South African Inflation Expectations:
Sensitivity to Surprises

INTRODUCTION

South Africa does not have to look far to observe the destructive effect of extreme price instability. Runaway inflation of the type experienced by her direct neighbour Zimbabwe is pervasive and holds implications far beyond the realm of Economic journals. Most countries are fortunate enough not to suffer such economic- and socio-political upheaval, but that does not mean that they can ignore the risk of price instability. Price instability increases uncertainty surrounding routine economic decisions and it is often monitored by investors as an indication of the macroeconomic health of a country. Comparatively minor price fluctuations today can lead to major stability problems tomorrow if they are not managed. This occurs when businesses, workers and consumers alike come to *expect* major, unchecked price changes.

It is in recognition of this fact that price stability has become a primary goal of modern monetary policy across the globe. The development of Economic theory throughout the 20th century provides governments with insight into the long-term nature of the price-stability challenge. Using instruments such as interest rates to influence prices, policy makers are required to be forward looking, because there can be long time lags between action and results. This can be tough in dynamic economies where the flow of cause and effect is not a one-way street. People participating in economies rationally act in their own interest, so they will respond to changes in, say, the interest rate in ways that may nullify the objectives of the original policy change if they don't believe that policymakers can indeed keep price changes stable.

This is why the latest theory emphasises that policymakers need to *anchor* inflation expectations, through being transparent in their decision making process, credible in the execution of their decisions and consistently-adherent to a rules-based approach. If people perceive these three things to be true, the theory goes, they will trust policymakers to deliver and they will not act in ways that counteract the objectives of the policy.

Looked at in reverse, this means that we can measure the credibility of a country's monetary policy by looking at changes in inflation expectations. If people adapt their *long-term* expectations of price changes when observing surprise changes in other economic variables such as income or input prices, it can be deduced that they do not trust policymakers to control prices in the face of economic shocks.

A recent paper by Monique Reid looks at changes in South African inflation expectations as a result of economic surprises, and concludes that changes in long-term expectations as a result of these occurrences are comparatively small, indicating that people find monetary policy responses to be credible.

HISTORICAL EVIDENCE   Previous analyses have attempted to measure how effectively the South African Reserve Bank (SARB) manages inflation expectations. These typically focused on less formal visual inspection of how macroeconomic variables change over time, giving us clues about how inflation expectations are evolving, or inflation expectations surveys which are only conducted four times a year and for set time periods into the future.

Another gauge of people's view on future price movements is captured by movements of the prices (measured as interest rates) of some financial instruments. For example, if it is believed that prices will rise in the future, people will expect that the SARB will have to raise future interest rates to counter inflation. One way to measure interest rate expectations is to look at the rates associated with financial instruments such as Forward Rate Agreements (FRAs). These are contracts between parties that fix interest rates charged for a future payment of debt. So looking at a 1 month FRA ending in 6 months time gives an indication of what people will expect the future short term (1 month) interest rate to be in 5 months time. Equally, the interest rate offered on a government bond that will be paid back in 5 years acts as a proxy for interest rate expectations in the longer term.

A study by Ballim and Moolman (2005) found a strong correlation between changes in the SARB-controlled repo-rate and short-term interest rates measured by financial instruments maturing in less than 1 year, but this correlation diminished when looking at longer-term rates represented by financial instruments with maturities greater than a year. Importantly, the short-term rate adjustments often occurred before the SARB announced a change in the repo rate. This seems to indicate that the SARB policy responses were (1) predictable and (2) deemed to be credible, since people were so confident that they could predict the SARB's future policy action that they moved in advance of the actual MPC decision in order to profit in the financial markets.

Despite this evidence further analysis is needed for three reasons:

- When identifying the factors leading to changes interest rate expectations, we need to measure the "surprise factor" – i.e. the difference between the predicted value of a variable and the actual or realised value. People form expectations of economic variables based on information available to them. Measuring the surprise factor means that we can more accurately identify the effect of *new information* represented by a shock or unexpected event such as a sudden hike in input prices. Ultimately, we want to measure policymakers' ability to respond to these shocks in a credible way.
- A forward interest rate is one type of interest rate, which is particularly useful in this study as it identifies the expected short term interest rate some time in the future. For example, the expected 1 year interest rate in 5 years time. The interest rates quoted for FRAs are forward interest rates, but they are only available with maturities less than one year and, for the sake of monetary

policy, analysts are more interested in longer term interest rates. Using a number of financial instruments with similar characteristics that mature at different horizons, the forward rates 'implied' by these other interest rates could be calculated (using the method described in Stellenbosch working paper 09/2009). This enabled the econometric analysis adopted in this study by providing the flexibility to calculate forward interest rates for any particular date.

- The observed changes in South Africa need to be compared to other countries to determine whether there is room for improvement (i.e. whether the changes in short-term interest rates in response to repo rate changes should be even smaller).

CHANGES IN INFLATION EXPECTATIONS

Using methodology developed by Sack and Swanson (2005), Reid proposes that we measure changes in inflationary expectations by looking at movements in "forward inflation compensation" (**FIC).**

To understand FIC, we must first define the difference between **nominal** and real interest rates.

If someone invests R1000 at 10% annual interest today, they will have R1100 in one years' time. This accounts for the *nominal* interest received. However, if prices also increase by 10% over that same year, the spending power of that future R1100 will decrease so that it is worth exactly the same as the R1000 today. The *real* interest rate received in this case (taking in to account the spending power of money) is therefore 0%. In other words:

<p align="center">Real Interest Rate = Nominal interest rate – Inflation</p>
<p align="center">OR</p>
<p align="center">Inflation = Nominal Interest Rate – Real Interest Rate</p>

We could calculate this equation using published statistics after the fact, but to look into the future we need to use interest rate and inflation *expectations*:

<p align="center">Expected Inflation = Predicted Nominal Interest Rate – Predicted Real Interest Rate</p>

Forward Inflation Compensation (FIC) is used as a proxy for inflation expectations and it is calculated using forward interest rates. To obtain values for forward interest rates, Reid uses *implied* forward interest rates. Some implied forward rates are expressed in nominal terms, whilst some are adjusted for expected inflation and expressed in real terms. This means we can calculate FIC using the formula below. Note that it is similar to the expected inflation formula above, but that we are now using specifically chosen variables as proxies to complete the calculation:

FIC = Nominal Forward Rate – Real Forward Rate

We can calculate FIC at different time horizons by using the implied forward rates calculated for different horizons. The implied 1 year forward rate ending in 5 year's time for instance, gives us a proxy of what people expect the 1 year interest rates to be between 4 and 5 years in the future, so using 1 year forward rates ending in 5 year's time in our calculation also provides a view of the expected **FIC** between 4 and 5 years in the future.

MODELING CHANGES IN FIC

The *surprise component* in each of the macroeconomic variables listed below is measured by looking at the **difference between the actual reported statistic and the forecasted statistic**:

- CPIX: The consumer price index (measure of average prices paid for consumer goods)
- GDP: Gross Domestic Product (measure of the country's production output)
- CA: Current Account (Difference between the value of exports and imports)
- PPI: Producer price index (measure of average prices paid for wholesale goods)
- REPO: SARB repo rate (lending rate set directly by the SARB)

A model was constructed to measure the impact of the surprise components of changes in these macroeconomic statistics on FIC (as a proxy for inflation expectations). So to what extent did a surprising macroeconomic statistic cause the financial markets to adjust their inflation expectations?

Since South Africa tailored policy to keep inflation within a predetermined target during the period of observation, we expect longer-term FICs to be unaffected by short-term surprises. Previous analyses by Gürkaynack, Levin, Sack and Swanson indicate that this was the case for inflation targeting countries Sweden and England.

THE RESULTS

The table below summarises the results of Reid's own modelling exercise. Starred highlighted variables are deemed to be significant, i.e. they passed statistical tests to insure that their impact on FIC was identifiable and real, rather than representing a false correlation ascribable to anomalies in the modelling data.

TABLE 2: IMPACT OF SURPRISES ON CHANGES IN FIC

Variable	Immediate Impact on spot interest rate	Impact on change in FIC in 1 Year	Impact on change in FIC in 5 years	Impact on change in FIC in 10 years
CPIX surprise	Increase*	Increase*	Increase	Increase
PPI surprise	Decrease	Decrease	Increase	Increase
GDP surprise	Increase	Increase	Decrease	Increase
CA surprise	Decrease*	Decrease*	Decrease	Decrease
REPO surprise	Increase	Increase*	Increase*	Increase
% FIC change explained by the model	9.2%	8.8%	3.9%	0.7%

Two of the 5 surprise variables (changes in CPIX and CA) have a significant impact on change in immediate inflation expectations, whilst 3 of the 5 (changes in CPIX, CA, REPO) have a significant impact on the change in 1-year FIC. In both cases, our model explains about 9% of the overall change in FIC. Tellingly, as we look 5 years and 10 years into the future, the surprise variables all become insignificant, and we are able to explain and predict a far smaller percentage of the change in FIC.

This indicates that people adapt their short-term inflation expectations when observing a surprise or shock, but they trust monetary policymakers to respond effectively and credibly to keep prices in check, so they do not expect uncontrolled price changes to continue in the long run, assuming that no further shocks occur.

INTERNATIONAL COMPARISON

It is interesting to contrast the effects of macroeconomic surprises in South Africa with those in the United States. A study by Gürkaynack, Sack and Swanson (2005) looks at the impact of changes in each of the surprises variables included above on the 1-year FIC ending in 10 year's time (i.e. the expected 1-year interest rate between 9 and 10 years ahead. For South Africa, the effect of all these surprises on changes in FIC becomes negligible within a 10-year time frame (in the case of GDP this happens within just 3 years). In contrast, the effects of the surprise variables in the United States take as long as 15 years to become negligible.

Reid takes this analysis further by looking at previously completed analyses for the US, UK, Sweden and Chile.

TABLE 3: SUMMARY OF INTERNATIONAL RESULTS

Variable	Immediate Impact on spot interest rate	Impact on change in FIC in 10 Years
US: 11 variables used to explain FIC changes		
Number of variables with highly significant impact	8 of 11	3 of 11
Number of variables with slightly less significant impact	2 of 11	2 of 11
% Change Explained by variables	16%	5%
UK before central bank independence: 7 variables used to explain FIC changes		
Number of variables with highly significant impact	5 of 7	2 of 7
Number of variables with slightly less significant impact	0 of 7	2 of 7
% Change Explained by variables	35%	21%
UK after central bank independence: 7 variables used to explain FIC changes		
Number of variables with highly significant impact	6 of 7	1 of 7
Number of variables with slightly less significant impact	0 of 7	0 of 7
% Change Explained by variables	24%	3%
Sweden: 8 variables used to explain FIC changes		
Number of variables with highly significant impact	2 of 8	0 of 8
Number of variables with slightly less significant impact	1 of 8	0 of 8
% Change Explained by variables	7%	1%
Chile: 4 variables used to explain FIC changes		
Number of variables with highly significant impact	1 of 4	0 of 4
Number of variables with slightly less significant impact	0 of 4	0 of 4
% Change Explained by variables	16%	2%

Source: Gürkaynack, Levin and Swanson (2006) except Chile - Gürkaynack, Levin, Marder and Swanson (2005)

Of the countries listed above, Sweden, Chile and the UK (after central bank independence) all follow structured inflation targeting regimes. In all these cases, surprise changes in variables had an initial impact on changes in FIC in the short term.

Long term, none of the surprise variables had a significant impact. In contrast the US and the UK (prior to central bank independence) do not represent inflation-targeting regimes. In the case of the US 5 of the 11 surprise variables still had an impact on FIC over a 10-year window.

CONCLUSION

It therefore seems that countries in this example, which adopt an explicit inflation-targeting framework are better able to anchor inflation expectations. And if expectations are anchored, people are less likely to act in ways that will destabilise prices in future.

The results of this analysis support earlier findings by Mitchell-Innes, Aziakpono and Faure (2007), who claim that South Africa's inflation-targeting regime is maturing. Still, it should be stressed that credibility should not be taken for granted. There are examples of a lack of co-ordination between policymakers and the market, suggesting that there is still room for improvement.

Overall, it seems that inflation targeting in South Africa is proving to be a useful framework for monetary authorities in South Africa to communicate with the public and anchor inflation expectations, although it is important to note that explicit inflation targeting is not the only route to monetary stability. Some successful and influential central banks have chosen not to adopt it. Yet there is an increasing overlap between adopters and non-adopters as far as the principles of a structured approach and clear communication is concerned, aimed at managing market expectations. Whereas the chosen regime offers a useful starting point, central banks are not at liberty simply to rely on the chosen methodology to do the work. Transparent, consistent and credible execution within that framework is just as important.

FURTHER INFORMATION

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FURTHER READING

Reid, M. 2009. *The sensitivity of South African Inflation Expectations to Surprises*. **Stellenbosch Economic Working Papers** **16/09.**