Draft

Monetary Transmission and Policy Rules in South Africa*

JANINE ARON
Centre for the Study of African Economies, Institute of Economics and Statistics, University of Oxford, England

AND

JOHN MUELLBAUER
Nuffield College, University of Oxford, England

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Abstract: *South African monetary policy in the last 30 years has experienced major regime shifts. This paper finds that Taylor rules, augmented for foreign interest rate influences, and based either on forecast, or actual, inflation and output gap measures, poorly describe the behaviour of the discount rate in the relevant sub-periods.Alternative descriptions of central bank behaviour are modelled. Forecasting output, however, we find strong real and nominal interest rate effects over 30 years, though subject to a regime shift. Forecasting inflation one year ahead, it appears that monetary policy has its effect mainly via the exchange rate and the output gap, with little evidence for an influence of money supply variations. In the short-run, higher interest rates raise inflation.*

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1. Introduction

Monetary policy in South Africa's transition economy, given capital account liberalisation and severe constraints on fiscal policy, has the major responsibility for curbing inflation and currency instability, and yet trying to ensure sufficient growth for longer-term political stability. Currently, monetary policy is going through a rapid transition. Previously, an old-fashioned, partly "monetarist" view assumed a simple connection between money supply and inflation. Accumulated international evidence does not support this, and in South Africa too force of circumstance has recently seen a move away from these ideas. The shift to inflation targeting which has already been announced (see also Casteleijn, 1999) demands good forecasting models of inflation, as well as a shared understanding with the private sector of the effectiveness of monetary policy for inflation, see Leiderman and Svennson (1995). The latter suggests an increasing need for transparency and public discussion of the underlying issues.

However, the South African Reserve Bank's quarterly econometric macro-model has not wholly been opened to outside scrutiny (by contrast with the UK where Treasury and Bank of England models are published and discussed at conferences and academic panel meetings)[1]. Discussions suggest that the Bank's models appear to omit two of the most important interest rate transmission channels: via wealth effects, and so asset prices; and via expectations[2]. Consequently, it is difficult to take a well-informed view of the size and dynamics of the effects of monetary policy. Further, these models give insufficient attention to the consequences of regime shifts such as financial

[1] An exception is a technical workshop with private sector and academic attendance, September, 1998, discussing sectoral equations of the models, some of which have been published piecemeal in Quarterly Bulletins of the Reserve Bank.

liberalisation, and, more generally, to the highly influential Lucas Critique of the use of policy modelling, see Lucas (1976). Such defects in earlier UK models played a major role in the spectacular and costly macroeconomic policy failures of the late 1980s and early 1990s.

This paper analyses the conduct of monetary policy by the Reserve Bank both by a description of historical evidence and by the formal modelling of interest rate rules of various types, also utilising forecasting models for output and inflation. A quantitative description of past policy should throw light on what scope there is to improve policy. Despite major changes in policy now in process and prospect, continuities with past policies are inevitable. New rules under discussion can be seen as variants, using different weights, of the interest rate feedback rules which we find describe past behaviour. Our analysis helps to understand the likely continuities as well as changes in policy. Our forecasting models may also serve as useful prototypes of the models required to make inflation targeting function well.

Section 2 describes the institutions of South African monetary policy. There have been three broad monetary policy regimes since the 1960s (Table 1). A liquid asset ratio-based system with quantitative controls on interest rates and credit up to the early 1980s was reformed gradually toward a cost of cash reserves-based system by about 1985. We discuss the use of pre-announced monetary targets from 1986, and the main policy emphasis on the central bank's discount rate in influencing the cost of overnight collateralised lending and hence market interest rates. Since early 1998, a new system of monetary accommodation has been introduced with daily tenders of liquidity through repurchase transactions (repo system). Monetary targets continue to be announced, but as is the case with the Bundesbank (Clarida and Gertler, 1996), these targets are guidelines, rather than strict rules.

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[2] The inflation sector, see Smal and Pretorius (1994), does, however, include one asset price (the exchange

The more open capital account and financial liberalisation in the 1990s has much diminished any usefulness of such targets, and they have been formally supplemented by a broader set of indicators. These include the exchange rate, asset prices, the output gap, the balance of payments, wage settlements, total credit extension, and the fiscal stance (see RESERVE BANK Quarterly Bulletin, October, 1997). It is likely that such indicators played a role in the preceding years too. However it has never been made clear what weights are attached to these indicators, nor how such weights may have changed, for instance, in the face of external shocks. It is apparent that balance of payments considerations, paramount in the latter half of the 1980s, and during currency crises in the mid- to late 1990s, have caused a countercyclical policy to be pursued.

As of March, 1998, M3 growth guidelines have operated over a 3 year rather than annual basis, and, for the first time, an inflation target for core inflation of 1-5 percent was announced (though without a deadline for reaching it). Policy appears to be evolving towards greater transparency, aiming to achieve more credibility and a more pronounced effect on inflationary expectations.

Section 3 analyses Taylor rules, extended in various directions, as quantitative descriptions of monetary policy in the 1986-1997 period. We find that a basic Taylor rule with partial adjustment and incorporating a foreign interest rate gives a poor description of policy. Indeed, at face value, such a rule suggests that policy with respect to inflation was apparently perverse. However, this ignores reactions of interest rates to excess money growth, which are found significant in a further extension of the model, reducing the apparent perversity of interest policy with respect to inflation. Finally, we show that a satisfactory policy description needs to incorporate some allowance for financial liberalisation, which with the removal of quantitative controls on interest rates

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rate), and a simple expectations proxy in the inflation equation, based on lagged inflation and the

and credit and restrictions on competition, was associated with a substantial rise in real interest rates. However, even with this more satisfactory model, it is plain that forecast inflation received a relatively low weight in the reaction function in the 1986-1997 period. It seems both desirable and likely that the weight on inflation is likely to rise substantially.

Section 4 derives a 4-quarter-ahead forecasting model for the rate of growth of real GDP. During the 1980s in South Africa, there were significant regime changes with the move to new operating procedures for monetary policy and a series of internal financial liberalisations. Periodically, serious political crises entailed the increasing international isolation of South Africa, reflected in diminished trade and finance, while its mineral dependency as a primary exporter gives an important role to terms of trade shocks in determining income growth. Our model builds in allowances for these features as well for a more standard income-expenditure approach for analysing the deviations of output from trend. We find that changes in nominal interest rates as well as levels of real rates, with quite long lags, have a negative effect on future output. These effects have, however, been somewhat altered by changes in the monetary policy regime. The trade surplus and government surplus to GDP ratios and improvements in the terms-of -trade all have a positive effect on future output. A smooth stochastic trend satisfactorily represents long-run changes in productivity growth of the kind one might expect in an economy subject to such regime changes.

Section 5 presents a model for forecasting the change in the log consumer expenditure deflator four quarters ahead. The model has an 'error or equilibrium correction' form. Apart from other elements in the short-term dynamics, we find that the forward inflation rate tends to fall when the real exchange rate is more overvalued, when wholesale prices are low relative to consumer prices, and when the indirect tax rate is low. We find that long-run inflationary expectations can be

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change in the money supply.

quite well proxied either by average inflation over the previous five years or by a smooth stochastic trend. The latter promises to offer a practical method for dealing with shifts in long-run inflationary expectations such as those which might arise from the adoption of inflation targeting. Other factors reducing domestic inflation are lower foreign inflation, a rise in the two year change in the current account surplus to GDP ratio and a fall in the output gap.

Section 6 summarises and concludes.

2. Institutions of South African Monetary Policy

2.1 The South African Reserve Bank

The legal independence of the South African Reserve Bank (SARB) is guaranteed by the South African Constitution (finalised in 1996?), which states: "The primary object of [SARB] is to protect the value of the currency in the interest of balanced and sustainable economic growth in the Republic. [SARB], in pursuit of its primary object, must perform its functions independently…; but there must be regular consultation between the Bank and the Cabinet member responsible for national financial matters." The constitution can only be altered with a two-thirds majority. Otherwise any alteration to the primary goals of the SARB would be contested in the Constitutional Court.

While the Constitution guarantees the SARB's independence, it nevertheless states that the exact powers and functions of the SARB should be determined by a separate Act of Parliament.

However, the current Reserve Bank Act (1989, with subsequent amendments) does not prescribe a completely transparent framework for monetary policy. In the first place, given that monetary policy targets are mere guidelines, the Act leaves open what level of inflation offers sufficient price stability, the rate with which stability should be achieved, and with whom the ultimate responsibility for price stability rests. In the second place, while the SARB is in principle accountable to Parliament through briefings and reports, there are no explicit benchmarks against which the performance of the SARB can be judged.

The Reserve Bank Act (1989) states that the SARB's management and functions are the ultimate responsibility of the SARB's full Board of Directors, which comprises 14 members[3], and which meets four times a year at present. However, while the Board may discuss monetary policy, it does not take interest rate decisions - though there is nothing in the Act to stop it from doing so. Moreover, the minutes of Board meetings are not published.

In practice, the operation of the main monetary policy tool between 1986 and 1998, the setting of the level of the Bank rate, has been at the behest of the Governor (see sections 2.3 below), after consultation with the Deputy Governors. The Minister of Finance may also be consulted, but policy may be altered without his approval, and further, minutes of his meetings with the SARB are not published. The Governor and three Deputy Governors are appointed for 5 year terms by the State President, but typically the tenure has been longer than this[4], which may have enhanced the independence of the SARB, but has potentially concentrated power in the hands of

[3] The Governor, his three deputies, three further officials appointed by the Government, and seven individuals elected by the SARB's private share-holders (four from finance or commerce, two from industry and one from agriculture).

[4] Governors De Jongh (1967-80), de Kock (1981-89) and Stals (1989-99), and Deputy Governor de Swardt (1990 -), have all exceeded the five year tenure. The new Governor, Mboweni began his term in August, 1999.

too few[5].

Apart from monetary policy resting in the hands of a few or ultimately one person, the process by which these decisions are arrived at is unclear. As shall be seen below, a wide range of intermediate variables, such as private credit growth, and the level of and changes in reserves, have in recent years supplemented the money growth "guidelines" in influencing interest rate decisions aimed at lowering inflation. However, it is not known which weights apply to these many and different indicators in the interest rate rule, which renders policy quite opaque.

2.2 Monetary and Inflation Targeting

Explicit monetary growth targets for M3, a broad definition of money[6], were announced annually during 1986 to 1998, following the recommendations of the de Kock Commission (1985). Targets were chosen both to accommodate projected real GDP growth and to contain inflation. As of March, 1998, M3 growth guidelines have operated over a 3 year rather than annual basis. Moreover, for the first time, an inflation target for core inflation of 1-5 percent was announced (though without a deadline for reaching it). Policy appears to be evolving towards greater transparency, aiming to achieve more credibility and a more pronounced effect on inflationary expectations. The feasibility of moving to a formal inflation targeting system has recently been discussed by the Reserve Bank in Casteleijn (1999), and by Kahn (1999).

In Figure 1, target growth zones and actual money growth outcomes are shown from 1986. As is the case with the Bundesbank (Clarida and Gertler, 1996), these targets are guidelines, rather

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[5] Governors may be dismissed by the Minister of Finance but currently only for malfeasance or incapacity.

than strict rules. A large deviation is apparent during the mid to late 1980s, as well as persistent overshooting of the targets from 1994 onwards, after the resumption of capital flows to South Africa.

Clearly the more open capital account and financial liberalisation in the 1990s has further diminished the usefulness of the M3 targets, and they have been formally supplemented by a broad and eclectic set of indicators. These include the exchange rate, asset prices, the output gap, the balance of payments, wage settlements, survey-based inflation expectations, total credit extension, and the fiscal stance (see SARB Quarterly Bulletin, October, 1997). It is likely that such indicators played a role in the preceding years too. However, as has been pointed out, it is unclear what weights attach to these indicators, nor how weights alter in the face of external shocks.

2.3 Operating Procedures

There have been three broad monetary policy regimes since the 1960s (see Table 1). First, a liquid asset ratio based system with quantitative controls on interest rates and credit was in place up to the early 1980s. Increasing dissatisfaction with this system, and following the recommendations of the de Kock Commission Reports (1978, 1985), resulted in reforms (see details in Appendix 2) from the early 1980s, toward a cost of cash reserves-based system by about 1985.

Under this second system, pre-announced monetary targets were used for the first time, with the main policy emphasis on the central bank's discount rate in influencing the cost of overnight collateralised lending and hence market interest rates. Our interest rate models in this paper focus on the second system of monetary control.

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[6] M3 is a broad definition of money, including notes and coins held by the public, plus all types of

In practice, to reduce the demand for bank credit, the SARB increased the bank interest rate at which it provided discount-window accommodation to banking institutions against the collateral of various government bills. The supply of credit (a major component of money supply changes in South Africa) could be influenced by open market operations and various other policies acting on overall liquidity. By creating a persistent "money market shortage" (where banks are in need of accommodation), and setting the bank rate at a relatively high level, the commercial bank rates have typically been closely linked to the bank rate. According to the SARB, monetary control thus operated indirectly through the slowing of the demand for money, with an estimated lag for its ultimate effect on inflation of over twelve months (e.g. Stals, September, 1995).

Since early 1998, following the difficulties and political sensitivity of direct interest rate setting under volatile capital flows, a third system of monetary accommodation has been introduced, operating daily tenders of liquidity through repurchase transactions (repo system). The repo interest rate is thus market-determined in auctions. The Reserve Bank signals its policy intentions on short term interest rates to the market through the amount offered at the daily tender for repurchase transactions, and this was recently made clear to the banks (SARB, June, 1999). A full provision of the estimated daily liquidity requirement of banks indicates indicates a neutral position on the part of the SARB. Marginal over- or under-provision of the estimated liquidity requirement signals that the SARB would prefer the repo rate to stabilise at prevailing levels. However, significant over- or under-provision of liquidity indicates the SARB would like to see a movement in the repo rate, the degree of which depends on the extent of rationing. Thus, rather than controlling the cost of liquidity

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deposits, short, medium and long-term, of the domestic private sector with South African banking institutions.

though setting the discount rate, the operation of monetary policy has effectively switched to rationing the quantity of liquidity.[7]

3. Interest Rate Rules

3.1 Background

A substantial literature has accumulated on the "Taylor Rule", (Taylor, 1993), as a description of interest rate setting behaviour by central banks. The simple Taylor Rule specifies the central bank's policy rate as a linear function of actual or expected inflation and of the actual or expected output gap (that is, a measure of the deviation of output from capacity or trend output). A special case of the Taylor rule, where the weight on the output gap is zero, is 'inflation targeting', in which the policy rate responds only to expected inflation. Policy simulations with macroeconometric models for a range of countries suggest that variants of the Taylor Rule have desirable stabilisation properties (e.g. **Barrell and Pain (1997)). Clarida and Gertler (1996) argue that despite the Bundesbank's claims to base interest rate policy largely on ensuring that monetary growth falls within specified target ranges, a modified Taylor rule provides a better description of its actual behaviour.

One widely adopted modification of the Taylor rule is to permit partial adjustment of the central bank's rate. This reflects the fact that central banks typically try to avoid interest rate volatility. For smaller economies subject to some degree of international capital mobility,

[7] Auctions with a predetermined fixed interest rate, much used in the early days of the new system, now only operate under exceptional circumstances, in order to obtain an immediate and substantial change in money market interest rates (e.g. in the face of large external shocks).

a further modification is necessary since domestic interest rates will necessarily tend to follow foreign rates. In the extreme case of perfect capital mobility, by the uncovered interest parity condition, international interest rate differentials reflect expected changes in the nominal exchange rate and risk premia. In the long-run, one would expect changes in the nominal exchange rate to be related to differences in the respective countries' inflation rates. This would imply that the small-country real interest rate should broadly follow foreign real rates.

This theory would suggest, for quarterly data,

$$r_t = \alpha_0 + \beta_1 r_{t-1} + \beta_2 E_{t-1}\Delta_4 lnp_{t+k} + \beta_3 E_{t-1}\, outgap_{t+m} + \beta_4 r^*_{t-1} - \beta_5 \Delta_4 lnp^*_{t-1} \qquad (3.1)$$

where r_t is the central bank's policy rate, $\Delta_4 lnp_{t+k}$ is the annual rate of change of the consumer price index over the horizon of k quarters, $outgap_{t+m}$ is the output gap at t+m, r^*_{t-1} is the foreign short interest rate and $\Delta_4 lnp^*_{t-1}$ is the foreign inflation rate. The horizons k and m are at the discretion of the Bank but will be constrained by its forecasting ability.

One testable hypothesis is $\beta_4 = \beta_5$, which would imply that the foreign interest rate enters in real form (abstracting from tax considerations). Some other special cases are worth mentioning. For example,

$$1-\beta_1 = \beta_2 = \beta_4 = \beta_5 \qquad (3.2)$$

would imply that, in the long-run, the domestic real rate moves in parallel with the foreign real rate. But in the short-run, the domestic interest rate can be higher or lower depending on whether the

output gap is positive or negative and on the direction of the adjustment process.

An alternative hypothesis is $\beta_5 = 0$. This might arise if $\Delta_4 lnp^*_{t-1}$ is a poor proxy for expected foreign inflation or the relevant horizon over which it is expected is different. For example, r^*_{t-1} may itself better reflect expectations of foreign inflation.

3.2 Estimating on Extended Taylor Rule for South Africa

It is clear from the discussion in Section 2 that there were major changes in monetary policy regimes during the 1980s. The early to mid-1980s under the Governor de Kock saw a move away from a system of monetary control utilising high liquidity ratios on banks and various quantitative controls, for instance on interest rates and consumer credit. The new cash reserve based system of monetary control operated via the cost of cash reserves, where the SARB's bank rate (i.e. the rediscounting rate for treasury bills) became the major policy tool with the aim of influencing a spectrum of market rates.

Our quantitative modelling of the discount rate begins in 1986. There are two reasons for this. The first is that the transition from the liquid assets to a cash reserve system of monetary control was not accomplished immediately. As shown in Appendix Table 2, liquid asset requirements were reduced gradually during 1980-85 from the abnormally high levels prevailing in 1980. Further, following the de Kock Commission final report of 1985, formal monetary growth target ranges were introduced for the first time only in 1986. The second reason is that during the 1984-1985 debt crisis, interest rates were raised to extraordinary levels in a vain attempt to keep foreign capital inflows coming and to prevent a debt default.

It is obvious that a Taylor rule cannot describe well the 1984-5 episode.

South Africa has had capital controls on domestic residents for many years, though these have been somewhat relaxed in recent years. Foreign investors, however, have been relatively unconstrained, except for the voluntary boycotts and restrictions of the 1980s imposed on South Africa to exert pressure against the Apartheid regime. While South Africa may not be a typical small open economy for the 1986-1997 period, the model in (3.1) is nevertheless an important reference point. Its implications and the hypothesis in (3.2) can be tested empirically.

Given the above considerations, the SARB's end of quarter discount rate was modelled using (3.1) on data for 1986Q2 to 1997Q4 using an IV technique to handle forward looking expectations. The discount rate, scaled by 100, is shown in Figure 2. Four alternative horizons were selected. The first gives a backward looking model where k=m=1. This can be estimated by OLS. The second uses contemporary inflation and output gaps, k=m=0. IV estimation is used on the conservative assumption[8] that the Bank's information set is dated t-1. The third model uses forward looking inflation and the current output gap. Thus k=3, implying the 4 quarter ahead inflation rate seen at t-1, and m=0. The final specification takes forward looking versions of both, k=m=3.

The output gap is constructed using an extended version of stochastic trend models of the type recommended by Harvey (1993), see also Harvey and Jaeger (1996). This can be estimated using the STAMP programme of Doornik et al (1996). The model has the following form:

$$lny_t = \alpha_0 + (1-\alpha_1)\, STOCH_t + \alpha_1 lny_{t-1} + \Sigma\beta_j X_{jt} + \varepsilon_t \qquad (3.3)$$

where y_t is real GDP, $STOCH_t$ is a smooth stochastic trend reflecting the underlying capacity of the economy to produce and the X_{jt} pick up cyclical factors. Distributed lags of changes in log capacity utilization and changes in the log real gold price are used here for an estimation period of 1973Q1 – 1998Q4. The stochastic trend is defined as a moving average of a moving average of random shocks. To be precise:

$$\Delta^2 STOCH_t = \eta_t \qquad (3.4)$$

where η_t is a random shock. Since differencing twice gives a stationary series, STOCH is an I(2) variable. The technique gives good results and is to be preferred to the widely used Hodrick-Prescott filter because it does not rely on any arbitrary calibration of the variance of the underlying shocks η_t, see Harvey and Jaeger (1996) for discussion. Instead, all the parameters of the model are estimated from the data.

The contextualisation of (3.3) and (3.4) in modern time-series literature deserves further discussion. Standard Dickey-Fuller tests suggest that over 1973-1998, log real GDP in South Africa is integrated of order one, i.e. I(1), implying that $dlny_t$ is a stationary variable, I(0). The combination of (3.3), where the X_{jt} are clearly I(0), and (3.4), appears to contradict this since $STOCH_t$ is I(2). However, as is well-known, the hypothesis that a variable such as lny_t is I(1) is hard to distinguish from alternatives such as that lny_t has a large autoregressive component and is stationary about a deterministic trend or a deterministic trend with a change in trend at some point in the sample. A low variance I(2) stochastic trend is often much like the latter. In other words, the

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[8] This is approximately correct for national accounts information, though this is subject to revision. Information on prices, interest rates, money and credit aggregate tends to be available with lags of a few weeks or less.

hypothesis that lny_t is I(1) is quite hard to distinguish from the alternative of I(0) on the one hand, and I(2) on the other, where the I(2) component is a smooth, low variance series.

The results, shown in Figure 2, were compared with the alternatives of modelling the underlying capacity trend with a cubic function of time and split time trends. For almost all specifications reported below, the stochastic trend model gives a better fit than these two alternatives. Figure 2 also shows the SA discount rate and the annual log-change in the consumer expenditure deflator, our measure of annual inflation. The foreign interest rate is taken as the US 3 month T-bill rate, shown in Figure 4, and the foreign price index is the US CPI.

The results are shown in Table 4. The results are very striking. Most remarkably, in all specifications the interest rate has a strongly significant NEGATIVE response to domestic inflation whether lagged or forward looking. At the very least, this suggests some major omitted factors which truly influence short interest rates in South Africa. The US inflation rate always has a positive but insignificant effect, except in column 4 where the effect is negative but still insignificant. Omitting it makes little difference to the other parameter estimates. The US T-bill rate is always significant, though only at the 8% level in column 4, and the hypothesis can be accepted that, ceteris paribus, a one percentage point rise in the US rate is eventually followed by a one percentage rise in the South African rate. The output gap is always significant. On the face of it, therefore, it would appear that in the 1986-1997 period, the SARB was concerned with output stabilisation, i.e. raised interest rates when output or prospective output was above trend. However, it apparently moved interest rates perversely with inflation or prospective inflation. This seems not the most obvious way of controlling inflation, though to the extent that the output gap is a cause of subsequent inflation, the focus on the output gap is likely to have been beneficial.

A specification test for columns 2 to 4 of Table 4 of the overidentifying restrictions rejects the specifications (Fn the test effectively compares the fit of the unrestricted reduced form regression of the dependent variable on all the instruments, with the fit obtained when the endogenous explanatory variables in (3.1) are replaced by their fitted values from ancillary regressions of these variables on the instruments)

3.3 An Extension of the Taylor Rule for Excess Money Growth

Since, on the evidence just presented, the extended Taylor rule represented by (3.1) clearly makes little sense for South Africa, further extensions were considered. Most obviously, since SARB declared its official policy to be one of following monetary growth targets from 1986, one can extend (3.1) by adding to it the deviation of monetary growth from the target, taking the latter to be the average of the upper and lower ranges set for the guidelines. Some experimentation suggested that the annual monetary growth deviation perceived at t-1 was the best measure. The results are shown in Table 5a. The deviation of monetary growth from the guidelines has a significantly positive effect in all four specifications. The fits of the equations all improve compared with Table 4. And the counter-intuitive negative inflation effects are much weaker, indeed insignificant in the forward-looking inflation specification.

Although the results are less implausible than those of Table 4, the combination of results from Tables 4 and 5a suggests that excess money growth is negatively related with recent, current and future inflation, given the other variables in the hypothesized interest rule relationship. Clearly the excess money growth variable in Table 5a mops up about half the negative inflation effect in Table 4.

A test of over-identifying restrictions in columns 2 to 4 rejects the model, further evidence that the Table 5a model is still not satisfactory.

3.4 Further Extensions of the Taylor Rule

We have already discussed the major changes in the financial system in South Africa in the 1980s and 1990s. As various interest rate controls, credit restrictions and barriers to competition have been removed, so the supply and demand for credit have become increasingly market determined. This has the implication that, other things being equal, higher and higher rates of interest have been required to equilibrate the supply and demand for credit. In Aron and Muellbauer (1998), we have developed a univariate indicator of the degree of liberalization of credit markets, which we denote as FLIB. Our hypothesis is that the bank rate set by SARB cannot be immune from this process and we therefore include FLIB(-1) as an additional regressor in the extended interest rate rule. Before we turn to these results, we explain briefly how FLIB was estimated.

Financial Liberalisation

The implications of financial liberalisation for monetary policy control have aroused interest and controversy, and a growing literature (e.g. Ericsson et al, 1997). Financial liberalisation makes possible greater borrowing, and can give rise to asset booms, which make further borrowing possible, effectively increasing the spendability of illiquid assets. This can drive the debt and consumption to income ratios up sharply, as seen in the UK and Scandinavia in the 1980s, and Mexico in the 1990s. To model financial liberalisation and its consequences, a flexible technique

linking institutional information with the behavioural responses is needed. Developing one is far from easy. In Aron and Muellbauer (1998), we model a univariate indicator of financial liberalisation, FLIB, using a piecewise linear spline function, based on sequential institutional changes, in which we permit no reversals. This indicator enters behavioural equations for household debt and consumption which are estimated jointly, imposing the cross-equation restrictions arising from the use of the same FLIB function in each. The debt and consumption equations also incorporate a rich set of economic variables including income and income expectations, important wealth effects and interest rate effects. A thumbnail sketch of financial liberalisation, particularly as it affected consumer credit markets, can be given as follows. Following the de Kock Commission reports (1978, 1985), substantial financial deregulation took place in South Africa's financial and credit markets in the 1980s (details are given in Appendix Table 2). The first key event was the move towards a more market oriented monetary policy in 1983-4 with a major decline in the banks' liquidity ratios. The second was associated with the 1986 Building Societies Act, and moves in 1987 and 1988 to increasing competition in the mortgage market. A series of de-mutualizations and take-overs in 1989-90 consolidated the stronger competition in the credit market. The 1990s saw pensions increasingly being used to provide additional collateral for housing loans. The popular access bond accounts allowing households to flexibly borrow and pay back up to an agreed limit set by their housing collateral were introduced in 1995. Finally, after the 1994 elections, many more black South Africans obtained formal employment, particularly in the public sector, giving access to credit which they would previously have been denied.

This qualitative portrait has implications for a univariate measure of financial liberalisation. The first is of a monotonic rise, that is, no reversals. The second is for particularly strong rises in

1984, in and after 1987, some consolidation in the early 1990s, and a renewed rise after 1994. Unfortunately, available information on institutional changes does not permit further quantitative implications to be drawn.

We define a financial liberalisation proxy FLIB via a non-decreasing linear spline function based on the above consecutive institutional changes as follows. Define a dummy D which is zero up to 1983Q4 and 1 from 1984Q1. Its four-quarter moving average, DMA84, then takes the values 0.25, 0.5, 0.75 and 1 in the four quarters respectively of 1984, and 1 thereafter. We define DMA85 to be the 4 quarter lag of DMA84, and DMA86 to DMA97 to be the 8 to 48 quarter lags, correspondingly. We then define

FLIB = d84 x DMA84 + d85 x DMA85 + ... d97 x DMA97

Thus, up to 14 parameters are used to define the spline function which, in principle, can shift shape in the first quarter of each year. However, by constraining these parameters to be non-negative, only 6 parameters are needed in practice to define FLIB. As noted above, when estimating this function, these parameters are subject to cross equation restrictions between the debt and consumption equations, since FLIB enters the latter in a joint estimation. The estimated series for FLIB is shown in Figure 3.

The results of extending the interest rate rule to include FLIB are shown in Table 5b. There is a dramatic improvement in the results. FLIB has a significant positive effect in all 4 specifications and the inflation effect is now positive throughout. The column 2 specification, with current dated inflation and output gap gives the biggest inflation effect as well as the best fit. As before, including

the lagged US inflation rate gives positive coefficients though none are significant. The results are therefore not reported. All variables now have the expected direction of effect, excess money growth, the US interest rate and the output gap remaining significant in most specifications. Moreover, the specification now passes a test of the overidentifying restrictions.

These results thus suggest that, in the context of liberalizing credit and other financial markets, and the international interest rate environment, the SARB did pay attention to current inflation and the output gap in its interest rate policy, despite the monetary growth targeting that it engaged in both in rhetoric and in fact. In the context of the large structural changes in money and credit markets, the attempt to target money growth was surely a mistake, leading to a worse output and inflation outcome than could very probably have been achieved, had a more sensible version of the Taylor Rule been followed. Our own evidence, of which more in Section 5, supports the conclusion of Moll (1998) who finds little link between monetary growth and subsequent inflation.

The UK had effectively abandoned monetary targeting by 1986, just as South Africa began, in large part because of the lack of stability in the relationship between money growth and output, inflation and interest rates. It had, by then, also been effectively demonstrated in a number of econometric studies, see for example Hendry (1985), that inverting a money demand equation does not give a sensible model of inflation – at least not in countries without hyperinflation or budgetary problems so severe that the authorities are tempted to resort to the inflation tax as a major source of revenue.

The recent downgrading of the monetary growth guidelines, the official acknowledgement that a wide range of information is now examined when formulating monetary policy, and moves in the direction of inflation targeting, are therefore to be welcomed.

4. Output Forecasts

The Lucas Critique has had a huge influence on econometric methodology, playing a major role in the switch from econometric estimation to calibration in the rise of the Real Business Cycle (RBC) school literature on the one hand, and the switch from large scale econometric modelling to VAR modelling on the other. Neither approach is very helpful for understanding the kinds of issues with which this paper is concerned.

A better methodology, in our view, is to model shifts in macropolicy feedback rules in more structural models which build in as much institutional knowledge as possible. The background for the approach, tailored for the US economy, is set out in Muellbauer (1996). It is shown that it is possible to forecast income growth up to three years ahead with considerable success, with the key variables being the change in nominal (and sometimes real) short-term interest rates, the real exchange rate (a measure of international competitiveness), the trade surplus to GDP ratio, the government surplus to GDP ratio and the change in a real share price index. These variables explain the deviation in income from trend, where the trend is represented either by a linear trend subject to changes in slope or a smooth stochastic trend which does not impose changes in trend *a priori* but allows them to be estimated flexibly. Parameter shifts in the income forecasting relationships appear to take place at broadly the dates suggested by prior information about policy regimes, corroborated by the shifts in the estimated feedback rules, and in the direction predicted by theory.

Forecasting Equations

As discussed above, during the 1980s there were significant regime changes in South Africa with the move to new operating procedures for monetary policy and a series of internal financial liberalisations. Periodically, serious political crises entailed the increasing international isolation of South Africa, reflected in diminished trade and finance. In particular, from late 1985 until the democratic elections of 1994, South Africa had little access to international capital (apart from some trade finance), and domestic policy was directed at maintaining current account surpluses through large import surcharges, exchange rate depreciation and interest rate policy. This constraint together with South Africa's mineral dependency as a primary exporter are expected to give an important role to terms of trade shocks and the current account balance in determining output growth (Figures 5 and 6).

Output is modelled using an extended version of stochastic trend models of the type recommended by Harvey (1993) and Harvey and Jaeger (1996), and was estimated using the STAMP programme of Doornik et al (1996). The economic basis for the model stems from Muellbauer (1996), discussed above. The model has the following linear reduced form:

$$\Delta_4 lny_{t+4} = \alpha_0 + STOCH_t + \alpha_1 lny_t + \Sigma_{i=2,n}\alpha_i X_{it} + \Sigma_{j=1,n}\Sigma_{s=0,k}\beta_j \Delta X_{jt-s} + \varepsilon_t \qquad (4.1)$$

where y_t is real GDP; $STOCH_t$ is constructed to be a smooth stochastic trend reflecting the underlying capacity of the economy to produce; and the X_{jt} include a range of possible determinants of output, discussed below. As discussed above in the context of the definition of the output gap, STOCH is constructed to be an I(2) variable.

This equation can be reformulated as an equilibrium correction formulation with a long-run solution given by

$$\ln y = -(\alpha_0 + \text{STOCH} + \Sigma_{i=2,n}\alpha_j X_j)/\alpha_1 \qquad (4.2)$$

However, since non-linear parameter restrictions are unavailable in STAMP, we report the coefficients of equation (4.1) directly. Note that the difference between lny and STOCH/α_1 is I(1), given the low variance of the I(2) variable STOCH. Hence, one can think of equation (4.2) as representing a cointegrating relationship in which the deviation from trend of lny is cointegrated with the X_j components which are I(1).

The set of explanatory variables X_j [9] examined included those relevant in Muellbauer (1996), namely the real and nominal interest rates, the government surplus to GDP ratio, the trade surplus to GDP ratio, the real exchange rate, a real stock market price index; but, in addition, the log terms of trade.[10] Further, institutional and dummy variables were included, namely a measure of financial liberalisation, and a measure of the shift in monetary policy in the early 1980s crossed with the interest rates, and a dummy for the drought of 1992/3.

In the process of simplification from the general forms, the data suggested several transformations, in particular moving average versions of some of the key regressors, and we obtain the results shown in Table 6. Two four quarter ahead output forecasting equations are reported: for the full sample of 1966q2 to 1997q4, and for the shorter sample of 1966q2 to 1990q4. Chow tests

[9] The variables are defined in Table 3, where stationarity and other statistics are presented. Recent trends in the range of macro-economic variables used in the equations are given in Appendix Table 1.

[10] Poor data precluded the inclusion of an unemployment rate as in Muellbauer (1996), but implicitly this is captured by the deviation of the dependent variable from the stochastic trend.

are unavailable in STAMP and the shorter sample is thus used to demonstrate parameter stability.[11] In treating the dynamics, for lags longer than three we restrict the dynamics to fourth differences or four quarter moving averages to prevent overparameterisation.

In the parsimonious equations reported, the only I(1) variable is the real interest rate, which is expected to form a cointegrating vector with the deviation of output from the stochastic trend. Note, however, that the current account and government surplus to GDP ratios are borderline I(0), so potentially they could also be part of a cointegrating vector.

We have emphasised three types of regime shifts. The first, captured by the stochastic trend, reflects a slowdown in the underlying growth rate in the early 1980s associated with the productivity losses resulting from the increasing isolation of South Africa (for example, the inefficient production of petrol from coal under trade sanctions which constrained oil imports). In the 1990s, there was a recovery in the underlying growth rate. The second type of parameter shift reflects changes in monetary policy in 1983-84 away from quantitative controls via liquidity ratios and other mechanisms towards more market oriented methods via interest rates. The measure is based on changing prescribed liquid asset requirements (see Appendix 2). The third shift is financial liberalisation from the 1980s, measured as detailed above in section 3.

Turning to the parameter estimates, nominal rises in interest rates and the level of the real rate both have strong negative effects. The real interest rate also enters as a lagged four quarter moving average, suggesting its effects on output are relatively long-lasting. The long duration probably results from the effect on investment and therefore the capital stock of high real rates. However, the shift towards more market-oriented monetary policy in the 1980s appears to have somewhat weakened their influence. The shift is picked up by interacting Δ_4 (PRIME) and RPRIMA

[11] The forecasts are based on full-sample estimates, not recursive estimates, since recursive estimation is

with the liquid asset ratio measure.[12] One reason for the smaller nominal effect is that when credit rationing is more pervasive, as before the regime shift, companies can do less to get round the cash flow constraints that result. Both effects may further be explained by the higher correlation between interest rates and quantitative credit controls used as a demand management policy tool before the regime shift. Financial liberalisation enters as a first difference suggesting that it has only a short-run effect in boosting output.

The positive government surplus effect enters through a three year moving average, which implies that deficits have long-lasting effects on later income growth.[13] It is possible in the South African context that, as well as reflecting the typical concerns for budget deficits followed by higher taxes or lower government expenditure, these deficits also signal political shocks. For example, in the past, unrest in the townships was often followed by higher social or military expenditure but may have had a direct negative effect on growth.

The positive effect expected from the trade surplus to GDP ratio is confirmed. There is a weak positive effect from the (three year) change in the terms of trade (including gold), as one might expect in a mineral dependent economy. Finally, given the importance of agriculture in South Africa output, the drought dummy produces the expected negative effect.

To test for parameter stability, a sample break of 1990 was chosen to coincide with the new monetary regime of Governor Stals, as well as the increased momentum of political change initiated by the release of political prisoner, Nelson Mandela. The parameter estimates from the shorter sample are extremely close to those of the full period suggesting that once structural change has been

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unavailable in STAMP.

12 The liquid asset measure in itself proved insignificant in the equation.

13 In contrast, in the US paper (Muellbauer, 1996), there is evidence that before the heightened concern with government deficits in the 1980s, there was a negative "Keynesian" response of output to the government surplus.

accounted for as described above, the remaining parameters are stable. There is no evidence of autocorrelated residuals. Tests for normality and heteroscedasticity are also satisfactory.

5. Inflation Forecasts

Structural models in open economies, as exemplified in typical large quarterly models, examine the interrelationship of consumer prices, wages, wholesale or output prices, import prices and the exchange rate - see Bank of England (1999) and Pretorius and Smal (1994)[14]. In principle, VAR models of inflation are concerned with the same set of variables and the lagged relationships between them.

Methodologically, our model for forecasting inflation four quarters ahead can be regarded as the single equation reduced form of a VAR system. VAR models used for forecasting with five endogenous variables as above need fairly short lags for parsimony. Moreover, while a single equation of a conventional VAR can be used to forecast one quarter ahead, forecasts further into the future using recursive substitution, require, in general, all the remaining equations of the VAR. Our single equation reduced form has the advantage over a full VAR of simplicity, and, it turns out, of economic interpretability. The disadvantage is that one might expect some positive residual auto-correlation, given that our dependent variable is the four quarter ahead inflation rate, which has a three quarter overlap with its lagged value. This could mean that estimated t-ratios and standard errors require some adjustment.

[14] The inflation sector in the South African Reserve Bank quarterly econometric model discussed in this paper is the most comprehensive for South Africa.

Our model estimates inflation four quarters ahead[15], measured by the log change in the consumer expenditure deflator[16], given information at time t (cf. the 12-month ahead inflation model of Stock and Watson, 1999). The approach differs from earlier work in three respects. In treating the dynamics, for lags longer than three we restrict the lag structure to fourth changes and four quarter moving averages to prevent overparameterisation. This allows examination of longer lags than is possible in a conventional VAR. We also treat slowly evolving long-run inflationary expectations by long backward looking inflation rate averages, or by a stochastic trend. Finally, we emphasise the role of inflation as relative price adjustment. In other words, an essential feature of the model is its "equilibrium correction" representation in which relative prices play a key role.

The reduced form single equation VAR model has the following general representation:

$$\Delta_4 \ln P_{t+4} = \gamma (\alpha_0 + \Sigma_{i=2,n}\alpha_i X_{it} - \ln P_t) + \Sigma_{j=1,n}\Sigma_{s=0,k}\beta_j \Delta X_{jt-s} + \phi \, LONGINFL_t + \varepsilon_t$$

$$= f(X) + \phi \, LONGINFL_t + \varepsilon_t \qquad (5.1)$$

where $\Delta_4 \ln P_{t+4}$ is the four quarter ahead inflation rate; the X_j include a range of potential inflation determinants detailed below; LONGINFL is a long moving average of past inflation (or a stochastic trend in an alternative representation) to proxy long-term inflationary expectations; while ε_t is white noise.

Given the finding that the annual inflation rate is I(1), then equation (5.1) cannot be interpreted directly as an "equilibrium correction" representation. However, since the moving average of inflation should also be I(1), and the deviation of inflation from its moving average should

[15] We find that a similar approach also gives remarkably good forecasts of the eight quarter ahead inflation rate.

[16] The consumer expenditure deflator is preferred to the CPI as the dependent variable because it excludes mortgage interest payments.

be I(0), then if the following representation is consistent with the data it can be given an equilibrium correction interpretation[17]:

$$\Delta_4 \ln P_{t+4} - \text{LONGINFL}_t = (1-\phi)\,(F(X) - \text{LONGINFL}_t) + \xi_t \qquad (5.2)$$

where ξ_t is white noise.

The persistence of inflation in South Africa has been widely commented on (see Figure 7), and one could think of such persistence in terms of a measure of long-term inflationary expectations[18]. We represent these inflationary expectations, after some experimentation, by the five year moving average of inflation; and in an alternative specification by a smooth stochastic trend. Either representation turns out to have very significant effects.

For the model in its most general specification, the X_j comprise nine variables, though in a general-to-specific testing procedure the data suggested the elimination or transformation of some of these. The variables are the log of the real exchange rate, log(REER); the real wholesale price index, log(RWPI), deflating by the consumer expenditure deflator, as well as the nominal rate of WPI inflation; the ratio to current GDP of the seasonally adjusted current account surplus, RCADEF; the terms of trade (including gold), LTOT; the output gap, OUTGAP; the log of the prime interest rate, log(prime); a proxy for the indirect tax rate, TAXR**;** the log of unit labour costs divided by the

[17] We are grateful to David Hendry for this point.

[18] A partial explanation is given by overlapping contracts**,** by relative wage objectives **(**see Fuhrer and Moore, 1995), and by the practice of capturing last year's price increases in this year's wage increase – rather than by using formal indexation. Unions for black workers were legalised in 1980, though unions were increasingly effective from the early 1970's.

consumer expenditure deflator, RULC; and the rate of change of an index of foreign wholesale prices, FORINFL. These are I(1) variables, as is the inflation rate.[19]

We present two specifications for forecast inflation, which differ in their treatment of inflationary expectations: one uses the proxy of a long average of past inflation; the other a stochastic trend from estimating with the programme STAMP (see sections 2 and 3 for a discussion of the construction of a smooth I(2) stochastic trend using STAMP).

After several steps of simplification from the general forms, we obtain the results shown in Table 7. Note that the estimation period for South African inflation from 1979q1-1997q4 is dictated by a regime switch from a fixed exchange rate to a floating rate regime in 1979q1, expected to alter the inflation process.

As expected, there are positive effects on next year's inflation rate from the real WPI, as consumer prices catch up with a lag to producer prices; from the output gap (for traditional reasons); and from the foreign rate of WPI inflation and its fourth lag, since with a given exchange rate, foreign inflation will translate to some degree into domestic inflation. The prime rate increases inflation through its effects on the mortgage cost component of the CPI. While our dependent variable excludes this component, these costs will, with a lag, feed into wages which respond to CPI inflation. A rise in the rate of indirect taxation is expected to raise the price level, and, in the transition, the rate of inflation.

There is the expected negative effect from the real exchange rate: the more overvalued the exchange rate, the more competitive pressure acts on domestic producers to prevent price increases; as well as from the change over the previous two years in the current account to GDP ratio, through exchange rate appreciation, but also as a symptom of falling excess demand.

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[19] Detailed definitions of variables and statistics are given in Table 3. Recent trends in the range of macro-

A rise in the terms of trade, via a boom following a positive gold price shock is likely to have inflationary consequences. Finally, the real unit labour cost could have a positive effect, indicating the lagged feed-through of labour costs. Otherwise it could have a negative effect, suggesting that when real unit labour costs are below average, there is more scope for wage increases and so inflation. In the event, both the levels effect and the rate of change effects proved insignificant in our equation. Note that the ratio of the unit labour cost to consumer price deflator is trendless during 1982-1998 (Figure 8).

Other experimentation with real or nominal M3 or private sector credit growth variables showed a lack of significant positive effects over the four quarter horizon (whereas they are significant in the eight quarter ahead equation). Conventional VAR models provide no counter-evidence on this score.

One variable which we have neglected, but which is potentially important for the South African case, is a measure of trade policy. Trade barriers began to be dismantled in 1990 and especially after 1994, which put downward pressure on inflation. Unfortunately we do not have an index of effective protection combining the effects of tariffs and quotas (the latter are dominant in South African trade policy until the early-1980s).

The LM tests for the first regression of the form (5.1) reported in Table 7 show little sign of residual autocorrelation, while it passes CHOW and normality tests. Recursively estimated beta coefficients computed in PCGIVE are shown in Figure 9. These suggest that the LONGINFL variable only begins to be significant after 1994, having shown relatively little variation in the previous 15 years. The LM tests are tightened with the imposition of the restriction discussed in equation (5.2), which is accepted by the data. Finally, the STAMP regression using a stochastic trend is

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economic variables used in the equations are given in Appendix Table 1.

reported in the second column of Table 7, and shows similar regression coefficients to the equation in column 1, with an improved standard error . The evolution of the trend is broadly similar to that of LONGINF.

The STAMP approach has the advantage of flexibility in real-time forecasting. Suppose, for example, that a new inflation targeting regime was widely regarded as credible, and supported by fiscal and other policies. If this succeeded in sharply reducing inflationary expectations, the stochastic trend estimated by STAMP is likely to pick up this regime shift within a few quarters. A backward-looking moving average of inflation, which assumes a similar degree of sluggishness in actual inflation feeding into long-term inflationary expectations in the future as in the past, may not be so successful in absorbing the regime shift.

Be that as it may, the two approaches give very similar inflation forecasts over the estimation period.

6. Conclusions

Monetary policy in South Africa has been through major evolutionary changes, particularly in the 1980s and again currently. In this paper we have modelled interest policy rules since 1986. As we show, attempts to fit a Taylor rule extended for the lagged dependent variable and the US short term interest rate, do not give sensible results. Astonishingly, it appears that the Reserve Bank changed the interest rate perversely with lagged, current or future inflation, with the estimated coefficients strongly significant. Only by introducing excess money growth and an indicator of financial

liberalisation (both factors raised real interest rates), does the Reserve Bank's policy rule look more sensible. Even then the weight attached to inflation is substantially below that found for policy rules in other countries, or indeed, with pure inflation targeting. These results, together with our modelling of inflation might suggest that the monetary targeting regime adopted in 1986 resulted in costly policy errors in terms of lost output and unnecessary inflation, so that its recent effective abandonment is to be welcomed. The force of this conclusion is weakened, however, by the fact that policy had competing preoccupations from late 1985, principally maintaining surpluses on the current account, given the virtual cessation of capital inflows.

While our forecast models for output and inflation were partly aimed at deriving efficient instruments to estimate variants of the Taylor rule, they also offer insights on monetary policy transmission with interesting policy implications[20], as well as practical suggestions for forecasting inflation, crucial under a targeting regime. For output, we find strongly significant interest rate effects both from the change in the nominal rate and the level of the real rate, though there is some evidence of a decline in both these coefficients[21] with monetary policy regime changes in the 1980's.

Forecasting inflation one year ahead, we did find an effect from the output gap in common with other studies, though only from its difference, suggesting low persistence from this source of inflation; but found no evidence for money or credit growth effects. However, the exchange rate is clearly an important factor for inflation. Not surprisingly, it appears not have a stable relationship with short-term interest rates. This leaves the authorities with difficult policy quandaries, as demonstrated only very recently in the 1996-98 exchange rate crises, when the exchange rate continued low or to fall further despite large increases in real interest rates.

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[20] However, note that these models do not constitute a full system and in themselves do not make possible policy experiments of the type discussed by Cunningham and Haldane (1999).

[21] While model coefficients declined, it is not necessarily the case that the effects of interest rates declined, given a sharp increase in the variance of interest rates at the time.

A rise in the interest rate, however, raises inflation as measured by the consumer price deflator in the following year, almost certainly via the mortgage cost component of the CPI, which feeds into labour costs. The mortgage cost component in the CPI has unfortunate policy implications. While inflation targeting will use the CPI-X (which excludes mortgage interest payments, similar to the UK's RPI-X), wage negotiators still focus on the headline CPI (or whichever proves to be the higher). There is, therefore, a strong case for switching to an imputed rent measure in the CPI, as in the US in 1981 and Australia in 1998. The case for this is stronger in South Africa than in the UK, since the market-rented sector is substantially larger than the 10 percent in the UK. If this policy was to be adopted, it would be important to preserve a substantial flexible market-rented sector, refraining from rent controls and home-ownership subsidies.

The move to inflation targeting which has been announced demands good forecasting models of inflation. Our inflation forecasting models should prove useful to the Reserve Bank. The Kalman filtering or stochastic trend approach helps to control for the effects of structural changes usually neglected in Reserve Bank models (e.g. trade liberalisation, deregulation of markets, and a tougher government stance on unions) and offers a practical way of dealing with the Lucas critique. Indeed, the move to inflation targeting itself can shift inflationary expectations. There is little evidence of positive serial correlation in our four quarter ahead inflation forecasts. This suggests negatively autocorrelated disturbances in the inflation process (implicit exchange rate forecasts probably being one factor). These would probably not be picked up in a conventional VAR, where lags are restricted for parsimony. Our single equation reduced form approach with a flexible lag structure therefore has important advantages –as well as simplicity and interpretability.

REFERENCES

Aron, J. and J. N. J. Muellbauer, Private Saving in South Africa, Paper presented at the Econometric Society European Meetings, Berlin, 29 August-2nd September, 1998.

Bandiera, O., G. Caprio, P. Honohan, and F. Schianterelli, (1998), "Does Financial Reform Raise or Reduce Saving?" paper prepared for the conference, "Saving in the World: Puzzles and Policies", K. Schmidt-Hebbel, N. Loayza and L. Serven (eds), September, 1998, The World Bank.

Barrell, R., L. Hurst and K. Drury. 1999. "An Encompassing Framework for Evaluating Simple Monetary Policy Rules." Mimeo, National Institute of Economic and Social Research.

Casteleijn, A.J.H. 1999. "The Viability of Implementing an Inflation Targeting Monetary Policy Framework in South Africa." South African Reserve BANK Quarterly Bulletin, June, 37-47.

Clarida, R. and Gertler, M. 1996. "How the Bundesbank Conducts Monetary Policy", National Bureau of Economic Research, Working Paper 5581.

Cunningham, A. and A. Haldane. 1999. "Evolution of the Monetary Transmission Mechanism in the UK." Paper presented at the Central Bank of Chile, Third Annual Conference on Monetary Policy: Rules and Transmission Mechanisms, Santiago, September.

de Kock, G.. 1978. Commission of Inquiry into the Monetary System and Monetary Policy in South Africa, Interim Report, Government Printer, Pretoria.

de Kock, G.. 1985. Commission of Inquiry into the Monetary System and Monetary Policy in South Africa, Final Report, Government Printer, Pretoria.

Ericsson, Neil R., David, F. Hendry, Kevin, M. Prestwich. 1997. "The Demand for Broad Money in the United Kingdom, 1878-1993." Board of Governors of the Federal Reserve System, International Finance Discussion papers: 596, November, 1-38.

Harvey, A.C. . 1993. *Time Series Models (2nd Edition),* Harvester Wheatsheaf.

Harvey, A. and A. Jaeger. 1993. "Detrending, Stylized Facts and the Business Cycle." *Journal of Applied Econometrics* 8: 231-47.

Hendry, D. 1985. "Monetary Economic Myth and Econometric Reality." *Oxford Review of Economics and Policy*. ?:72-84.

Kahn, B. 1999. "Inflation Targeting." Centre for Research into Economics and Finance in South Africa, LSE, Quarterly Review, ? 1999.

Koopman S. J., A.C. Harvey, J.A. Doornik and N. Shephard. 1995. *STAMP 5.0*. London:

Chapman and Hall.

Leiderman, L. and L. E. O. Svensson. 1995. *Inflation Targets*. CEPR, London.

Lucas, R. E.. 1976. "Econometric Policy Evaluation: a Critique", *Carnegie-Rochester Conference Series Supplement to the Journal of Monetary Economics*, 1, 19-46.

MacKinnon, J. .1991. "Critical Values for Cointegration Tests." in Engle, R. and C. Granger (eds.), (1991), *Long-run Economic Relationships: Readings in Cointegration*.Oxford: Oxford University Press.

Muellbauer, J. N. J.. 1996. "Income Persistence and Macropolicy Feedbacks in the US." *Oxford Bulletin of Economics and Statistics* 58: 703-733.

Stals, C. 1995. "Monetary Policy and its Implications." Address, Conference of the International Herald Tribune, 11 September.

Taylor, J. 1993. "Discretion versus Policy Rules in Practice." Carnegie Rochester Conference on Public Policy, December, 195-214.

Table 1: Monetary Policy Regimes

Years	**Monetary Policy Regime**
1960-1981	Liquid asset ratio-based system with quantitative controls on interest rates and credit
1981-1985	Mixed system during transition[1]
1986-1998	Cost of cash reserves-based system with pre-announced monetary targets (M3)
1998-	Daily tenders of liquidity through repurchase transactions (repo system), plus pre-announced M3 targets and targets for core inflation

1. Details in Appendix 2.

Table 2: History of Money Growth Targets

Year	**Money Growth** ***Guidelines (%)***	**Money Growth** ***Actual (%)***	**Inflation** ***"Target"***	**Inflation** ***Actual (total)***	**Inflation** ***Actual (core)***
1986	**16-20**				
1987	**14-18**	**16.92**			
1988	**12-16**	**27.17**			
1989	**14-18**	**22.62**			
1990	**11-15**	**12.22**			
1991	**8-12**	**12.53**		**15.3**	
1992	**7-10**	**7.96**		**13.9**	
1993	**6-9**	**7.01**		**9.7**	
1994	**6-9**	**15.72**		**9.0**	
1995	**6-10**	**15.16**		**8.7**	
1996	**6-10**	**13.61**		**7.4**	**7.5**
1997	**6-10**	**17.15**		**8.6**	**8.8**
1998	**6-10**	**14.55**	**1-5**	**6.9**	**7.5**
1999	**6-10**				

SOURCE: SARB Quarterly Bulletins

Table 3: Statistics and Variable Definitions

Variable	*Definition of Variable*	*I(1)*	*I(2)*
(1970q2-1997q4)	**Interest Rate Rules**		
Discount rate	SARB bank rate/100		
US T-bill rate	3 month US T Bill rate/100		
Inflation	Annual inflation rate of the consumer expenditure deflator		
Output gap measure	Deviation of real GDP from a stochastic trend		
Excess M3 growth	Annual growth rate of M3 less the annual growth target rate		
FLIB	Financial liberalisation measure - see text		
US inflation	Annual CPI inflation		
(1966q2-1997q4)	**Output Forecasting Equation**		
$\Delta_4 \ln (y)$	Annualised real GDP growth rate (seas. adj.)	-4.53**	
ln (y)	Log of real GDP (seas. adj.)	-1.70	
RPRIMA	Real prime interest rate/100 (4 quarter MA)	-2.27	
Δ_4 PRIME	Annual change of prime interest rate/100	-4.31**	
RCADEF	Ratio to current GDP of the seas. adjusted current account surplus (4 quarter MA)	-4.70**	
DEFMA12	Gov. surplus to GDP ratio (12 quarter MA)	3.91**	
FLIB	Financial liberalisation measure - see text		
DFLIB	First difference in FLIB	-	
Monetary regime shift dummy	Dummy progressing from 0 to 1 in 1983:2-1985:4 , derived from short term liquid asset requirements	-	
ND4PRIME	Shift dummy x Δ_4 PRIME	-	
NRPRIMA	Shift dummy x RPRIMA	-	
$\Delta_{12} \ln$ (TOT)	Three year change in the log terms of trade	-3.77**	
DUM92	Drought dummy=1 for 1991:3-92:2, or =0	-	
(1979q1-1997q4)	**Inflation Forecasting Equation**		
$\Delta_4 \ln$ (P) (+4)	Four quarters ahead annual inflation rate of the consumer expenditure deflator	-0.92	
LONGINFL	Average inflation rate over the last five years	-1.72	
$\Delta_3 \ln$ (P)	Three quarter change in the log of the consumer expenditure deflator	-0.91	
ln (REER)	Four quarter MA of the log of the real effective exchange rate	-1.39	
ln (RWPI)	Log ratio of the WPI (8 quarter MA) & the consumer expenditure deflator	-0.43	
Δ_8 RCADEF	Two year change in the ratio to current GDP of the seas. adjusted current account surplus	-4.05**	
ΔOutput gap	First difference of the deviation of real GDP from a stochastic trend	-5.06**	
$\Delta_{12} \ln$ (TOT)	Three year change in the log terms of trade	-2.85	
ln (prime)	Log of prime interest rate/100	-3.75**	
TAXR	Percentage difference between current and market price GDP (two quarter MA)	-3.03*	
FORINFL	Annual foreign WPI inflation	-3.33*	

1. For a variable X, the augmented Dickey Fuller statistics is the t ratio on π from the regression: $\Delta X_t = \pi X_{t-1} + \Sigma^{k}_{i=1} \theta_i \Delta X_{t-i}$ $\psi_0 + \psi_1 t + \varepsilon_t$, where k is the number of lags on the dependent variable, θ is a constant term and t is a trend. The kth-order augmented Dickey-Fuller statistic is reported, where k is the last significant lag of the 6 lags employed. For null order I(2), Δ X

replaces X in the equation above. Asterisks * and ** denote rejection at the 5% and 1% critical values. *[Table to be completed]*

Table 4: Taylor Rules with Partial Adjustment and Foreign Rates

Dependent variable SARB discount rate	**1986:2-1997:4** **Equation 1** ***(using lagged SA inflation & lagged output gap)***	**1986:2-1997:4** **Equation 2** ***(using current SA inflation & current output gap)***	**1986:2-1997:4** **Equation 3** ***(using future SA inflation & current output gap)***	**1986:2-1997:4** **Equation 4** ***(using future SA inflation & future output gap)***
Regressors				
intercept	0.036 (4.2)	0.035 (5.3)	0.040 (5.0)	0.017 (2.6)
discount rate (t-1)	0.78 (18.0)	0.80 (23.1)	0.75 (18.2)	0.914 (18.3)
US T-bill rate (t-1)	0.22 (2.7)	0.20 (2.6)	0.18 (2.4)	0.20 (1.7)
US inflation (t-1)	0.07 (1.4)	0.06 (1.2)	0.10 (1.9)	-0.05 (0.4)
SA inflation	-0.15 (4.8)	-0.14 (45.9)	-0.14 (5.2)	-0.12 (3.1)
output gap measure	0.36 (3.4)	0.41 (3.8)	0.49 (4.1)	0.51 (2.5)
Diagnostics				
s.e	0.00554	0.00583	0.00609	0.00707
R^2	0.964	0.960	0.957	0.942
Adj.R^2	0.960	0.955	0.951	0.935
DW	2.42	2.41	2.23	1.86

Notes:

1. Absolute values of asymptotic t-ratios in parentheses
2. The additional instruments used in columns 2 to 4 are two lags in the output gap, four lags in the quarterly S.A. inflation rate, one lag in the rate of change of the nominal exchange rate, the lagged annual growth rate of real domestic credit, and the lagged deviation of annual M3 growth from target. Furthermore, for column 3, we added the forecast value of the annual SA inflation rate using t-1 information, from the model discussed in Section 5. For column 4, we also added the forecast value of the annual rate of growth of output using t-1 information from the model discussed in Section 4. A further experiment of adding 4 lags in quarterly money growth had almost no effect on the estimates reported above and in Tables 5a and 5b below.

Table 5a: Extended Taylor Rule with Excess Money Growth

Dependent variable SARB discount rate	**1986:2-1997:4** **Equation 1** ***(using lagged SA inflation & lagged output gap)***	**1986:2-1997:4** **Equation 2** ***(using current SA inflation & current output gap)***	**1986:2-1997:4** **Equation 3** ***(using future SA inflation & current output gap)***	**1986:2-1997:4** **Equation 4** ***(using future SA inflation & future output gap)***
Regressors				
intercept	0.030(3.7)	0.0028 (5.0)	0.027 (4.2)	0.021 (4.3)
discount rate (t-1)	0.78 (19.9)	0.80 (25.8)	0.78 (23.4)	0.83 (28.9)
US T-bill rate (t-1)	0.17 (2.2)	0.15 (2.0)	0.10 (1.4)	0.07 (0.7)
SA inflation	-0.08 (2.0)	-0.07 (2.2)	-0.04 (1.0)	-0.02 (0.6)
output gap measure	0.23 (2.1)	0.26 (2.7)	0.23 (2.6)	0.21 (3.0)
excess M3 growth	0.078 (3.0)	0.077 (3.8)	0.096 (4.9)	0.103 (5.1)
Diagnostics				
s.e	0.00514	0.00527	0.00532	0.00544
R^2	0.969	0.968	0.967	0.965
Adj.R^2	0.965	0.964	0.963	0.961
DW	2.67	2.70	2.63	2.67

Notes:

1. Absolute values of asymptotic t-ratios in parentheses
2. The additional instruments used were as in Table 4 and also included the lagged US rate of inflation.

Table 5b: Extended Taylor Rule (with excess money growth and financial liberalisation)

Dependent variable SARB discount rate	**1986:2-1997:4** **Equation 1** ***(using lagged SA inflation & lagged output gap)***	**1986:2-1997:4** **Equation 2** ***(using current SA inflation & current output gap***	**1986:2-1997:4** **Equation 3** ***(using future SA inflation & current output gap)***	**1986:2-1997:4** **Equation 4** ***(using future SA inflation & future output gap)***
Regressors				
Intercept	0.017 (2.0)	0.011 (1.4)	0.015 (2.1)	0.009 (1.7)
Discount rate (t-1)	0.43 (3.2)	0.39 (3.9)	0.57 (9.3)	0.62 (9.7)
US T-bill rate (t-1)	0.38 (3.6)	0.37 (4.6)	0.27 (3.2)	0.24 (2.7)
SA inflation	0.09 (1.3)	0.15 (2.2)	0.07 (1.5)	0.09 (1.9)
Output gap measure	0.23 (2.3)	0.20 (2.3)	0.19 (2.0)	0.10 (1.8)
excess M3 growth	0.056 (2.2)	0.051 (2.5)	0.055 (2.7)	0.070 (3.6)
FLIB	0.089 (2.7)	0.106 (4.0)	0.064 (4.0)	0.060 (3.4)
Diagnostics				
s.e	0.00478	0.00455	0.00478	0.00492
R^2	0.974	0.976	0.974	0.972
Adj.R^2	0.970	0.973	0.970	0.968
DW	2.33	2.36	2.55	2.55

Notes:
1. Absolute values of asymptotic t-ratios in parentheses
2. The additional instruments were as in Table 5a.

Table 6: Forecasting equations for real output

Dependent variable D_4 **log (y) (+4)**	**Using STAMP with stochastic trend 1966q2 - 1997q4**	**Using STAMP with stochastic trend 1966q2 – 1990q4**
Regressors		
ln (y)	-1.18 (14.7)	-1.16 (12.8)
RPRIMA	-0.40 (3.7)	-0.40 (4.5)
RPRIMA(-4)	-0.31 (-3.6)	-0.31 (4.0)
Δ_4 PRIME	-0.25 (-3.0)	-0.31 (3.6)
RCADEF	0.31 (4.0)	0.30 (4.1)
DEFMA12	3.43 (3.2)	4.28 (3.8)
DFLIB	0.29 (2.5)	0.33 (2.6)
ND4PRIME	0.23 (2.2)	0.33 (3.4)
NRPRIMA	0.34 (2.6)	0.36 (3.2)
Δ_{12} ln (TOT)	0.03 (1.8)	0.02 (1.4)
DUM92	-0.02 (4.0)	-
Diagnostics		
s.e	0.00923	0.00923
DW	2.12	2.02

Absolute values of asymptotic t-ratios in parentheses

Table 7: Forecasting Equations for Inflation

Dependent variable $\Delta_4 \log (P) (+4)$	**Using "inflationary expectations" 1979q1 – 1997q4**	**Using STAMP with stochastic trend 1979q1 – 1997q4**
Regressors		
intercept	-1.66 (11.8)	-
LONGINFL	0.63 (6.3)	-
Δ_3 ln (P)	-0.19 (2.6)	-0.14 (1.7)
ln (REER)	-0.11 (5.0)	-0.09 (3.8)
ln (RWPI)	0.47 (21.0)	0.50 (4.9)
Δ_8 RCADEF	-0.18 (7.7)	-0.20 (6.2)
ΔOutput gap	0.64 (4.8)	0.67 (4.8)
Δ_{12} ln (TOT)	0.10 (6.7)	0.10 (5.9)
ln (prime) (-3)	0.04 (5.6)	0.05 (5.4)
TAXR (-3)	0.84 (5.7)	0.84 (3.7)
FORINFL (-4)	0.30 (6.6)	0.11 (2.2)
Diagnostics		
s.e	0.00806	0.00827
R^2	0.950	
Adj.R^2	0.941	
DW	1.73	1.82
LM1	0.82	
LM2	1.03	
LM3	2.08	
CHOW	1.16 [.337]	

Absolute values of asymptotic t-ratios in parentheses

Figure 1: Money Growth: Actual and Target Guidelines

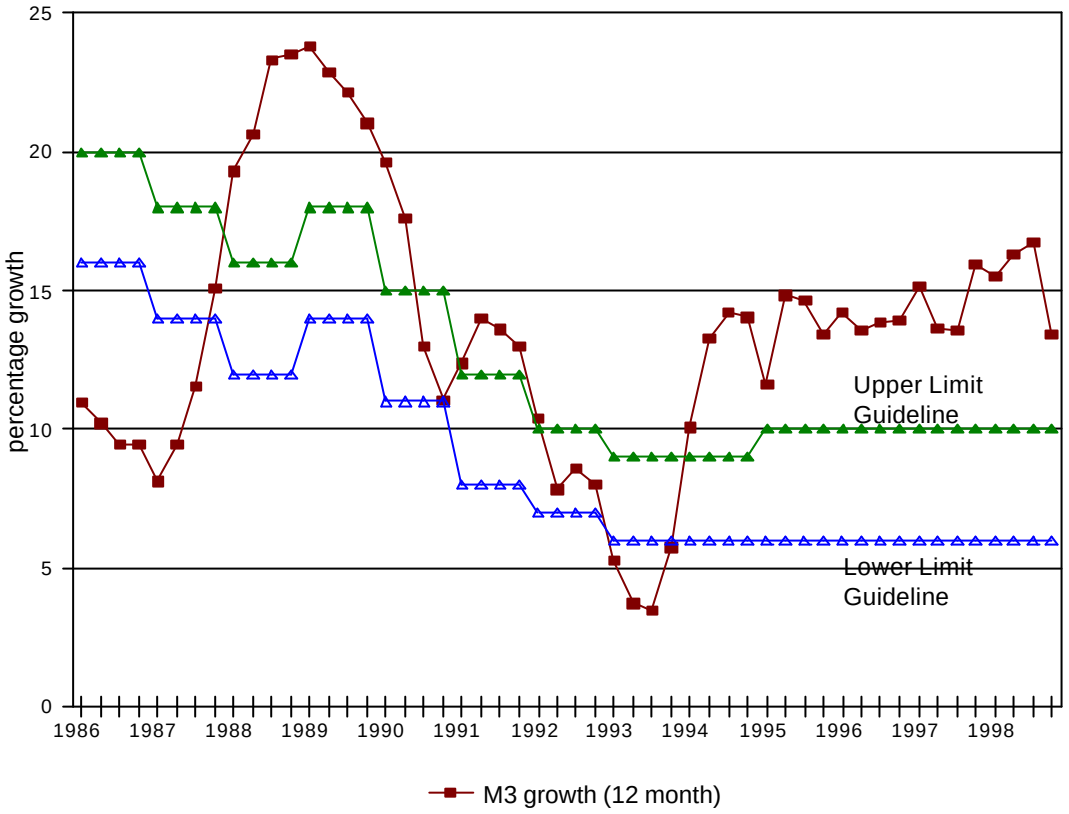


Figure 2: The Output Gap, Inflation and the SARB Discount Rate

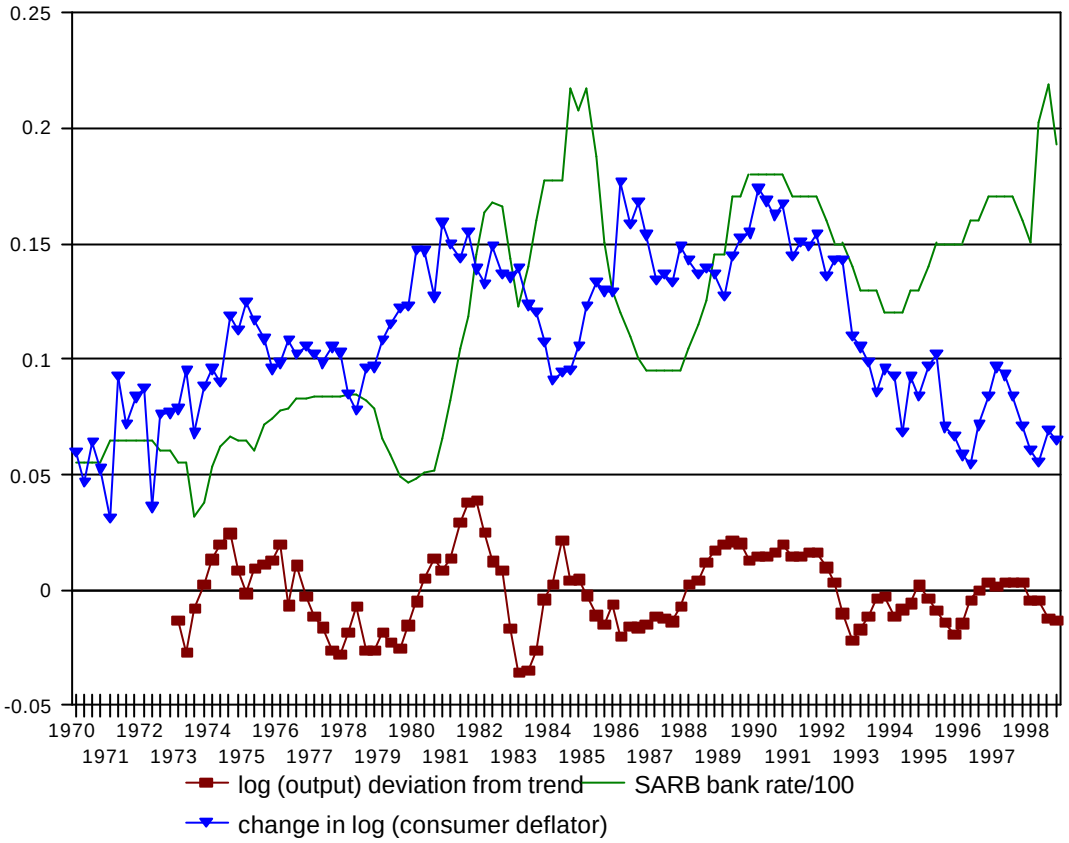


Figure 3: Financial Liberalisation

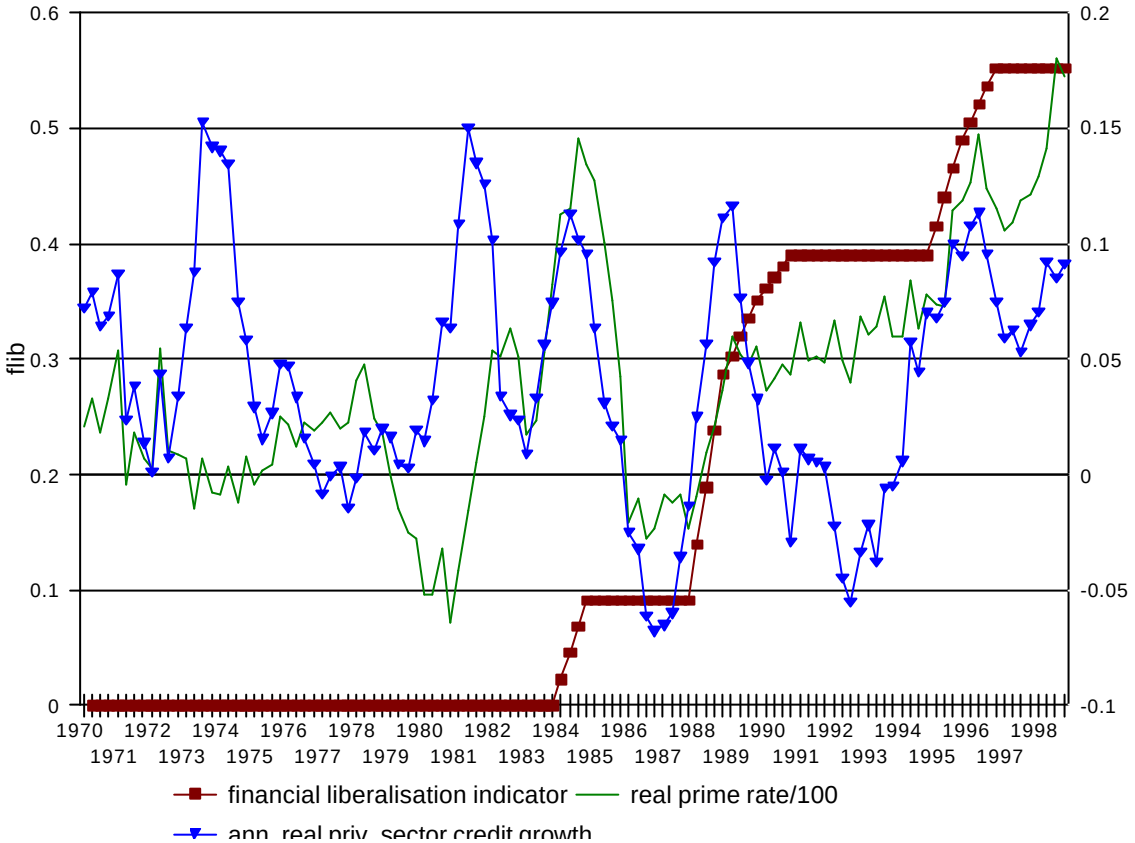


Figure 4: US and SA Interest rates

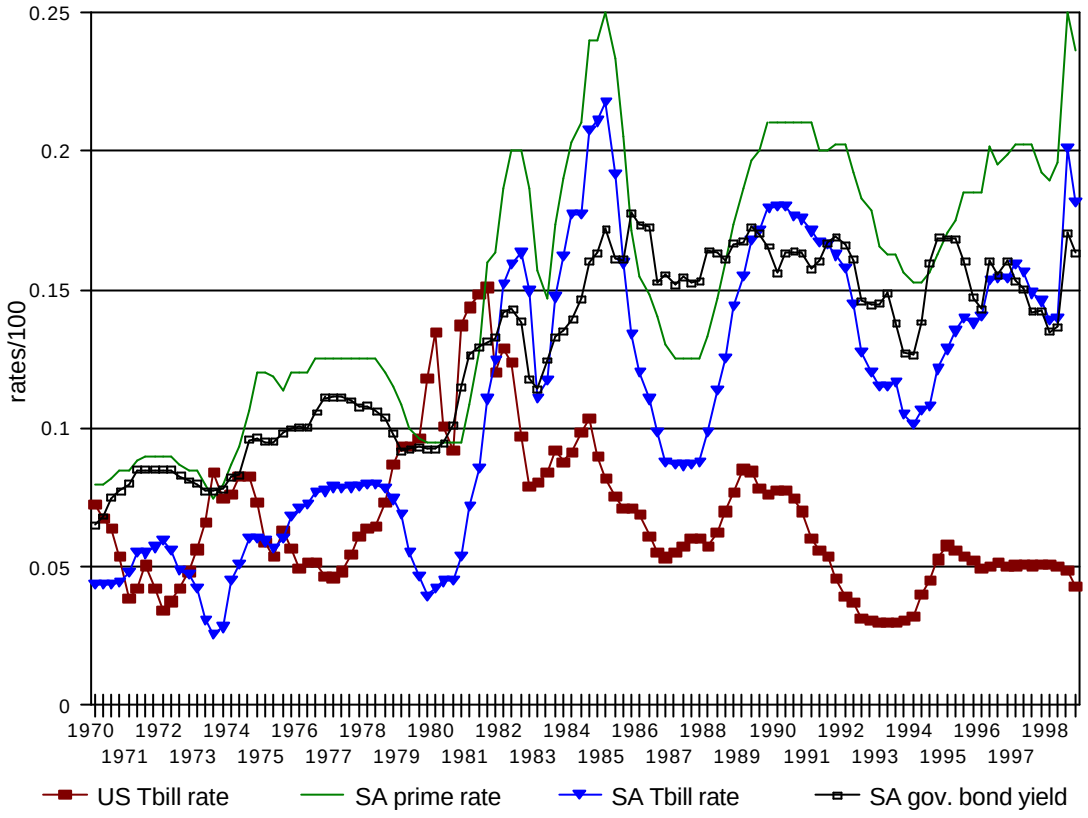


Figure 5: Real GDP Growth and the Current Account

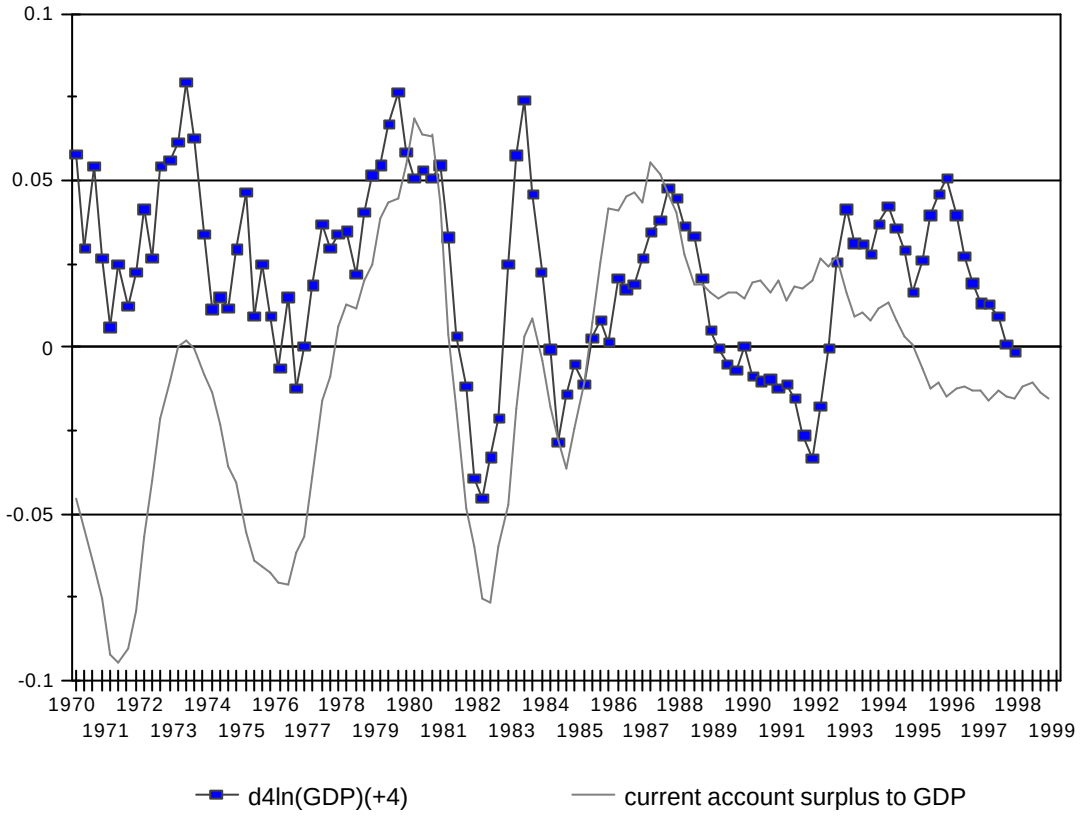


Figure 6: Exchange Rates and the Terms of Trade (including Gold)

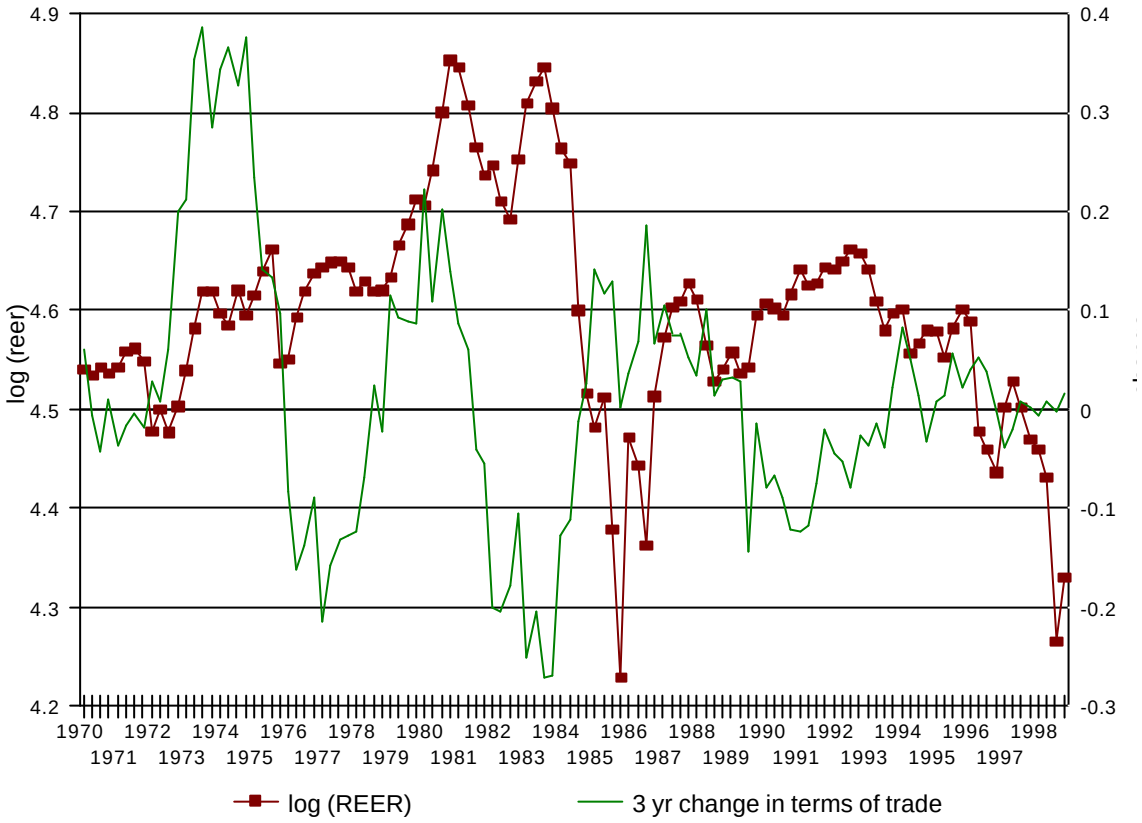


Figure 7: One Year Ahead and 5 Year Moving Average Inflation Rates (using the Consumer Expenditure Deflator)

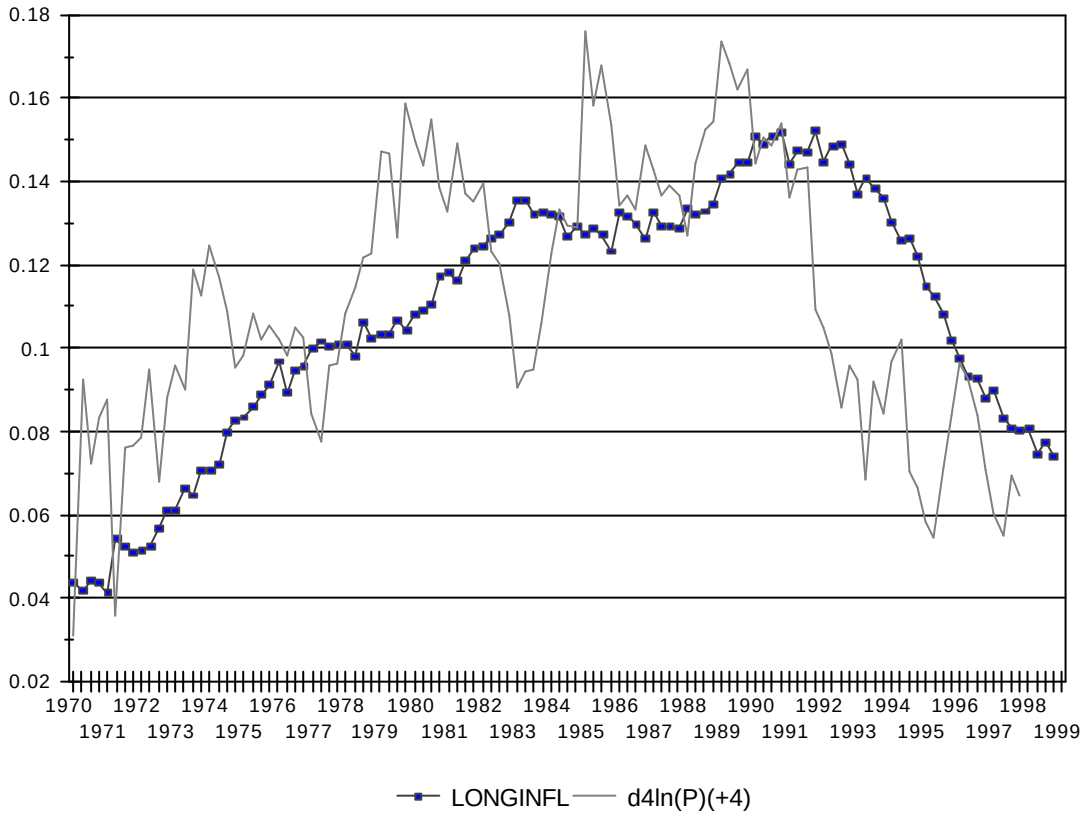


Figure 8: Cost push factors

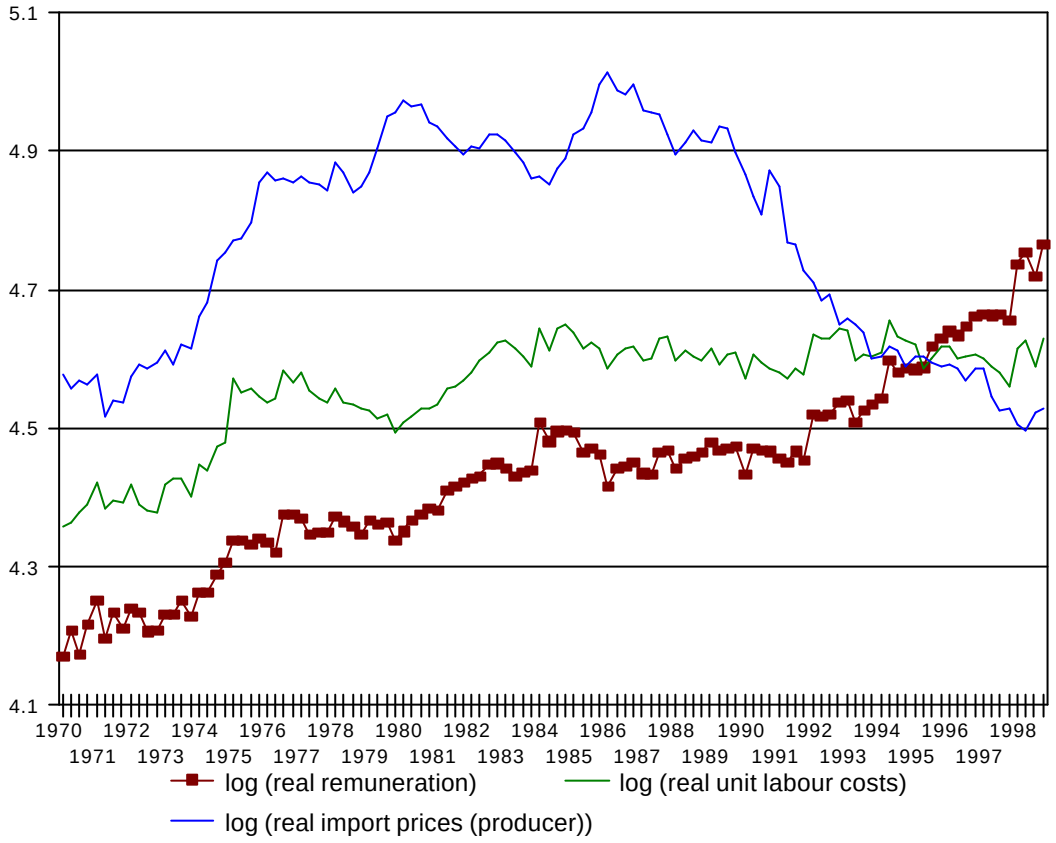
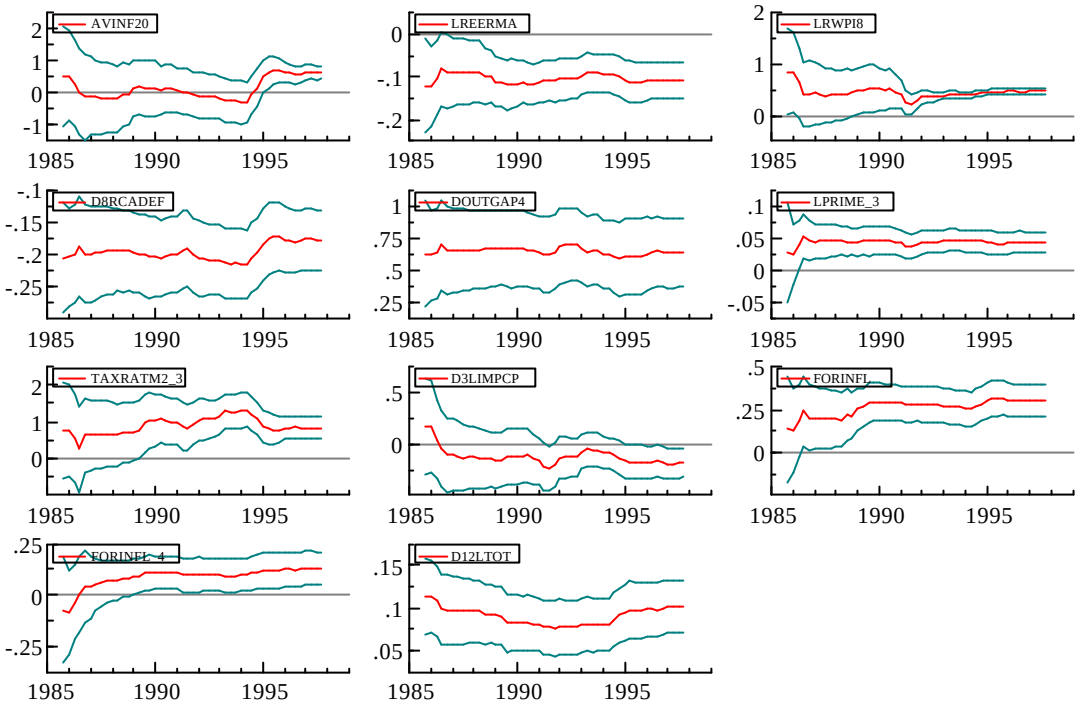


Figure 9: Inflation Equation (Table 7, Column 1): Recursively-estimated Beta Coefficients



Appendix Table 1: Selected Macro-Economic Data for South Africa:1960-97

Dates	*M2/ Gross Reserves*	*Priv. Credit/ GDP (%)*	*CPI Inflation (%)*	*Bank Rate (eop %)*	*Real GDP Growth (%)*	*Fiscal deficit/ GDP (%)*	*Current Account Deficit/ GDP (%)*	*Terms of Trade (90=100)*	*London Gold Price ($ per oz.)*	*LT Capital Flow/ GDP (%)*	*ST Capital Flow/ GDP (%)*
Five year averages:											
61-65	NA	NA	NA	3.7	5.7	-3.7	2.1	87.1	35.1	-1.7	0.1
66-70	5.4	54.0	2.5	5.6	5.3	-4.7	2.4	84.0	37.0	1.6	1.9
71-75	7.7	55.6	7.6	5.7	4.4	-3.3	-4.2	99.7	78.3	3.0	0.6
76-80	10.1	53.7	12.6	7.3	2.1	-5.0	-0.7	106.3	186.8	1.7	-1.5
81-85	6.8	55.3	13.0	14.8	3.0	-2.5	-1.8	104.2	446.7	1.0	0.5
86-90	11.8	59.3	16.9	12.9	1.5	-4.3	3.1	105.4	390.0	-0.9	-2.3
91-95	16.2	61.4	13.7	14.8	0.1	-4.9	1.3	99.1	366.6	-0.1	-1.1
96-97	15.2	66.5	6.8	16.0	3.3	-5.9	-1.6	101.7	385.9	2.5	-0.3
The 1990's:											
1990	18.48	60.98	15.50	18.00	-0.30	-1.90	1.9	100.00	383.58	-0.04	-0.60
1991	15.85	62.14	17.00	17.00	-1.00	-2.70	2	98.40	362.19	-0.56	-0.14
1992	15.36	61.30	16.30	14.00	-2.20	-4.50	1.5	97.10	343.72	-0.44	-0.94
1993	16.19	60.13	10.40	12.00	1.30	-8.50	1.6	98.00	359.70	-0.07	-3.92
1994	15.30	62.38	9.30	13.00	2.70	-6.80	-0.3	101.90	384.05	0.81	0.19
1995	13.51	65.35	7.40	15.00	3.40	-5.70	-2	100.50	384.17	3.76	0.16
1996	16.92	67.66	6.20	17.00	3.20	-6.10	-1.3	102.90	387.71	1.24	-0.75
1997	9.23	70.62	8.10	16.00	1.70	-5.60	-1.5	101.50	331.11	5.05	-1.65

Appendix Table 2: Financial Liberalisation in South Africa 1960-97

A. LIBERALISATION OF INTEREST RATES

Deposit Rate Controls:

Mar. 65-Jul. 66	Upper limits first imposed on rate of interest payable on bank and building society deposits
Dec. 69	Reintroduced at 7% per annum
Aug. 70	Dropped: government decides to subsidise certain interest rates
Mar. 72	Reintroduced
Mar. 80	Dropped

Lending Rate Controls:

i. Clearing banks prime rates for overdraft:

before 1967	Minimum and prime overdraft lending rates set by agreement with the SARB at 1.5 and 2% above the bank rate
1967-mid-75	Min. and prime overdraft lending rates set at at 2 and 2.5% above bank rate
Jul. 75	A newly defined prime rate ("the lowest rate at which a clearing bank will lend on overdraft") set by individual banks within the margins 2.5-3.5% above the bank rate (changes to be discussed first with the SARB)
16 Feb. 82	Banks released from obligation of keeping prime rate within specific limits (still had to inform the SARB of intended prime rate changes)

ii. Loan and credit transactions:

Maxima have been in force since before the 1960s in terms of various Usury and Finance Acts. Maximum finance charge rates are now linked to clearing banks' prime rates by formula, for various categories of money loan and credit and leasing transactions.

iii. Mortgage rate:

Informal constraints were removed only in the early 1980s

B. DIRECTED CREDIT

Nov. 65	Total of discounts and advances by monetary banking institutions to the private sector restricted to the level of such credit on 31 Mar. 65
Dec. 66	Ceiling reduced to 92.5% of the Mar. 65 level
Aug. 67	"Voluntary" control made mandatory by proclamation
May 68	Extend ceilings to cover bank investment in private sector securities
Aug. 70	Extend to non-monetary banks to curb competition
Sep. 72	Intention announced to phase out ceilings, but raised them by 7.5%
Nov. 72	Credit ceilings abolished
Feb 76	Credit ceilings reimposed for bank credit to the private sector
77-80	Further tightened ceilings at various points
Aug. 80	Credit ceilings finally withdrawn

C. CASH RESERVE AND LIQUID ASSET REQUIREMENTS

Liquid Asset Requirements:

Liquid asset requirements were used as the principal monetary policy instrument fom 1960 through mid-1982. Details from the maximum ratios reached in early 1980:

Aug. 80	Two categories of banks: e.g. Cat. A: 58% (ST), 35% (MT), 5% (LT)
27 Sep. 82	Two categories of banks: e.g. Cat. A: 54% (ST), 34% (MT), 5% (LT)
19 Jul. 83	All banks the same % liabilities: 48% (ST), 28% (MT), 5% (LT)
20 Sep. 83	All banks the same % liabilities: 40% (ST), 20% (MT), 5% (LT)
8 Dec. 83	All banks the same % liabilities: 30% (ST), 20% (MT), 5% (LT)
14 Mar. 84	All banks the same % liabilities: 25% (ST), 18% (MT), 5% (LT)

29 Mar 85	All banks the same % liabilities: 22% (ST), 16% (MT), 5% (LT)
31 Aug. 85	New method to calculate ST liabilities results in a larger calculated amount of such liabilities. All banks: 20% (ST), 15% (MT), 5% (LT) liabilities
Feb 91	Definition of ST liabilities extended to include repurchase agreements and other liabilities not previously included. All banks: 20% ST liabilities
Apr. 93	Certain types of assets (e.g. banker's acceptances) lose liquid asset status. All banks: 5% total liabilities

Cash Reserve Requirements:

Start to be lowered from March 1982. Details from the early 1980s:

11 Apr. 80	Two classes of banks: e.g. A: Basic: 8% (ST, non-i bearing); Additional: 7% (ST, non-i bearing), 5% (MT, i bearing with NFC)
12 Sep. 80	Two classes of banks: e.g. A: Basic: 8% (ST, non-i bearing); Additional:10% (ST, non-i bearing), 3% (MT, non-i bearing), 2% (MT, i bearing with NFC)
31 Mar. 82	Two classes of banks: e.g. A: Basic: 8% (ST, non-i bearing); Additional: 4% (ST, non-i bearing), 3% (MT, non-i bearing), 2% (MT, i bearing)
27 Sep. 82	All banks: Basic: 8% (ST, non-i bearing); Additional: 2% (ST, non-i bearing), 2% (MT, i bearing with the National Finance Corporation (NFC))
30 Sep. 83	All banks only Basic requirements: 8% (ST, non-i bearing) 2% (MT, non-i bearing), 2% (MT, i bearing with NFC)
15 Mar. 84	All banks: 8% (ST, non-i bearing) 2% (MT, non-i bearing)
31 Jul. 85	Bank's vault cash included in cash reserves
1 Apr. 86	All banks: 5% (ST, non-i bearing) 2% (MT, non-i bearing)
1 Feb. 91	All banks: 4% (ST, non-i bearing)
21 Jul. 92	All banks: 4% (ST, non-i bearing); additional 1% (ST, i bearing)
26 Apr.93	All banks: 3% (ST, non-i bearing); additional 1% (ST, i bearing)
Aug. 93	All banks: 1.5% (ST, non-i bearing) 1% all other liabilities; additional 1% (ST, i bearing)

D. COMPETITION IN FINANCIAL MARKETS

28 Feb. 83	*Register of Co-operation (ROCO)* ended: this was an agreement among commercial banks which limited competition.
1983	Few new banking institutions stablished prior to 1980. From 1983, a substantial number of new banks were allowed to start operations (1980:50, 1989:60)

Takeovers and mergers:

1989	Nedbank and SA Permanent Society merge to form Nedperm Bank
1991	United, Volskas and Allied Societies form ABSA
1992	ABSA takes over Bankorp (leaves 4 major banking groups)
1994 onwards	Foreign banks enter SA

Financial innovation:

1990s	Credit cards; "Access Bonds" where households can borrow against housing collateral; Pension assets can be used as collateral for mortgage lending

E. SUPERVISORY/PRUDENTIAL REGULATORY CHANGES

1986	*Building Society Act, 1986:* Tax benefits and other advantages giving building societies a

	monopoly of the mortgage market are phased out.
1988	Amendments to banking and building society legislation enacted in 1988 made cash reserve and liquid asset requirements the same for each. Previously building societies required no cash reserve requirements against liabilities to the public, substantially lower liquid asset requirements and no supplementary liquid asset requirements.
1990	*Deposit-taking Institutions Act of 1990:* Banks & building societies brought under the same legislation, save for small mutual building society sector (covered by separate Act)
	F. EXCHANGE RATE LIBERALISATION
1961-1975	Fixed exchange rate regimes of various types
Sep 22 1975	The Rand is devalued 17.85 percent: the new rate is R1.00=$1.15.
Jan 24 1979	A two-tier exchange rate system established: official rate renamed the Commercial Rand and put on a controlled float, applicable to foreign trade, authorised capital transfers and current payments including remittance of dividend and interest payments. Free-floating Financial Rand applicable to non-residents' financial transactions, incl. FDI, repatriation of capital and profits,and outward capital transfers by residents and emigrants.
Feb 7 1983	Dual exchange rates are unified to a controlled float of an Effective Rand.
Sep 2 1985	Two-tier system is re-established, with Commercial and Financial Rands.
Mar 1995	The dual rates are finally unified in a "managed" float
	G. CAPITAL ACCOUNT LIBERALISATION
	Non-residents
Mar 1995	The dual rates are unified (abolition of all controls on the transactions of non-residents)
June, 1996	Local borrowing limit for 100% foreign investors is doubled to 100% of effective capital
	Residents:
13 July 95	Institutional investors are allowed to swap up to 5% of their total assets with foreign investors (insurance companies, pension funds and unit trusts)
June, 1996	The limit on institutional investors for asset swaps is raised to 10%
June, 1996	Financial institutions can place up to 3% of 1995 cash flows abroad in 1996 by end-1996, and easier forex access for corporations wishing to invest in neighbouring states
June, 1996	Exports still have to be repatriated within 7 days, but can offset forex needs for imports within 30 days.
October, 1996	Authorised foreign exchange dealers foreign exchange cash limits doubled to $1.5 billion (since April, 1996 had been allowed to exceed these limits).
March 12, 1997	Reforms announced in Budget speech, effective from July 1997 include: - Corporates can transfer up to R30 million per new investment to countries outside the Common Monetary Area, & up to R50 million per new investment in SADC countries -Firms can raise off-shore financing based on balance sheet strength of their parent co.'s -Long-term insurers, pension funds and unit trusts authorized - in addition to swap facilities previously sanctioned - to transfer capital abroad in 1997 equal to 3% of net inflow of funds to these institutions during 1996, with overall limit of 10% of total assets to be held in foreign-currency denominated securities - Qualifying institutional investors allowed to invest 2% of net domestic income surpluses during 1996 in securities listed on stock exchanges in the SADC member countries, subject to the overall limit of 10% of total assets.

SOURCE: Categories from Bandiera et al (1997). De Kock Commission (1984); SARB Quarterly Bulletins; Money and Banking Statistics of South Africa: 1970-92.

1. Note: adjustments to deposit and lending rates were made at various times to the maximum rates and various classes of intermediaries and liabilities subject to these controls, and coverage and level of credit ceilings was also adjusted on several occasions.

2. Details on the foreign exchange market from Aron et al (1998).
3. Discussion of different monetary policy regimes, including the use of explicit monetary targets (later "guidelines") from mid-1986, is given in the text.