Asian crises pale into insignificance when compared with the volatility which has generally dogged both these two countries' currencies.

CHAPTER FOUR
Indicators of Crisis

Kaminsky *et al* (1997) argue that there is strong empirical support for the abnormal behaviour of these indicators prior to a currency crises: international reserves; the real exchange rate; credit growth; credit to the public sector; domestic inflation; the trade balance; export performance; money growth; M2/international reserves; real GDP growth; and the fiscal deficit.

The intention of this chapter is to describe the behaviour of each of these indicators for South Africa and Zimbabwe across the 'crisis- ridden' 1990s. One purpose behind this is to explore whether the various 'indicators' do exhibit 'abnormal' behaviour prior to currency crises.

A further aim, however, is to describe the 'empirical reality' of these two countries by describing not only how these 'indicators' behave following a crisis, but also whether the 'indicators' behave 'abnormally' in reaction to events other than an impending currency crisis. The 'crises' discussed in this chapter refer explicitly to the 1996 and 1998 currency crises in South Africa, and the 1997 and 1998 currency crises in Zimbabwe. These were described in the previous chapter.

A concern will be with to what extent one can talk about 'normal' behaviour in transition crisis- ridden countries (and hence how useful an 'early warning' system can be). Some attention will also be paid to the various measures of each indicator available, and whether the indicator appears to be meaningfully measured.

Finally, an attempt will be made to highlight when the behaviour of an indicator can be supported by the theoretical literature. This will be used to argue why the model of Sachs *et al* (1996) might be inapplicable to both South Africa and Zimbabwe.

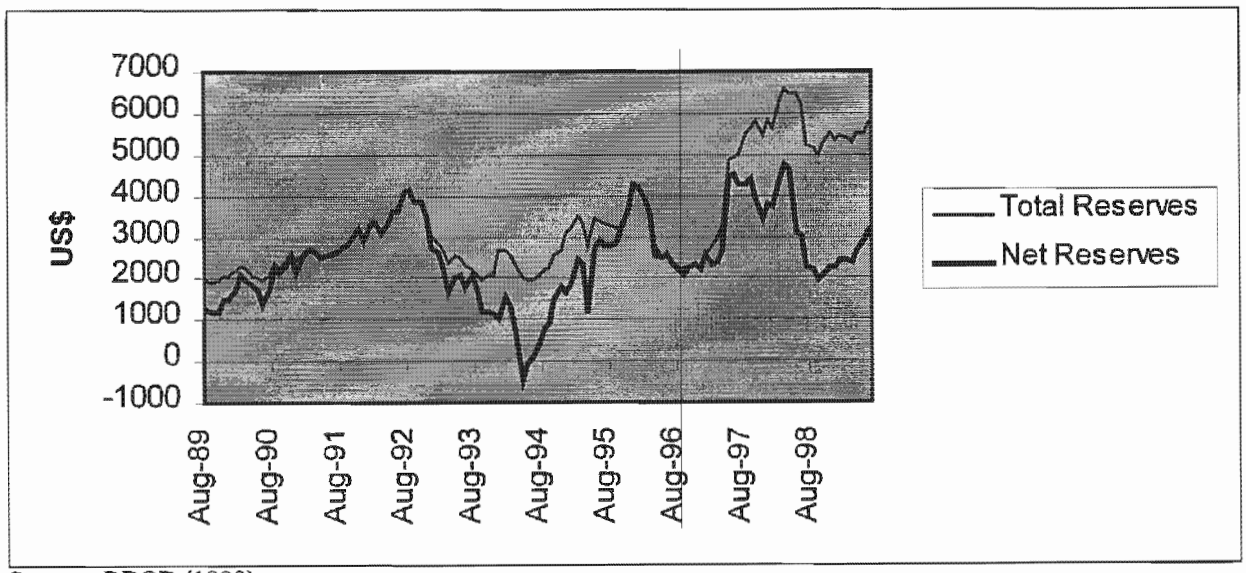
4.1 International Reserves

Data for this sub- section is from the Reserve Bank Quarterly Bulletin (RBQB) for South Africa, and the Quarterly Economic and Statistical Review (QESR) for Zimbabwe.

South Africa

In the South African case Net Reserves of the Reserve Bank includes foreign assets less liabilities, whereas Total Reserves refers to foreign assets. We have converted to US$ using the average nominal exchange rate. Figure 4.1.1 illustrates the distinction between foreign assets (which is somewhat confusingly called Total Reserves) and Net Reserves for South Africa. The distinction can help incorporate Reserve Bank borrowing as an intervention in attempt to avert a crisis.

Figure 4.1 1: Reserves (South Africa)



Source: RBQB (1999)

The data is in levels because of the massive periodic percentage changes in Net Reserves. It is clear that the 1994 election caused a large increase in the liabilities of the Reserve Bank as it attempted to prevent a large depreciation of the rand.[48] The Reserve Bank was able to reduce its liabilities when confidence was restored following the successful

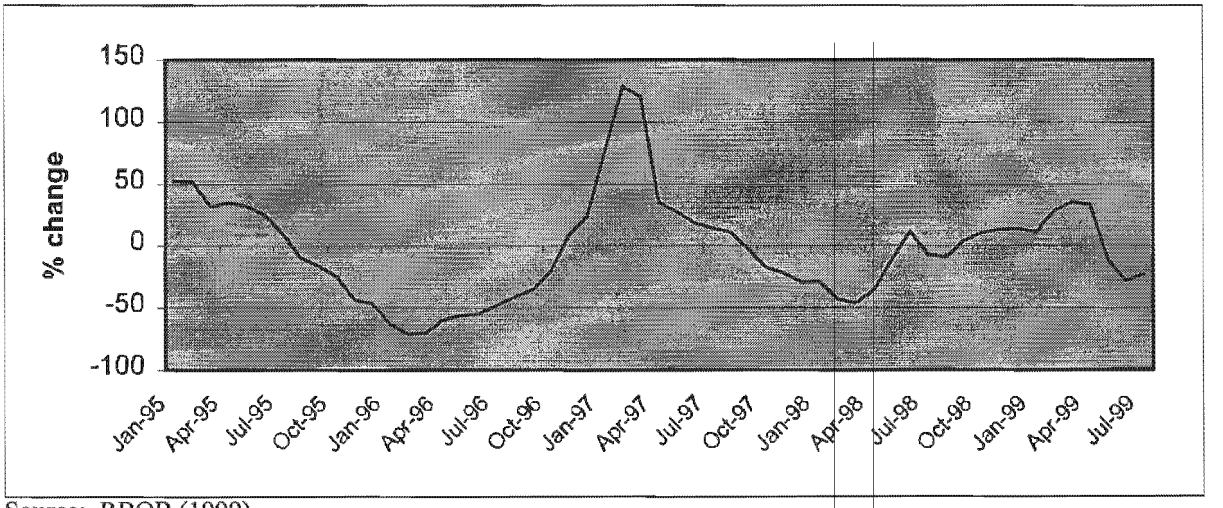
[48] In fact, the problematic change realises itself in May and June 1995 where the month on previous year's month percentage change is of the magnitude of several thousand percent (-6416% and + 7590%).

election. A temporary reversal, when the financial rand was abolished in March 1995 has been recorded. By early 1996 Total and Net Reserves were approximately equal.

This equality has in fact been cited as an important precipitator of the 1996 crisis. Aron and Elbadawi (1999), for example, argue that the improved position of Net Reserves in early 1996 led investors to anticipate a further relaxation of exchange controls, and this in part precipitated the 1996 crisis. As has already been hinted, this is very much *second generation* logic, and can help account for the 'strange' behaviour of reserves prior to the crisis.

A further instrument at the disposal of the Reserve Bank is the Forward Book, which indicates the net oversold position of the Reserve Bank (i.e. it amounts to the Bank's forward dollar assets less liabilities position). Data for South Africa is only available from 1994, and is (slightly contradictorily) quoted in rands by the Reserve Bank. It has been converted to US$ using the average nominal exchange rate. Figure 4.1.2 shows the percentage change in net oversold position of the Reserve Bank.

Figure 4.1 2: Forward book (South Africa)



Source: RBQB (1999)

It illustrates how the Reserve Bank increased its exposure to the Forward Book in an effort to cushion the rand against the negative expectations in the build- up to the 1994 election. It is also clear how the forward position was reduced when the doomsayers

were proved wrong. During the 1996 crisis and the 1998 crisis the Reserve Bank also increased its exposure to the Forward Book.

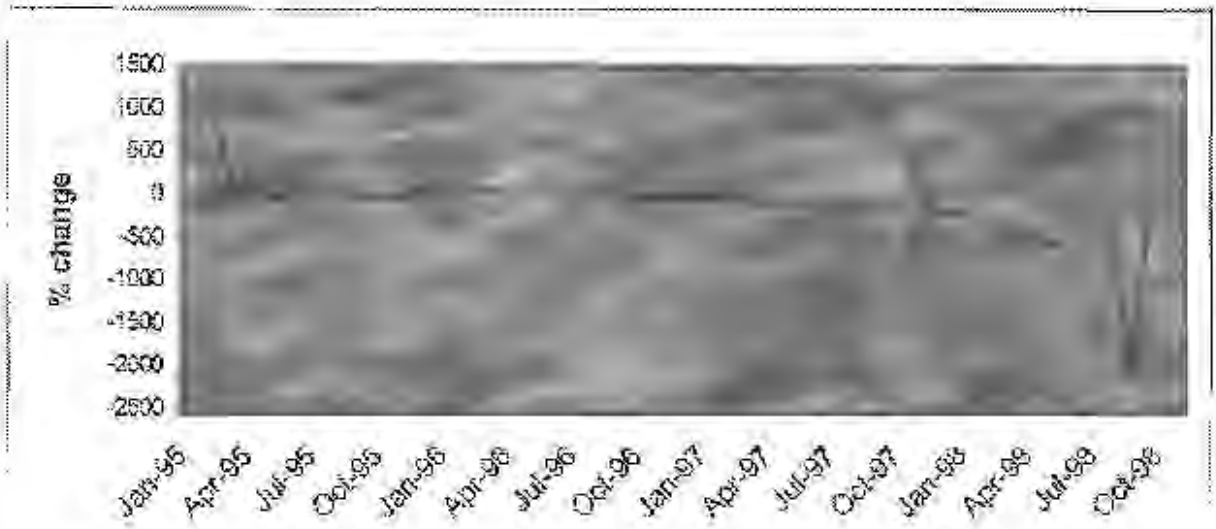
What is also interesting is the improvement in the position of the Forward Book prior to the 1996 crisis, and again prior to the 1998 crisis. Again, one might argue that investors were anticipating a relaxing of exchange controls once the position of the Forward Book improved, and their actions precipitated the crisis. Efforts not to use the Forward Book as a means of Reserve Bank intervention should be encouraged, as both an increase in liabilities and an improvement in liabilities appear to be potentially destabilising.

A more detailed analysis of reserves once again reaffirms the idea of an increase in reserves precipitating the crises. This is at odds with the first generation models *a la* Krugman (1979), which suggest a decline in reserves as preceding a crisis. Furthermore, massive percentage changes in Reserves occur often simply because the numbers are close to zero. It will be argued that this is a general problem with many of the 'indicators', and questions the meaningfulness of using them as indicators in the form suggested by Kaminsky *et al* (1997).

Zimbabwe

Data on the net foreign asset (NFA) position of the Reserve Bank of Zimbabwe are published in the Quarterly Economic and Statistical Review. Data is available from January 1994. It has been converted into US$ using the average nominal exchange rate. Figure 4.1.3 computes the percentage change in NFA.

Figure 4.1.3: Net foreign assets (Zimbabwe)



Source: QESR (various issues)

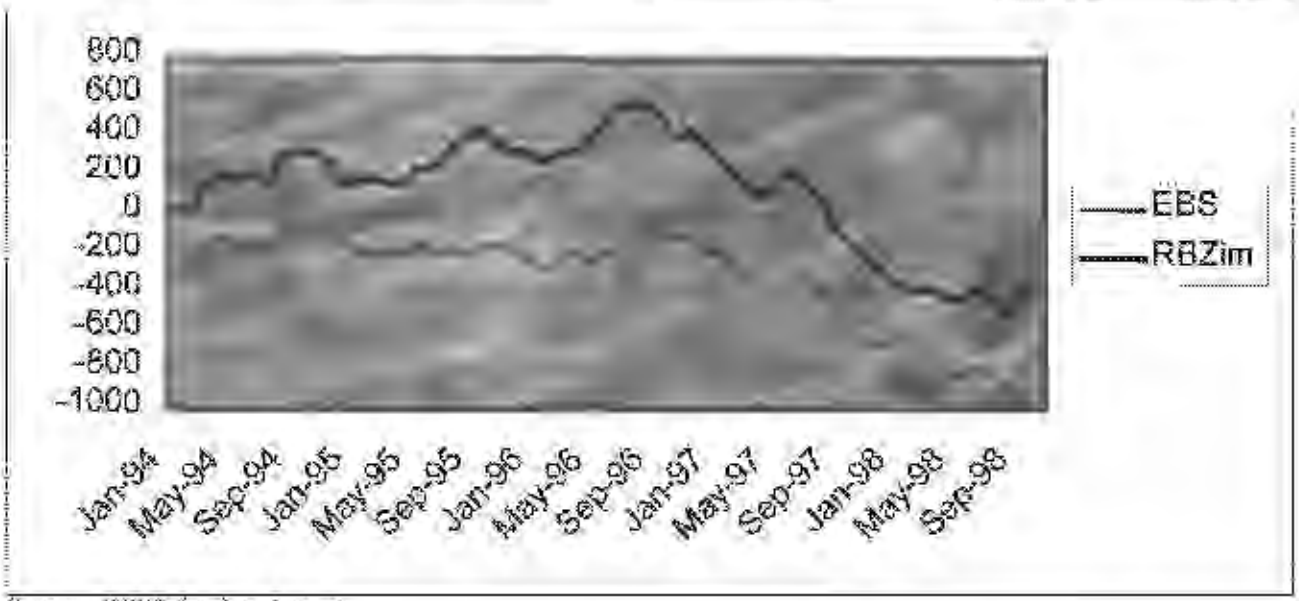
The large percentage increases in net foreign assets in early 1995 stem from abnormally low January and February 1994 values. The change in net foreign assets becomes negative for the first time in February 1997.[49] It is notable that the percentage decrease in NFA consistently sends a negative signal from February 1997 up to the 1997 crisis. The percentage decrease lessens slightly after April 1998, but then explodes in August 1998 with a decrease greater than 2000%.

The Reserve Bank of Zimbabwe also publishes an overall net foreign assets series, which includes the net foreign assets of Deposit Money Banks and Other Banking Institutions with the Reserve Bank. Figure 4.1.4 compares the net foreign assets of the Reserve Bank (RBZim) with that of the entire banking sector (EBS). Again, the series have been

[49] Caused by an increase in liabilities.

converted to US$ using the average nominal exchange rate. The series are also only available from January 1994. They are shown in levels.

Figure 4.1.4: Overall net foreign assets (Zimbabwe)



Source: QESR (various issues)

What is striking is that overall net foreign assets have been negative throughout the period. This suggests an acute foreign exchange shortage in the economy, and a reliance on donor loans to meet obligations. While the situation was relatively stable up to September 1997, since then the overall situation has worsened considerably. The Reserve Bank's net assets have also become negative from September 1997. The acute shortage of reserves has prevented the Reserve Bank from reducing its liabilities subsequent to the September 1997 crisis. This contrasts with the South African case where the Reserve Bank has been able to reduce its liabilities subsequent to the crises.

The Zimbabwean experience thus illustrates a persistent decline in Reserves prior to both its crises (e.g. Figure 4.1.3). The decline has worsened following the 1997 crisis. As a signal, then, Reserves appears to be a good 'indicator' of impending crisis. The Zimbabwean crises also appear to be congruent with first generation type models.

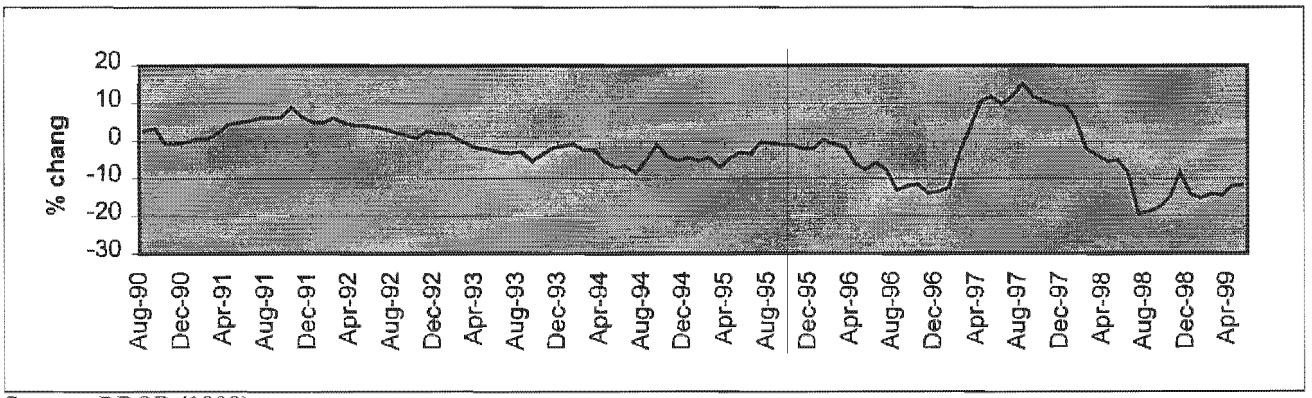
4.2 The Real Exchange Rate

The real effective exchange rate attempts to measure the price of a country's bundle of output in relation to that of its trading partners. A decrease suggests an improvement in competitiveness.[50] A persistent decline in a country's competitiveness (perhaps because it has been immune to other countries' depreciation) might lead one to anticipate its currency coming under attack. This paper argues that both South Africa and Zimbabwe were relatively unaffected by the Mexican and Asian crises. If their subsequent currency volatility was merely a lagged reaction to these crises one would need to argue that there was a misalignment in the real exchange rate because of this.

South Africa

Figure 4.2.1 outlines the movement in the real effective exchange rate for South Africa.[51] The variable is calculated by the Reserve Bank.[52]

Figure 4.2 1: The Real Exchange Rate (South Africa)



Source: RBQB (1999)

From March 1993 until January 1996 there is not one positive percentage change in the real exchange rate. This suggests a persistent improvement in competitiveness prior to

[50] A decrease in the measure indicates that the prices of the trading partners' basket of goods have increased in relation to that of the host country. See, for example, Winters (1991).
[51] Kaminsky *et al* (1997) suggest deviations of the real exchange rate from a deterministic time trend. We have persisted with the 12 month difference. Unfortunately, the sign on the 12 month difference often differed from that of the month on month change.
[52] The relative weights are derived from international trade in manufacturing goods before the introduction of the Euro in January 1999.

the 1996 crisis (and a muted Mexican crisis hangover). The speculative attack in 1996 might have come as somewhat of a surprise.[53]

The variable shows a percentage decrease until March 1997 as the effect of the 1996 depreciation is felt. The onset of the Asian crisis[54] contributes to the percentage increase in the real exchange rate as South Africa initially was relatively unaffected by the Thai devaluation. Nevertheless, from February 1998 the percentage change is again negative.

The month on month change shows an increase between November 1995 through January 1996, and November 1997 through March 1998. A run of positive month on month changes is by no means rare,[55] however, and only followed by a substantial depreciation on these two occasions. The disparity between the month on month and twelve monthly change is disquieting.

The Thai devaluation appears to have contributed to a decrease in South African competitiveness, whereas the evidence from Mexico is ambiguous. This paper, however, argues that an overvalued real exchange rate was just one factor out of a number which contributed to South Africa facing *second generation* type crises during this period. Viewing the 1998 crisis as simply an adjustment to Asia misses out on these insights.

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[53] The IMF Staff Country Report (1997: 7) argues, however, that the real effective appreciation of the rand in late 1995 led to concerns that the rand had become overvalued. This 'appreciation' is month on previous month change, and not month on previous 12 month difference. It occurs over November and December 1995.

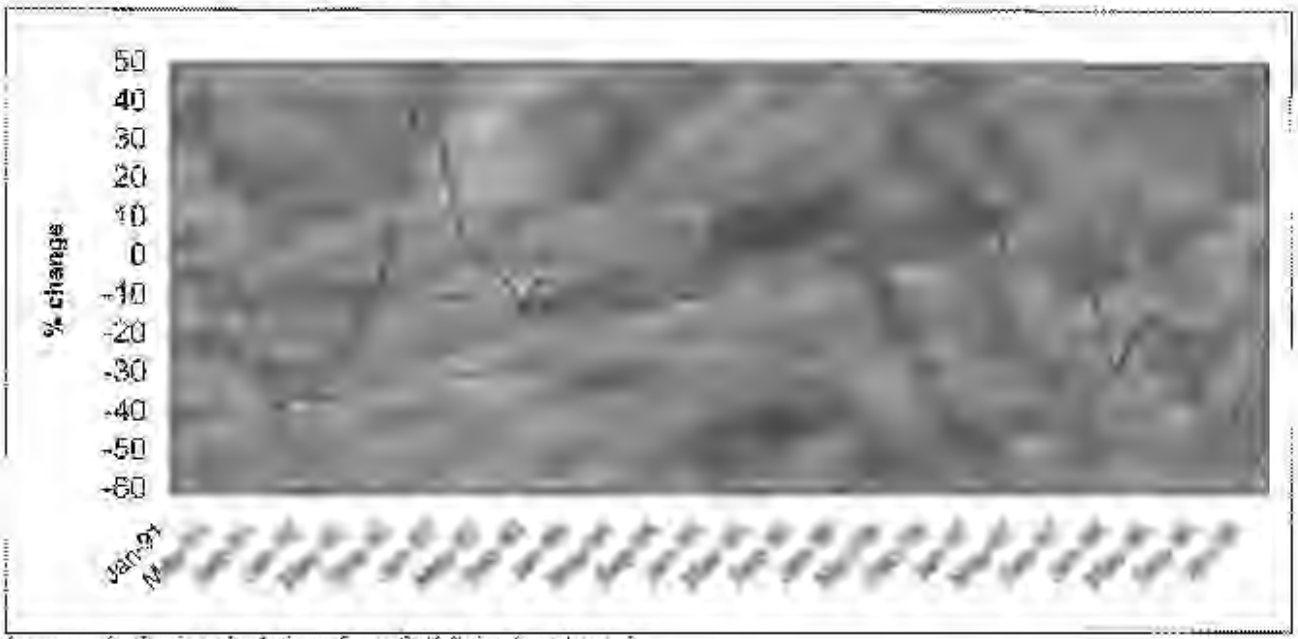
[54] The Thai baht was devalued in July 1997.

[55] This is especially true of 1991 and much of 1992.

Zimbabwe

A real effective exchange rate is not constructed by the Reserve Bank of Zimbabwe. The following bilateral index was computed, which compares the price of a bundle of goods in Zimbabwe with that in the United States.[56] The index is considerably simpler than that computed by the South African Reserve Bank.[57] Figure 4.2.2 describes the percentage change in this index.

Figure 4.2.2: The Real Exchange Rate (Zimbabwe)



Source: Author's calculations from QESR (various issues)

Again, we have persisted with the 12-month difference. An increase represents a decrease in competitiveness. The inflation following the 1992 drought can be seen to have eroded some of the initial competitive gains arising from a devaluing exchange rate.

There is an increase in the month on twelve month real exchange rate from Jan 1995 through July 1996, and December 1996 through April 1997. Hawkins (1997) mentions

[56] The index equals US$ price of a Zimbabwe dollar multiplied by the Zimbabwe consumer price index divided by the US consumer price index.

[57] A similar index constructed for South Africa displayed a 0,69 correlation with the real effective exchange rate discussed above. This correlation fell to 0,73 in first difference form.

an overvalued exchange rate as a factor in the build up to the 1997 crisis. Moreover, the month on month changes reinforce this. [58]

It is unclear whether one should follow Sachs *et al* (1996) and argue that Zimbabwe had a highly devalued real exchange rate prior to the Mexican crisis of 1994 and (by extension) the Asian crisis of 1997. Sachs *et al* (1996) compare the real exchange rate value against that between 1986-9, a period when the Zimbabwean economy was heavily regulated.

The Zimbabwean experience is more empathetically in favour of an overvalued exchange rate prior to its 1997 crisis. The real exchange rate computed here does not allow for an analysis of the impact of the Mexican and Asian crises since the countries which were affected by it are not weighted in the index. The United States was relatively unaffected by the Mexican and Asian crises. This implies the Zimbabwe dollar was overvalued regardless of the impact of the Mexican and Asian crises.

Mini Summary

There is some reluctance to read too much into movements in the real effective exchange rate. The International Financial Statistics Yearbook (1998: x), for example, notes that "in view of certain conceptual and data-related limitations ... movements in nominal and real effective exchange rates need to be interpreted with considerable caution". The index for Zimbabwe is weighted completely in favour of the United States. The South Africa index is also weighted heavily in favour of developed countries. This chapter will consequently stress a number of other indictors (such as exports) in gauging a country's competitiveness.

[58] Month on month increases occur in July through September 1995, November 1995 through January 1996, September 1996, December 1996 through April 1997, and July 1997. Interestingly, December 1997 through March 1998 (where the Zimbabwe dollar appreciated) also show a month on month increase.

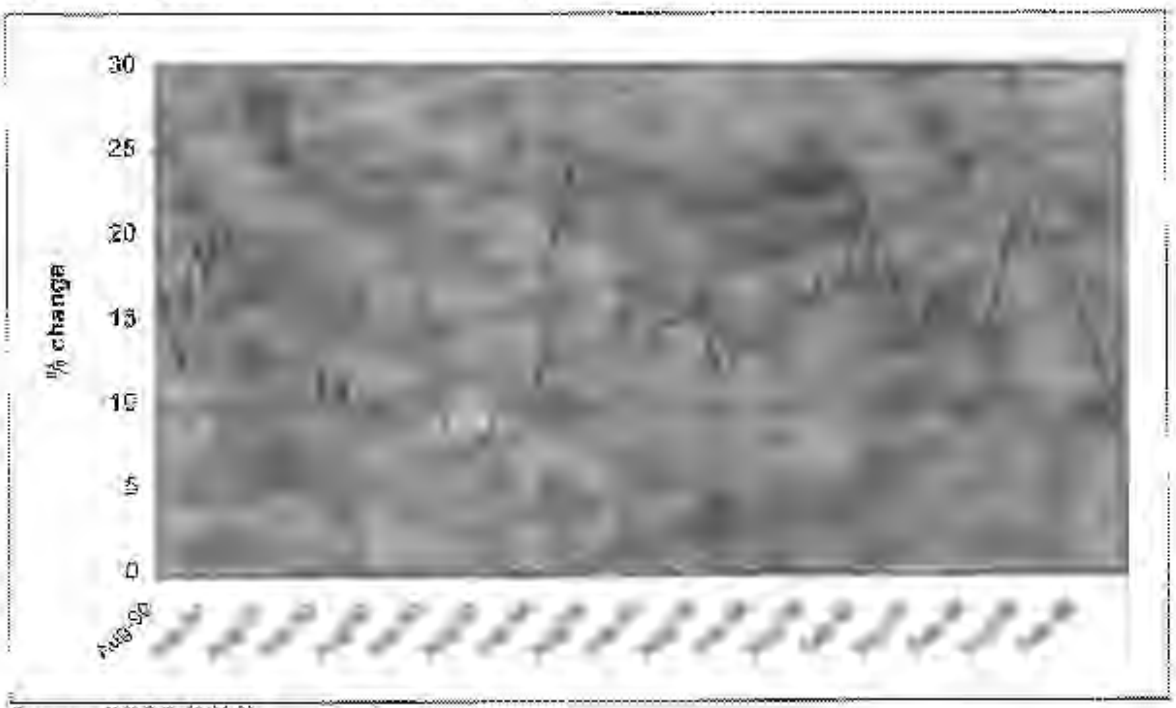
4.3 Credit to the Public Sector

Kaminsky *et al* (1997) also suggest credit extension and credit to the public sector as useful indicators of impending crisis. Rapid growth in credit extension is a trait of first generation models, and might suggest an exacerbation of the balance of payment position due to an extravagant private or public sector. Rapid credit extension would also contribute to growth in the money supply and consequently inflationary pressures in the economy. The IFS in its Banking Survey publishes domestic credit extension for South Africa, and in its Monetary Survey for Zimbabwe.

South Africa

The South African series unfortunately contains some gaps,[39] so use has been made of the Reserve Bank Quarterly Bulletin's Total Credit Extension. This series, whilst not identical, closely follows that of the IFS.

Figure 4.3 1: Credit Extension by all Monetary Authorities (SA)



Source: RBQB (1999)

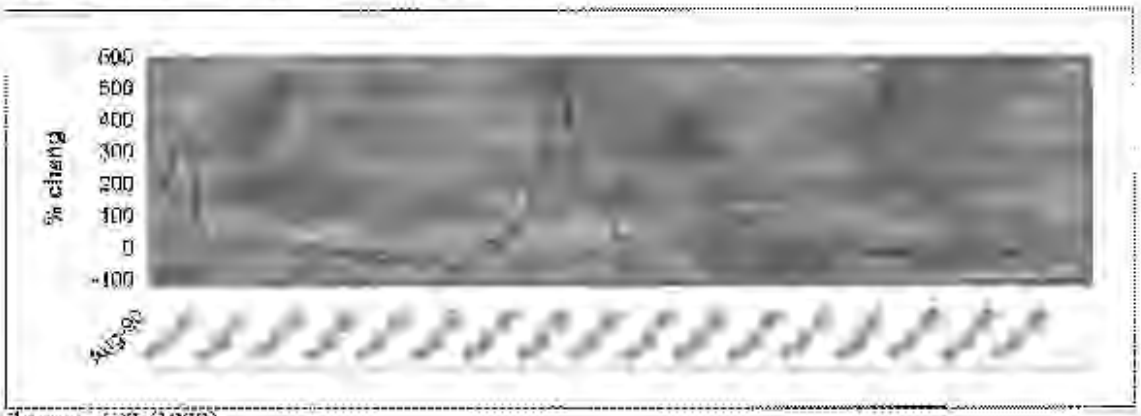
[39] From July to December 1991

As Figure 4.3.1 shows, credit extension is generally high throughout the period. It is above 20% in February and March 1991; October 1991; April through November 1994; January and April 1997; and July and August 1998.

The only time an indicator might have 'flashed' correctly then would have been in anticipating the 1998 crash (the July and August peaks are following the crisis). The large increases in April through November 1994 (and prior troughs) straddle the 1994 election period. This contradicts somewhat the IMF Staff Country Report (1999: 7) referring to the "rapid growth of credit aggregates" in the latter part of 1995. The seasonal increase in November and December is removed by taking a 12-month difference.

Figure 4.3.2 charts the change in claims to Central Government for South Africa. The figures are from the IFS.

Figure 4.3.2: Claims to Central Government (SA)



Source: IFS (1999)

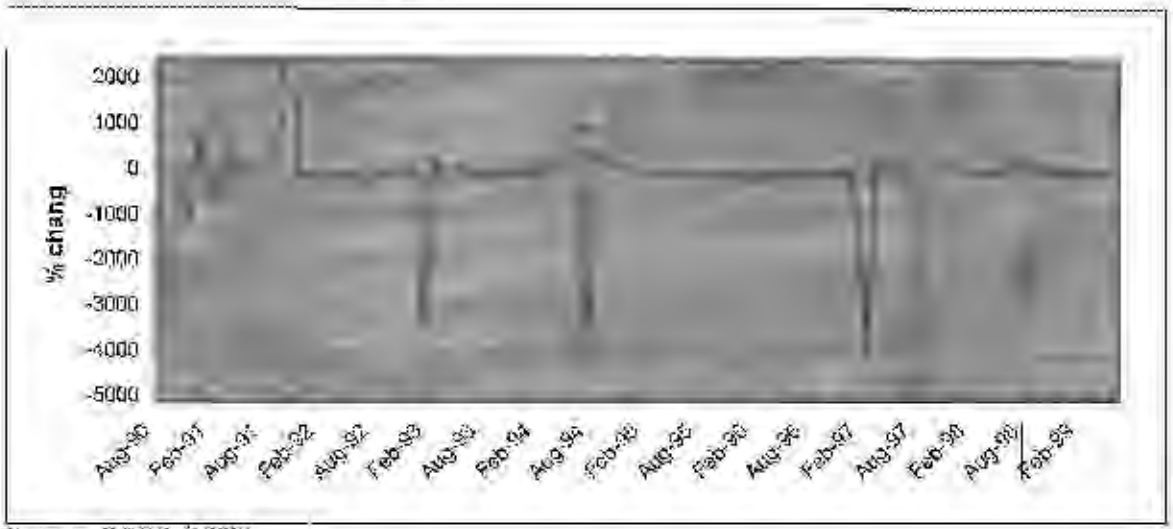
There are peaks in 1990 and over the 1994 election. A lesser peak follows the 1996 crisis. Prior to the crises the change has been negative. According to first generation (and 'early' credibility) logic[66] it thus appears to be a poor indicator of impending crisis. However, a restrictive policy eventually might prove too costly even for a 'tough' government. Hence a negative change might imply a looming crisis as it heightens the

[66] As indicated in Chapter 1, governments, which signal strong anti- expansionary intentions should decrease the likelihood of speculative attack by proving their 'toughness'.

time- consistency problem facing government. This logic can be incorporated into sophisticated second generation models of currency crises.

The Reserve Bank Quarterly Bulletin also publishes Net Credit Extension to government. Figure 4.3.3 charts its percentage change. The central message is starker.

Figure 4.3.3: Net Credit Extension (SA)



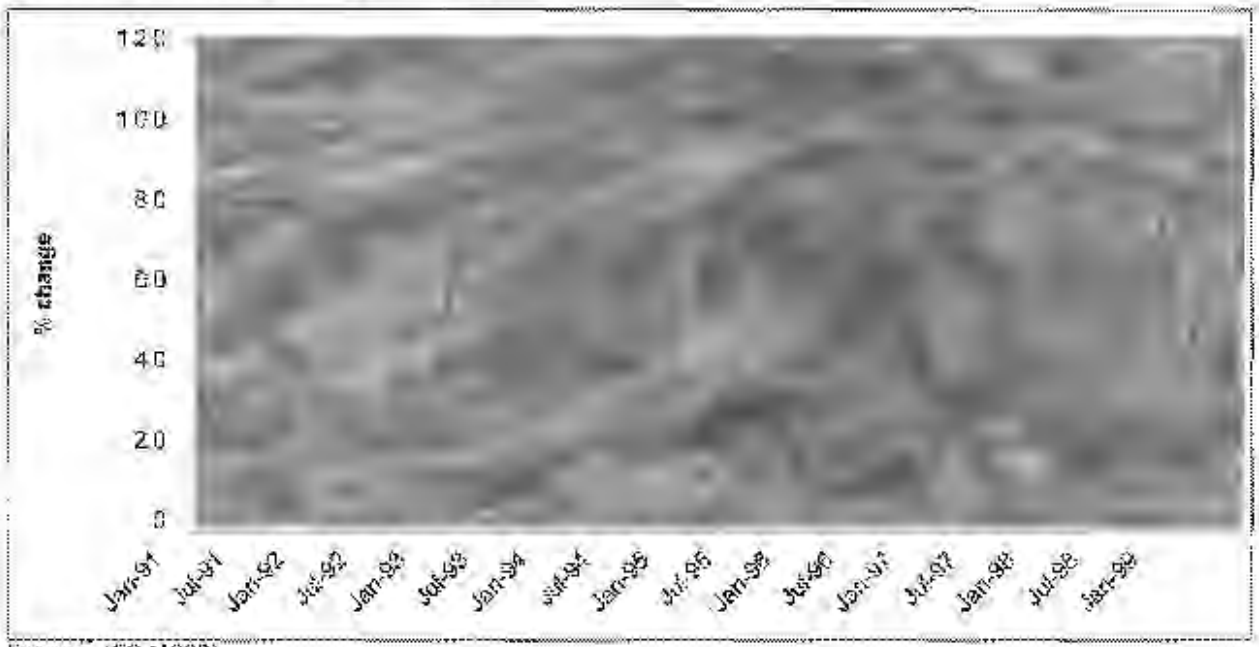
Source: RBQB (1999)

The spike in October 1991 is caused by an abnormally low value one year previously. Otherwise, apart from some early large values (December 1991, and March and April 1992) and the 1994 election blip, the change in net credit extension is either inconsequential or strongly negative (in January 1993, July 1994, and February 1997).

Zimbabwe

The IFS publishes a series on Domestic Credit for Zimbabwe. Its percentage change is illustrated in Figure 4.3.4. The Quarterly Economic and Statistical Review also publishes a series on Domestic Credit, which is available only from 1994. It is, however, substantially different from the IFS series. It is possible to disaggregate the Reserve Bank's Domestic Credit into claims on government, public enterprises and the private sector. The IFS Domestic Credit appears to more closely resemble the Reserve Bank's claims on private sector. This in fact forms the majority of claims.

Figure 4.3.4: Domestic Credit (Zimbabwe)

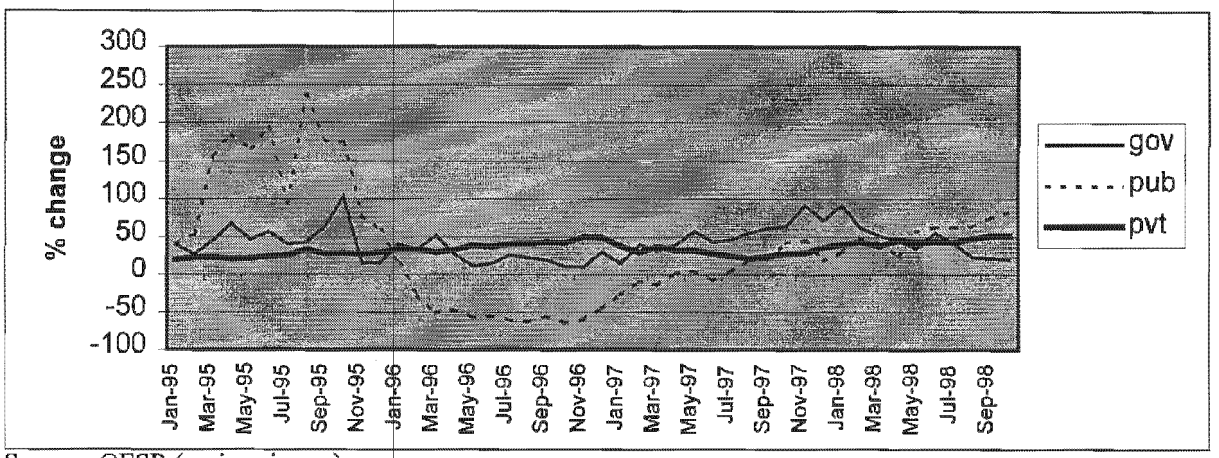


Source: IFS (1999)

In comparison with South Africa, domestic credit growth in Zimbabwe is rarely below 20%. Growth peaks above 60% in the months of February through April 1993; June through September (and November) 1994; October 1997 through February 1998; and April through November 1998. It therefore would not appear to be too reliable an indicator of an impending crisis, although it was 'flashing' prior to the 1998 crisis. Part of the rationale for this indicator's poor performance might stem from our suspicion that it excludes non- private credit extension.

Figure 4.3.5 illustrates the growth in each of the components of Domestic Credit for Zimbabwe. The series is from the Quarterly Economic and Statistical Review. Data is available only from 1994.

Figure 4.3 5: Components of Domestic Credit (Zimbabwe)



Source: QESR (various issues)

The change in claims to the private sector is the least variable of the three components. There is a large increase in claims to public enterprises from January 1995 through January 1996.[61] The Government claims spike in October 1995, November 1997 and January 1998. Taking cognisance of non- private claims improves the performance of the indicator in anticipating the 1997 crisis. It would appear that the performance of the public sector has contributed to creating a crisis environment in Zimbabwe. The Reserve Bank in its Quarterly Review in fact describes credit growth being dominated by that to government and private sector in 1997.

Mini Summary

The South African experience thus suggested a disciplined public sector; at odds with the Latin American experience of the late 1970s where extravagant public spending helped conceptualise first generation models of currency crises. Second generation models that focus on the inherent trade-off facing government might be more applicable. This contrasts strongly with the Zimbabwean experience, which appears to affirm a spendthrift state.

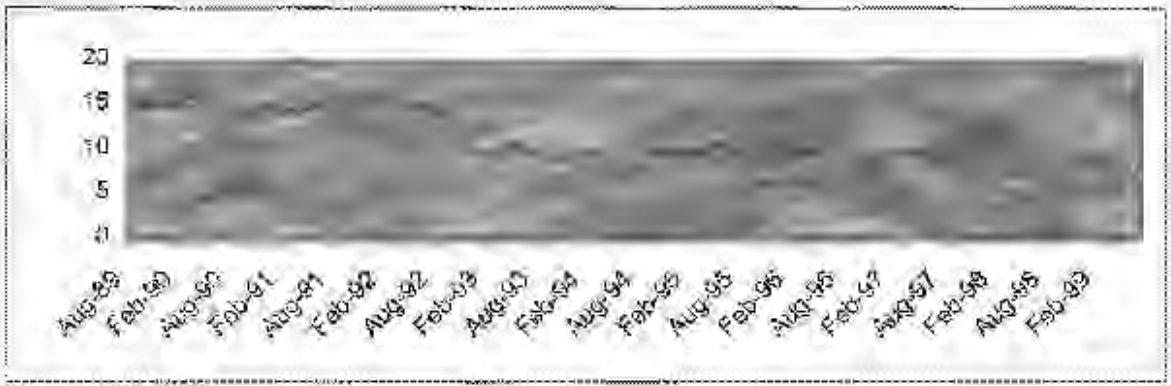
[61] This partly reflects 'creative accounting' to secure an IMF loan (which was suspended in 1995).

4.4 Consumer Prices

South Africa

Figure 4.4.1 charts the direction consumer prices (headline inflation) has taken in South Africa since August 1989. The series is from the IFS.

Figure 4.4.1: Headline Inflation (SA)



Source: IFS (1999)

Consumer prices appear to have slipped downwards from an initial high plateau. In fact, the ± 15 % rate until August 1992 partly accounts for the increase in the real exchange rate (i.e. decrease in competitiveness) over this period (see Figure 4.2.1) where South African inflation was significantly above that of her trading partners.

The overall downward trend is clearly discernible in the years prior to both the 1996 and 1998 crises.[92] Inflation peaks following the crises, partly because headline inflation includes interest rates in its weighting (but also because the price of imports rises after a depreciation). The downward trend reaffirms the evidence from credit extension of the apparent 'toughness' of the South African state.[93]

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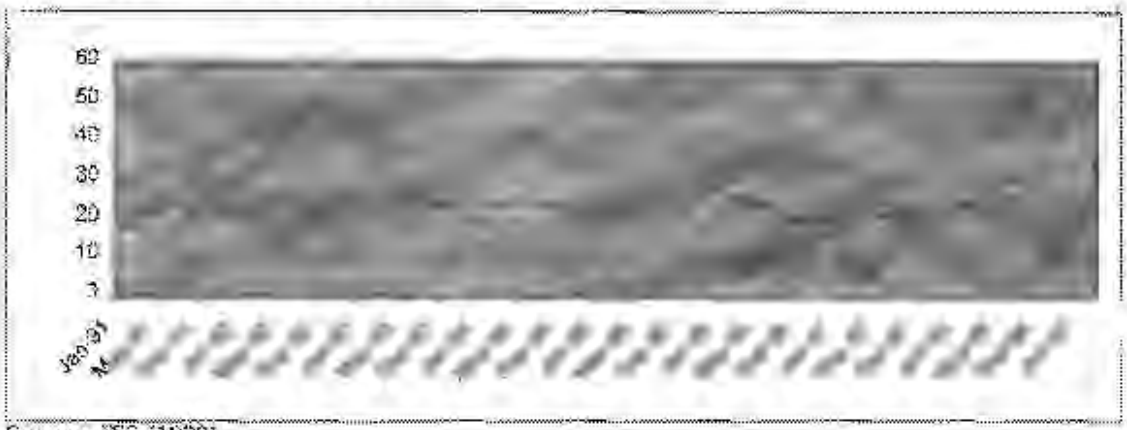
[92] The Budget Review (1999: 39) congratulates itself on the "(s)ignificant success ... in recent years in lowering the rate of increase in the producers price index and the overall consumer price index. From 1991 to 1998, core inflation and consumer price inflation fell by 11,4 and 8,4 percentage points respectively. Producer price inflation fell from 15,2% in 1989 to 3,5% in 1998".

[93] Mean especially in the sense of the Reserve Bank's anti- inflationary slant. The fall in consumer prices is also a result of the policy of trade liberalisation exemplified in GEAR resulting in lower import prices. The 1999 Budget Report (1999: 39), for example, notes how "South Africa has progressively opened its borders to global commerce by liberalising its trade regimes. Tariff levels are being reduced, with the trade weighted import tariff falling to 9.2% in 1997".

Zimbabwe

Figure 4.4.2 charts the direction of consumer prices for Zimbabwe. Data again is from the IFS.

Figure 4.4.2: Consumer Prices (Zimbabwe)



Source: IFS (1999)

Consumer prices increased rapidly in 1992 and 1993. There were above 25% from October 1991 through July 1993. This is largely a consequence of the crippling 1991/92 drought. Consumer prices subsequently increased at a fairly constant 20+ percent thereafter, going again above 25% only in November 1995 through February 1996. While the increase subsequently fell below 20%, since March 1998 consumer prices have once again been above 25%.

There thus appears to have been some 'warning' of the impending crises. More generally, the evidence from consumer prices once again places the Zimbabwe experience more in sync with first generation logic in the sense of justifying crisis with an appeal to 'poor fundamentals'.

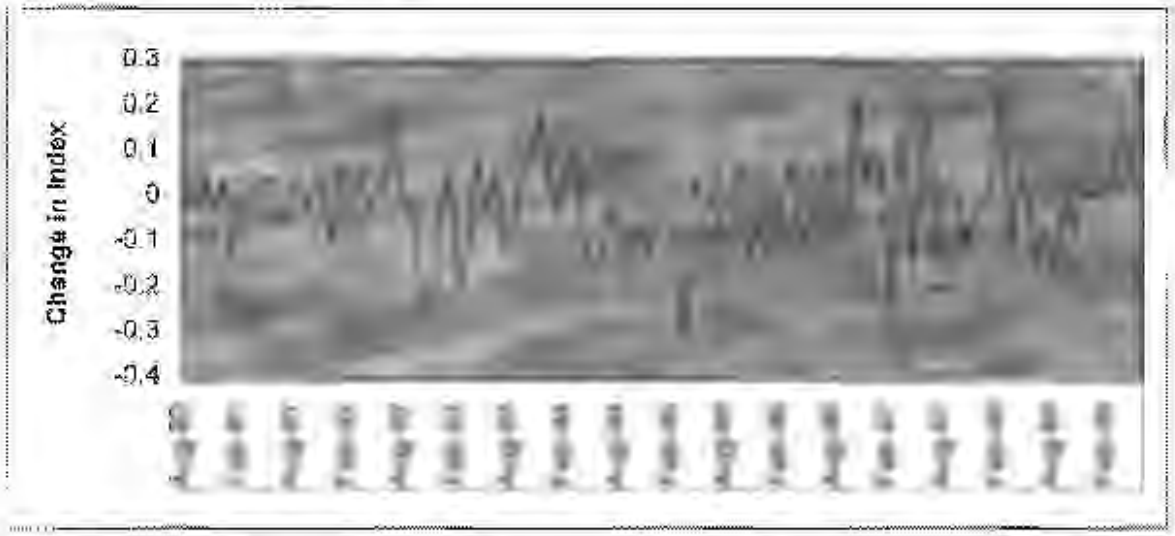
4.5 Trade Balance

The next indicator suggested by Kaminsky *et al* (1997) is the trade balance.[64] This can be conceptualised as (X-M)/(X+ M).[65]

South Africa

The South African data comes from the IFS. An interesting structural difference between the pre- and post- election period is that prior to 1994 South Africa was required to run a surplus on its trade account. Following the 1994 election it has periodically been able to rely on capital inflows to finance a deficit.

Figure 4.5.1: Trade Balance (SA)



Source: IFS (1999)

Figure 4.5.1 charts the 12- month difference in the trade balance, as a proportion of X+ M.[66] The index is notoriously volatile. However, there is a large increase in the trade deficit as a proportion of X+ M in March 1995 and February 1997 when compared with its level one year earlier. Moreover, this appears to be because these were large deficit months, rather than because March 1994 (coinciding with the 1994 election) and

[64] I.e. exports minus imports (X-M).
[65] One reason behind the transformation (X-M)/(X+ M) is that (X-M) will exhibit massive percentage changes for numbers that lie close to zero. An alternative would be to weight the changes (X-M)/GDP.
[66] This is calculated as $[(X-M)/(X+M)] - [(X-M)_{12}/(X+M)_{12}]$.

February 1996 (coinciding with the first crises) were not. These 'extreme' values fall within the 24 month window preceding the crises.[67]

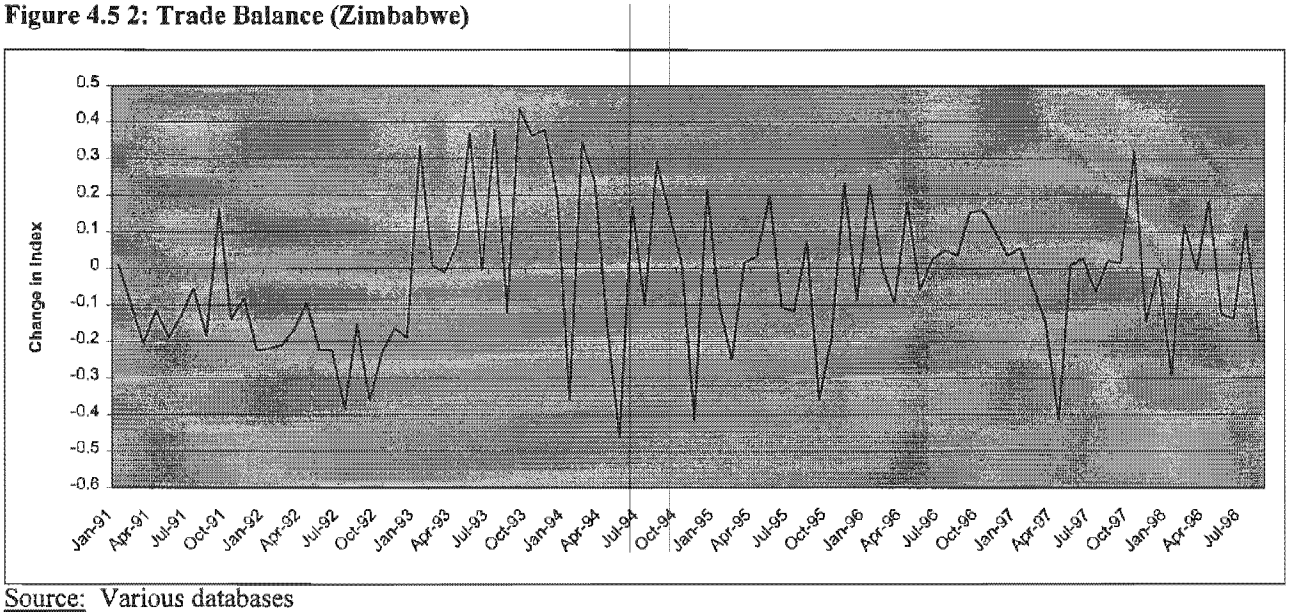
Zimbabwe

The IFS data of exports and imports for Zimbabwe only runs to June 1997. The Reserve Bank of Zimbabwe publishes a Visible Trade Balance,[68] figures which are available from 1992 to August 1998. The series is not internally consistent, however, as the domestic merchandise component of exports appears to have been calculated differently prior to 1994. The difference is not too large, and where the IFS series and the Reserve Bank series overlap they are quite similar. We have therefore felt relatively comfortable with augmenting the Reserve Bank series with the IFS series where necessary to obtain a measure of the trade balance across the entire period.

Zimbabwe has generally run a deficit on its trade balance. Periods of surplus are small and occur only over 10 months. Figure 4.5.2 charts the 12 month difference in the trade balance as a proportion of X+ M. The consistent deficit is suggestive of a vulnerable position, especially when complemented with the reserves position (see, for example, Figure 4.1.4).

[67] It is also interesting to note how, following each crisis; a positive trade balance was restored.
[68] It is the difference between exports, (which consists of gold sales, domestic merchandise, and re-exports) and total imports.

Figure 4.5 2: Trade Balance (Zimbabwe)



Source: Various databases

The index is exceedingly volatile. Large decreases occur in July and September 1992, January and November 1994, September 1995 and April 1997. While the 1995 and 1997 decreases can be interpreted as anticipating the 1997 crisis, there are a number of 'false' alarums. The Quarterly Economic and Statistical Review (1998) highlights poor export performance in the face of increasing imports throughout 1997. [69]

4.6 Export Performance

Kaminsky *et al* (1997) also suggest a focus on export performance. Not only can poor export performance imply an overvalued exchange rate, but also exports provide an economy with much needed foreign exchange. Often, much of the rationale behind a liberalisation attempt is to improve export performance.

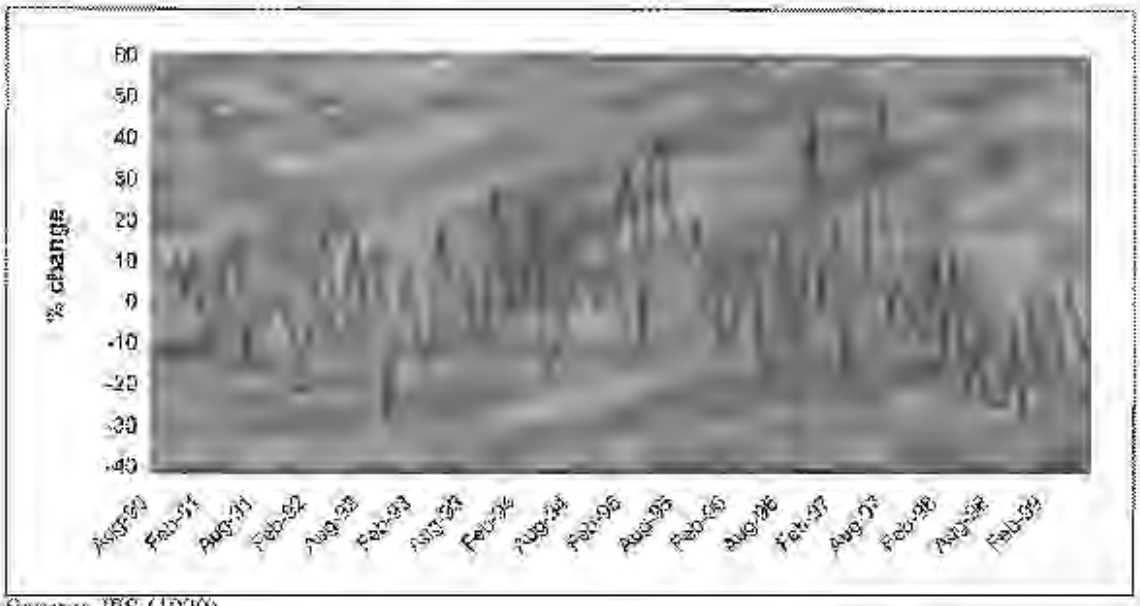
Both the twelve- month percentages change in exports for South Africa and Zimbabwe are exceedingly volatile. This translates into a noisy indicator.

[69] This deteriorating position is most obvious when charting the level of (X-M).

South Africa

Figure 4.6.1 charts the percentage twelve-month changes in exports for South Africa. Data is from the IFS.

Figure 4.6.1: Export Performance (SA)



Source: IFS (1999)

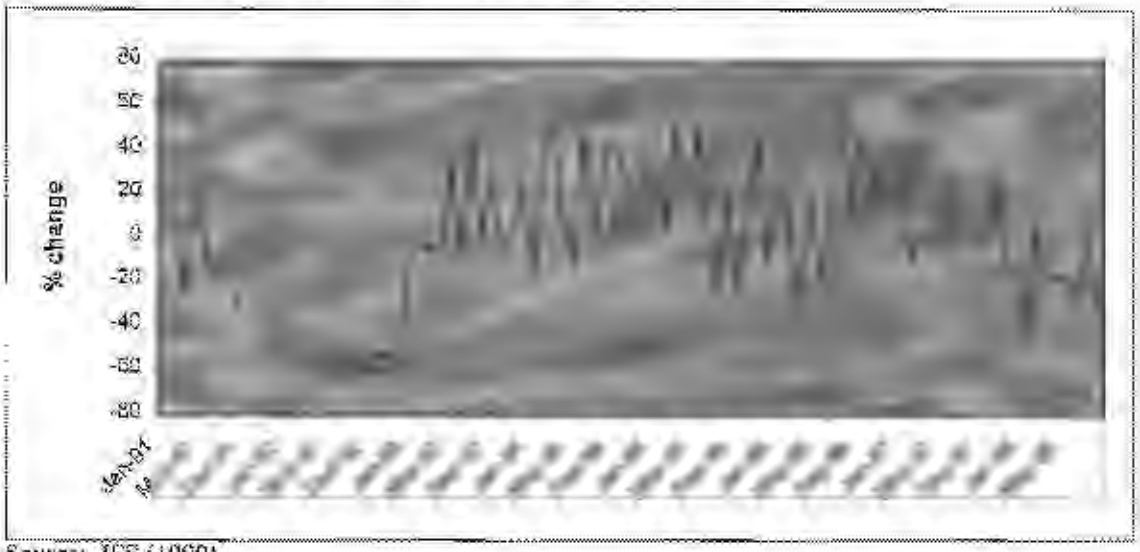
Large decreases (greater than -15%) occur in October 1992, May 1996, February 1997, and April, June, July, August 1998 and February 1999. Apart from October 1992, the poor export performance partly reflects the tightening of monetary policy following the 1996 crisis. It is thus debatable whether the 'extreme' behaviour of this indicator is anticipating the 1998 crisis or is in response to the 1996 crisis.

A relaxation of interest rates was widely anticipated in early 1997, partly because of the strain high interest rates were exercising on the economy. The Asian crisis, which broke in mid- 1997, resulted in a cautious approach to interest rate reduction. The export performance continued to deteriorate, especially as the 1998 crisis deepened. The indicator was thus reflecting an increasingly poor macro- economic environment, rather than only responding to a prior crisis.

Zimbabwe

Figure 4.6.2 illustrates export growth for Zimbabwe. Like SA, it is exceedingly volatile.

Figure 4.6 3: Export Performance (Zimbabwe)



Source: IFS (1999)

What stands out is the crippling effect of the drought in the early 1990s, and the large fluctuation in the month on previous year's month change in exports over the entire period. However, since February 1997 export growth has generally been sluggish (with January 1998 standing out as a particularly large decrease). Numerous commentators cite the deteriorating balance of payments position brought about by poor export performance in the build- up to the 1997 crisis. There are also large percentage decreases in July and September 1995 (also during a drought), and May 1996.

Mini Summary

Both South Africa and Zimbabwe display poor export performance in the build- up to their mid- 1990 exchange rate crises. South Africa and Zimbabwe's delayed reaction to the Thai devaluation can be seen as a contributing factor. This paper argues also the South African case illustrates a state determined to signal its 'toughness' to the market, whereas in the Zimbabwean case the poor performance signals foreign exchange shortages and state mismanagement of the economy, reflecting a descent into first generation type chaos.

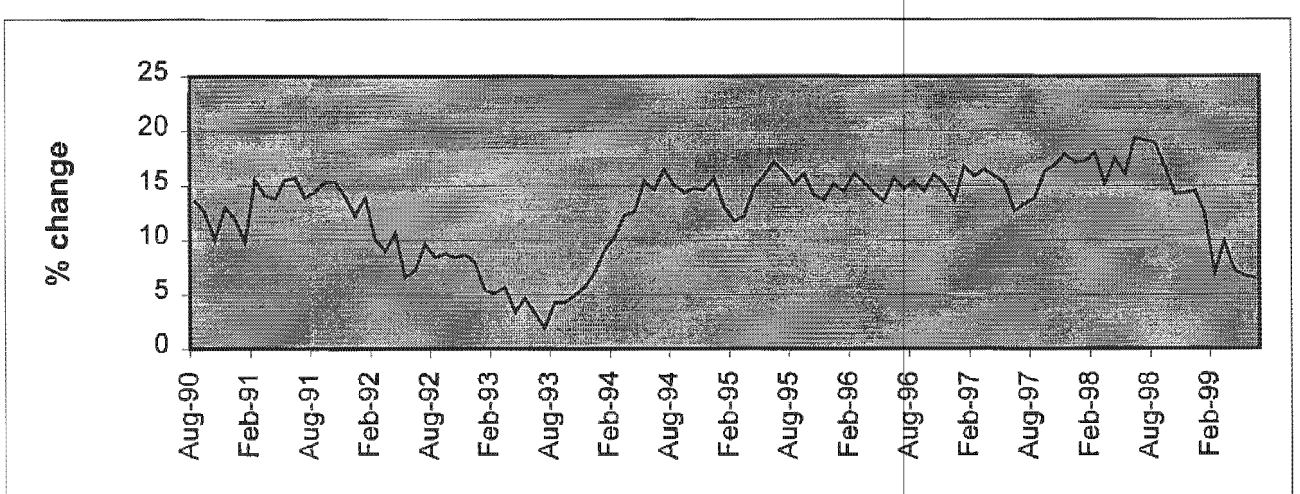
4.7 Money supply

The next indicator suggested by Kaminsky *et al* (1997) is the growth in the money supply. The money supply is not easily quantifiable. As financial systems have become more sophisticated (i.e. as some assets have become more liquid) it become increasingly difficult to define what should be included. The broadest measure presently used by the SA Reserve Bank and the Zimbabwe Reserve Bank is M3.

South Africa

Figure 4.7.1 charts the growth in M3 for South Africa. Although falling prior to the 1994 election, growth has remained stubbornly high for much of the subsequent period. Aron and Elbadawi (1999) point out that it has consistently exceeded the upper limit of approximately 10% targeted by the Reserve Bank. It has partly been fuelled by high credit extension growth.

Figure 4.7 1: M3 growth (SA)



Source: RBQB (1999)

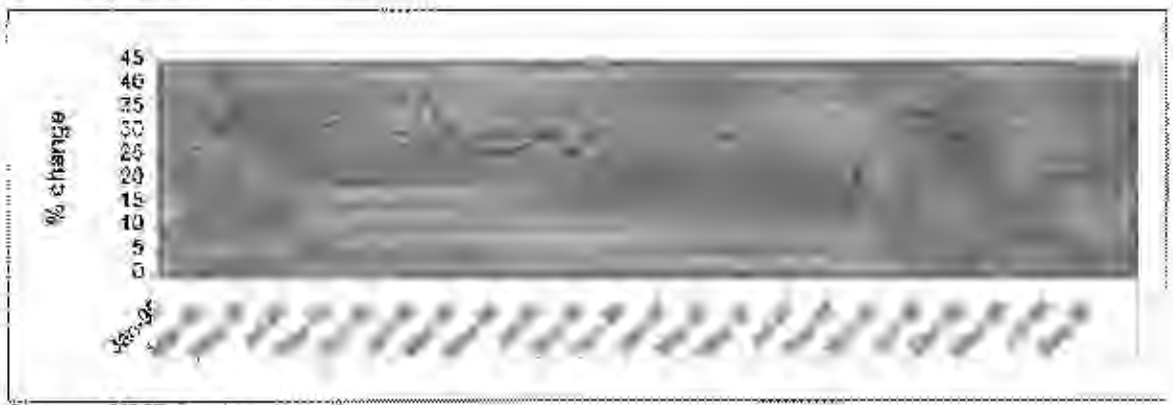
The IMF Staff Country Report (1997) in particular refers to a rapid growth in monetary aggregates in the latter part of 1995. In comparison to previous growth behaviour, growth peaks in May through September 1995. While this might indicate that the indicator was flashing red prior to the 1996 crisis, it has been 'abnormally' high for most of the period.

There is some controversy as to what is an adequate measure of the money supply, and that it has been argued that M3 might be a misleading indicator given the increased financial sophistication which has occurred over this period in South Africa.[70] If anything, this reaffirms the difficulty of attempting an economic analysis during a period of change.

Zimbabwe

Data for M3 is available for Zimbabwe from 1994. This is a limited period in which to draw any clear- cut comparisons.[71] Figure 4.7.2 charts the growth in M3.

Figure 4.7.2: M3 growth (Zimbabwe)



Source: QESR (various issues)

The growth in M3 generally appears to be increasing at a decreasing rate across the period. Growth has largely been tempered by the fall in reserves over the period. Nevertheless, there are peaks in April and October 1995 and January 1996. There is also a sharp increase just prior to the 1998 crisis. The Reserve Bank frequently refers to high credit extension driving the increase in the money supply.

4.8 The ratio of M2 to Reserves

The variable M2/international reserves gives an indication of the extent to which domestic residents can precipitate a crisis after becoming aware of (say) a timo-

[70] This is acknowledged by Stals in his 1997 annual address to the shareholders of the Reserve Bank.
[71] In particular, the period is too short to distinguish outside of the 24 month window period.

consistency problem.[72] It gives an indication of what might be exchanged into foreign exchange against the ability of the authorities to meet that exchange at the going price. More directly, it reflects the extent of investor concern that their currency might not be exchanged into US$ at the going price.

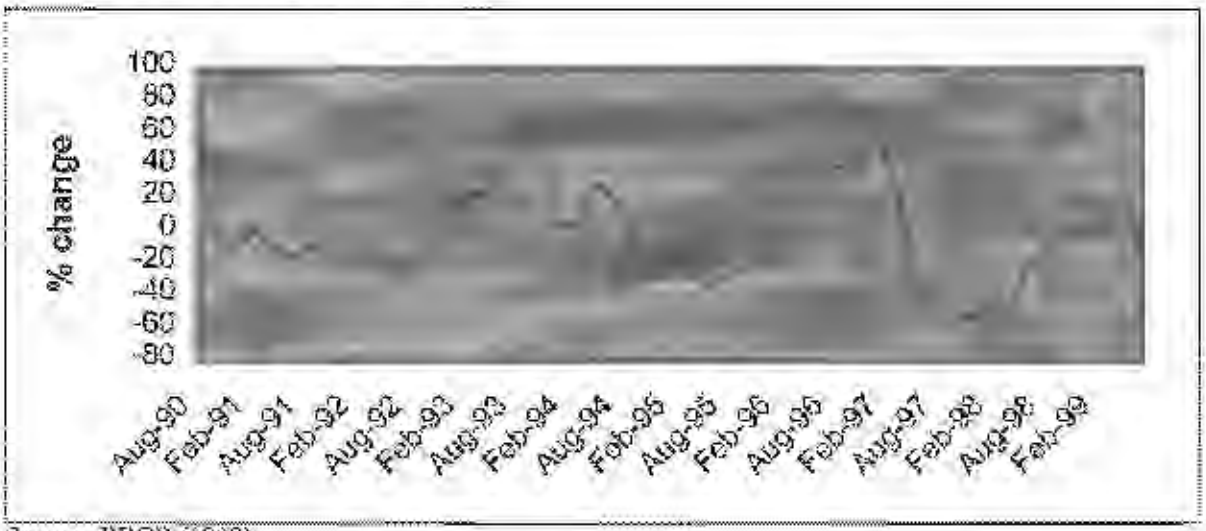
Foreign assets will be used as the measure of international reserves. This measure has been used (rather than the IFS measure or net reserves), because the borrowing capability of the Reserve Bank is felt to limit domestic residents' ability to precipitate a crisis. The figures used are thus from the Reserve Bank Quarterly Bulletin and the Quarterly Economic and Statistical Review.

South Africa

Figure 4.8.1 charts the change in M2/Reserves for South Africa. An increase in the ratio should reflect an increase in vulnerability as it signals either greater domestic currency or less foreign exchange.

[72] The Bank for International Settlements (1998) argues that a major precipitator of the run on the Thai baht was from the unhedged dollar position of domestic investors who rushed to buy dollars. This then precipitated the crisis.

Figure 4.8 1: M2/Reserves (South Africa)



Source: RBOB (1999)

The ratio increases prior to the 1994 election as reserves are depleted. The fall shortly before the election, however, is a consequence of M2 growth becoming negligible as money is hoarded, and as M2 growth approaches zero so the change in M2/Reserves also plummets.

The decrease in the ratio in 1995 and 1997 stems from the large inflows of reserves over this period. In fact, the ratio increases marginally in March and April 1996 and only increases precipitously in May. The build up to the 1998 crisis is no different with the ratio falling prior to the crisis.

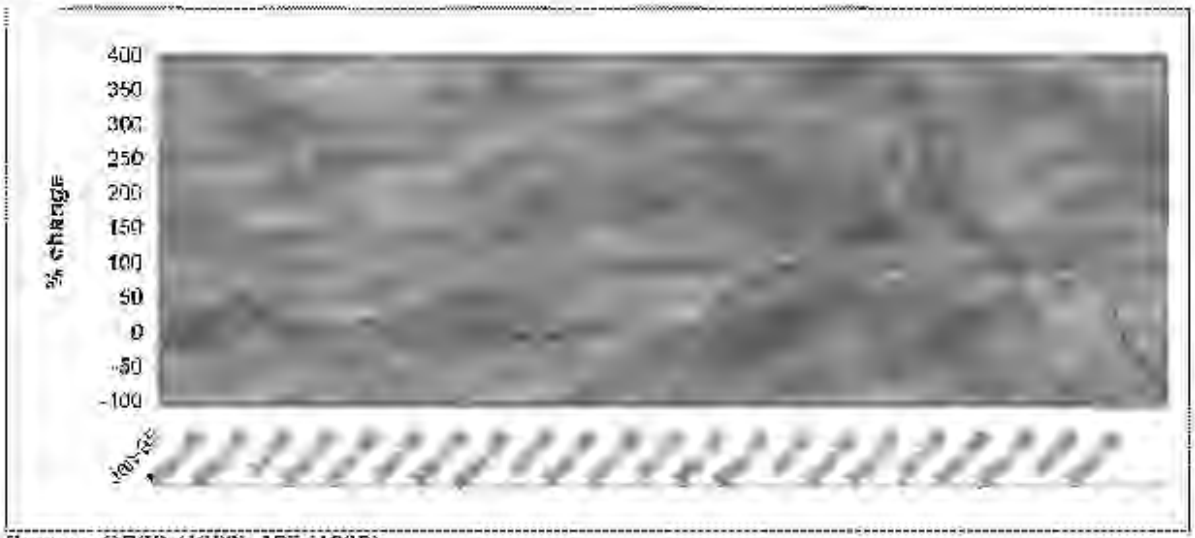
The change in M2/Reserves thus appears a poor indicator of impending crisis for South Africa. This is largely due to the awkward behaviour of reserves, which has previously been outlined. It should also be stressed that this does not rule out a second generation currency crisis for South Africa as there can be a number of precipitating factors (in fact we have already mentioned the position of the forward book as a possible precipitator).

The falling ratio, however, also suggests that investors should not have been concerned about a deterioration in the ability of rands to be exchanged for US$ prior to the crisis. In this sense, the crises were unexpected. However, the increase in reserves was coming off a low base. South Africa, despite the improvement in reserve position, has a low level of reserves when compared with other developing countries.

Zimbabwe

Figure 4.8.2 repeats the percentage change in M2/Reserves for Zimbabwe. Again, Foreign Assets has been used as the measure of reserves. This series is obtained from the Quarterly Economic and Statistical Review. M2 is obtained by summing Money and Quasi- Money from the IFS.

Figure 4.8 2: M2/Reserves (Zimbabwe)



Source: QESR (1999), IFS (1999)

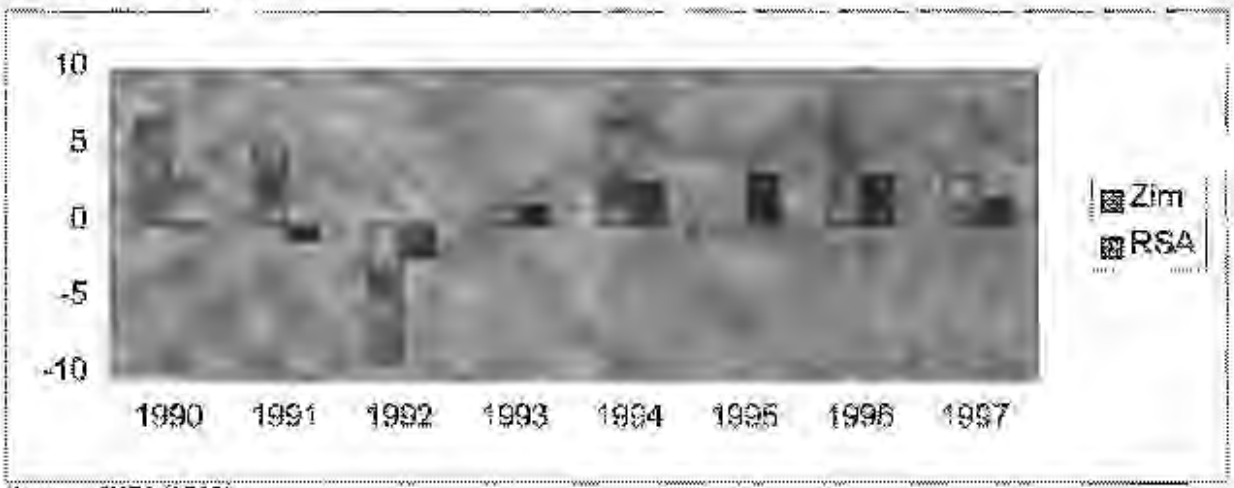
The change in M2/reserves displays a massive increase from early 1997. Again, the fall in reserves is mainly driving this. There are spikes in September and November 1997. There might have been anticipated a difficulty with the Reserve Bank meeting its obligations should investors have chosen to convert the Zimbabwean dollars at the prevailing exchange rate. This, together with the precarious position of 'fundamentals' already outlined, might have been a trigger for the crisis.

4.9 Real GDP growth

Kaminsky *et al* (1997) also cite real GDP growth as an important indicator of impending crisis. This might be because poor growth encourages the authorities to devalue (or because poor growth leads the private sector to anticipate a devaluation and hence actually force one). Alternatively, rapid GDP growth might suggest an unsustainable consumption boom and impending balance of payments crisis.

Data for GDP growth is not available in monthly form. Table 4.9|1 lists the annual GDP growth for SA and Zimbabwe. Figures are from the World Development Indicators (WDI) and available until 1997.

Table 4.9 1: GDP growth



Source: WDI (1999)

An annual figure provides for a less timely early warning. The South African economy was in recession up to 1992. The recovery has been disappointing, with South Africa seemingly unable to break through the three percent per annum ceiling. This translates into a disappointing growth performance. It will be argued that the South African government has deliberately avoided populist measures (which might have translated into a better growth performance) in an effort to gain long- term credibility. The poor growth

performance however should perhaps be interpreted as laying the foundations for a second generation crisis.[73]

There is a sharp contraction in GDP for Zimbabwe during the 1991/2 drought. There is also a contraction in 1995, and growth in 1997 is less than 5% pa. The performance, however, is volatile with good rains playing an important part in the performance of the economy.

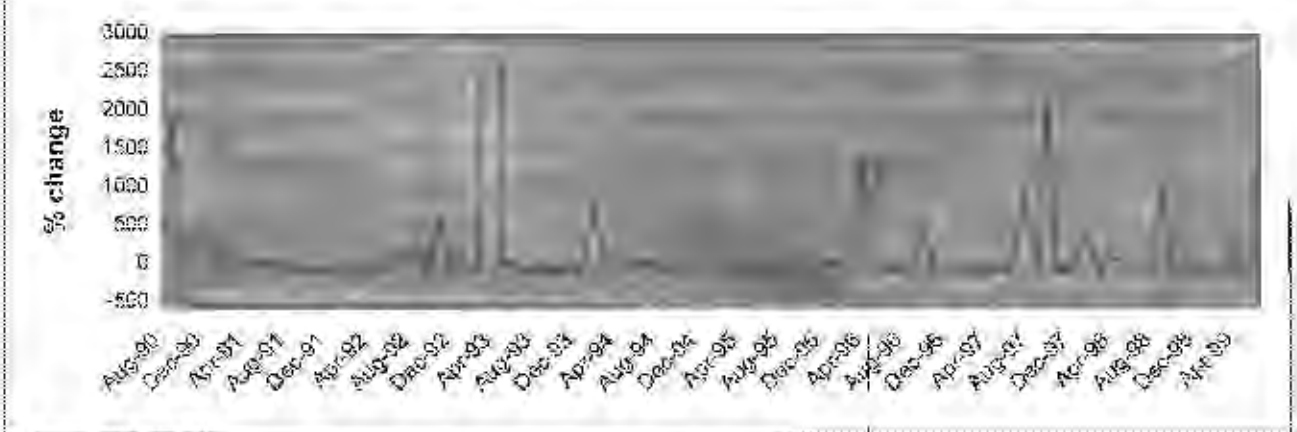
4.10 Budget Deficit

The final indicator suggested by Kaminsky *et al* (1997) is the budget deficit. The IFS for South Africa and the Quarterly Economic and Statistical Review for Zimbabwe records Revenue and Grants less Total Expenditure including net lending. This is available in monthly form.

South Africa

Once again, however, numbers close to zero will exaggerate percentage changes. Figure 4.10.1 outlines the percentage 12 monthly change in government finance for South Africa.

Figure 4.10.1: Budget Deficit (South Africa)



Source: IFS (1999)

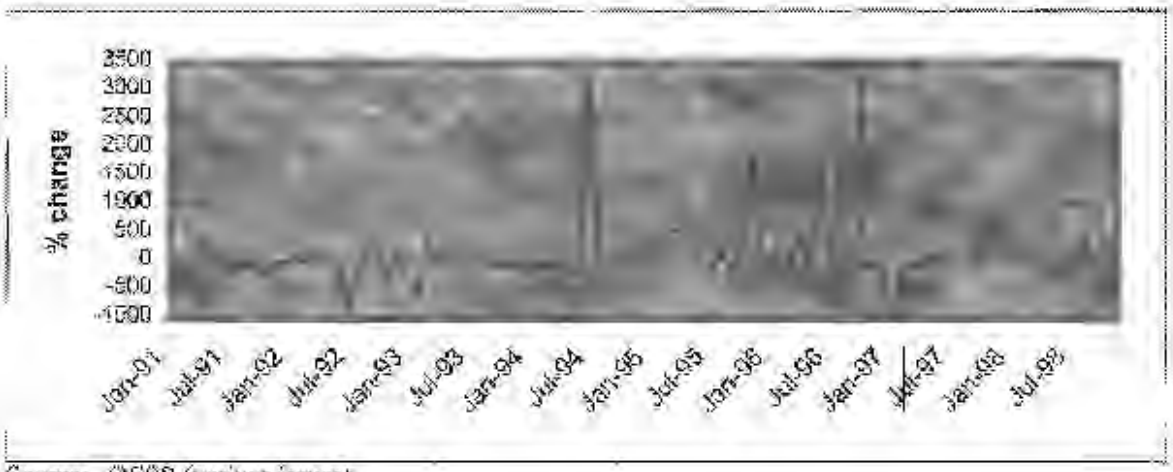
[73] While this policy might have signalled the 'toughness' of the government to a sceptical market, it also adversely affected the external environment to such an extent that even a 'tough' government might have balked. For more on this point, see Drazen and Masson (1994).

The massive percentage increase in March 1993 (306125%) dwarfs the entire index. This stems from an abnormally low March 1992 value. Other increases greater than 500% occur in August 1990, January 1994, March 1996, September 1996, July 1997, September 1997 and August 1998. None anticipates the 1996 crisis according to the criteria set by Kaminsky *et al* (1997). The large increases in July and September 1997, however, might be interpreted as 'flashing' for the 1998 crisis. However, the variable is generally so sensitive to small numbers as to be meaningless.

Zimbabwe

Figure 4.10.2 repeats the description for Zimbabwe.

Figure 4.10.2 (Zimbabwe)



Source: QESR (various issues)

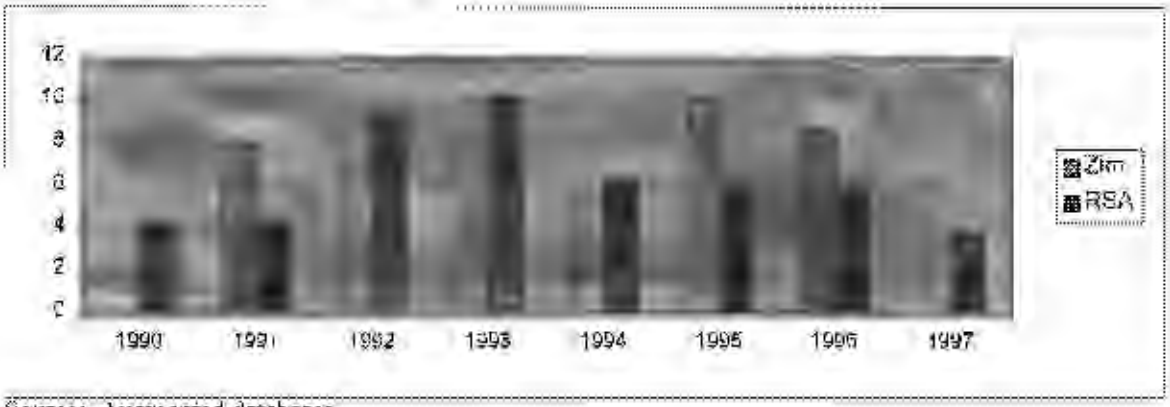
Again, the massive percentage increase in August 1996 (18639%) occurs because the numbers are close to zero, and this magnifies a small absolute change. While this increase in a sense anticipates the 1997 crisis, there is some question as to the meaningfulness of this measure.

Comparison

The World Development Indicators published annual figures of the overall budget deficit including grants as a percentage of GDP for South Africa and Zimbabwe. Figures for Zimbabwe are only available until 1993. The Quarterly Economic and Statistical Review

series, while more complete, is substantially different. The two are thus not directly comparable, although they are shown together in Table 4.10.1.

Table 4.10.1: Budget Deficit as percentage of GDP



Source: Augmented databases

The South Africa budget deficit increased substantially in the first half of the 1990s, but since 1994 has been reduced in Maastricht- like steps.[74] While the deficit was at 6% in the 1996 crisis, it continued to be reduced in the build-up to the 1998 crisis. The Zimbabwe deficit remained above 8% in 1995 and 1996. While the South African state is attempting to signal its 'toughness' here, the opposite argument might be made for Zimbabwe.

4.11 Summary of Chapter

This chapter has not attempted to assess 'rigorously' the usefulness of each indicator. Nevertheless, it has highlighted the vulnerability of certain indicators to 'small' numbers (such as South African Credit Extension to Government, and the Trade Balance for both countries); the sensitivity of certain indicators to a month on month or a twelve monthly change (such as South African Real Exchange Rate and the South African Net Credit Extension); and the difficulty indicators have in anticipating currency crises. There also appear to be differences between the various databases as to how each indicator is measured.

[74] See, for example, Dupasquier (1999).

These practical difficulties aside, there is also an inherent difficulty in the ability of an 'indicator- based' approach to foresee certain second generation type currency crises. Unlike in first generation models where economic fundamentals are generally 'exploding', in second generation models individuals take advantage of a time-consistency problem. This time-consistency is not necessarily suggested by 'extreme' economic conditions (but rather by an almost arbitrary trigger). Indicators might not then be exhibiting 'extreme' behaviour prior to a crisis.

This chapter has hinted at the presence of such a possible time-consistency problem facing the South African state by highlighting how the various indicators reflect the state's attempt to signal its 'toughness' despite deteriorating macroeconomic variables. This has been contrasted with the Zimbabwean case where 'exploding' economic fundamentals have been seen to be reflective of a first generation type crisis. The chapter has thus argued that the crises experienced by South Africa in 1996 and 1998 and Zimbabwe in 1997 and 1998 should be seen as 'local' crises and not simply lagged responses to the Mexican and Asian crisis.

CONCLUSION

Managing capital inflows has become a major preoccupation of developing countries over the past decade. Palma (1998) describes this period as characterised by high, and particularly volatile, international liquidity. The flow of private capital to emerging markets increased from US$ 50 billion in 1990 to US$ 336 billion in 1996, but fell to around US$ 150 billion in 1999.[75]

The increase in capital flows needs to be understood in the context of an increasingly liberalised global economy. Developing countries have been pre-occupied with dismantling capital controls, and liberalising their economies in an effort to attract international capital. Much of the impetus behind this liberalisation has come from the lessons policy makers chose to learn from the Latin American debt crisis of the early 1980s.[76] While 'giving market forces play' legitimised this 'new' philosophy; having a stable nominal exchange rate (usually by pegging the exchange rate) was often seen as an essential means of restoring price stability.

Much of the confidence derived from the liberalising ethos in fact had come from the belief that heavy- handed government had been responsible for the earlier currency crises. First generation models of currency crises in particular implied that economies were pushed into crisis by a spendthrift state. These models nestled nicely with the neo-classical story of the impossibility of moving an economy beyond full employment, and left neo-classical economists with the comfortable thought that the blame for the currency crises experienced by Argentina (1978-81) and Mexico (1973-82) largely should be laid at the door of a government embarking on expansionary domestic policies.

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[75] Figures from both The Economist (October 1997: 99), and Financial Mail (February 2000: 20).

[76] For an account of how poor economic fundamentals (i.e. inflationary domestic policies) were blamed for the turnaround in the net capital inflow of foreign capital to Latin America from US$70 billion in 1981 to US$5 billion in 1983 (figures from Palma and in 1998 US$) see, for example, Theron (1998). Stiglitz (1998) has argued that the debt crisis spawned the 'Washington Consensus' with its focus on 'liberalised trade, macroeconomic stability, and getting prices right' as prerequisites to restoring investor confidence to the region.

The early credibility literature also laid considerable stress on the cost arising out of uncertainty regarding the 'government type'. The stamp of a market- orientated state was seen to provide inoculation against possible currency volatility.

This paper has contrasted South Africa with Zimbabwe, both of whom embarked on market- orientated reforms in the early 1990s, and argued that while the South African state has been able to reaffirm its commitment to market- orientated reforms, Zimbabwe has stumbled in its reluctance to implement a number of the reforms. Drawing on the theoretical discussion in Chapter One, and the description of the 'empirical reality' of both countries in Chapter Four, the argument has been made that the South African state has signalled its 'toughness' to a sceptical market, whereas Zimbabwe has drenched the market with its 'wetness'.[77]

The paradox, which is articulated in the theoretical literature, is that both 'types' of governments experience a deterioration in certain 'economic fundamentals' in signalling their government 'type' to a market. This makes both vulnerable to crisis, albeit for very different reasons. This paper stressed how both South Africa and Zimbabwe appear to have been more vulnerable to 'local' crises than those crises which have affected developing countries in general.

The paper has argued that Zimbabwe has been subject to a number of *first generation* type crises largely precipitated by unsustainable government policies. It has suggested that more sophisticated *second generation* models should be applied to South Africa, where an acute trade-off appears to exist between disciplined policies and deteriorating external conditions.

Developing countries do however find themselves between a rock and a hard place with respect to capital inflows. A simple second generation of Sachs *et al* (1996) attempts to

[77] The adoption of the South African government's Growth, Employment and Redistribution Strategy (GEAR) was announced in 1996. It attempted to establish the credibility of the government by committing it to Washington Consensus based policies. The Zimbabwean government's war veterans payout and reimposition of certain exchange controls in 1997 contrasts strongly with this.

gauge to what extent 20 developing countries exposed to capital inflows experienced an appreciated exchange rate and a lending boom, and consequently were vulnerable to contagion following the Mexican peso crisis of December 1994. The unsuccessful application of this model to the 1997 Asian crisis suggests the difficulty of assessing countries' vulnerability to crisis prior to the crisis.

Nevertheless, it is encouraging that the reaffirmation of South Africa's commitment to further market reform following its 1996 crisis appears to have made it less vulnerable to global contagion than Zimbabwe. While South Africa was worse affected (in terms of the crisis index) than Zimbabwe during the Mexican crisis, the situation was reversed during the Asian crisis.

The paper has also argued that a descriptive examination of the behaviour of the eleven indicators suggested by Kaminsky *et al* (1997) caution against their effectiveness as leading indicators of currency crisis for these two countries. Not only do indicators not always 'jump' in the 24 month window prior to a crisis, but they can also 'jump' as a consequence of a crisis. If two crises follow in quick succession (as is the case for both of these countries) one cannot be certain why the indicator is 'jumping'. In addition, extraneous factors such as drought and political events stand out as extraordinary events that can unduly affect the behaviour of a number of the indicators.

The insights from the currency crisis literature are often uncomfortably *ex post*. This paper has argued that both the multivariate and signalling approaches are deficient in their ability to predict crises. While the vulnerability of small developing countries to currency crises are complex, this paper has argued that conditions existed in South Africa and Zimbabwe for currency crises independent of the Mexican and Asian crises. Future research should attempt to assess this more rigorously as it is of crucial policy importance.

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