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A research report commissioned by:

the dti

External Relations and Policy Coordination Unit
Research Management Directorate

The volatility of the rand and its impact on the manufacturing sector: the impact on exporters and investors

1 October 2003

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Executive Summary

*An EPRI research report commissioned by **the dti**'s Research Management Directorate*

The volatility of the rand and its impact on the manufacturing sector: the impact on exporters and investors

1 October 2003

The foreign exchange rate and its volatility exert a substantial impact on export competitiveness and risk-adjusted returns to investment in South Africa's manufacturing sector. This study analyses the causes of rand volatility, with a particular emphasis on international capital flows, interest rate differentials and other macroeconomic fundamentals and policy variables. The study evaluates the impact of the rand on **the dti**'s priority sectors, including agro-processing, automotives, chemicals, textiles, ICT, mining and metal-based industries, and tourism. The analysis focuses on the export and investment performance of these sectors and the broader South African economy. The study also analyses the impact of the South African Reserve Bank's monetary policy on the exchange rate and its volatility.

The first question this study addresses is: what are the sources of exchange rate volatility in South Africa? South Africa's long-run real exchange rate is largely well explained by macroeconomic fundamentals, although short-run fluctuations lead to significant periods of misalignment characterised by over-shooting the equilibrium level. The real exchange rate in 2002 was significantly below its estimated long-run equilibrium level. During the first half of 2003, the exchange rate rose well above its equilibrium level. Much of the volatility can be explained by the variability of the exchange rate's fundamental determinants—particularly changes in interest rate differentials and to a lesser extent changes in terms of trade. Greater variability in fiscal policy, however, is associated with less exchange rate volatility, consistent with the hypothesis that fiscal flexibility allows the economy to better absorb shocks without destabilising the exchange rate. The analysis is unable to identify clear evidence that portfolio or foreign direct investment flows destabilised the real exchange rate independently of macroeconomic fundamentals, although this failure is not evidence of the contrary—measurement problems preclude a clear finding that these capital movements were entirely benign. However, the variability of other private sector investment flows was significantly and positively correlated with real exchange rate volatility, independently of the effects of the other macroeconomic fundamentals.

The second question this study addresses is: what is the impact of the volatility of the exchange rate on the South African economy? Evidence from sectoral analysis of South African manufacturing exports documents the strong negative impact of exchange rate appreciation on the volume of exports. Given the over-valued rand exchange rate identified above, the model predicts significant declines in export production. Yet, there is little evidence that rand volatility (independent of the level of the currency) exerts a negative effect on export production. Assuming market availability of risk hedging instruments, volatility only has an impact to the extent that it raises the forward exchange rate. This raises the question of whether some companies—particularly small enterprises—might not have effective access to forward cover. If this is the case, specific **dti** programmes that broaden access to exchange rate management instruments might help to address the problem of rand volatility. However, it appears that the most significant dimension of the problem is macroeconomic, not microeconomic, in nature.

The third question is: what mechanisms in the Reserve Bank's monetary policy framework serve to reduce exchange rate volatility? Three cases can be considered:

- In the middle of 1998, the nominal rand exchange rate began to rapidly depreciate, in large part due to contagion from the East Asian financial crisis. The initial consequence was an increase in imported inflation. The Reserve Bank intervened rapidly and substantially—implementing a more restrictive monetary policy that sharply increased the prime lending rate. As a consequence, export growth as well as overall economic growth stalled, but the depreciation was halted and inflation was quickly brought under control. The real economy adjusted to promote greater financial stability.
- By contrast, when the 2001 depreciation episode began, the Reserve Bank initially eased monetary policy, then moderately restricted policy leading to gradual increases in interest rates. As a result, the depreciation episode was more protracted and contributed to a more significant increase in inflation. Nevertheless, exports grew at unprecedented rates and the overall economic growth rate reached a seven-year high. The financial system adjusted for the benefit of the real economy.
- Towards the end of 2002, inflation began to decline yet the Reserve Bank maintained restrictive monetary policy and the prime rate continued to rise. Real interest rates were rising while most of the nation's trading partners grappled with concerns about deflation. South Africa's interest rate premium increased sharply and the rand began to appreciate. The combined impact of higher interest rates and the appreciation shocked the export sectors, leading to export contraction in early 2003.

Both growth and investment significantly respond positively to increased export demand and negatively to increases in interest rates. As a result, the Reserve Bank's focus on inflation-targeting has the potential to contribute to a mis-aligned over-valued exchange rate and high interest rates—with negative consequences for export production, economic growth and employment. A focus on exchange rate stabilisation, however, can produce even worse results—if the Reserve Bank tries to preserve an over-valued exchange rate with high interest rates, as during the 1998 depreciation. The Reserve Bank's management of the 2001 depreciation effectively balanced internal and external objectives, but the rigid focus on inflation targeting into 2002 led to extraordinarily high interest rate differentials that contributed to an over-valued rand. A more balanced monetary policy framework—even within the overall inflation-targeting strategy—could be more consistent with financial and economic stability.

The optimal strategy for addressing over-valuation and excess volatility must balance the macroeconomic with the micro. The central bank may find it optimal to pursue a macroeconomic solution—intervening in the foreign exchange market by buying reserves with domestic currency, thus tending to stabilise the real exchange rate and protecting the vulnerable economic sectors. This strategy must be weighed against the possibly inflationary consequences of the reserve build-up, and address the need for institutions to manage the fund of foreign exchange

When macroeconomic constraints impede this kind of solution, then microeconomic strategy can provide a counter-balance. The severity of the consequences of this problem underscores the case for appropriate and effectively integrated manufacturing strategy. The negative macroeconomic externality can be remedied with a focused framework of export incentives that target the industrial sector. Alternatively, the impact of over-valuation and excess volatility can be reduced by broadening the capacity of the tradable sector to serve both the domestic as well as export markets. In these cases, specific types of investment and export incentives

should reflect the particular objectives of economic policy, such as human resource development, job creation and economic growth.

Introduction

The core strategy of **the dti** is premised on the view that "the majority of the remedies to the factors limiting accelerated growth and development lie within the micro-economy."[1] Manufacturing exports demonstrate substantial promise in terms of promoting economic growth and job creation, and **the dti** manages a portfolio of microeconomic instruments aimed at realising this potential. Targeted interventions can effectively remove production bottlenecks and correct market failures, and sectoral co-ordination can improve the social returns to private investment. Yet some problems affecting competitiveness are primarily macroeconomic—and require macroeconomic solutions. In the face of macroeconomic shocks, the challenge lies in separating the competencies of micro- and macroeconomic instruments, and identifying how *macroeconomic* problems can reinforce the need for appropriate *microeconomic* strategies.

This study analyses the problem of rand volatility, identifying its sources and documenting its impact on export competitiveness and risk-adjusted returns to investment in South Africa's manufacturing sector. This analysis of rand volatility focuses on international capital flows, interest rate differentials and other macroeconomic fundamentals and policy variables. The study evaluates the impact of the level and volatility of the rand exchange rate on **the dti**'s priority sectors, including agro-processing, automotives, chemicals, textiles, mining and metal-based industries, ICT and tourism. The analysis examines the export and investment performance of these sectors and the broader South African economy. The study also analyses the impact of the South African Reserve Bank's monetary policy on the exchange rate and its volatility.

The evidence in this study shows that misalignment of the rand exchange rate poses a real threat to the competitiveness of the export sector. Monetary policy has contributed to rand volatility and failed to eliminate the significant over-valuation of the currency that has developed over the past year, in large part due to the fundamental orientation of the inflation-targeting strategy. The Reserve Bank grapples with an essential trade-off between managing inflation and stabilising the exchange rate. A

[1] Vision 2014. Department of Trade and Industry. http://www.**dti**.gov.za/the**dti**/vision.htm

commitment to inflation-targeting undermines the Reserve Bank's ability to keep the exchange rate aligned with the needs of the productive sectors of the economy. The costs of misalignment—particularly for export industries driving South Africa's economic growth—challenge the government and the Reserve Bank to re-evaluate the orientation of monetary policy. At a microeconomic level, the need for coping mechanisms strengthens the case for developing focused interventions that support affected economic sectors. In the absence of monetary policy reform, effective export and investment incentives play an increasingly important role—addressing microeconomic bottlenecks while counterbalancing macroeconomic costs.

The report consists of four major sections. First, the report analyses the sources of exchange rate volatility in South Africa. Second, the report evaluates the impact of the exchange rate on exports and investment. The third major section of the report assesses the role of the Reserve Bank's monetary policy framework. The final section identifies policy implications, with a focus on the microeconomic options available to **the dti**.

1) The sources of rand volatility

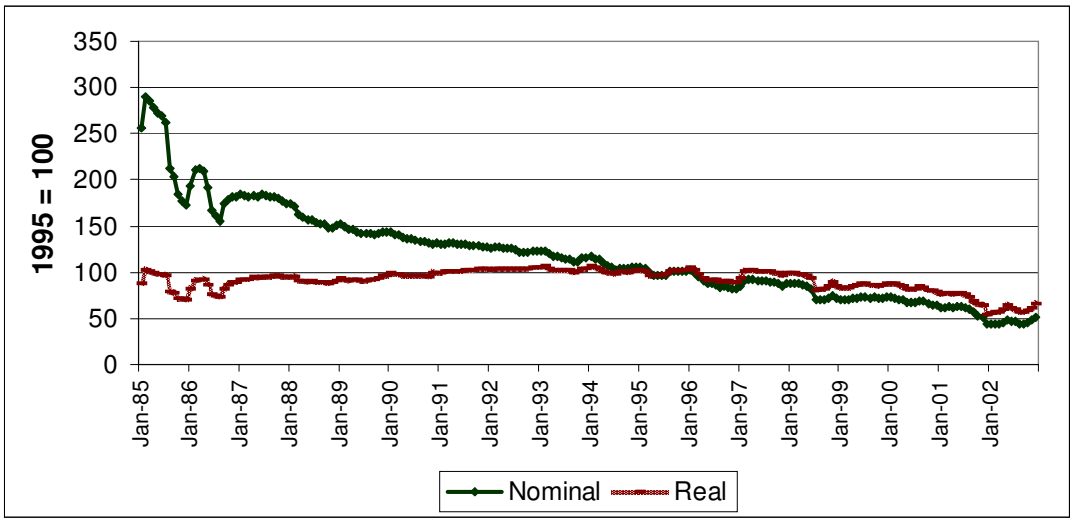
1.1) Background

The first question this study addresses is: what are the sources of exchange rate volatility in South Africa? From December 2000 to December 2001, the rand lost 34% of its value against the US dollar, and 25% on a real trade-weighted basis. Over the following year, the rand then appreciated 29% against the US dollar, and 30% on a real trade-weighted basis. Since then, the rand has appreciated approximately another 20% against the US dollar. This volatility has the potential to unsettle investors and undermine the role of exports in South Africa's growth strategy. This section evaluates the causes of South Africa's exchange rate volatility, based on a model analysing the underlying determinants of the real effective exchange rate.

The graph below depicts the evolution of South Africa's nominal and real effective exchange rates on a quarterly basis. The nominal exchange rate weights the bilateral exchange rates using South Africa's trade shares with major trading partners. The real exchange rate in addition adjusts for price differentials between the countries. The nominal exchange rate is more volatile and demonstrates a depreciating trend

throughout the entire time frame, while the real exchange rate exhibits a steadily depreciating trend only since the mid-1990s.

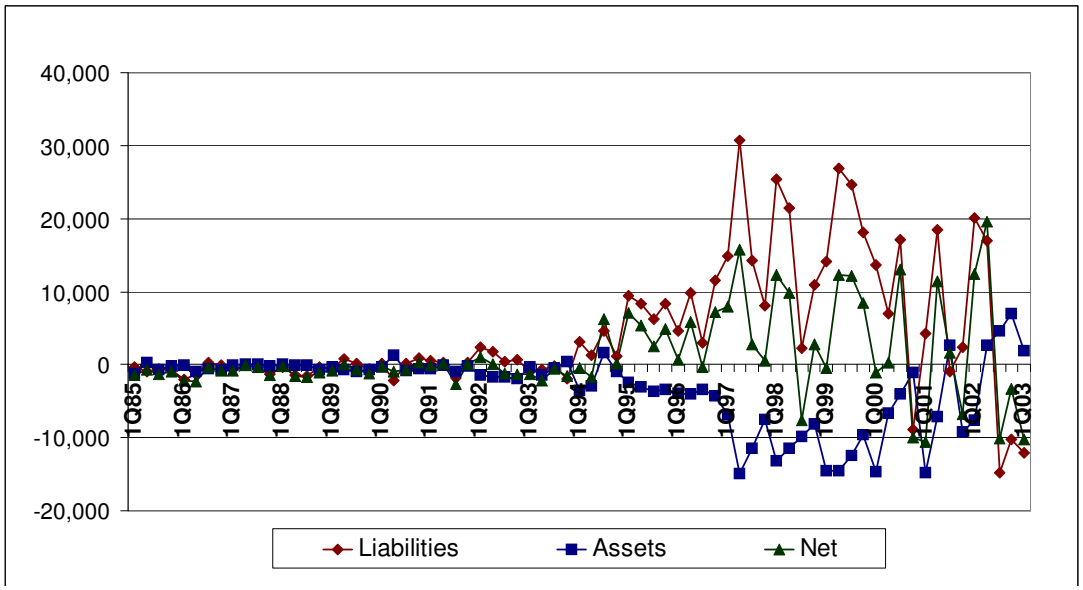
GRAPH 1: South Africa's real and nominal effective exchange rates, 1985 – 2002



SOURCE: IMF IFS (2003)

The hypothesis that capital flows are the primary source of rand volatility can be illuminated with the graph below, depicting gross and net international capital flows in and out of South Africa from 1985 to 2003. Most striking is the substantial increase in volatility after 1994, associated with economic and financial liberalisation. While capital movement volatility may have contributed to the variability of the exchange rate after 1994, the stability of capital flows during the period of exchange controls leaves open the question of what other factors might have destabilised the exchange rate.

GRAPH 2: South Africa's international capital flows, 1985 – 2003 (R billions)



SOURCE: SARB (2003)

1.2) Modelling the equilibrium real exchange rate

The comparison of graphs 1 and 2 above motivates the need to develop a more complete model of the determinants of the real effective exchange rate. This study employs an econometric model of the rand exchange rate that estimates the impact of the variability of the underlying determinants on rand volatility. Specific components of capital flows include foreign direct investment, portfolio investment and other types of investment by banking institutions, the non-bank private sector and public sector institutions. In addition, the model incorporates other important explanatory variables, including interest rate differentials, terms of trade measures and fiscal policy variables.

The model is based on estimating misalignment between the observed real effective exchange rate and its unobserved equilibrium level using macroeconomic fundamentals and policy control variables. The variability that cannot be explained through these quantifiable variables is attributable to "short run misalignment" of the exchange rate, and often heavily influenced by speculative factors. The approach differs from the classical purchasing power parity (PPP) methodology in that it allows the real equilibrium exchange rate to vary over time and explains why deviations from PPP rates can persist over time. The long run equilibrium approach is more relevant to South Africa (and most countries) because observed exchange rates can diverge from estimated PPP rates for decades, yet they converge to estimated equilibrium rates much more rapidly. The time path of estimated equilibrium rates provides a more relevant prediction for future exchange rate movements and reflects the impact of the interaction between macroeconomic fundamentals and policy choices. This model estimates a long-run co-integrating relationship that corrects for the non-stationary nature of the exchange rate and its explanatory variables—the details of the estimation technique are reported in the Technical Addendum.

The model evaluates alternative specifications of the variables that explain the real exchange rate. [2] These variables include:

- the differential between South African interest rates and world interest rates (the interest rate differential);

[2] The term "real exchange rate" henceforth refers to the real effective exchange rate.

• various measures of capital flows involving foreign direct investment, portfolio investment, and other investment as well as unrecorded transactions;

• a trend variable from 1994 to 2003, representing a shift towards greater trade and financial liberalisation and openness;

• real government consumption; and

• the ratio of the average price of exports to the average price of imports (the terms of trade).

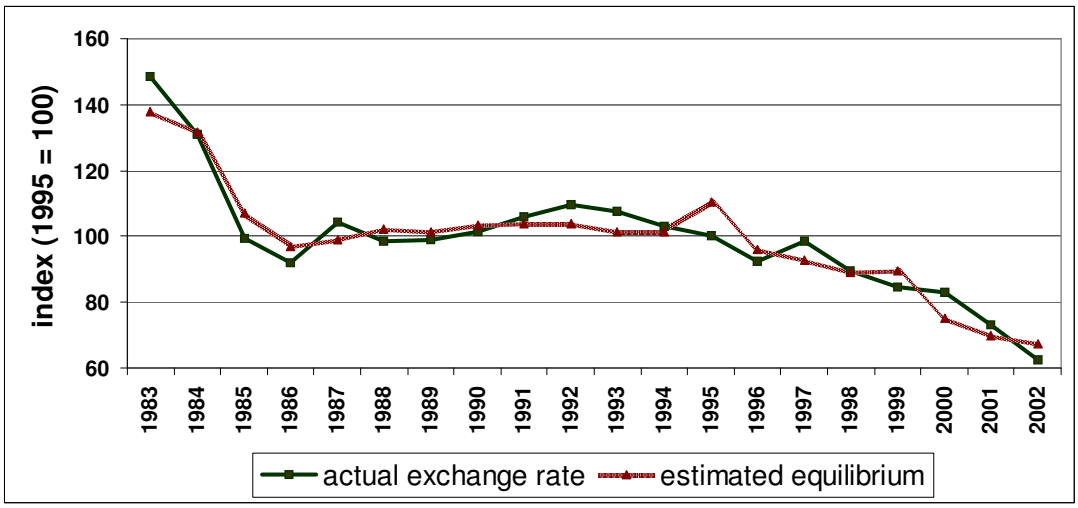
The variables have theoretical justifications developed from microeconomic underpinnings.[3] In South Africa's case, the interest rate differential (measured in real terms) reflects largely a monetary policy response to inflation and exchange rate volatility. The response of the equilibrium exchange rate is theoretically ambiguous—factors like aggregate demand, productivity and monetary policy effects tend to appreciate the rand, while the liability effect from capital inflows stimulated by high interest rates tends to depreciate the equilibrium exchange rate.[4] Likewise, the response of the equilibrium rate to changes in real government consumption are ambiguous, depending on the composition of spending between tradable and non-tradable goods, and the impact of the change in government spending on fiscal balance. Increases in government consumption that increase the fiscal deficit and are concentrated on tradable goods tend to depreciate the currency. Improvements in the terms of trade of trade act like a positive productivity shock and tend to appreciate the equilibrium exchange rate. Inflows of capital likewise appreciate the equilibrium exchange rate, like positive interest rate differentials, but are also subject to a potential long run liability effect. The trend variable reflects the increased financial and economic liberalisation accompanying the democratic transformation. Increased openness reduces the domestic price of tradable goods, tending to reduce overall inflation while depreciating the currency.[5]

Using data from the South African Reserve Bank (SARB) and the International Monetary Fund (IMF), a co-integrating relationship between the real effective exchange rate and these explanatory variables over the past twenty years was

[3] See Hinkle and Montiel (1999) and Montiel (2003) for the theoretical development of the underlying models.
[4] See MacDonald and Ricci (2002) for a discussion of the appreciation effects, and Hinkle and Montiel (1999) and Montiel (2003) for a discussion of the liability effect.
[5] See Goldfajn and Valdes (1999) and Hinkle and Montiel (1999).

estimated.[6] All the explanatory variables are significant at the 95% level except for the terms of trade.[7] Positive interest rate differentials and capital inflows both had positive and significant effects in terms of appreciating the equilibrium real exchange rate. The trend variable representing increasing trade liberalisation indicates a significantly negative effect in terms of depreciating the equilibrium real exchange rate. The estimated equilibrium real exchange rates are graphed along with the observed real exchange rates in the graph below.

GRAPH 3: Actual and equilibrium real exchange rates (IMF), 1983 – 2002



The very close fit depicted above reflects the strength with which the macroeconomic fundamentals and policy variables explain the real exchange rate. The model explains 92% of the annual variability in the real exchange rate. The predicted equilibrium exchange rate reflects the rapid depreciation of the currency during the early 1980s, the moderate appreciation through the mid-1990s and the steady depreciation accompanying trade liberalisation over the past several years. The model documents the over-valued currency during the early 1990s, as well as the misalignment in 1997 that preceded the rapid depreciation in 1998. The model

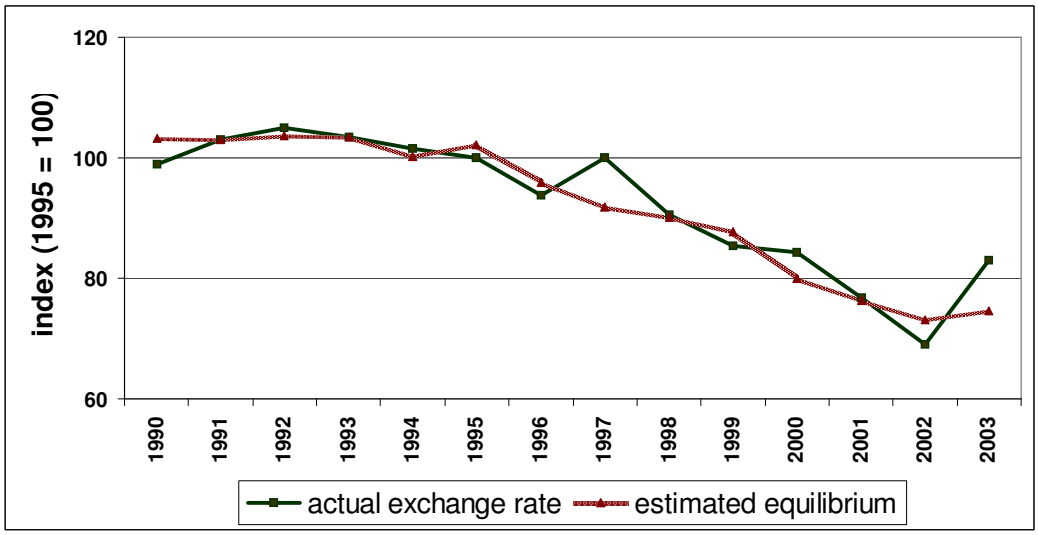
[6] The sources of the data (1983 to 2002), the results of the augmented Dickey-Fuller (ADF) tests and the specifications of the co-integrating relationships are detailed in the Technical Addendum.

[7] MacDonald and Ricci (2002) point out that few studies in practice find the terms of trade effect to be significant. See also Cashin, Cespedes and Sashay (2002), Chen and Rogoff (2002), and Goldfajn and Valdes (1999).

suggests that the 2001 depreciation was characterised by over-shooting—the average actual exchange rate in 2002 was weaker than its estimated equilibrium level.

To test the robustness of the model and its sensitivity to data measurement issues, an alternative specification was estimated using the South African Reserve Bank's reported real effective exchange rate. [8] A co-integrating relationship between this measure of the real effective exchange rate and the explanatory variables since 1990 was estimated.[9] The significance of the explanatory variables is considerably weakened by the smaller sample size, but all the effects have the same qualitative impact. Positive interest rate differentials and capital inflows both had positive effects in terms of appreciating the equilibrium real exchange rate, and the trend variable indicates a negative effect. The estimated equilibrium real exchange rates are graphed along with the observed real exchange rates in the graph below.

GRAPH 4: Actual and equilibrium rates (SARB, excluding Zimbabwe), 1990 – 2003



As in the previous model, the close fit depicted above—again with 92% of the exchange rate variability explained—reflects the strong link between the real exchange rate and macroeconomic fundamentals and policy variables. The same basic trends from the first model are reflected: the predicted equilibrium exchange rate appreciates

[8] The Reserve Bank's real effective exchange rate excludes Zimbabwe because of the skewing effects of the country's high rate of inflation.

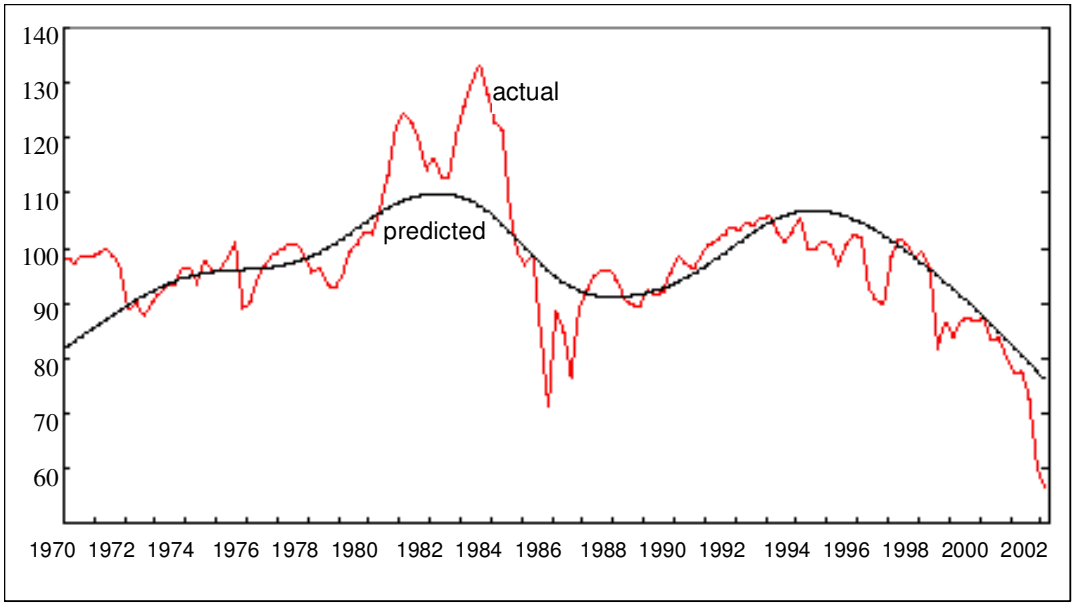
[9] The sources of the data (1990 to 2003), the results of the augmented Dickey-Fuller (ADF) tests and the specifications of the co-integrating relationships are detailed in the Technical Addendum. The Reserve Bank only reports this series from 1990.

moderately through the mid-1990s and then steadily depreciates during trade liberalisation. The model identifies the misalignment in 1997 preceding the rapid depreciation in 1998. The model corroborates the previous finding of over-shooting during the 2001 depreciation, and also indicates that the current exchange rate is significantly stronger than the equilibrium level.

1.3) Comparison with other equilibrium exchange rate estimates

These results are consistent with the model estimating South Africa's equilibrium real exchange rate developed by MacDonald and Ricci (2002). Using Johannsen co-integration estimation techniques, they predicted the equilibrium exchange rate using a different set of explanatory variables over the 1970 to 2002 (first quarter) time frame. The evolution of the equilibrium exchange rate in their model is similar to that estimated for this report—in both cases, the equilibrium exchange rates fall in the early 1980s, then rise to peak in 1995, and then fall steadily until 2002. In both models, the actual exchange rates are under-valued in latter half of the 1980s, become over-valued in the early 1990s and are clearly under-valued in 2002.

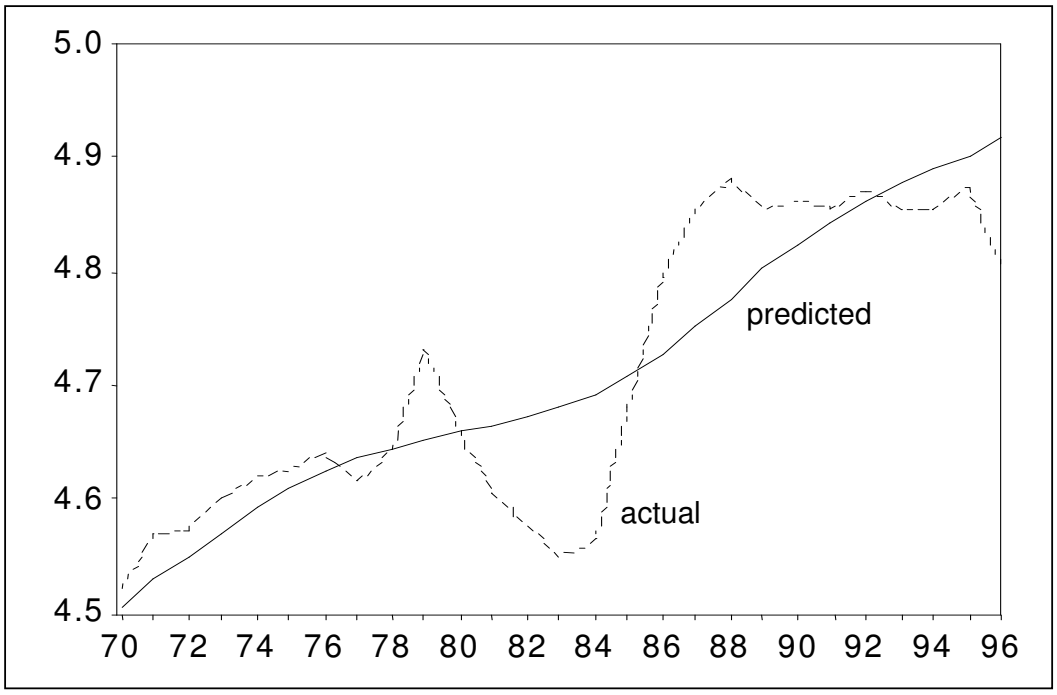
GRAPH 5: Actual and equilibrium real exchange rates, 1970–2001 (1995 = 100)



SOURCE: MacDonald and Ricci (2002).

The findings in this report are also consistent with similar studies carried out for other countries. Hinkle and Montiel (1999) developed the methodology on which this study is based and applied it to Burkina Faso, Côte d'Ivoire and Thailand. They characterise the methodology as particularly appropriate for middle-income developing economies with a high degree of financial integration with the rest of the world. The relationship between the estimated long-run equilibrium and the actual exchange rate for Thailand is similar to that for South Africa—substantial misalignments predict corrections, which tend to overshoot the equilibrium levels. For instance, the graph below depicts the growing over-valuation of the Thai baht in the early 1980s, and the subsequent depreciation, as well as the renewed over-valuation in the mid 1990s, which led up to East Asian financial crisis.

GRAPH 6: Actual and equilibrium exchange rates in Thailand, 1970–1996



SOURCE: Montiel (2003)

1.4) Evaluating the sources of rand volatility

The model identifies the key macroeconomic fundamentals determining the equilibrium real exchange rate. The actual exchange rate fluctuates around this equilibrium level, reflecting two sources of medium-to-long-run volatility. First, some of the underlying fundamentals are volatile, which contribute to volatility of the equilibrium exchange rate. Second, the degree of misalignment between the observed exchange

rate and the equilibrium level is sometimes volatile—such as in the past few years. Much of the volatility of the real exchange rate (measured by the standard deviation) can be explained by the variability of the fundamental determinants (also measured by their standard deviations). For instance, as financial market participants change their expectations about global conditions affecting economies with significant linkages to primary commodities, they move the rand exchange rate as well as the exchange rates of economies with a similar commodities base. As a result, the joint variability of the Canadian and Australian dollar exchange rates (versus the US dollar) explains 21% of the volatility in the rand/dollar exchange rate from 1980 to 2003. Similarly, volatility in the monthly change in gold and foreign currency reserves explains 52% of the variability in the nominal dollar/rand exchange rate over the same period.

In order to explain variability in the real effective exchange rate, the co-integrating relationship estimated from the model in section 1.2 was adapted in order to link exchange rate volatility to variability in its determinants. Alternative specifications were tested and evaluated, and the results are detailed in the Technical Addendum. The main finding is that greater variability of interest rate differentials, net capital inflows and terms of trade were consistently positively correlated with greater volatility of the real effective exchange rate. Increased volatility of these economic variables is associated with greater volatility of the real exchange rate. The variability of real government consumption expenditure, however, was negatively correlated with the variability of the real exchange rate. Greater variability of real government consumption expenditure was associated with reduced volatility of the real exchange rate. To the extent that fiscal policy serves as an effective adjustment mechanism responding to real shocks to the economy, variability in real government consumption expenditure would be negatively correlated with volatility of the real exchange rate.

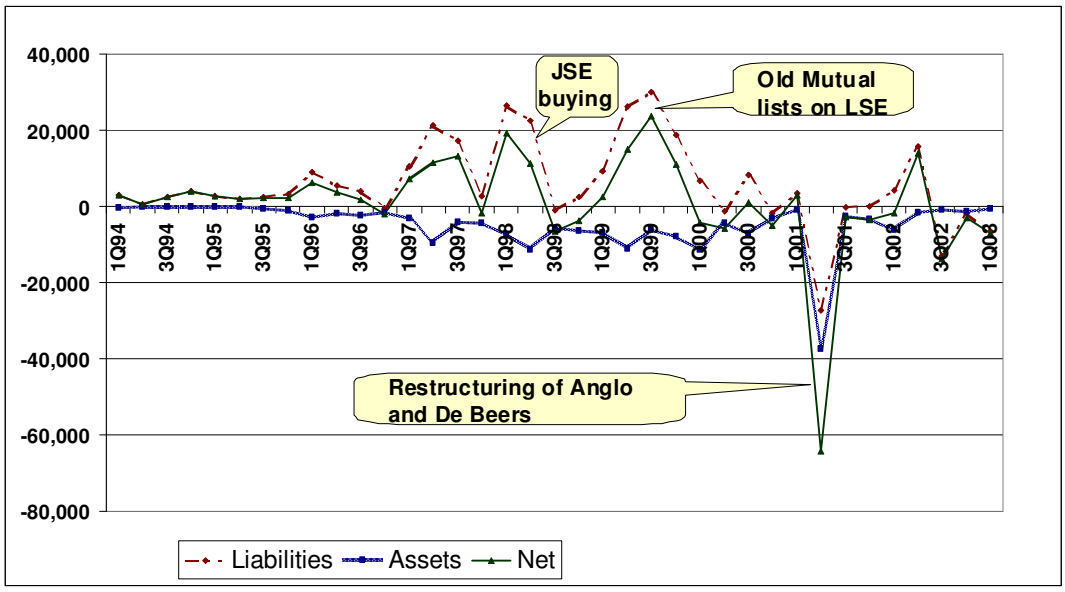
Under the hypothesis that the volatility of capital inflows and outflows caused the variability of the real exchange rate, the variability in capital inflows would be positively correlated with exchange rate volatility. In order to identify further the specific source of the positive correlation between real exchange rate volatility and the variability of net capital inflows, the volatility measures (standard deviations) of the components of net capital inflows were entered into the model. Four specific components were tested: (1) portfolio investment, (2) foreign direct investment, (3) other investment, and (4) unrecorded transactions. No independent significant relationship between the volatility of portfolio investment or foreign direct investment

could be statistically identified. The variability of unrecorded transactions was significantly but negatively correlated with real exchange rate volatility.

It is not possible to conclude from these tests that the volatilities of portfolio investment or foreign direct investment do not have a significant impact on real exchange rate variability for two reasons. First, both portfolio investment and foreign direct investment are significantly influenced by interest rate differentials and terms of trade. Variability of portfolio and foreign direct investment is positively correlated with real exchange rate variability but not independently of these fundamentals (interest rate differentials and terms of trade). Second, measurement error due to accounting transactions that skew the volatility of portfolio and foreign direct investment may impede the identification of significant relationships between investment and exchange rate volatility.

For instance, the net portfolio investment inflows and the net foreign direct investment outflows in the second quarter of 2001 (during which the transactions restructuring Anglo-American and De Beers were executed) account for about half the volatility of foreign direct investment and portfolio investment (as measured by standard deviations) during the entire 1986 to 2002 time frame. Since the portfolio investment outflows were more than offset by the foreign direct investment inflows during this quarter, however, the net impact on the foreign exchange market was a fraction of that indicated by the contribution of the transactions to the volatility measure. The movements of portfolio investment are depicted in the graph below.

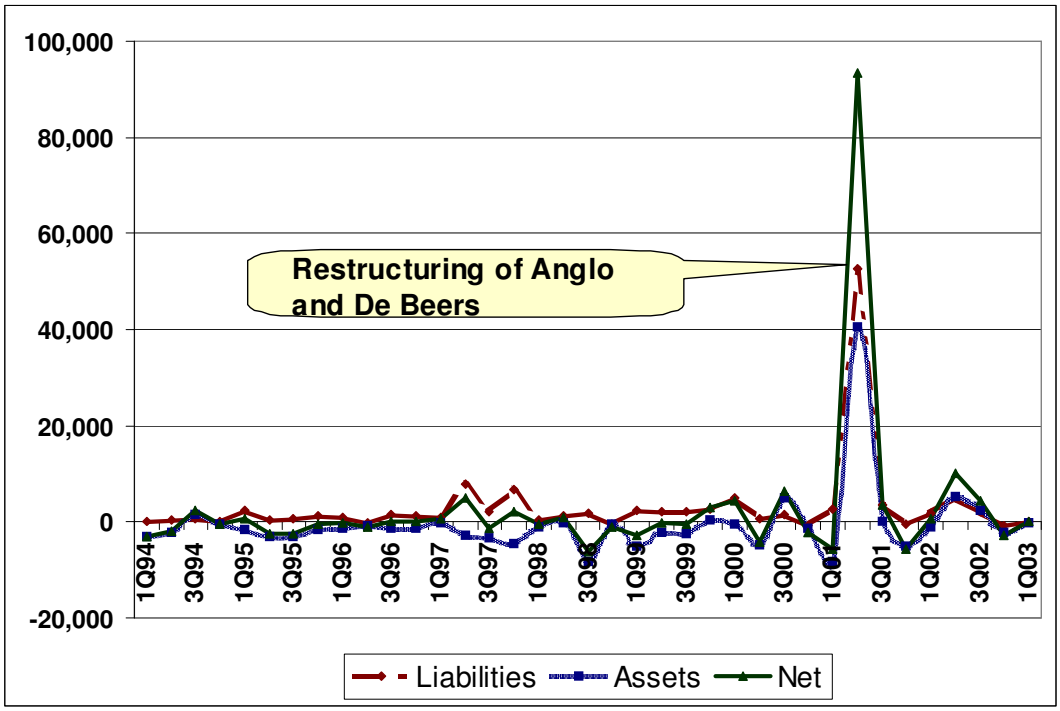
GRAPH 7: South Africa's portfolio investment flows, 1994 – 2003 (R billions)



SOURCE: SARB (2003)

Likewise, accounting volatility in foreign direct investment is introduced when dividends are declared in one quarter then actually paid in a subsequent quarter. The unpaid dividends are recorded as a capital inflow in the initial quarter, and then as a capital outflow in the subsequent quarter. It is likely that these highly anticipated flows affect foreign exchange markets differently from unexpected capital flow reversals of a similar magnitude. The movements of foreign direct investment are depicted in the graph below.

GRAPH 8: South Africa's foreign direct investment flows, 1994 – 2003 (R billions)



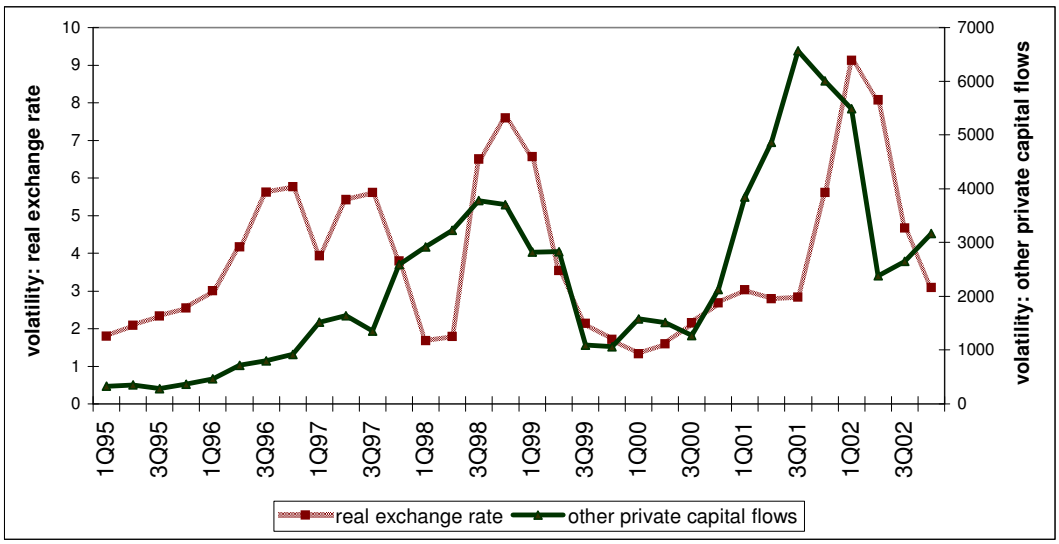
SOURCE: (SARB 2003)

While the econometric analysis did not find the measures of the variability of portfolio investment and foreign direct investment to be statistically significant in explaining the volatility of the real exchange rate, the volatility of other investment was found to be positive and significant. Other investment consists of all recorded transactions other than portfolio and foreign direct investment, including loan liabilities and assets, deposits and other liabilities and assets. Other investment includes transactions by monetary and public authorities, public corporations, banks and the non-bank private sector.

In order to identify the type of investor driving the other investment variability correlated with exchange rate volatility, independent volatility measures were calculated for the public sector (monetary and public authorities and public corporations), the banking sector, the non-bank private sector and the private sector as a whole. The variability of other investment by the private sector as a whole was found to explain as much independent exchange rate volatility as the variability of all net capital flows, and the effect was positive and statistically significant (at a 99.9% level).

The graph below shows the relationship between the volatility of the real exchange rate and the volatility of other investment by the private sector (private investment excluding portfolio investment and foreign direct investment) from 1995 to 2002. For instance, the volatility of other private investment rose sharply before the 2001 depreciation episode, peaking two quarters prior to the maximum period of rand volatility. The South African Reserve Bank attributed this volatility to "some delay in the repatriation of export proceeds by South African exporters" (SARB QB Sept. 2001) and the withdrawal of non-resident deposits from South African banks (SARB QB Dec. 2001).

GRAPH 9: Volatility of private other capital movements and the real exchange rate



SOURCE: SARB (2003)

1.5) Conclusions

South Africa's long run real exchange rate is largely well explained by macroeconomic fundamentals, although short-run fluctuations lead to significant periods of misalignment characterised by over-shooting the equilibrium level. The real exchange rate in 2002 was significantly below its estimated long-run equilibrium level. During the first half of 2003, the exchange rate rose well above its equilibrium level. Much of the volatility can be explained by the variability of the exchange rate's fundamental determinants—particularly changes in interest rate differentials and to a lesser extent changes in terms of trade. Greater variability in fiscal policy, however, is associated with less exchange rate volatility, consistent with the hypothesis that fiscal flexibility allows the economy to better absorb shocks without destabilising the exchange rate. The analysis is unable to identify clear evidence that portfolio or foreign direct investment flows destabilised the real exchange rate independently of macroeconomic fundamentals, although this failure is not evidence of the contrary—measurement problems preclude a clear finding that these capital movements were entirely benign. However, the variability of other investment flows by the private sector was significantly and positively correlated with real exchange rate volatility, independently of the effects of the other macroeconomic fundamentals.

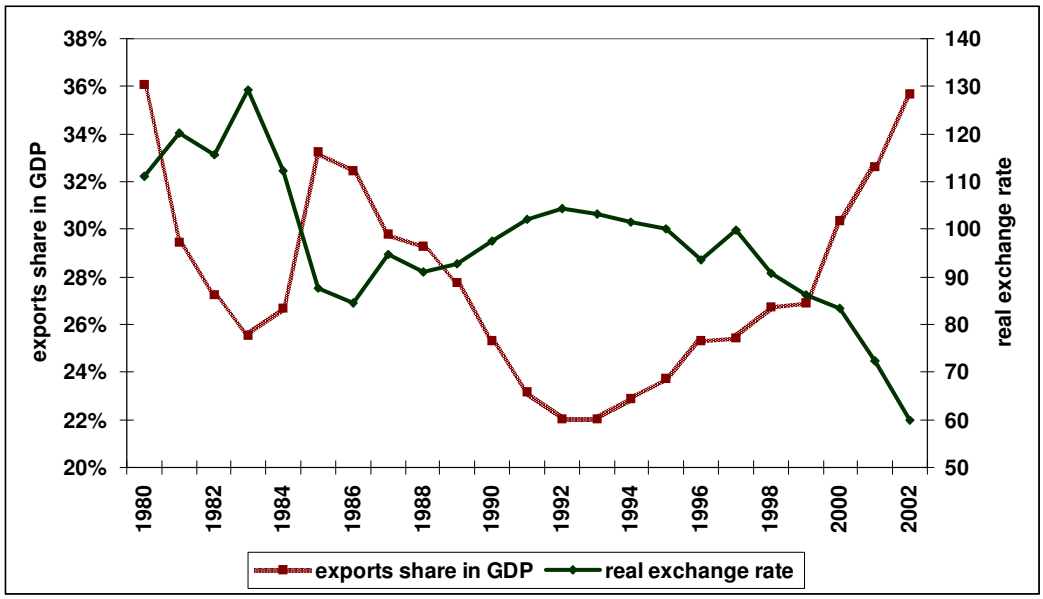
2) The impact of rand volatility on exports and the economy

2.1) Background

The second question this study addresses is: what is the impact of the volatility of the exchange rate on the South African economy? The rand exchange rate is one of the most important relative prices affecting economic activity. As the relative price of tradable (versus non-tradable) goods, the exchange rate is determined by and in turn influences supply and demand conditions for export industries. Both the level and the volatility of the exchange rate are important, as well as other factors affecting supply and demand. This section analyses how the level and volatility of the rand affect the South African economy, with a particular focus on agro-processing, automotives, chemicals and allied industries, clothing, textiles and footwear, ICT, mining and metal-based industries, and tourism. This section evaluates the impact of exchange rate volatility in the context of the broader process of trade liberalisation.

An initial comparison of the real exchange rate to the export share in national income (as measured by Gross Domestic Product) shows a strong inverse relationship, as depicted in the graph below. The weakening of the real exchange rate in the early eighties coincided with a rising export share, and both trends reversed course in 1983. From the late 1980s, the export share fell while the real exchange rate appreciated. By 1992, the real exchange rate began a decade long decline and the export share rose steadily.

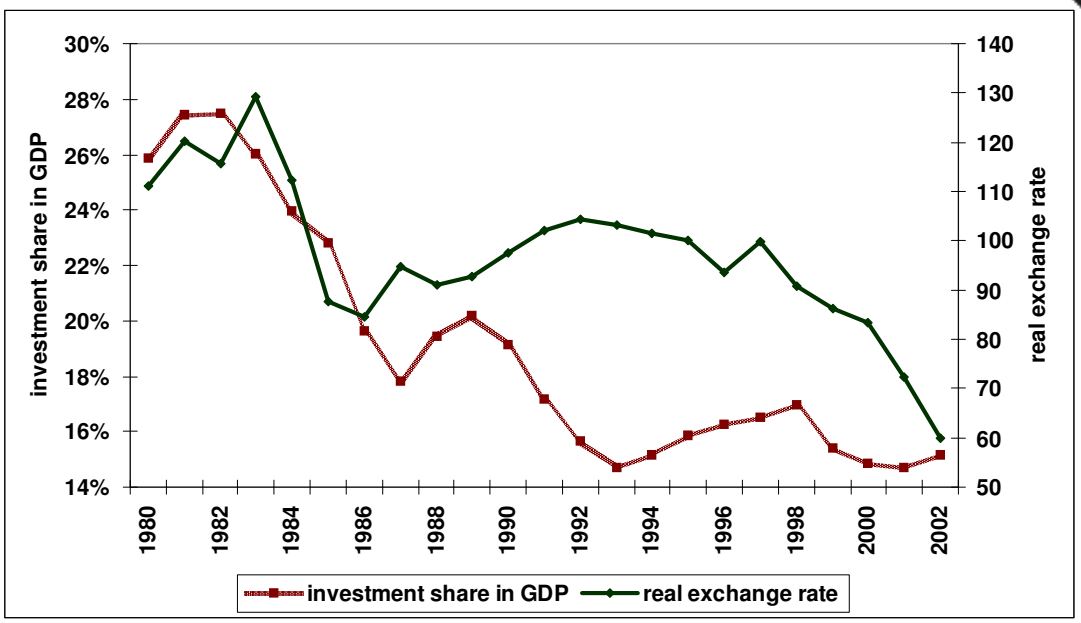
GRAPH 10: Exports and the real exchange rate, 1980 – 2002



SOURCE: SARB database and IFS (2003)

The relationship between the real exchange rate and investment from 1980 to 2002 is less clear. The graph below depicts a strong positive relationship from 1980 to 1990, but the relationship is insignificant thereafter.

GRAPH 11: Investment and the real exchange rate, 1980 – 2002



SOURCE: SARB and IMF (2003)

The weak relationship in part reflects the aggregation of the data across export and domestic sectors. A depreciation promotes export industries, tending to stimulate investment in that sector. However, a depreciation makes imported capital goods more expensive, tending to impede investment. Until the early 1990s, with the export sector declining, depreciations had little capacity to boost investment. As a result, the data depict the strong positive link between exchange rate appreciations and increased investment. From the mid-1990s, however, with the export sector reinvigorated, the ambiguous relationship between exchange rate movements and investment emerged.

The relationship between the volatility (as opposed to the level) of the rand and exports and investment is even more ambiguous. In theory, if exporters and investors are risk averse, then exchange rate volatility fosters greater uncertainty and dampens investment and export supply. However, forward exchange contracts are readily available for small investors, and given South Africa's positive interest rate differentials with respect to its trading partners, forward exchange rates are more attractive than spot rates. Given the availability of hedging instruments, at least over the one-year time horizon, the link between exchange rate volatility and poor export performance is less clear.

For export firms with relatively short horizons, the existing forward exchange markets may be adequate to address the problem of exchange rate risk. However,

with the rate of depreciation at times exceeding the South African interest rate premiums, exporters may be tempted to forgo the hedging costs and risk an appreciation, hoping for an expectations-exceeding depreciation that enhances their profits. The strategy is not irrational, but the consequences of an unexpected appreciation can substantially reduce profitability.

This raises the question of what is truly troubling exporters: is it the volatility of the rand or is it the perception of a mis-aligned excessively strong real exchange rate? Did exporters find the volatility of 2001, when the rand was weakening, as much of an impediment to growth as the volatility of 2002, when the rand was strengthening? The volatility of the real exchange rate (as measured by the standard deviation) was about fifty percent greater in 2001 than in 2002.

International experience is inconclusive in terms of the impact of exchange rate volatility on exports. One early survey of the literature (Farrel, De Rosa and McCown 1983) finds little conclusive evidence of a link between exchange rate volatility and export performance during the period of fixed exchange rates. Likewise, an IMF study (1984) found similar results. Bélanger and Gutiérrez (1990) examined studies of floating exchanging rates and found little concrete evidence that exchange rate volatility served as a significant impediment to export development. However, research with dis-aggregated economic sectors had more reliable results, and these studies found a small but significant negative link between exchange rate volatility and the volume of exports. Work by Kroner and Lastrapes (1993) found a temporarily negative impact on exports from volatility for some countries, but no effect for others. Bini-Smaghi (1991) carried out a study of manufacturing exports for European countries, finding a significant negative impact from volatility for those countries that invoice their exports in a currency other than that of their home country. Kumar (1992) found that volatility tends to increase intra-industry trade and reduce net trade, although the findings are not entirely statistically significant.

2.2) Modelling the impact of exchange rate volatility on exports

In order to test the hypothesis that rand volatility exerts a negative impact on South African exports, a co-integration model was estimated explaining sectoral exports using the level of the real effective exchange rate, one-year and three-year volatility measures and the rate of growth of South Africa's trading partners from 1990

to 2002. The sectors include agro-processing, automotives, chemicals and allied products, metal processing, minerals processing, and textiles, clothing, leather and footwear. Time series data is not available for ICT as a sector.[10] In addition to the single equation co-integration model estimated using alternative lag structures, a structural supply and demand model was estimated using an instrumental variables approach. The details of the data, estimation methodology and structural specifications are detailed in the Technical Addendum.

The results of the structural model found no significant negative relationship between volatility of the real exchange rate and the supply of exports. Similar analysis was carried out for nominal effective exchange rates and bilateral nominal exchange rates with the same results. However, in all cases the effect of the level of the real effective exchange rate was very significantly negative. Appreciations of the currency are significantly correlated with reductions in the value of exports, and the responses are always greater than one.[11] The effect on South African exports of economic growth in the trading partner countries was consistently positive, and statistically significant in some cases. The table below represents the results for the countries for which valid co-integration relationships were estimated using contemporaneous variables.

TABLE 1: Impact of real exchange rate levels and volatility and global growth on the rand value of sectoral exports

[10] However the Cape Information Technology Initiative (CITA) undertook a census of Western Cape ICT companies in 2003. In a survey of 566 ICT companies (defined as firms that "provide goods and services that support the electronic display, processing, storage and transmission of information") in the Western Cape, 179 (32%) derived revenue from exports, with Africa being the most frequently cited export destination (76%), followed by Europe (32%) and North America (17%). Exports are dominated by software development (25%), mobile communications and telecommunications (8%), web development (6%), out-sourced services and consulting (5%), and Internet related services (5%). Only half of these exporting companies derive more than 50% of their revenue from exports. Exporting companies cited the exchange rate as a major factor in competitiveness. While most ICT exporters were aware of the **dti**'s incentive programmes, the overwhelming majority have not used them or perceived them as being either of little use or too complex to access.

[11] A one- percent appreciation reduces the effective price of exports to the supplier if the goods are invoiced at a fixed price in foreign currency. The appreciation may leave the quantity of exports unchanged yet reduce the value simply because of this effective price effect. If the value of exports increases by more than one percent in the face of a one- percent depreciation, the real quantity of exports is increasing.

Industry	REER	volatility	growth
Agro-processing	-1.78 **	0.10	0.11 *
Chemicals and allied products	-1.58 **	0.18	0.12
Automotives	-3.56 **	0.00	0.12
Mineral-processing	-1.28 **	0.09	0.07

NOTE: contemporaneous explanatory variables

The column labelled REER presents the percentage change in the value of exports given one percent depreciation. All the estimates are statistically significant (at a 99% level). For instance, a one-percent depreciation of the rand is associated with a 1.78% increase in agro-processing exports. The response is smaller for chemicals and allied products—amounting to a 1.58% increase for a one-percent depreciation. The response of automotives is greatest—a 3.56% increase in exports is associated with the one-percent depreciation. The impact for mineral-processing is just greater than one.

None of the sectors have significant effects associated with the volatility measures. For agro-processing, the impact of growth in trading partner countries was positive and statistically significant (at a 95% level). In nearly all cases, the magnitudes and significance levels were greater with the structural models estimated using the instrumental variables technique.

For most of the industries, the impacts of the explanatory variables were more significant with a lag. Table 2 below shows the responses of export output to the lagged level of the real effective exchange rate, lagged volatility and lagged economic growth in trading partner countries.

TABLE 2: Impact of lagged real exchange rate levels and volatility and global growth on the rand value of sectoral exports

Industry	REER	volatility	growth
Agro-processing	-2.26 **	0.12	0.08
Metal-processing	-1.58 **	0.06	0.05
Automotives	-4.61 **	0.10	0.02
Mineral-processing	-1.81 **	0.09	0.09 *
Textiles, clothing, leather and footware	-1.35 **	0.03	0.03 *

NOTE: lagged explanatory variables

A one-percent depreciation is associated with a 2.26% increase in agro-processing exports in the following year, compared to the 1.78% increase in the same year. Valid co-integration relationships could be estimated for metal processing and textiles, clothing, leather and footwear using lagged explanatory variables. A one-percent depreciation is associated with a 1.58% increase in metal-processing exports in the following year, and a 1.35% increase in textiles, clothing, leather and textiles. No significant relationship between volatility and exports in the following year could be identified. For both mineral-processing and textiles, clothing, leather and footwear, a one percentage point increase in the growth rate in trading partner countries had significant positive effects on South African exports in these sectors.

These findings are consistent with numerous studies that have found a strong and significant relationship between exchange rate depreciations and export growth.[12] The results for exchange rate volatility are in line with international studies, although at odds with conventional wisdom. Given the focus by exporters on the negative consequences of volatility, the results are consistent with the hypothesis that the negative impact of appreciated exchange rate levels are incorrectly attributed to volatility. In the presence of effective forward exchange markets, volatility should not affect export volumes,[13] except to the extent that volatility affects the forward exchange rate.[14] Another possible reason that volatility might not have a significant negative impact on sectoral volumes—even if it harms some exporters—is that the net impact might be mixed. Volatility represents risk as well as opportunity. As De Grauwe (1992) points out, volatility can be separated into high net exporter price periods and low net exporter price periods. During the high price periods, exporters can increase their production and sales, and reduce them during the low price periods. This raises the average price and profitability of exports.

[12] Some studies, such as Naude (2002), have found no significant relationship between the real exchange rate and aggregate exports. Studies that dis-aggregate exports are generally more successful in identifying causal variables, particularly with respect to the exchange rate. Several studies have found a significant relationship between depreciations and increased exports, including Fallon and da Silva (1994), Tsikata (1999) and Golub (2000). Estimated real exchange elasticities range between 0.63 and 1.4. That is, a one- percent depreciation is associated with an increase in the value of exports between 0.63% and 1.4%.

[13] For a discussion of this, see Ethier (1973) or Baron(1976).

[14] For details, see Viaene and de Vries (1987, 1992)

Tourism is also classified as an export (albeit a non-manufacturing export), but data on visitors arriving in South Africa have significant gaps in the time series for most countries. However, comparisons of results for the first five months of 2001, 2002 and 2003 document a strong increase in tourism in 2003 in spite of the volatile and strong rand. The details of this analysis are provided in the Technical Addendum.

2.3) The impact of exchange rate volatility on investment

The ambiguous impact of volatility on exports results from the relatively attractive terms by which exporters can hedge exchange rate risk. Because of South Africa's positive interest rate differentials *vis-à-vis* nearly every country, forward rates for foreign currency purchases and sales are higher than spot rates. Investors, however, tend to be net importers, since the capital goods sector is import-intensive. Managing exchange rate risk is more expensive for investors because they must pay these higher forward rates to hedge future foreign currency purchases. Volatility and higher interest rates both tend to increase the cost of forward cover. The table below prioritises the top five impediments to investment in 2003, according to a survey of manufacturers.

TABLE 3: Major impediments to investment in 2003

Impediments to investment:	**no effect**	**very little effect**	**moderate effect**	**strong effect**	**prohibitive**
1. Fluctuations in the exchange rate	2	8	27	52	12
2. Labour regulations	4	11	26	47	12
3. Insufficient demand for product/poor sales outlook	6	15	23	42	13
4. The costs of capital and concerns about the interest rate	3	10	30	47	9
5. The cost of labour	4	11	29	48	7

SOURCE: Kaplan (2003), citing BER Manufacturing Survey

Fluctuations in the exchange rate ranks as the number one impediment to investment in the opinion of the surveyed manufacturers, more important than labour regulations, low levels of demand, or capital and labour costs. The importance of exchange rate fluctuations increased in 2003 compared to 2002 even as volatility

began to fall. The question may be misleading—the survey did not separate out the independent effects of rand strength, rand weakness and rand volatility. A strong rand may be a significant impediment to investment in export industries, yet support investment in industries that produce non-tradable goods. A weak rand may support investment in export industries, yet undermine investment in industries that rely very heavily on imported capital goods. In the absence of these choices in the survey, a manufacturer might attribute the effect of either rand strength or weakness to rand volatility.

The distinction is crucial. Policies for addressing rand volatility are different from policies that adjust the level of the real effective exchange rate. If the problem is actually rand volatility, then the question arises as to whether certain firms are unable to access forward exchange contracts. Commercial banks provide forward cover for up to twelve months, for contracts as small as ten thousand US dollars. While hedging instruments that manage export revenue risk may be relatively attractive (since the forward rate is greater than the spot rate), forward contracts for import costs are very expensive. The cost is increased with greater rand volatility or higher interest rates, and this cost may serve as a barrier to foreign exchange risk management.

2.4) Conclusions and policy recommendations

Evidence from sectoral analysis of South African manufacturing exports documents the strong negative impact of exchange rate appreciation on the volume of exports. Given the over-valued rand exchange rate identified in the previous section, the model predicts significant declines in export production. Yet, there is little evidence that rand volatility (independent of the level of the currency) exerts a negative effect on export production. Assuming market availability of risk hedging instruments, volatility only has an impact to the extent that it raises the forward exchange rate. This raises the question of whether some companies—particularly small enterprises—might not have effective access to forward cover. If this is the case, specific **dti** programmes that broaden access to exchange rate management instruments might help to address the problem of rand volatility. However, it appears that the most significant dimension of the problem is macroeconomic, not microeconomic, in nature.

3) The role of the Reserve Bank's monetary policy framework

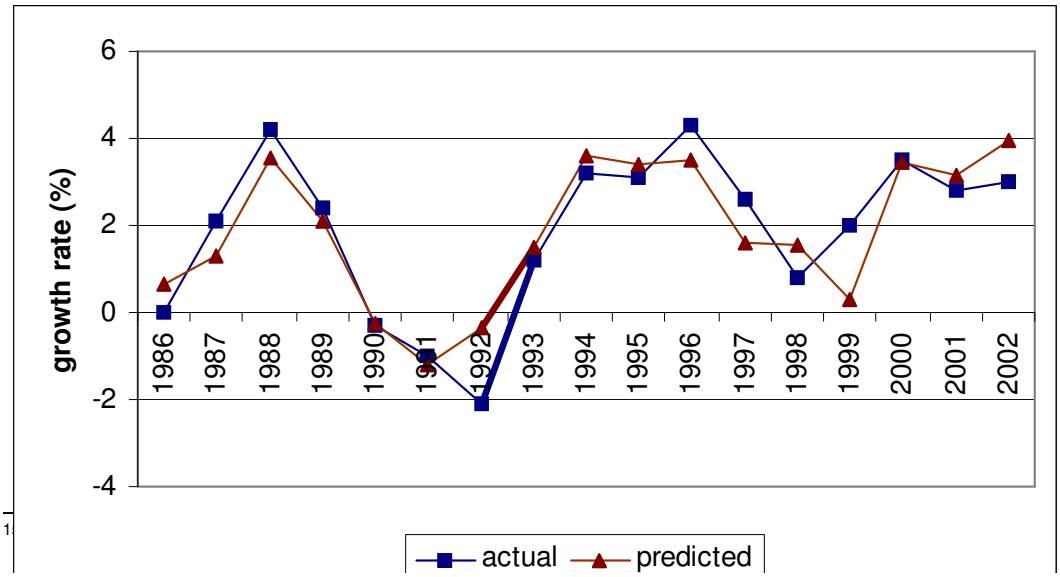
3.1) Background

The third question this study addresses is: what are the existing mechanisms available in the South African Reserve Bank's monetary policy framework that serve to reduce exchange rate volatility? This section assesses the contribution of export performance to economic growth within the context of the overall macroeconomic strategy. During the 1990s, the South African Reserve Bank (SARB) pursued a flexible strategy of monetary aggregate targeting that enabled it to intervene in foreign exchange markets as necessary. Over the past several years, the SARB has followed a stricter inflation targeting strategy that in theory leaves little room for managing exchange rate volatility at a macroeconomic level. This study evaluates the use of monetary policy to manage exchange rate volatility since 1994, with a particular emphasis on choice of strategy. The report identifies and evaluates specific examples of SARB interventions, discussing the instruments used and their effectiveness. Finally, the study assesses the effectiveness of hedging instruments and identifies appropriate remedies where they are lacking.

3.2) Modelling exports, growth, investment and the Reserve Bank's role

South Africa's economic growth rate can be effectively explained using four key policy variables—government spending, taxation, monetary policy (measured indirectly through the prime lending rate) and export policy (also measured indirectly, through the export growth rate). The graph below depicts the predicted growth rates using this explanatory framework.[15]

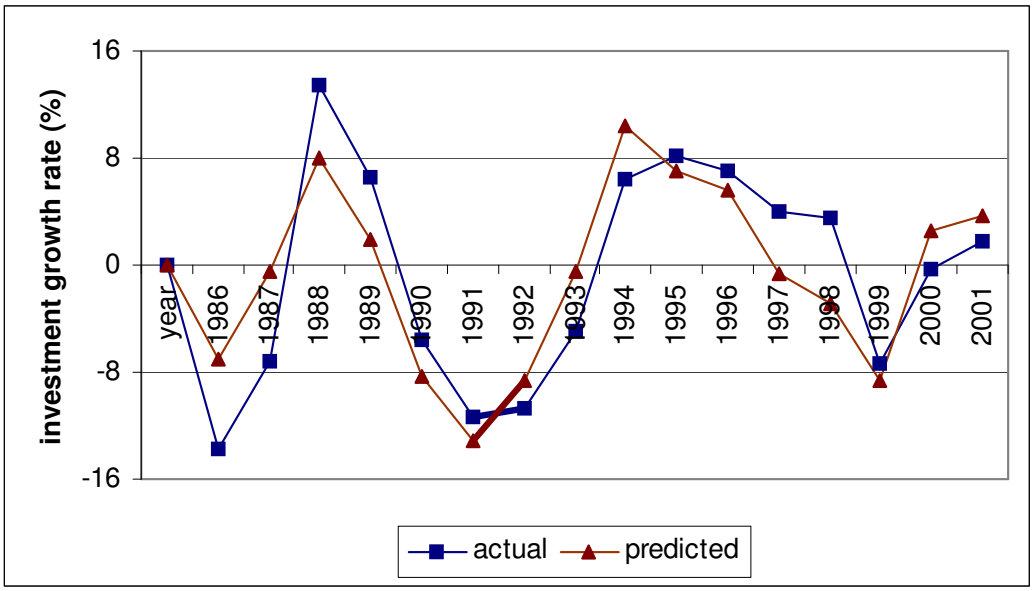
GRAPH 12: Predictions from a model of South Africa's growth rate



In this model, greater levels of government spending have positive demand and supply effects and tend to increase the growth rate, while higher taxation has a countervailing impact and tends to reduce economic growth. More restrictive monetary policy reduces inflation but weakens economic growth in the short- to medium-run. Export growth contributes directly and indirectly to higher economic growth rates. Monetary policy has a direct effect on economic growth through the interest rate, as well as an indirect effect through a rand appreciation. An increase in the interest rate directly reduces economic growth, but also appreciates the rand (everything else equal), tending to reduce exports and further weaken economic growth. In this model, estimated based on relationships in economic data since 1985, a one percentage point increase in the prime lending rate reduces the following year's economic growth rate by a quarter of one percentage point. An increase in the growth rate of exports increases the economic growth rate by 0.17%.[16]

Likewise, South Africa's investment growth rate can be nearly as effectively explained using the same four policy variables. The graph below depicts the predicted investment growth rates using this explanatory framework.[17]

GRAPH 13: Predictions from a model of investment in South Africa



[16] The estimator for the interest rate effect is statistically significant at the 95% level, the estimator for the export growth rate effect is statistically significant at the 99% level. The model explains 80% of the variance in the economic growth rate and is estimated using co-integration techniques.

[17] The details of the model are provided in the Technical Addendum.

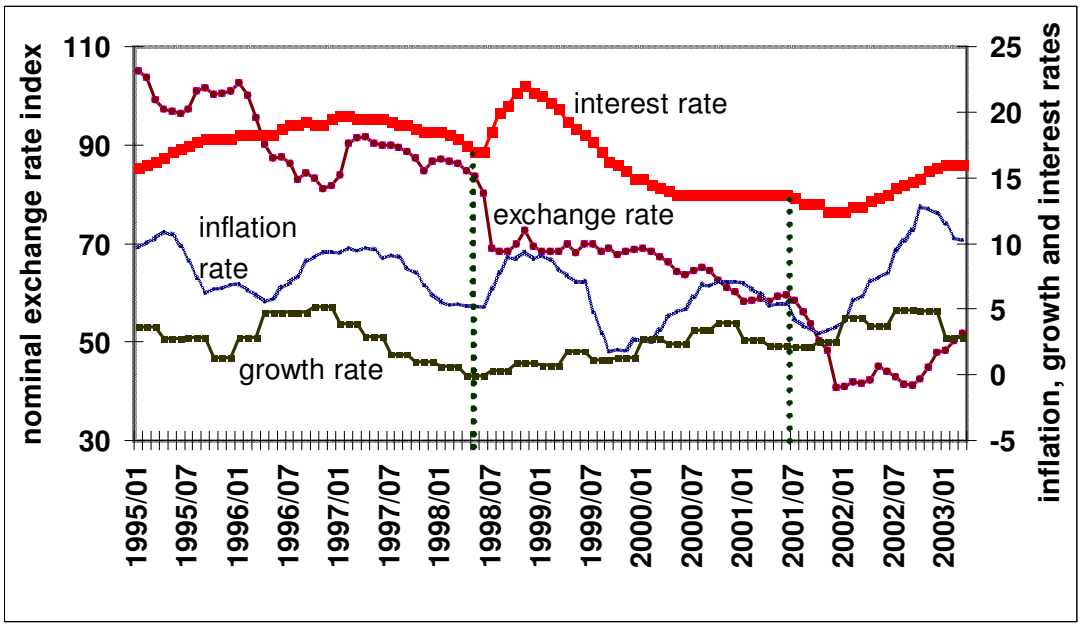
The qualitative effects of the explanatory variables are similar to those in the economic growth model. Greater levels of government spending have positive effects on investment, while higher taxation has a negative impact. Higher interest rates increase the cost of capital, reducing investment. Increased demand for exports stimulates investment in the tradable goods sector. In this model, again estimated using data since 1985, a one-percentage point increase in the prime lending rate reduces the following year's investment growth rate by 1.55%. Investment is six times more sensitive than overall economic growth rates to increases in interest rates. An increase in the growth rate of exports increases the investment growth rate by 0.54%.[18] Investment is three times more sensitive than overall economic growth rates to increases in export demand.

3.3) Reserve Bank intervention and monetary policy

Given these empirical relationships, one can evaluate the evolution of South Africa's monetary policy interventions since 1994. The graph below depicts the key variables from 1995 to 2003—the prime lending rate, the nominal exchange rate, the inflation rate and the economic growth rate. The two vertical dotted lines represent the beginning of two separate exchange rate depreciation episodes.

[18] The estimator for the interest rate effect is statistically significant at the 99% level, the estimator for the export growth rate effect is statistically significant at the 95% level. The model explains 74% of the variance in the economic growth rate and is estimated using co-integration techniques.

GRAPH 14: Monetary policy in South Africa, 1995 – 2003



SOURCE: SARB (2003)

It is illuminating to compare these two separate episodes. In the middle of 1998, the nominal rand exchange rate began to rapidly depreciate, in large part due to contagion from the East Asian financial crisis. The initial consequence was an increase in imported inflation. The Reserve Bank intervened rapidly and substantially—implementing a more restrictive monetary policy that sharply increased the prime lending rate. As a consequence, export growth as well as overall economic growth stalled, but the depreciation was halted and inflation was quickly brought under control. The real economy adjusted to promote greater financial stability.

By contrast, when the 2001 depreciation episode began, the Reserve Bank initially eased monetary policy, then moderately restricted policy leading to gradual increases in interest rates. As a result, the depreciation episode was more protracted and contributed to a more significant increase in inflation. Nevertheless, exports grew at unprecedented rates and the overall economic growth rate reached a seven-year high. The financial system adjusted for the benefit of the real economy.

Towards the end of 2002, inflation began to decline yet the Reserve Bank maintained very restrictive monetary policy and interest rates continued to rise. Real interest rates in South Africa were rising while most of the nation's trading partners

grappled with concerns about deflation. The real interest rate premium rose sharply, and the rand began to appreciate. The combined impact of higher interest rates and a rand appreciation shocked the export sectors, leading to export contraction in early 2003.

3.4) The monetary policy framework

South Africa's monetary policy framework has evolved from an orientation towards exchange rate stability to a single-minded focus on domestic inflation. The Reserve Bank intervened successfully to stabilise the rand prior to the 1994 elections as well as during the abolition of the financial rand in 1995. During the 1996 currency depreciation, the Reserve Bank intervened in the forward market, contributing to R19 billion in total forward cover losses from 1981 to 1998. In 1997, the National Treasury made the decision that the Reserve Bank would no longer provide long term forward cover. During the 1998 East Asian financial crisis, the Reserve Bank used interest rate intervention to stabilise the rand after the initial depreciation. The costs of this episode were discussed in the previous section. In 2001, the Reserve Bank explicitly adopted a policy not to intervene to support or stabilise the rand, consistent with its overall strategy of inflation-targeting. The rand's rapid depreciation in 2001 and subsequent appreciation in 2002—with the real economic costs identified in this report—motivate the reconsideration of South Africa's monetary policy framework.

The choice of a monetary policy framework can be evaluated in terms of foreign exchange rate management options.[19] There are two extreme options—a fixed exchange rate with monetary policy fully devoted to stabilising (fixing) the exchange rate, or alternatively, a "clean" float with monetary policy fully devoted to domestic objectives, such as inflation targeting. If the extreme options are not suitable, a central bank can adopt an intermediate regime balancing both internal (price level) and external (exchange rate) objectives.

Those who argue for fixed exchange rates frequently assert that floating rates are associated with excessive volatility and misalignment with respect to the equilibrium rate that persists over long time periods. They argue that volatility and

[19] This discussion draws heavily on Montiel (2003).

misalignment have high real costs in terms of deterring investment and international trade. Those who favour flexible rates, on the other hand, argue that fundamentals are the prime determinant of the observed values, and that if the fundamentals change, the fixed exchange rate will not be sustainable. And adjusting a fixed exchange rate is more costly than allowing a flexible exchange rate to freely adjust. In addition, flexible exchange rates support more rapid balance of payments adjustment, facilitating healthy trade arrangements.

In choosing an appropriate strategy, there are several important considerations:

- How costly is high inflation?
- How much does inflation fall when one switches adopts a new foreign exchange management strategy?
- How large are shocks to the economy?
- How costly would macroeconomic adjustment be without a pro-active policy response?
- How productive is the exchange rate regime in facilitating adjustment? What alternative policies are available?

Countries with different preferences or facing different circumstances may choose different foreign exchange management strategies, and a given country may adapt different strategies at different points in time as its circumstances change. One can identify conditions that sway a country in the direction of one extreme or the other. Fixed exchange rates tend to be preferable when credibility issues are important, domestic macroeconomic management is weak, domestic wage and price flexibility is high, and/or real shocks are not important. Floating exchange rates are preferable if the country possesses a central bank with a strong anti-inflationary reputation, if domestic fiscal and monetary policies are well managed, if wages and prices exhibit substantial short-run stickiness, and/or if real shocks can be expected to be important.

Many countries have characteristics of an intermediate case. When countries have central banks without strong reputations, it is necessary to manage or fix the exchange rate to anchor people's expectations of future inflation. Also, while fixed exchange rate stabilise the nominal exchange rate, it leaves the real rate potentially volatile. Intermediate regimes allow the nominal rate to adjust in order to stabilise the

real rate. In addition, intermediate regimes can provide more discretion to the Reserve Bank, which is important as a substitute for flexible fiscal policy.

South Africa's framework leans heavily, if not exclusively, towards domestic price stability objectives. Given South Africa's vulnerability to external shocks, the problem of exchange rate over-shooting and the persistence of misalignment, a more even balance between internal and external objectives may be more consistent with economic stabilisation and the long-term development objectives of the nation. Greater balance can be achieved within an inflation-targeting framework. Given the current state of significant misalignment, raising and widening the inflation targeting band would tend to move the real exchange rate towards its equilibrium level while providing Reserve Bank authorities with more flexibility to balance internal and external objectives.

3.5) Conclusions

Both growth and investment significantly respond positively to increased export demand and negatively to increases in interest rates. As a result, the Reserve Bank's focus on inflation-targeting has the potential to contribute to a mis-aligned, over-valued exchange rate and high interest rates—with negative consequences for export production, economic growth and employment. A focus on exchange rate stabilisation, however, can produce even worse results—if the Reserve Bank tries to preserve an over-valued exchange rate with high interest rates, as during the 1998 depreciation. The Reserve Bank's management of the 2001 depreciation effectively balanced internal and external objectives, but the rigid focus on inflation targeting into 2002 led to extraordinarily high interest rate differentials that contributed to an over-valued rand. A more balanced monetary policy framework—even within the overall inflation-targeting strategy—could be more consistent with financial and economic stability.

4) Balancing the macro with the micro: policy responses

4.1) Background

The answers to the three questions above frame the analysis of appropriate policy responses addressing the problem of rand volatility and its impact on the South

African economy. As discussed in the previous section, much of the problem is macroeconomic—and requires a macroeconomic strategy to resolve the problem. Yet macroeconomic policy is constrained by competing objectives—such as price stability. In the absence of policy flexibility to address the underlying exchange rate problem, microeconomic policies—such as export and investment incentives—may help to offset the negative consequences of over-valuation and excessive volatility. Even if there is no macroeconomic problem, microeconomic mechanisms may be helpful to correct market failure—for instance, in the case of small-scale exporters being unable to access exchange rate hedging instruments.

Some economists have attributed the level and volatility of the rand exchange rate to the impact of primary commodity prices, particularly gold.[20] This study finds some support for this hypothesis, identifying a significant correlation between terms of trade variability and the volatility of the real exchange rate. The link between natural resource wealth, over-valued and volatile real exchange rates and manufacturing export weakness is well-documented, referred to by economists as the "Dutch disease".[21] Many natural resource-endowed countries suffer from over-valued excessively volatile currencies, undermining the development of manufacturing exports. Their experiences and coping mechanisms provide insight for developing appropriate policies in South Africa.

4.2) International lessons of experience

[20] MacDonald and Ricci (2002, page 20) find that an increase in real prices of South Africa's main commodity exports of one percent is associated with an appreciation of the real effective exchange rate of around half a percent. The Central Bank of Lesotho (2002) attributed the rand appreciation in early 2002 in part to the rising gold price. This is also a common view in the business press. For instance, *Business Day* recently identified interest rate differentials, the strong euro and higher gold prices as supporting rand strength (Maltz 2003).

[21] Initially, the term "Dutch disease" referred to the deterioration in manufacturing exports due to rapid growth of natural resource exports (oil, gold or other minerals, etc.). The term originated in an analysis of the natural gas discovery in the Netherlands in the 1960s, and the resulting strengthening of the Dutch guilder to the detriment of the country's non-energy exports. The term also applies to situations where capital inflows or higher commodity prices lead to an excessive appreciation of the domestic currency. Krugman (1987) extends this further, analysing how restrictive monetary policy can lead to an over-valuation of the currency and undermine competitiveness.

A report by the Economic Commission for Latin America and the Caribbean (Macario 1998) identifies how Chile's "success in exporting natural resource-intensive commodities… has prompted symptoms of 'Dutch disease', undermining the competitiveness of a broad range of manufactured goods in foreign markets." The report highlights the negative implications for both exports and investment, and analyses a strategy for addressing the problem that aims to "move from incentives which are directly geared to export companies to horizontal instruments which seek to improve the competitive capacity of all companies in the country." (Page 124) The elimination of direct export subsidies frees fiscal resources that can be channelled to these new horizontal instruments. The strategy involves reducing the role of a distortionary "drawback" mechanism that enables firms to recuperate tariffs paid on imported inputs used in the manufacturing of exported products. This complies with World Trade Organisation rules, and enables a reallocation of resources to focus more broadly on non-traditional exports and even non-tradable goods. This diversification reduces the impact of real exchange rate distortions.

The strategy argues that "the best way of fostering a sustained increase in exports is to ensure that companies' goods are competitive in both domestic and foreign markets." (Page 127) A strong base in domestic markets provides a buffer against global shocks, while a robust export orientation provides learning, economies of scale and advantages in competing in the domestic market against foreign imports. Domestic and export orientations are complementary. The strategy also recognises the importance of broader industrial support. Transportation and export infrastructure are critical, particularly ports. Reducing the bureaucracy associated with the export process is important. The strategy also stresses the value of stimulating production by promoting appropriate technology, financing and training.

A more recent report by the Open Society Institute (Stiglitz 2003) acknowledges how "natural resource wealth can destabilise exchange rates. It can cause currency appreciation that weakens sectors of the economy not based on natural resources by making it difficult for manufacturers to export or to compete with imports. Meanwhile, the natural resource sector of the economy provides substantial revenues, but does not create employment throughout the economy. The resulting

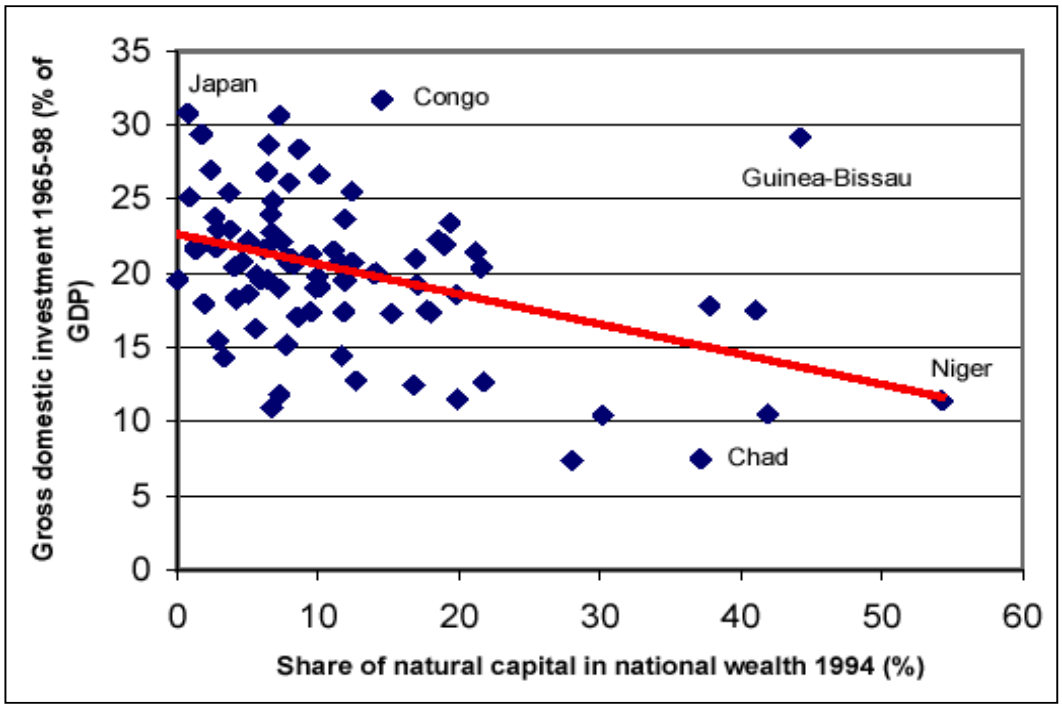
unemployment can give rise to political and social instability." (Page 2) The report focuses on the role of stabilisation funds that moderate the inflow of foreign exchange, serving as a buffer for the exchange rate that insulates manufacturing sectors while providing a reserve of resources for economic downturns.

Mineral exports generate economic growth and foreign exchange, but the instability of international markets creates a negative macroeconomic externality for the rest of the economy—particularly manufacturing exports. Taxing mineral profits does not necessarily correct this market failure. Stiglitz (2003) points out that "major oil companies have tried to minimise their royalty payments by under-reporting the effective price of oil and over-reporting their costs. It was only through hard research that such evasion was detected, for instance, in the State of Alaska, and it was only through even harder prosecution that the oil companies finally agreed to pay the more than a billion dollars that they had avoided paying the state." (Page 3) Simpler mechanisms than profit taxes may prove more practical. For instance, in the case of mining, a fixed royalty per unit of output or revenue, not profit, may provide a more effective remedy.

Gylfason (2001b) examines the specific transmission mechanisms through which the Dutch disease undermines economic performance, examining cross-country evidence on the link between natural resource wealth and growth determinants. He finds a statistically significant correlation between the share of natural capital in national wealth and the rate of physical investment.[22] The graph below depicts the relationship. He hypothesises that "natural resource abundance may blunt private and public incentives to save and invest and thereby impede economic growth." (Page 9) Alternatively, exchange rate volatility associated with natural resource-based economies may undermine investment in non-resource export sectors.

[22] From a sample of 87 observations, the estimated Spearman rank correlation was -0.37. A one-percent increase in natural capital's share of national wealth was associated with a 0.2% lower investment rate (measured as a percentage of national income).

GRAPH 15: The Dutch disease and domestic investment



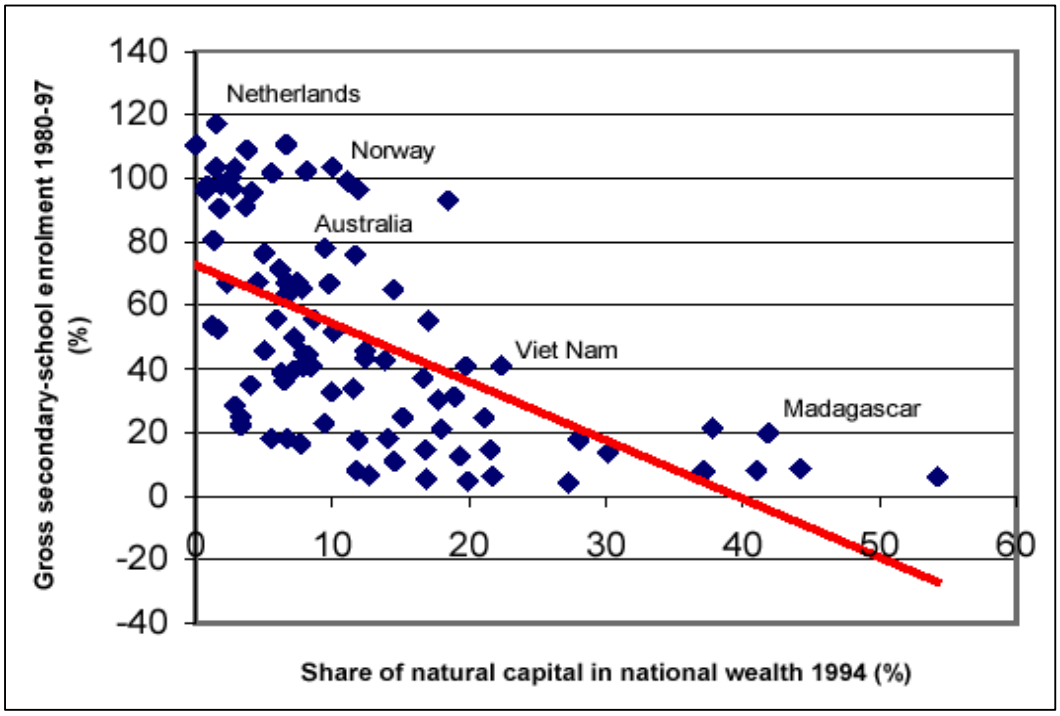
SOURCE: Gylfason (2001b)

Likewise, Gylfason finds a similar relationship between natural resource wealth and human capital investment. The graph below depicts the cross-country relationship—higher shares of natural capital in national wealth are associated with a significantly lower rate of secondary school enrolments.[23] Alternative measures of human capital investment yield similar results.[24] Gylfason hypothesises that "natural-resource-rich nations may be tempted to underestimate the long-run value of education," due in part to the relatively higher share of non-wage income in total income. (Page 7) More structurally, Wood (1999) argues that to the extent that natural-resource-based industries are less capital-intensive (both human and physical), they generate fewer spillover benefits for other industries and impede learning-by-doing and technological advance.

[23] From a sample of 91 observations, the estimated Spearman rank correlation was -0.66. A one-percent increase in natural capital's share of national wealth was associated with a 1.8% lower secondary-school enrolment.

[24] Including primary and tertiary enrolment rates, years of schooling and shares of public expenditure on education. See also Gylfason, Herbertsson, and Zoega (1999), Gylfason (2001a) and Temple (1999).

GRAPH 16: The Dutch disease and human capital investment



SOURCE: Gylfason (2001b)

There are exceptions, of course, and these are instrumental in deriving the relevant lessons of international experience. Of 65 natural resource-abundant countries (measured from 1970 to 1998), only Botswana, Indonesia, Malaysia and Thailand had investment rates of more than 25% of national income and annual per capita income growth rates greater than four percent. Botswana in particular leveraged its natural resource wealth to finance one of the highest rates of education expenditure (relative to national income) in the world. Likewise, East Asian economies provide evidence of how investment in education and training serve as an engine of growth: more and higher quality education shift comparative advantage from resource-intensive production towards higher value-added manufacturing and services, accelerating learning-by-doing and growth (Gylfason 2001b).

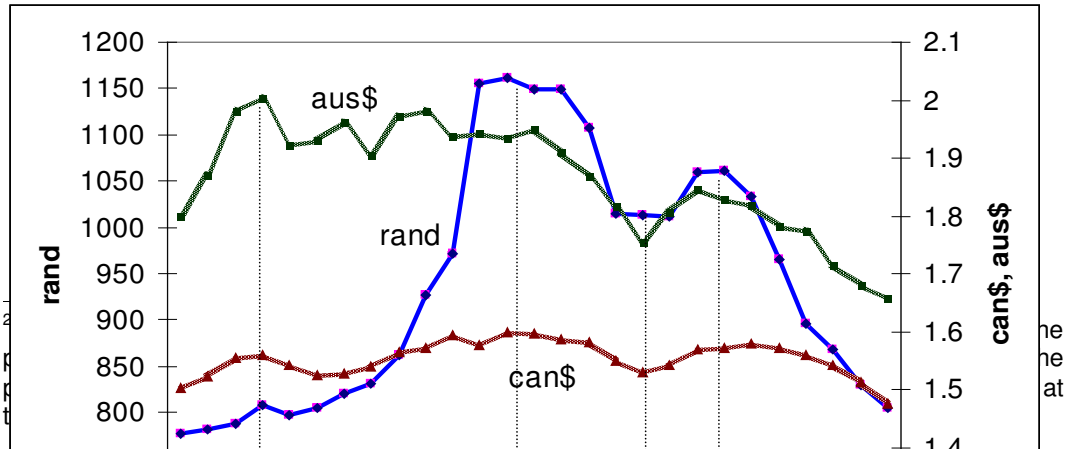
4.3) Dutch disease and the rand exchange rate

There is no unambiguous link between commodity prices and exchange rate over-valuation in South Africa. Terms of trade are insignificant in the real exchange

rate model developed for this study, and the statistical relationship between mineral prices and the real exchange rate depend on the timeframe of the analysis.[25] From January 1987 to December 1992, they moved in the opposite direction—the real effective exchange rate appreciated 16%, while the US dollar gold price fell 18%. From January 1996 to December 1999, however, they moved in the same direction—the exchange rate appreciated 20%, while the gold price rose 41%. More recently, from January to December 2001, they moved in the opposite direction—the exchange rate depreciated 29%, while the price of gold rose 4%. Yet from January to December 2002, they moved in the same direction—the exchange rate appreciated 18% and the gold price rose in step by 18%.

These statistics suggest that commodity prices were not singularly responsible for the exchange rate volatility experienced over the past three years—gold prices (and a broader basket of South African metal prices) were rising when the rand experienced its sharpest devaluation in late 2001. Nevertheless, historical evidence documents the role that commodity prices have played in contributing at times to an over-valued rand. A comparison of South Africa's nominal rand exchange rate (*vis-à-vis* the US dollar) with other currencies whose country's rely heavily on primary commodities demonstrates a strong relationship. The graph below tracks the rand/dollar exchange rate versus the Australian dollar and Canadian dollar (both *vis-à-vis* the US dollar) exchange rates turning points of the three exchange rates match each other very closely. Statistically, the nominal Canadian and Australian exchange rates explain the rand exchange rate better than do the currencies of South Africa's major trading partners.

GRAPH 17: Commodity currency exchange rates



SOURCE: SARB (2003) AND IFS (2003)

Reserve diversification may explain some of the co-movements in commodity currency exchange rates.[26] This reinforces the consequences of "Dutch disease". A shift by central banks towards reserve diversification into commodity currencies coinciding with an increase globally in the demand for gold creates a powerful momentum for rand appreciation. While it is not clear that these forces triggered the initial appreciating trend in 2002, they could certainly have contributed to the resilience of rand strength throughout 2003. Together with relatively high interest rates, these macroeconomic relationships are perpetuating a strong rand at the expenses of export growth.

4.4) Microeconomic policy options

While the volatility and misalignment of the rand are primarily macroeconomic problems, constraints to monetary policy reform may shift focus towards microeconomic solutions. Appropriate microeconomic reforms can address the problems on several levels. First, to the extent that there are microeconomic market failures, appropriate government-led corrections can improve economic efficiency. Second, to the extent that institutional factors aggravate the costs of rand volatility and misalignment, government support in improving institutional delivery can promote investment, economic growth and job creation. Third, where macroeconomic trade-offs

[26] I am indebted to Professor Robert Aliber (University of Chicago) for his hypothesis (in a private conversation) that reserve diversification by central banks could lead to substantial increases in demand for commodity currencies, including the rand.

prevent an export-friendly monetary policy, appropriate and effective incentives can promote manufacturing value-added and beneficiation, helping to insulate the economy from the adverse consequences of exchange rate volatility and over-valuation.

South Africa's well-developed markets enable exchange rate volatility to be effectively hedged through forward market transactions. Market failures, however, preclude perfect and complete protection. Transaction costs reduce export profitability, particularly as volatility increases. Forward exchange markets are incomplete, particularly in terms of hedging longer-term risks, and covering smaller enterprises and those without access to formal finance. In addition, forward cover requires that market participants be able to predict (and under exchange control regulations document) the timing and magnitude of their foreign exchange requirements. The Department of Trade and Industry can help to overcome these constraints and correct the market failures through microeconomic programmes and incentives. A long term solution involves promoting broader access to the formal sector financial instruments. Pegging the rand exchange rate used for determining export incentives may provide an interim short-term remedy.

Institutional constraints aggravate the impact of rand volatility and misalignment. In particular, low levels of human capital and infrastructure investment undermine an economy's ability to take advantage of the benefits of globalisation. Lessons of international experience demonstrate that policy responses that focus on skills development, education and infrastructure development can effectively inoculate an economy from "Dutch disease", as the examples of Botswana, Indonesia, Malaysia and Thailand suggest. In particular, a national skills development strategy is critical for enabling commodity-dependent firms to access the human resources required for value-adding diversification.[27]

In addition to promoting human capital and infrastructure investment, government can offset the impact of "Dutch disease" through direct incentives promoting manufacturing value-added. The Chilean example provides a useful case

[27] Paul Jourdan, president of the Council for Minerals Technology (Mintek), points out that Nokia was a commodities-based company (pulp and paper) prior to developing into one of the world's leading manufacturers of cellular telephones. "Nokia was able to move downstream by investing in its people. You become your own laboratory, allowing sideways movement." (reported in the *Sunday Times*, 15 October 2000.)

study illuminating South Africa's experience. Direct export subsidies can be expensive and distorting, yet import credit schemes may undermine industrial integration—as in the case of South Africa's clothing and textiles industry. More effective incentives target both exports and production for domestic consumption, supporting a more resilient industrial structure that is less vulnerable to exchange rate volatility and misalignment. Incentives should directly promote the key public objectives—for instance, job creation rather than investment.

4.5) Conclusions

The optimal strategy for addressing over-valuation and excess volatility must balance the macroeconomic with the micro. An International Monetary Fund analysis of the problem, for instance, identifies that the central bank may find it optimal to pursue a macroeconomic solution—intervening in the foreign exchange market by buying reserves with domestic currency, thus tending to stabilise the real exchange rate and protecting the vulnerable economic sectors. This strategy must be weighed against the possibly inflationary consequences of the reserve build-up, and address the need for institutions to manage the fund of foreign exchange. (Ebrahim-zadeh, 2003).

When macroeconomic constraints impede this kind of solution, then microeconomic strategy can provide a counter-balance. The severity of the consequences of this problem underscores the case for appropriate and effective interventions. The negative macroeconomic externality can be remedied with a focused framework of export incentives that target the industrial sector. Alternatively, the impact of over-valuation and excess volatility can be reduced by broadening the capacity of the tradable sector to serve both the domestic as well as export markets. In these cases, specific types of investment and export incentives should reflect the particular objectives of economic policy, such as human resource development, job creation and economic growth.

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