Loud and clear?
Can we hear when the SARB speaks?

MONIQUE REID AND STAN DU PLESSIS

Stellenbosch Economic Working Papers: 11/10

MONIQUE REID
DEPARTMENT OF ECONOMICS
UNIVERSITY OF STELLENBOSCH
PRIVATE BAG X1, 7602
MATIELAND, SOUTH AFRICA
E-MAIL: MREID@SUN.AC.ZA

STAN DU PLESSIS
DEPARTMENT OF ECONOMICS
UNIVERSITY OF STELLENBOSCH
PRIVATE BAG X1, 7602
MATIELAND, SOUTH AFRICA
E-MAIL: STAN@SUN.AC.ZA

UNIVERSITEIT
STELLENBOSCH
UNIVERSITY

BER
BUREAU FOR ECONOMIC RESEARCH

A WORKING PAPER OF THE DEPARTMENT OF ECONOMICS AND THE
BUREAU FOR ECONOMIC RESEARCH AT THE UNIVERSITY OF STELLENBOSCH

Loud and clear?

Can we hear when the SARB speaks?

MONIQUE REID AND STAN DU PLESSIS[*]

ABSTRACT

Inflation targeting is a forward-looking framework for monetary policy that has brought unprecedented transparency to the process of monetary policy. This paper aims to assess the degree to which the South African Reserve Bank's (SARB) Monetary Policy Committee (MPC) has, since the introduction of inflation targeting, successfully communicated to the public its policy analysis, and, in particular, the expected future policy changes. This paper follows international literature (Rosa and Verga (2007), Ehrmann and Fratszcher (2005)) in constructing a numerical index that is used to reflect the information content of the SARB's communications, specifically the monetary policy statements that accompanied each of the MPC meetings since 2000. Relating this index to subsequent policy decisions reveals the informativeness of the index and, by implication, the informativeness of the underlying monetary policy statements. This method allows us to judge, systematically, the degree to which the MPC has communicated successfully, and the evolution of that success over the past nine years. We find evidence that the MPC has succeeded in signalling their likely future policy decision with consistency over this period.

Keywords: South Africa, Inflation targeting, Central bank communication,
Effective monetary policy, forward-looking policy framework
JEL codes: E42, E52, E58

Note: This paper is also available as ERSA Working Paper 155.

---

1.   INTRODUCTION

Communication is increasingly recognised as an essential tool for the implementation of modern monetary policy. Most modern monetary policy regimes, whether inflation targeting regimes or not, identify price stability as their primary objective and recognise that central bank transparency[1] and credibility are crucial to the attainment of this objective. As a result of the broad move towards greater transparency, communication has become part of any modern monetary regime. In order for monetary policy to effectively influence economic decisions, it must influence interest rates along the entire yield curve, but modern monetary authorities only have direct control over the repo rate (or equivalent) at the very short end of this curve. The decomposition of nominal interest rates into real interest rates, inflation expectations and risk premia, as given by the Fisher equation, shows that the South African Reserve Bank (SARB) needs to manage expectations of the future real interest rate as well as inflation expectations if it is to influence nominal interest rates over longer horizons. As a consequence, managing inflation expectations is increasingly recognised as essential for effective monetary policy.

> "For successful monetary policy is not so much a matter of effective control of overnight interest rates as it is of shaping market expectations of the way in which interest rates, inflation, and income are likely to evolve over the coming year and later … not only do expectations about policy matter, but, at least under current conditions, very little else matters."   (Woodford, 2005:15)

Reid (2009) analysed the effectiveness of monetary policy in South Africa, with an emphasis on the communications of the central bank with the public. The results of her empirical tests of the sensitivity of inflation expectations (derived from market interest rates) to macroeconomic surprises, support inferences about the relative predictability of monetary policy and the degree of coordination between the central bank and financial markets. Reid (2009) found that the evident coordination between the SARB and financial markets attests to successful strategic interaction between these parties: although both pursue their own interests, they optimise the interest rate outcome through strategic co-operation. This collaboration has been encouraged by the characteristics of modern monetary policy, such as transparency, accountability, credibility and a commitment to rules-based policies. This does not suggest any duress, but rather that the SARB and financial markets, as players in a strategic game, have decided that it is in their respective best interest to cooperate (Reid, 2008).

Even greater transparency could be achieved, as suggested by Reid (2008), if the SARB published a forecast of the expected path of its policy instrument. In addition to greater transparency, this would emphasise the forward-looking nature of monetary policy and thereby enhance the predictability of the SARB's policy decisions. Presently, only three central banks (the Reserve Bank of New Zealand, the Norges Bank and the Reserve

---

[1] There is, however, ongoing debate about the limits of the benefits of transparency; see, for example, Cukierman (2007).

Bank of Sweden) have any experience with publishing such forecasts, and the impact has not yet been studied empirically (Blinder et al., 2008). Although the SARB does not publish its forecasted interest rate path, it is possible to investigate empirically the implicit forward-looking content of the SARB's communications.

This paper aims to assess the degree to which the South African Reserve Bank's (SARB) Monetary Policy Committee (MPC) has, since the introduction of inflation targeting, successfully communicated to the public its policy analysis, and, in particular, the expected future policy changes. Section 2 introduces the literature that studies the communication of central banks about future monetary policy. The monetary policy inclination index, how it was created and a preliminary discussion of its application to study the SARB's communication about future monetary policy are described in section 3. In section 4 the index is applied to evaluate the *consistency* of the SARB's communication, where consistency is essentially the degree to which the deeds of the SARB match its prior words. The information content of the inclination index is studied from a number of angles, starting with exploratory data analysis and econometric tests, followed by OLS and ordered probit regression analyses. These techniques, jointly, will provide insight into the consistency of the SARB communication about intended future monetary policy. Section 5 concludes.

2.   COMMUNICATION ABOUT FUTURE MONETARY POLICY

The recent paper by Blinder, Ehrmann, Fratzscher, De Haan and Jansen (2008), surveys the theoretical and empirical literature in the field. They describe the compelling move towards greater transparency in central bank communication, which has the goal of improving the management of expectations. Additionally, the authors review the evidence on the contribution of central bank communication to the successful implementation of monetary policy.

According to Blinder et al. (2008), central banks used better communication to increase the signal-to-noise ratio of their interaction with the broad public, including financial markets. From this perspective, literature on the success achieved with better communication can be divided into two strands: first, research about the extent to which the central bank "creates news" considers the impact of central bank communication on financial markets; and, second, research that considers the extent to which central bank communication "reduces noise" examines how these improve the predictability of its policy decisions.

Starting with the first strand, some international research (including Kohn and Sack (2004) and Reeves and Sawicki (2007)) investigates whether a central bank creates news, without considering whether this news moves the markets in the desired direction. The second strand of the literature measures (quantitatively) the communication of the central bank in question, in order to provide an indication of the direction of the communication and to establish whether the markets responded in the desired manner, or whether this just increased volatility (Musard-Gies (2005), De Haan and Jansen (2005), Rosa and Verga (2007), Ehrmann and Fratszcher (2007)).

This literature has been influenced by authors such as Romer and Romer (1989), who adopted a narrative approach – creating indices based on the examination of policy records – to measure the stance of monetary policy. By translating what the central bank communicates about *future* monetary policy into an index, it becomes possible to identify the direction (and the magnitude, if desired) in which the central bank intends to influence the markets. Ultimately, then, one can judge the degree to which this communication was successful.

Two approaches have been adopted in the literature, each offering different advantages. Some researchers, for example, Heinmann and Ullrich (2005), have created an "objective index", which measures the frequency of coding words, whilst avoiding the use of judgement in the construction of the index. Other researchers – Rosa and Verga (2007) and Erhmann and Fratzscher (2005) – have created indices that entail some judgement or interpretation in codifying the communication of the central bank. Rosa and Verga (2007) argue that subjective indices are supported by hermeneutic theory. These indices can be used to investigate the information content of a central bank's communication, which in turn will enable evaluation of the consistency and effectiveness of the monetary policy communication of the central bank.

In South Africa there have been few formal studies of the extent to which the SARB creates news or reduces noise, and these have been limited, primarily, to evaluations of the predictability of monetary policy (Ballim and Moolman (2005), Aron and Muellbauer (2006)), or to the sensitivity of financial markets to macroeconomic surprises (Reid, 2009). All of these previous studies investigate the movement of market interest rates in anticipation of, or in response to, monetary policy *action* (an announcement of the monetary policy decision). This paper contributes to the South African literature through the creation of an index that will allow for direct evaluation of the SARB's *communication* on its possible future monetary policy stance through its regular monetary policy statements.

3. METHOD: MONETARY POLICY INCLINATION INDEX

The concept of consistency is explored comprehensively in section 4, but the assumption is that consistency (in the sense that the central bank's deeds match its prior words) is essential for building the reputation of a central bank. This is supported by Blinder's (2000) finding that central bankers and academic economists share widespread consensus that credibility is exceptionally important to a central bank[2]. In addition, both groups agree that credibility is built mainly through a track record of matching words with deeds - that is, through consistent policy decisions that are communicated to the public.

Monetary policy requires repeated interaction which creates incentives for the bank to communicate in a consistent manner in order to be considered credible. The relevant

---

[2] Although the responses of academic economists reflected far greater dispersion than those of central bankers, the mean response was still 4.23 out of 5, where 5 signified that the respondent believed credibility to be 'of the utmost importance'.

commitment is not to any given path of policy decisions, but rather to the process by which policy decisions are taken. Svensson (2002) calls such a process a targeting rule, in contrast to an instrument rule, where a particular policy-reaction function is itself fixed[3].

This paper evaluates the SARB's communication as a tool of monetary policy. To that end, it assesses the degree to which likely actions indicated in the SARB's communication was followed by policy action consistent with the prior communication. In other words, we evaluate the informational content of the SARB's communication, using a measure of consistency.

The analytical tool used to examine the consistency of the SARB's communication is a subjective index of monetary policy inclination, supported by the hermeneutic argument[4] of Rosa and Verga (2007). However, Rosa and Verga start by forming a glossary of words and phrases that they use as a guide to their index. This was viable for their study of the European Central Bank (ECB) as the ECB uses a "very standardised form of language" (Rosa and Verga, 2007: 149). On a number of occasions, the ECB president even explained his use of a particular term. The same approach did not deliver useful information in the South African case where, to the best of the authors' knowledge, the SARB made fewer explicit attempts to clarify the informational content of any particular word or phrase.

We created an index to capture the information (in terms of the *direction* of change) contained in the official statement after each Monetary Policy Committee (MPC) meeting, with respect to the likely future development of the stance of monetary policy conveyed by the policy statement. Although the SARB uses a number of other communication devices, including monetary policy reviews and monetary policy forums, we focus in this study on the monetary policy statements released at 15:00, directly after the monetary policy committee meetings. The wide publicity attracted by these statements and their higher relative frequency were the important criteria in this decision, but the research could be extended to analyse the other channels of communication in a similar fashion. Apart from the formal channels of the SARB's communication, it might also be instructive to study the information content of other, more informal, communication such as comments by the governor at press conferences. Jac Laubscher (2009) recently argued that the governor's comments at a press conference provided valuable information to assist understanding of the MPC's surprising decision to leave the repo

---

[3] However, Woodford (2003) offers further theoretical complication by showing that commitment to a policy procedure is inconsistent within a standard New Keynesian framework, except if the policy procedure has the additional characteristic that he calls a "timeless perspective". Policy with a timeless perspective is a decision rule that is optimal not only at a point in time, but one that would have been optimal in any earlier period, with the present knowledge of the transmission mechanism. From a timeless perspective the optimal policy procedure for the economy evolves with our knowledge of the economy and with structural changes in the economy.

[4] According to Rosa and Verga (2007), hermeneutic theory and textual analysis emphasise that communication is subjective, and its success depends jointly on the content of the messages sent and their interpretation by the receiver. Hermeneutic theory also highlights the dynamic nature of language, which seems relevant for the analysis of the SARB during a period where, as a young inflation targeter, it was learning to use communication as a monetary policy tool.

rate unchanged in June 2009, but lamented the exclusion of such information from the formal policy statement.

To limit the inherent subjectivity of the method used here, each MPC statement was read and judged independently by two researchers, each of whom assigned a numerical value between -2 and +2 to the statement, reflecting the monetary policy inclination communicated by the statement. Both researchers were asked to provide an overall index value for each statement, after considering the following themes in each statement: comments about headline and core inflation, and expected inflation (especially the SARB's own forecast, the BER's survey of inflation expectations and the break-even inflation rate from the bond market); comments about the business cycle and the output gap; comments about wages and labour-market pressures; comments about money supply; comments about external accounts; and finally, overall comments about the appropriateness of the monetary policy stance. Each researcher had to justify the index value assigned in terms of the aforementioned topics. Following their independent evaluations, the researchers discussed each report and their evaluations in detail to arrive at a consensus index value.

An index value of 0 suggests that the overall message of the statement is that the stance of monetary policy is unlikely to change in the near future (i.e. that monetary policy at the time was appropriate). A value of -1 was assigned when the communication suggested that there is a *possibility* of the interest rate being lowered at the following monetary policy meeting, while -2 reflected communication that suggested an *imminent* easing. Similarly, values of +1 or +2 respectively represented communication of the *possibility* of an interest rate tightening, and an *imminent* interest rate rise.

For example, the MPC statement of 22 April 2004 was given an index value of 0. Although the statement comments on rising inflation, it was still within the target band and the expressions "the inflation outlook over the coming months as well as over the longer term continues to be favourable" and "domestically, most conditions seem to endorse the containment of inflation", suggest that the MPC judged inflationary pressure to be contained. The report's final section (subtitled, "Monetary Policy Stance") concludes that "CPIX inflation will remain within the target range during the forecast period while the economy should pick up momentum", which was interpreted as an indication that the MPC judged the stance of policy to be appropriate at the time.

By contrast, a value of -2 was given to the report following the meeting of 28 May 2009. The MPC had reduced the repo rate at the preceding four MPC meetings, and the following sentences add to the impression that, in terms of inflationary pressures, there was, if anything, an even stronger case for a further easing of monetary policy:

> "The most recent CPI inflation forecast of the Bank shows a relatively unchanged outcome for the near-term as compared to that presented to the previous meeting of the Monetary Policy Committee. Over the longer term, there appears to be a moderate improvement [in the inflation outlook]." (SARB, 2009)

With regard to output, the statement reports that "GDP contraction was broad-based" and "high frequency indicators suggest that the negative trend in GDP growth is likely to continue during the second quarter of 2009, although at a more moderate pace of contraction" (SARB, 2009). The following comment in the final section of the statement cements the authors' view that the SARB was communicating a continuation of its easing stance:

> "The evidence which was presented to the Monetary Policy Committee suggests that the output gap has widened further. This is expected to contribute to an improved inflation outlook, notwithstanding some current inflation inertia." (SARB, 2009)

The monetary policy decision following this statement (25 June 2009) turned out, however, to be a controversial one, and will be discussed in detail in section 4.2.

A challenge faced in the application of the inclination index is the fact that the horizons between meetings varies in our sample period. The dates of the MPC meetings and the resulting horizons between meetings are presented in table I. While the intervals between meetings differ, they have mostly been two months apart[5], with a standard deviation of 0.58, suggesting that the range 1.5 to 2.5 months covers the majority (48 out of 62) of the intervals. The robustness of the regression results in section 4.2 to these changing horizons is evaluated by comparing the results of regressions using an "event horizon" to those using a "calendar horizon".

---

[5] The median interval length is two months.

Table I

		Horizon (months)				Horizon (months)
2000	13 Jan			**2005**	10 Feb	2
	2 Mar	1.5			14 Apr	2
	6 Apr	1			9 Jun	2
	19 May	1.5			11 Aug	2
	15 Jun	1			1 Oct	1.5
	11 Aug	2			8 Dec	2.5
	21 Sept	1.5		**2006**	2 Feb	2
	16 Oct	1			13 Apr	2.5
	16 Nov	1			8 Jun	2
2001	19 Jan	2			3 Aug	2
	16 Mar	2			12 Oct	2.5
	25 Apr	1.5			7 Dec	2
	14 Jun	2		**2007**	15 Feb	2.5
	26 Jul	1.5			12 Apr	2
	20 Sept	2			7 Jun	2
	15 Nov	2			16 Aug	2.5
2002	15 Jan	2			11 Oct	2
	14 Mar	2			6 Dec	2
	13 Jun	3		**2008**	31 Jan	2
	12 Sept	3			10 Apr	2.5
	28 Nov	2.5			12 Jun	2
2003	20 Mar	4			14 Aug	2
	12 Jun	3			9 Oct	2
	14 Aug	2			11 Dec	2
	10 Sept	1		**2009**	5 Feb	2
	16 Oct	1			24 Mar	1.5
	11 Dec	2			30 Apr	1
2004	26 Jan	1.5			28 May	1
	22 Apr	3			25 Jun	1
	10 Jun	1.5			13 Aug	1.5
	12 Aug	2			22 Sept	1.5
	14 Oct	2				
	9 Dec	2				

Note: The horizon lengths are rounded to the nearest 0,5 of a month

4.   CONSISTENCY

In the literature (Rosa and Verga (2007), Erhmann and Fratzscher (2005)), the term *consistency* is used to describe the degree to which the *actions* of the central bank correspond with their previous communication about monetary policy (their *words*). According to Erhmann and Fratzscher (2005: 7), consistency is a "necessary condition if the statements are meant to help markets anticipate better future decisions", and Blinder (1998) argues that it is crucial to building credibility:

> "To me, that is the hallmark of credibility: matching deeds to words. … Credibility means that your pronouncements are believed – even though you are bound by no rule and may even have a short-run incentive to renege. In the real world, such credibility is not normally created by incentive-compatible compensation schemes or by rigid

> precommitment. Rather, it is painstakingly built up by a history of matching deeds to words. A central bank that consistently does what it says will acquire credibility by this definition almost regardless of the institutional structure."

> (Blinder, 1998: 64)

(a) Exploratory Data Analysis

Visual inspection of the indicator variable and the policy rate at subsequent meetings (Figure I) provides the first indications of the consistency of the SARB's communication. The shaded band highlights the values between -1 and 1 (as read off the secondary axis).

Figure I
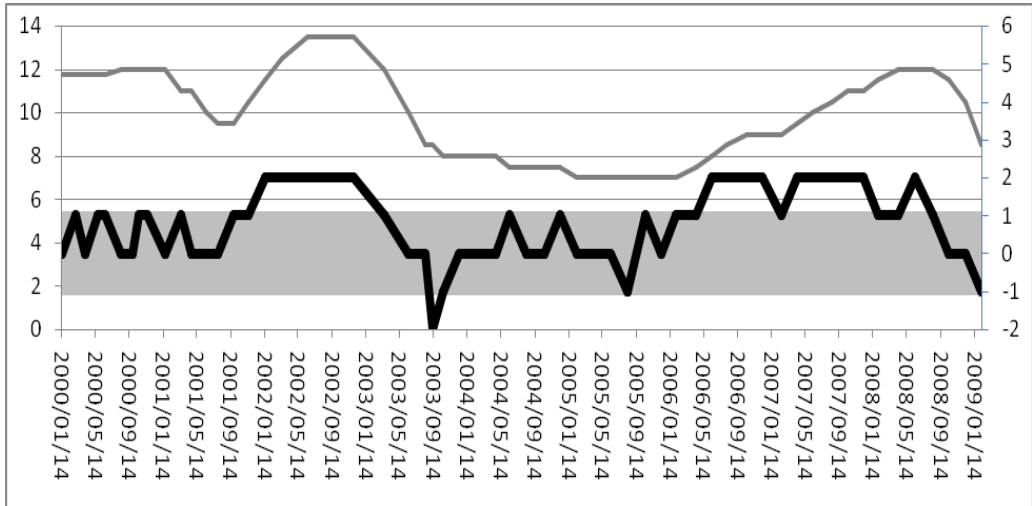
Note: The grey line represents the repo rate at t+3, and the black line represents the index. The shaded area highlights the area between -1 and 1, where the communications are not suggesting an imminent adjustment of monetary policy.

Source: *SARB (repo rate)*
              Own construction (index)

The grey line depicting the repo rate at time t+3[6], i.e. three months after the index value (measured on the primary axis), shows the actual monetary policy decisions over this period. For a central bank to influence market expectations about future policy adjustments, its communication should lead the policy adjustment.

---

[6] The choice to illustrate the repo rate at time t+3 is ad hoc and simply shifts the repo rate line backwards by three months to show that the SARB's communication does precede the actual changes in the repo rate. The SARB's communication will precede the actual repo rate moves by varying horizons with respect to different MPC decisions and the choice to depict the repo rate at t+3 does not impact materially on our interpretation of figure I.

It is important to recognise that central bank communication that merits an index value of 1 or -1, even if it never becomes 2 or -2, is a valuable part of the monetary policy toolkit, acting as a credible threat, if used consistently. Index fluctuations between 1 and 0 in 2000-2001 could simply reflect uncertainty, or learning by a then newly constituted MPC. However, if this kind of communication is understood by the SARB's audience to be consistent, credible, and conditional on the state of the economy, it could be used to manage inflation expectations. It would thereby contribute to price stability without requiring an actual monetary policy change – policy change which could impose other costs on the economy.

Table II

		Repo rate change Period t+1						
		Cut	Unchanged	Rise	Total	p(decline)*	p(unchanged)*	p(rise)*
Index in Period t	-2	3	1	0	4	75.0	25.0	0.0
	-1	2	1	0	3	66.7	33.3	0.0
	0	6	14	1	21	28.6	66.7	4.8
	1	2	12	4	18	11.1	66.7	22.2
	2	0	5	10	15	0.0	33.3	66.7
					61			

*p (decline/unchanged/rise) means the sample probability of decline/unchanged/rise in the repo rate given the index value in each row.

Transition matrices (Tables II and III) provide a more systematic way of evaluating this data to investigate the consistency of the SARB's communication. The monetary policy inclination communicated by the SARB is read horizontally in rows, and the actual monetary policy that transpired is read vertically in columns. Table II assesses the period 2000-2009, whereas Table III evaluates only 2004-2009[7]. An investigation of a period starting a few years after the adoption of inflation targeting (2004 in this case) allows us to compare the full sample with the sample excluding the first four years, and thereby to test the theory that the communication within the inflation targeting framework of the SARB became more consistent as the framework matured.

In these tables, we interpret consistency as follows:
1. Strong consistency: the MPC adjusts the repo rate at its next meeting in a manner consistent with the index value, e.g. a +2 index value is followed by an interest rate rise and a -2 index value is followed by an interest rate cut.
2. Mild inconsistency: the MPC adjusts the repo rate at its next meeting even though the index value had shown only a risk of policy adjustment (e.g. +1 or -1) and not an imminent policy adjustment.

---

[7] In addition, a transition matrix was created which included only MPC decisions where the committee knew that inflation was outside of the target range (i.e. the date on which the CPIX data was released was considered to allow for a lag with regard to data availability). In other words, all the data points where inflation was within the target range were removed from the full dataset. The results do not differ materially from those in the full sample. Communication of a 2 and 1 became 100% consistent and -2 became 90% consistent, whereas communication of a 0 and 1 revealed slightly more hawkish communication than the full sample.

3.   Strong inconsistency: the MPC adjusts the repo rate at its next meeting in a direction inconsistent with the present index value, e.g. cutting the repo rate following a meeting where the index value was +2.

From the first row in Table II it emerges that an index value of -2 was followed by a repo rate cut at the subsequent MPC meeting in three-quarters of the cases, while the repo rate remained unchanged in a quarter of cases. The latter is a mild form of inconsistency, in that the repo rate remained unchanged (the rate adjustment was not imminent). Communication with a value of 2 likewise achieved a high degree of consistency, with a repo rate rise following two-thirds of the cases where such a value is recorded. There was no evidence of strong inconsistency for index values of +2. An index value of zero (the value most frequently observed) was followed by a constant repo rate in two-thirds of the cases, and it is notable that of the seven interest rate adjustments that did follow an index value of zero, six were interest rate cuts. There were only three instances of a -1 index value, and in two of these cases the MPC cut the repo rate at subsequent meetings, keeping the repo rate constant in the third case. These cases present no evidence of strong inconsistency.

By contrast, an index value of 1 (the second most frequent index value) was followed by an unchanged repo rate in two-thirds of the cases, possibly capturing a baseline (or neutral) communication from the SARB, which warns against inflationary risks even when they are not imminent. This would certainly be a reasonable baseline for an inflation-targeting central bank, but it does mean that an index value of +1 should be interpreted as indicating a neutral stance with respect to the expected interest rate path. On two occasions (12 June 2003 and 12 August 2004), a value of 1 was followed by a cut in the repo rate, which indicates strong inconsistency. However, the first of these two can be explained by a correction of the miscalculated inflation figures by Stats SA, rather than by inconsistent communication from the SARB. The event on the 12 August 2004 is evaluated in further detail in section 4.2.

We can test formally whether there is any relationship between the index values in the rows and the subsequent interest rate decisions in the columns of Table II, using the Pearson test statistic. The null hypothesis in this procedure is *independence*, i.e. no relationship between the rows and columns, compared with an alternative of *dependence*. Rejecting the null hypothesis is evidence that the index value is associated in a significant manner with particular outcomes for subsequent interest rate decisions. The Pearson test statistic for Table II is 32.13, which is larger than the critical value of the appropriate chi-squared distribution with 8 degrees of freedom, even at significance levels as exacting as one-tenth of a percent. While these results suggest that there is a relationship between the index and subsequent interest rate decisions, it does not reveal the nature of that relationship, a question to which we return with appropriate techniques, below.

Table III

Starting in 2004	Repo rate change Period t+1						
		Cut	Unchanged	Rise	Total	p(decline)*	p(unchanged)*	p(rise)*
Index in Period t	-2	2	1	0	3	66.7	33.3	0.0
	-1	1	1	0	2	50.0	50.0	0.0
	0	3	8	0	11	27.3	72.7	0.0
	1	1	5	3	9	11.1	55.6	33.3
	2	0	3	7	10	0.0	30.0	70.0
					35			

*p (decline/unchanged/rise) means the sample probability of decline/unchanged/rise in the repo rate given the index value in each row.

The data in Table III, representing the results for the period 2004 to 2009, is very similar to the full sample, with only a few exceptions. Communications awarded an index value of -2 or -1 were a little less likely to be followed by an easing of monetary policy than for the full period, and communications awarded an index value of 2 or 1 were slightly more likely to be followed by a tightening of the repo rate. Communications awarded an index value of 0 were more likely to be consistent (followed by unchanged monetary policy) and never to be followed by monetary policy tightening. Repeating the Pearson test for independence in Table III yields a test statistic of 20.43, which rejects the null hypothesis of independence very comfortably at a 1% level of significance.

(a i) Inflation surprises versus policy confusion

Buliř, Šmidková, Kotlán and Navrátil (2008: 9) make an important distinction between "inflation surprises" and "policy confusion". They recognise that a central bank's deeds can turn out differently from its prior words for two reasons: One possibility is that the central bank did communicate clearly, but that the macroeconomic environment subsequently changed in such a way that the Bank understandably had to depart from the policy direction communicated previously. Buliř et al. call such cases, "inflation surprises". Another possibility is that inconsistency between prior communication and subsequent policy might reflect poor communication by the central bank, so creating what Buliř et al. call "policy confusion". Careful study of the circumstances behind each apparently surprising decision is required to distinguish between these two cases.

Table IV identifies occasions on which analysts and financial markets were surprised. The first two columns show the dates and interest rate decisions that were to some extent controversial. In the third column ("Reuters surprise"), the difference between the median of the Reuters Econometer forecast[8] for the repo rate and the actual subsequent monetary policy decision identifies when and in which direction the analysts were surprised. The fourth column identifies policy announcement dates on which the change in the Banker's Acceptance rate (BA rate) moved more than 0.25%. This was indicator of a market surprise, and the threshold change of 0.25% was calibrated to identify days on which the markets were substantially surprised. Using media reports together with speeches, media releases, Monetary Policy Reviews and Quarterly Bulletins published on

---

[8] A survey by Reuters of forecasts made by a panel of professional economists.

the SARB's website to contextualise these surprises, potentially allows us to distinguish between inflation surprises and policy confusion.

The fifth column of Table IV shows the monetary policy inclination index for each of these decisions (the index value assigned at the previous meeting reflecting the policy inclination relevant to each decision). This column will help us to distinguish between "inflation surprises" (i.e. unanticipated changes in the economy) and potential "policy confusion" (i.e. policy surprises attributable to inefficient communication, as opposed to economic shocks).

The final column identifies those interest rate decisions that could be classified as instances of potential "policy confusion" based on this method. It should be noted, however, that this column is likely to overstate the instance of policy confusion (it is an upper bound) as the index is based on the monetary policy report alone, and disregards the other mechanisms by which the SARB communicates with the public. Consequently we investigated each instance of potential 'policy confusion' by studying speeches, media releases, monetary policy reviews and Quarterly bulletins that were available on the SARB's website prior to each of these meetings, to discover any communication that might have prepared the public for the subsequent MPC decision. Such communication might reveal that the economic environment had changed, or that the SARB was evaluating it differently. Finally, numerous media reports were evaluated following each case of potential policy confusion to assess whether the media anticipated (for example from communication not published on the SARB's site) the changed stance of the SARB.

Table IV

Date	Interest rate decision	Reuters surprise	Change in BA Rate	Index	Confusion
2001/06/14	-100bp	#N/A	-0.82	0	X
2001/09/20	-50bp	#N/A	-0.4	0	X*
2002/01/15	+100bp	#N/A	0.45	1	
2002/09/12	+100bp	#N/A	0.37	2	
2003/06/12	-150bp	#N/A	-0.6	1	X*
2003/09/10	-100bp	#N/A	-0.32	0	X*
2003/10/16	-150bp	#N/A	-0.61	-2	
2003/12/11	-50bp	#N/A	0.35	-1	
2004/08/12	-50bp	#N/A	-0.66	1	X
2005/04/14	-50bp	-0.5	-0.57	0	X
2006/06/08	+50bp	0.5	0.38	1	
2006/10/12	+50bp	-0.5	0.04	2	
2007/02/15	0	0	-0.29	2	X
2007/10/11	+50bp	0.5	0.253	2	
2008/04/10	+50bp	0.5	0.237	1	
2008/06/12	+50bp	-0.5	-0.384	1	
2009/02/05	-100bp	0	-0.412	0	
2009/03/24	-100bp	-1	-0.1	-1	
2009/04/30	-100bp	1	-0.232	-2	
2009/06/25	0	0.5	0.201	-2	

Note: The Reuters panel did not forecast the repo rate at the beginning of the period; hence, the N/A values in the first column. In columns 3 and 4, x's are used to identify dates on which each of the variables measured a surprise, and the (+) or (-) indicates the direction of the surprise. The *'s in the final column identify the decisions which are readily explainable and can therefore be classified as inflation surprises rather than policy confusion.

Of the twenty interest rate surprises shown in Table IV, seven were identified as instances of potential "policy confusion" (marked with an X), and three of these are readily

explicable, as shown below: the unexpected reduction of the repo rate in September 2001 both surprised the markets and was not anticipated by the index, but should be classified as an inflation surprise due to a technical adjustment of the repo rate[9] and the September 11 attacks on the World Trade centre, just prior to the policy decision. The June 2003 policy decision (which wrong-footed the markets and the index) was also an inflation surprise, because Statistics South Africa (Stats SA) acknowledged on 26 May 2003 that inflation statistics had been overstated for some time, resulting in a clamour for immediate repo rate adjustments (Loxton, 2003). Finally, the surprise decision in September 2003 was made at an unscheduled meeting of the MPC, following the rapid change in the economic environment, which implicitly suggests that this was an inflation surprise[10].

We are left with four instances of potential "policy confusion" out of 20 interest rate surprises and more than 60 policy meetings. The evidence for an "inflation surprise" will now be considered for each of these: Starting with the decision of 14 June 2001, where the MPC surprisingly cut the repo rate by 100bp. The degree of surprise can be read in the associated 82bp decline of the BA rate. The SARB released one speech by Governor Mboweni (on 14 May 2001) and 4 press releases in the interval between this meeting and its immediate predecessor. The press releases contained no information regarding the inflation outlook, and while the Governor's speech, entitled "Volatility of the currency and its impact on monetary policy" touched on domestic economic developments it gave no indication of a change to the inflation outlook. In fact, the concluding comments encouraged the audience to 'sit tight, grit our teeth and suffer in silence', and 'inflation is coming down slowly but surely. Further evidence that the public had not been prepared for the interest rate change can be seen in the media's response, e.g. Business Day (15 June 2010) wrote that "Mboweni's pre-emptive strike caught even the most optimistic by surprise…"

On the 12th of August 2004 the MPC cut the repo rate by 50bp, which surprised the market to the extent that the BA rate decline by 66bp. The monetary policy inclination index stood at 1 following the preceding MPC meeting. Of the five media releases by the SARB in the interval none were relevant for the inflation outlook. Nor did the Quarterly Economic Review section of the SARB's Quarterly Bulletin (released on 24 June 2004) suggest a change in the inflation outlook. Governor Mboweni gave three speeches in the interval, on the 22nd and 27th of July and the 5th of August respectively. The former contained a general discussion of factors impinging on inflation (both positively and negatively) as well as suggesting that inflation might breach the upper bound of the target

---

[9] The technical adjustment of the repo rate on 5 September 2001 was aimed at improving the functioning of the money market in South Africa (SARB, 2001) and should therefore not be seen as an adjustment of the policy stance.

[10] The international context for these surprises should not be forgotten: During the period from late 2001 until 2005 the Federal Reserve Board in the USA kept its policy interest rate (the Federal Funds Rate) at a markedly lower level than would have been suggested by an application of the Taylor rule – that had hitherto correlated closely with the Fed's policy stance (Taylor, 2009). While there is no suggestion of a simple relationship between interest rates in the USA (or elsewhere) and the repo rate in South Africa, the SARB had to weigh up the unusually large spread between local and international interest rates against the concomitant effects on capital flows and the exchange rate of its policy decisions during this period.

temporarily, but nothing suggested an improvement in the inflation outlook that would justify an easing of policy. The remaining two speeches did not concern domestic economic developments. Finally, the media was taken completely off guard by the MPC's decision, for example Business Day's headline on 13 August 2004 read "Markets rocked by Mboweni's rates shock" and they referred to the previous meeting where the Governor had "…signalled at the time that the rate-cutting cycle had ended, saying 'the party was over'". SARB Press releases, speeches or other communications accessible to the media did not therefore prepare the public for the policy decision of 12 August 2004.

The circumstances surrounding the policy decision of 12 August 2004 were further clouded by the arrival of a delegation of trade union representatives and management from the Chamber of Mines at the SARB on the final day of the MP meeting. Their purpose was to hand a memorandum to the Governor "demanding immediate steps to weaken the currency's value" (Phasiwe, 2004). Interrupting an MPC meeting to meet with a delegation intending to pressurise the committee was, with the benefit of hindsight, probably an error of judgment. It was doubly regrettable since the MPC surprised the markets by lowering the repo rate at that meeting (Laubscher, 2009). The confluence of a surprising repo rate reduction with an inappropriate accommodation of interest groups pressurising for just such a decision might have undermined the perceived independence of the SARB.

On the 14th of April 2005 the MPC cut the repo rate by 50bp, which caused a market surprise that pushed the BA rate down by 57bp and was 50bp below the expectations summarised in the Reuter econometer. While the December 2004 SARB Quarterly Bulletin referred to moderating inflation it also mentioned firm economic growth, giving no clear indication of an change in the assessment on the domestic outlook. Certainly, the media did not anticipate the policy adjustment, with the Business Day observing that "… last week's statement has had analysts reading between and beneath the lines in an attempt to puzzle out what really motivated the committee."

On the 15th of February 2007 the MPC kept the repo rate constant, in line with the expectations summarised by the Reuters Econometer), but not in line market expectations where the surprise could be read in the associated 29bp BA rate decline. The monetary policy inclination index stood at plus 2, suggesting an imminent rate rise. In the interval between this meeting and it's predecessor the SARB released a Quarterly Bulletin which referred to a 'robust economy' where 'domestic expenditure continued on its robust expansion path', wages were edging higher and CPIX that had 'picked up significantly' although it 'remained well within the target area'. While this description of the economy does not itself suggest an imminent rate rise, it does not contradict the preceding monetary policy statement where that intention was more clearly flagged. In this instance the press was not as sharply critical of the MPC's decision, though they did nit report any prior information that suggested circumstances or their analysis thereof had changed since the previous meeting.

In summary, the evidence suggests that one four occasions (June 2001, August 2004, April 2005 and October 2007) the MPC's decisions were surprising for reasons not easily

attributable to changing economic circumstances[11], at least not as communicated by the SARB to the public in any of the platforms analysed here. Given that the method used in this paper is likely to overstate the number of interest rate surprises, the evidence suggests that the SARB has communicated its intentions about the future direction of policy with considerable success over the period studied.

(a ii) Turning points

Some of the most challenging policy decisions which the MPC has had to communicate were the turning points of the policy cycles - 14 June 2001, 15 January 2002, 12 June 2003, 8 June 2006 and 11 December 2008. The second and third turning points (15 January 2002 and 12 June 2003) coincided with inflation surprises discussed in the previous section, so it is inappropriate to assign these to poor communication. However, the first turning point (14 June 2001) was clearly a substantial surprise to financial markets and was not predicted by the index (see Table IV). The fourth (8 June 2006) surprised the Reuters panel, financial markets, and elicited media criticism (Joffe, 2006). In this case, the index corresponding to this policy decision was 1, also indicating mild inconsistency. The final turning point (11 December 2008) is interesting in that it did not surprise the Reuters panel or financial markets much (it is therefore not identified in Table IV), but the index did not predict the turning point at all (the index value was 0). In summary, the SARB has found it much more difficult to communicate likely turning points in the interest rate cycle, an unsurprising result given the inherent difficulty of the decisions involved.

(b) Regression analysis

In this section, the approach of Rosa and Verga (2007) is adopted to begin a process of describing the information content of the index. Firstly, the change in the SARB's instrument rate (the repo rate) is regressed on the index variable, while controlling for the technical adjustment of September 2001 with a dummy variable.

$$(Repo_{t+m} - Repo_t) = \alpha + \beta_t Index + \beta_t Tech\_adj_t + \varepsilon_t$$

The results of the regressions for m=1 to m = 6 (i.e. the change in the repo rate between time t and the repo rates one, two, three, four, five and six months later) are presented in Table Va. The estimates for the coefficient on the variable "index" should provide an indication of the relationship between the change in the actual repo rate and the index value, or the amount of information provided by the index on future monetary policy decisions.

---

[11] Mention should also be made of the case of June 2006: although our method does not identify it as potential policy confusion. The media lamented the lack of transparency surrounding the monetary policy decision, claiming that despite warnings of a possible rate hike by the Governor of the South African Reserve Bank, the available data and the Reserve Bank's communication had not convinced the market that the threat was credible (Joffe, 2006). Although our index did reflect that the SARB had communicated the possibility of a rise in the future (an index value of 1), the Reuters Econometer was surprised by 0.5 and the BA rate by 0.38, reflecting that they had not believed the rise was imminent.

Table Va

	m=1	m=2	m=3	m=4	m=5	m=6
Constant	-0.021	-0.257***	-0.458***	-0.604***	-0.743***	-0.819***
Index	0.010	0.271***	0.444***	0.570***	0.723***	0.814***
Tech_adj	0.010	-0.014	0.015	1.034***	1.020***	2.005***
R-squared	0.006	0.351	0.330	0.351	0.348	0.328
observations	58	58	58	58	58	58

Note: OLS regressions at various horizons, using the index and a dummy variable for the technical adjustment as explanatory variables. White heteroskedasticity-consistent standard errors were used. ***, ** and * signify that a variable is significant at the 1%, 5% and 10% levels.

The weak results for m=1 can be explained by the fact that most of the MPC meetings took place every second month, so there is very little movement in the dependent variable at t+1 (one month after the statement). From m=2 to m=6, the coefficient estimates of the index are positive and significant (increasing in size as the horizon lengthens), and the R-squared is between 0.328 and 0.351, which suggests that the index does indeed have informational content[12].

The coefficient on the index suggests that a statement which signalled an imminent monetary policy tightening (an index value of 2) was on average followed by 50 and 100 basis point increases in the repo rate within the following two and four months respectively. These coefficients are larger in magnitude than those estimated by Rosa and Verga (2007) for the ECB, which is unsurprising as the monetary policy adjustments by the SARB (in the context of an emerging market economy) are usually greater than those of the ECB. In line with the results of Rosa and Verga (2007), the constant was negative and significant at all horizons, which could reflect that the communication tended to emphasise greater inflation risk (tendency toward monetary policy tightening) than what usually materialised.

As a robustness check, the regressions were estimated with alternative index values independently scored by Reid prior to consultation with Du Plessis. These results (shown in Table Vb) do not differ substantially from the combined index[13].

Secondly, OLS regressions using dummy variables for each of the five possible index values, rather than a continuous variable "index", were estimated to determine whether the values of the index displayed a cardinal or ordinal relationship. This will provide insight into how this index can be used appropriately in further studies. Again, the technical adjustment of September 2001 was controlled for by including a dummy variable.

$$(Repo_{t+m} - Repo_t) = \beta_1 D_{-2} + \beta_2 D_{-1} + \beta_3 D_0 + \beta_4 D_1 + \beta_5 D_2 + \beta_6 Tech\_adj_t + \varepsilon_t$$

---

[12] The regressions were estimated with alternative index values independently scored by the first author prior to consultation with the second author. These results (shown in the appendix) do not differ substantially from the combined index, which suggests that the results are robust despite the subjective nature of the index.

[13] As with the transition matrix, this regression was re-run including only points where inflation was outside the target range. The results were similar, but a little stronger.

Table VI

	m=1	m=2	m=3	m=4	m=5	m=6
D -2,t	0	-1.50***(NA)	-1.50***(NA)	-2.00***(NA)	-2.00***(NA)	-2.00***(NA)
D -1,t	0	-0.50**	-0.83	-1.17	-1.17	-1.17
D 0,t	-0.04	-0.20*	-0.45***	-0.62**	-0.86***	-0.95***
D 1,t	0	0.03	-0.03	0.06	0.06	-0.03
D 2,t	0	0.23***	0.43***	0.47***	0.70***	0.90***
Tech_adj	0	-0.03	0.03	0.94***	0.94***	2.03***
R-squared	0.02	0.41	0.33	0.36	0.36	0.34
observations	58	58	58	58	58	58

Note: OLS regressions at various horizons, using dummy variables for each of the index values and a dummy variable for the technical adjustment, as explanatory variables. White heteroskedasticity-consistent standard errors were used. ***, ** and * indicate that a variable is significant at the 1%, 5% and 10% levels.

Again, m=1 is uninformative due to the fact that most of the MPC meetings are two months apart. The regression outputs show that the coefficients on three of the index values (-2, 0, 2) are significant, suggesting that these values of the index contain fairly reliable information. The signs of the coefficients on the dummy variable for index values -2 and 2 are as expected, but the coefficient for the index value 0 is negative and significant (although much smaller than the coefficients for -1 and -2). This supports the interpretation following the regression using the continuous variable "index", that communications have a slight bias towards overstating the inflation risk.

Wald tests were used to determine whether the index was ordinal or cardinal in nature (whether a 2 (-2) reflects double the upward (downward) inflation risk that a 1 (-1) does).

The Wald test null hypothesis that $\beta_1 - \beta_2 = \beta_2 - \beta_3$,
$\beta_2 - \beta_3 = \beta_3 - \beta_4$,
$\beta_3 - \beta_4 = \beta_4 - \beta_5$

was firmly rejected at all horizons, suggesting that the relationship between the coefficients (different values of the index) is ordinal, but not cardinal.

This outcome and the fact that the index comprises discrete outcomes motivated the use of an ordered probit model to further test the robustness of the results. Due to the previous conclusion that the index values have an ordinal rather than cardinal relationship, this ordered probit contained the dummy variables for each index value, and the technical adjustment, as regressors.

The dependent variable in the OLS regression was the interest rate change over fixed calendar periods (2 months, 3 months, etc,). In contrast, the dependent variable in the ordered probit model is interest rate change between successive meetings, with these meetings spaced irregularly over the calendar. The consistent results for the two models show, however, that our inference does not depend on either of the two expressions for changes to the interest rate path.

The ordered probit results were then used to investigate the number of type I and II errors that arose from the regression model.

Table VII

Index prediction	True positives	False positives	True negatives	False negatives
Interest rate decline	5 (71.4%)	2 (28.6%)	46 (83.6%)	9 (16.4%)
Unchanged	26 (65%)	14 (35%)	15 (68.2%)	7 (31.8%)
Interest rate rise	10 (66.7%)	5 (33.3%)	42 (89.4%)	5 (10.6%)

Table V summarises the predictive ability of the ordered probit model based on the index values described above. There are three rows in the table, each of which considers potential type I and II errors by the model with respect to the following predictions: an interest rate decline (in row 1), an unchanged interest rate (row 2) and an interest rate rise (row 3). The first two data columns show the proportion of true and false positives, e.g. in 71.4% of the cases where the model predicted an interest rate cut, an actual interest rate cut followed at the subsequent meeting. In two-thirds of the cases where the model predicted an interest rate rise, the MPC raised the repo rate at the subsequent meeting. The second column provides an empirical estimate of the model's type I forecasting error, and the highest type I error is 35% for the "unchanged" signal.

The final two data columns show the proportion of true and false negatives, e.g. in 83% of the cases where the model suggested there would not be an interest rate cut, the MPC did not reduce the repo rate at their next meeting, and in 89.4% of the cases where the model suggested there would not be an interest rate rise, the MPC followed suit. The final column is, therefore, an empirical estimate of the model's type II prediction error for the three relevant categories. It is encouraging that the type II error never rises above 32%.

Finally, it is notable that the type I and II errors are both highest for the model's ability to predict no change in the repo rate. An index value of zero should therefore be interpreted as indicating (i) that the MPC did not communicate a likely future change in the policy stance and (ii) uncertainty about the likely future policy direction. Positive signals, whether indicating a likely rise or decline in the repo rate, seem to have been communicated with greater accuracy.

5.   CONCLUSION

The role of communication is widely recognised as a valuable tool for the implementation of modern monetary policy, but research has tended to focus more on the effects of the *actions* of central banks, rather than their *communication*. A numerical index was constructed to reflect the monetary policy inclination communicated by the SARB's MPC statements. This index was applied in a number of ways to investigate the nature and success of the communication of the SARB. Exploratory data analysis and formal econometric tests revealed commendable consistency in the communication contained in the MPC statements, which was supported by more formal regression analyses. Our evidence

suggests that the MPC has succeeded in signalling its likely future policy decisions with admirable consistency over this period.

APPENDIX

Table Vb

	M=1	M=2	M=3	M=4	M=5	M=6
Const	-0.020	-0.225**	-0.398***	-0.523***	-0.632***	-0.684***
Index	0.010	0.259***	0.410***	0.522***	0.649***	0.717***
Tech_adj	0.020	0.225**	0.398***	0.152***	1.632***	2.684***
R-squared	0.007	0.427	0.378	0.391	0.374	0.338
Observations	58	58	58	58	58	58

Note: OLS regressions at various horizons, using Reid's index and a dummy variable for the Tech_adj(technical adjustment), as regressors. White heteroskedasticity-consistent standard errors were used. ***, ** and * represent that a variable is significant at the 1%, 5% and 10% levels.

References

ARON, J and MUELLBAUER, J. (2006). Review of Monetary Policy in South Africa since 1994. *Revised Version of a paper prepared for a joint CSAE Stellenbosch University conference: South African Economic Policy Under Democracy: a 10 Year Review, 27/28 October 2005.*

BALLIM, G, and MOOLMAN, E. (2005). Testing the potency of transparency of the South African Reserve Bank's inflation targeting policy. *Hardcover, Standard Bank.*

BLINDER, A. 1998. Central Bank in Theory and Practice.

BLINDER, A, EHRMANN, M, FRATZSCHER, M, DE HAAN, J and JANSEN, D. (2008). Central Bank Communication and Monetary Policy: A Survey of Theory and Evidence. *Journal of Economic Literature*, vol. 46(4), December 2008.

BULIř, A, ŠMIDKOVă, K, KOTLáN, K, and NAVRáTIL, D. (2008). Inflation Targeting and Communication: It Pays off to Read Inflation Reports. *IMF Working Paper*, No 234, October 2008.

CUKIERMAN, A. (2007). The Limits of Transparency. London, *CEPR Discussion Paper* 6475

DE HAAN, J and JANSEN, D. (2005). Talking Heads: The Effects of ECB Statements on the Euro-Dollar Exchange Rate. *Journal of International Money and Finance*, 24(2):343-361.

ERHMANN, M AND FRATZSCHER, M. (2005). Transparency, Disclosure and the Federal Reserve. *European Central Bank, working paper no. 457*, March 2005.

HEINMANN, F and ULLRICH, K. (2005). Does it Pay to Watch Central Bankers' Lips? The Information Content of ECB Wording. *Centre for European Economic Research*, Discussion Paper 05-70.

JOFFE, H. (2006). Bank must get message right on next interest rate movement. *Business Day*, 18 July 2006.

KOHN, D and SACK, B. (2004). Central Bank Talk: Does it Matter and Why? *In: Macroeconomic, Monetary Policy, and Financial Stability*, Ottawa: Bank of Canada, 175-206.

LAUBSCHER, J. (2009). Reserwebank moet beleid beter kommunikeer. *Die Burger*, 1 July 2009, pp 2.

LOXTON, L. 2003. Interest rates may drop after stats blunder. *The Cape Times*, May 27, 2003, pp 1.

MUSARD-GIES, M. (2005). Do ECB's statements steer short-term and long-term interest rates in the euro zone? *The Manchester School*, 74 (Supplement): 116-39.

PHASIWE, K. 2004. Unions, bosses join forces to tackle Mboweni on rand. *The Business Day*, 12 August 2004, pp 1.

REEVES, R and SAWICKI, M. (2007). Do Financial Markets React to Bank of England Communication? *European journal of Political Economy*, 23(1): 207-27.

REID, M.B. (2008a). Communication in the Strategic Game of Monetary Policy: Proposal for an Interest Rate Forecast. *Unpublished Masters Dissertation*, March 2008.

REID, M.B. (2009). The Sensitivity of South African Inflation Expectations to Surprises, *South African journal of Economics, forthcoming September 2009.*

ROSA, C. and VERGA, G. (2007). On the Consistency and Effectiveness of Central Bank Communication: Evidence from the ECB. *European Journal of Political Economy*, 23(1):146-75.

SOUTH AFRICAN RESERVE BANK. (2009). Statistical and Economic information. Available at: http://www.reservebank.co.za [Accessed 01 04 09]

SOUTH AFRICAN RESERVE BANK. (2001). Monetary Policy Review, October 2001. Available at: http://www.reservebank.co.za [Accessed 18 08 09]

SVENSSON, L.E.O. (2002) What Is Wrong with Taylor Rules? Using Judgement in Monetary Policy Through Targeting Rules. Cambridge, Ma. *NBER* working paper 9421.

TAYLOR, J. B. (1997). "A core of practical macroeconomics." *American Economic Review* 87(2): 233-235

WOODFORD, M. 2003. *Interest and Prices: Foundations of a Theory of Monetary Policy*. Princeton: Princeton University Press.

WOODFORD, M. 2005. Central-Bank Communication and Policy Effectiveness. Presented at the Federal Reserve Bank of Kansas City Symposium "The Greenspan Era: Lessons for the Future". Jackson Hole, Wyoming, August 25-27, 2005.