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CENTRAL BANK COMMUNICATION: A SURVEY AND CONTENT ANALYSIS OF THE SOUTH AFRICAN RESERVE BANK'S MONETARY POLICY COMMITTEE STATEMENTS

ARNOLD SEGAWA

STUDENT NUMBER: 1974701

WITS BUSINESS SCHOOL

FACULTY OF COMMERCE, LAW AND MANAGEMENT

UNIVERSITY OF THE WITWATERSRAND
JOHANNESBURG

A thesis submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, Johannesburg, in fulfilment of the requirements for the degree of Doctor of Philosophy.

Johannesburg, 2022.

Declaration

I declare that this thesis is my own, unaided work, other than where specifically acknowledged. It is being submitted for the degree of Doctor of Philosophy in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in any other university.

Signed this 4th day of November 2022



ARNOLD SEGAWA

STUDENT NUMBER: 1974701

WITS BUSINESS SCHOOL

FACULTY OF COMMERCE, LAW AND MANAGEMENT

UNIVERSITY OF THE WITWATERSRAND

JOHANNESBURG

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Abstract

The South African Reserve Bank (SARB), South Africa's central bank, adopted inflation targeting in 2000. In 2000, the SARB adopted flexible inflation targeting as a monetary regime and in doing so, set its inflation target at 3%–6% for the CPIX (Coco and Viegi, 2020). However, for inflation targeting to prove effective, it remains vital that the monetary institution in question contains the expectations of the private sector primarily in line with the expectations channel of the transmission (Svensson, 1999). To this end, the role of effective communication has in the past two decades proved vital in monetary policy.

This PhD dissertation seeks to evaluate the SARB's communication strategy, with particular emphasis on its Monetary Policy Committee (MPC) statements, and thereafter appraise its interaction with the media and other market agents. This evaluation takes the shape of three studies, with particular focus firstly on SARB's MPC statements over the past twenty-one years. This study assesses whether there has been more clarity in SARB's communication over the past twenty-one years by relying on the Flesch and Flesch-Kincaid methods, which are widely accepted in central bank communication literature. In evaluating SARB's communications and upon surveying the data, this section offers empirical evidence about SARB's MPC meeting statements spanning more than two decades, clearly exhibiting its evolution.

The second facet of the study examines whether the SARB's MPC communications between 2010 and 2021 triggered causality in the subsequent news reports from the Mail & Guardian newspaper in South Africa. The study examines whether SARB's post-MPC statements' readability was reciprocated in the subsequent Mail & Guardian newspaper articles. Relying on the Flesch-Kincaid Grade Level score and Flesch Reading Ease Score methodology to survey both SARB's MPC statements and the corresponding Mail & Guardian newspaper articles, a computation is created that is subsequently used to examine Granger causality.

The section concludes that although there may appear to be a co-movement between SARB's MPC statements' Flesch-Kincaid Grade Level score and Flesch Reading Ease Score to the Mail & Guardian's newspaper articles' Flesch-Kincaid Grade Level score and Flesch Reading Ease Score, the Granger casualty test reveals that there is no causality between the two variables.

The third section examines SARB's MPC statements' tone and sentiment between 2000 and 2021 using the Besigye-Segawa's TextBlob polarity and subjectivity calculator, which measures central bank communication tone and sentiment using the Loughran-McDonald dictionary's word classification to gauge the polarity (positivity and negativity) and subjectivity (objectivity and subjectivity) of SARB's MPC communications. The study then uses SARB's tone and sentiment results as a leading indicator to examine causality with inflation expectation results from the Bureau of Economic Research (BER) results survey. The systematic analysis relies on the Granger causality test to show causality of the MPC statements' tone and sentiment on successive BER inflation expectations, thus justifying the need for effective communication as SARB's MPC communications' polarity and subjectivity ultimately have a causal effect on inflation expectations.

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1. INTRODUCTION

Communication is an integral element of monetary policy in many developing, developed and emerging economies. Undeniably, central bankers have made great efforts to improve transparency and accountability to the public (Eijffinger and Geraats, 2006; Dincer and Eichengreen, 2009). As central banks move towards the transparent path, they increasingly provide the public with a wealth of information from inflation reports, press releases and press conferences.

The last three decades have seen drastic change in central bank transparency, buoyed by outright accountability and communication. However, it is imperative to acknowledge the role of a transparent central bank in modern-day monetary economics (Haldane and McMahon, 2018). The evolution has seen central banks go as far as explaining their policy actions and forecasts to the public in greater detail both as regards monetary policy and financial stability (Dincer and Eichengreen, 2014).

At the end of the 2008 global financial crisis, many central banks were faced with a battle to return their economies to positive growth, and this saw many central bankers opt for a rather unconventional easing of monetary policy. As policy rates approached the effective lower bound (ELB), they had to resort to unusual policies, and one monetary tool that gained popularity was forward guidance. ELB being the point beyond which any further monetary policy in the same direction is counterproductive. Because policy rates were already approaching zero (or at zero for some central banks), further easing of policy rates was almost unproductive and a promising solution was to simply manage expectations about the future course of policy. This in itself helped morph communication into a monetary policy tool (Ehrmann et al., 2019). Natvik et al., (2019) delve deeper into the effects of communication on forward guidance in Norway and Sweden, examining whether the central bank practice of publishing interest rate projections improves how market participants map new information into future interest rates, relying on high-frequency data on forward rate agreements.

With forward guidance and communication emerging as vital tools in modern central banks' arsenals, Ehrmann et al. (2019. 93-94) categorise the different types of forward guidance:

> "In practice, central banks have used different types of FG [forward guidance]. The literature typically identifies three such types, depending on whether the FG horizon, i.e., the time period over which policy rates are expected to remain at current levels, has been defined by means of (i) a state-contingent threshold, (ii) a calendar date, or has been (iii) left open-ended. In addition, some central banks also provide FG when policy rates are not constrained by the ELB [effective lower bound]. This type of FG will not be studied in this paper–it will focus exclusively on FG at the ELB."

Admittedly, central banks' migration toward clear communication on financial stability has also buoyed more studies on the merits of this particular direction, such as Horváth and Vaško (2016), who constructed an index of central bank transparency regarding the communication of financial stability aspects but went further and scored these central banks on a global scale with a retrospective analysis which shows how overall transparency improved over time. Their study comprehensively reveals how transparency fosters financial stability. With time, this has seen mere announcements of policy actions evolve into explanations; as the former chairperson of the US Federal Reserve Bank, Janet Yellen (2013), once remarked: "The explanation is the policy."

But this was not always the case as central bankers epitomised institutional, clandestine communication. In his submission, Friedman (2008. 1) stated:

> "Within living memory, many if not most central bankers thought it unwise if not perhaps undignified to explain their policy objectives to the general public except in the most general and abstract terms. Addressing specific policy actions was seen as even more inimical to the accepted norms of professional conduct."

But this gradually changed with the emergence of inflation targeting as a monetary policy regime, as advanced by Ekkehard and Merola (2018)– it becomes relatively easier for central banks to foster economic stability when economic agents have an outright understanding and direction of the central bank's goals and objectives. Shapoval et al., (2019) substantiate, noting that the monetary transition by many central banks to inflation targeting in the early 1990s fostered openness in disclosing goals and mandates. For example, publication of future policy rates unpredictably armed central banks with more leverage to achieve the objectives of monetary policy as the modern-day central banks not only forecast macroeconomic variables but use this information to manage inflationary expectations, and ultimately provide the public with comments on any deviations from targets in previous forecasts.

To this end, modern central banking has somewhat morphed into the art of expectations management armed with effective communication (Woodford, 2001; De Haan et al., 2007; Cosimano and Van Huyck, 1993; King, 1997; Blinder, 1998; Buiter, 1999; Bernanke, 2004; Issing 2005) and in shaping public expectations, effective monetary policy eases uncertainty whilst fostering accountability for politically independent central banks (Stiglitz, 1998; Blinder et al., 2008; Dincer and Eichengreen, 2009). This premise is further endorsed by Poole (2001.9), who admits that:

> "The presumption must be that market participants make more efficient decisions… when markets can correctly predict central bank actions. Communication may also enhance the effectiveness of monetary policy."

Admittedly, Friedman's (2008) submission that central banks' critical role as effective communicators of the forward guidance reaffirms their role as anchors and managers of expectations, consequently easing their overreliance on the traditional policy rate monetary instruments. This is further echoed by Haldane and McMahon (2018), who submit that better central bank communication fosters a better public understanding of monetary policy as well as satisfaction with it, which later correlates with inflation expectations from households that are closer to the inflation goals of the central bank.

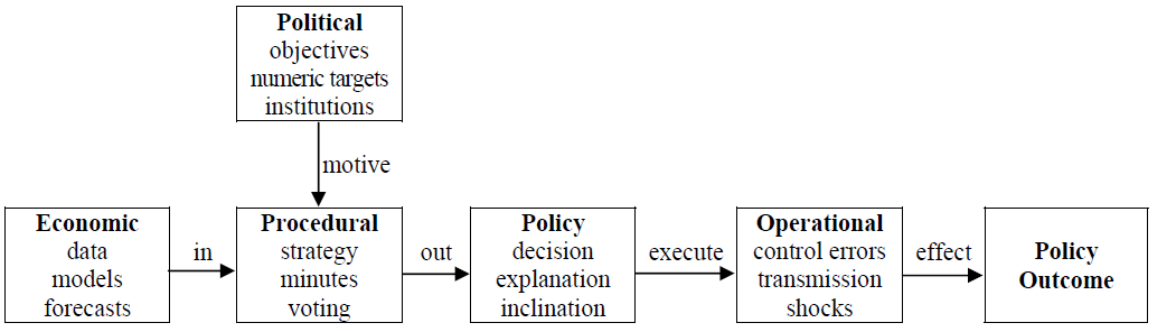
Woodford (2005); Blinder et al., (2008) went on and explored various benefits of the increase in communication, such as higher predictability of interest rate decisions.

In addition, the work of Reeves and Swicki (2007) revealed that the Bank of England's speeches have less effect relative to its minutes and inflation reports on the UK financial markets, while Hayo et al. (2010) found that the speeches of European Central Bank officials had a substantial effect compared to reports and testimonies on the EU and Pacific markets.

More so, literature on communicating with the public has seen interesting findings emerge such as Istrefi, 2019; Bholat et al., 2019, who empirically prove that Bank of England communications with the general public work if they are simple. Their studies contrast Bank of England's inflation reports which since November 2017, are layered communications of the reports as opposed to the more complex summary. This visual summary written in plain English and complemented with visuals specifically targeted the public and was well read.

As central bank communication gained credibility as a monetary policy tool, Geraats' (2002; 2006) relatively early scholarship on central bank communication laid an early foundation which validated the need for central bank transparency (see figure 1). Geraats (2002) clearly explored and categorised central bank transparency as taking on political, economic, and operational transparency with a standout submission being procedural transparency which in her scholarship she determined was an evident variant to consider when gauging the superiority of decision-making.

Figure 1: Theoretical Framework for Central Bank Transparency



Source: Geraats (2002, F 541).

The challenge has remained that a lot of central bank communication research has focused on communication and financial markets, as noted by Blinder et al., (2008. 941):

> "Virtually all the research to date has focused on central bank communication with the financial markets. It may be time to pay some attention to communication with the general public."

Several recent strands of literature, which I survey in this study, address different aspects of central bank communication.

It should be noted that subsequent literature on central bank transparency corroborated Geraats' (2002) framework with Cruijsen and Eijffinger (2010) too able to empirically prove that transparency not only improves consensus across forecasters but simultaneously anchors inflation expectations.

A submission, which was reinforced by Issing (1999. 508-9), leading up to the migration to the Euro:

> "What matters for transparency is, therefore, clarity as well as openness. For a new and supranational institution like the ECB [European Central Bank], it is particularly important that it sends clear and coherent messages to the markets and the wider public.... Speaking with one voice– or at least speaking 'one language'-is of particular importance for transparency and clarity in the case of the Euro system."

In contrasting fashion however, some scholars such as Cukierman (2009) make a case for restricting central bank transparency, especially when the bank holds private information about macroeconomic challenges in the economy whose release could have dire repercussions such as triggering a run-on commercial bank. Therein lies the question, what qualifies as sensitive information? This was followed up with Van der Cruijsen et al. (2010), who submitted that there exists such a thing as optimum transparency and past this threshold, the accuracy of private sector expectations may instead deteriorate.

Nonetheless, this criticism built on the work of LeRoy and Porter (1981) and Geraats (2002), which exposed how communication may have adverse effects if it is 'sufficiently noisy'.

Despite these scholarly advances in the past two decades however, a lot of the literature on central banks' communication on interest rates and its short-run effects such as the effects of central bank communication financial markets and the yield curve (Briere, 2006; Kohn and Sack, 2004; Ehrmann and Fratzscher, 2007; Lucca and Trebbi, 2009; Hayo et al., 2015; Ekkehard and Merola, 2018). Furthermore, Blinder et al. (2008; 2017) expansively examine the effects of domestic central bank communication on stock markets and bond returns, with Hayo et al. (2010), Hayo and Neuenkirch (2012) taking it further with an examination of the effects of central bank communication on international spill-overs. Another string of literature has explored various central bank communication styles and the contents of monetary announcements (Apel and Grimaldi 2012; Jansen and De Haan 2010; Allard et al. 2013; Siklos 2013; Bholat et al. 2017).

Furthermore, there has also been a trend in central banking communication exploring the effects of increased transparency and on forecasting accuracy (Sturm and De Haan, 2011). Remarkably, however, the relative advancements in computer coding have seen an emergence of literature on the effects of communication on macroeconomic variables such as high-frequency foreign exchange movements away from mere interest rate movements. This premise is attested to by a Hansen and McMahon (2018) study which revealed how central banks generate surprises to the markets and further portrays how central bank communication has both high-frequency and low-frequency aspects attributed to monetary policy framework announcements such as revisions in inflation targets. Central banks communicate in a number of ways, namely though qualitative communication instruments such as speeches, official publications, statements and minutes but they can also communicate through relatively more quantitative communication instruments, such as inflation outlooks, both forward and present.

This thesis will solely examine central bank communications in terms of monetary policy statements released officially by the respective central bank although it is known that speeches do not exhaust the list of communication outputs produced by central banks.

It is known that central banks communicate with many audiences, from market participants to policy-makers to the public, and the vastness of their audience informs their communication channel diversity. This study however relies on speeches as they are addressed to multiple audiences. Their format is less constrained than are other official documents, but more significantly, as highlighted by Carpenter (2010), speeches by central bankers often present an opportunity to observe reputation protection behaviour, which is examined in the method (See polarity and subjectivity).

But as central banks disseminate this information (quantitative and qualitative), scholars such Blinder (1995; 1998; 2004; 2018) have queried whether central bank communication is a complement or a substitute to monetary policy. In answering this question, it is essential to rely on Blinder's (1995.1-2) logic that, "the essence of monetary policy is the art of managing expectation". Upon this establishment, an inquisition can be explored with Friedman's (2008.6) argument, where he validates that:

> "When the central bank regularly miscommunicates the purported efficiency gains to private sector decision making from greater predictability of future policy actions are obviously nullified. And if the central bank is deliberately obfuscating its policy objectives – or, more likely, if it reveals one among a set of objectives but conceals the others – the purported gains to what Alan calls the democratic accountability of its decision making are precluded as well."

There Friedman (2008) is typifying that communication in that respect would be a substitute for higher or lower interest rates and underscoring the essence of communication as a monetary policy tool.

Although it is established today that communication is a vital monetary policy tool, there remains disagreement in the literature on the extent to which central bank communication adds information compared to the information contained by macroeconomic variables that are typically included in a Taylor rule model, which is basically a reactionary model that measures to what extent a central bank should raise interest rates when inflation is high or when employment exceeds full employment levels. In the light of this, the results presented by Heinemann and Ullrich (2007) and Rosa and Verga (2007) highlight that communication brings forward information not previously provided by more orthodox macroeconomic variables. However, these findings are contested by Jansen and De Haan's (2009) scholarship, which found that more traditional and straightforward Taylor-rule models by far outperform models that only rely on communication variables.

It should be noted that the norm was that only crisis-hit central banks communicate more frequently given their imminent policy reforms, as affirmed by Blinder et al. (2017:1), "Central banks in crisis countries are […] more likely to have resorted to new policies, to have had discussions about mandates, and to have communicated more." This proposition was reaffirmed by Gertler et al., (2019. 2), who state:

> "European Central Bank representatives started communicating their views even more intensively during the crisis period to provide clearer and more transparent descriptions of policy outlooks. Importantly, ECB representatives also broadened their communication, and in addition to conventional monetary policy, they also started communicating the strategy and implementation of unconventional monetary policy measures."

Born et al., 2014; Shafik 2017; Goodhart and Lastra, 2017; Tucker 2018; Edelman 2018; further promote this notion, revealing that the intensity of communication regarding financial stability has increased following the 2007 financial crisis and submitting that, post-2007, many central banks handed macro-prudential supervision responsibilities to central banks.

Indeed, one could imagine the shock for central bankers across the world leading up to 1990 when the Bank of New Zealand, which did not particularly have a crisis looming, opted for forward guidance at a time when the notion of forward guidance was outright rejected (see Blinder, 2018).

But how far has central bank communication come? In a parliamentary inquiry in the 1930s, Sir Stephen Harvey, the Bank of England deputy governor at the time, unequivocally told parliament that they need "leave our actions to explain our policy," going further to say that "it is a dangerous thing to start to give reasons."

On the other hand, Alan Greenspan, the thirteenth US Federal Reserve Bank chairperson from August 1987 to January 2006, famously bragged earlier in his career that he was "mumbling with great incoherence". If this was not enough, on 5th December, 1996, Alan Greenspan, remarked:

> "How do we know when irrational exuberance has unduly escalated asset values, which then become subject to unexpected and prolonged contractions as they have in Japan over the past decade?"

Two words, "irrational exuberance", were interpreted by the market as a warning that markets were overvalued, and this triggered declines in stock markets worldwide.

Rather interestingly, by 2004 Greenspan had changed his 'incoherent' communication stance in a bid to manage expectations as attested by the tone in a 2004 speech where he revealed with clarity that the US Federal Reserve Bank would keep the federal funds rate low "for a considerable period." Indeed, an unexpected change in tone.

But this was not always the case as it was only in 1994 that the US Federal Reserve Bank's Federal Open Market Committee (FOMC) began to disclose its decisions on the federal funds rate target.

Later, in 1999, the FOMC commenced revealing its "bias with respect to future changes in monetary policy in its statements" (Blinder et al., 2008).

As time went on, the US Federal Reserve Bank began revealing FOMC votes, with names attached, immediately after each meeting. This was unprecedented at the time.

The same direction was taken by the ECB, as Mario Draghi (2014) declared in a speech underscoring the role of central bank communications as a policy tool in itself. The ECB chairperson announced that from then on it would commence publishing summaries of monetary policy meetings, and testing various formats to identify which of these are most widely understood by the general public (Bholat, 2019).

This at the time was in line with Ehrmann and Fratzscher's (2007) scholarship, who agreed that not only would communication buoy central bank transparency but a central bank communication strategy design should allow for decisions to be made by a committee given how empirical evidence showed that committees exhibit a better response to shocks. In addition to this, Ehrmann and Fratzscher (2007. 510) substantiate:

> "A central bank has to decide how the individual committee members should communicate with the public, in particular how and whether they should communicate their personal views. As argued by Ben Bernanke … it may be desirable to communicate the diversity of views in the committee, or, as argued by Otmar Issing, the central bank might think that this may risk inhibiting clarity and common understand."

The same trend is seen at the Bank of England where only a century ago, the Bank had one speech a year. The tide has changed as in 2016 alone it issued 80 speeches, 62 working papers, close to 200 consultation documents, just under 100 blogs and over 100 statistical releases — in total, over 600 publications (Haldane 2017).

Bernanke's (2004) rationale for communicating the diversity of views held in the committee, which is alluded to above, is validated by his argument that it is imperative to communicate the diversity of committee's assessments since it helps the markets to unpack the risks associated with the policy decisions at the time the decision is made.

The clear communication from the US Federal Reserve Bank was able to 'create news' as per Blinder et al., (2008.4), who determine that "central bank communications *create news* focus on how, e.g., the central bank's pronouncements influence expectations and therefore move asset prices". In rather contrasting fashion however, Cieslak and Schrimpf (2019) appear to dispute the rationale of Blinder et al., (2008) in their exploration of the communication of several central banks and contrasting monetary policy-related news and non-monetary news. This study revealed that financial markets reacted more intensely to non-monetary news during crisis times, while monetary news only gained dominance post-2013.

Nonetheless, Blinder et al., (2008) are supported by Altavilla et al. (2014), who reveal that macroeconomic communications from the central bank in question can explain about one-third of the low frequency (quarterly) fluctuations in long-term bond yields. More importantly, Coenen et al., (2017) further reveal that when central banks announce asset purchase programmes, market uncertainty is significantly reduced, and especially if the announcement is accompanied by clear communication on the implementation details, such as the size of the programme. In the case of Europe, substantial studies from Christelis et al., (2016) have empirically revealed that when the market expects relatively lower inflation, these expectations trickle down in the future inflation.

For this study, there is extensive literature inspecting financial market co-movements and central bank communication. But it is critical to allude to Blinder (1998) and Bernanke's (2004) scholarship, who place emphasis on the fact that monetary policy essentially has only a single direct tool, which is the overnight

interest rate. With this logic, central banks can only rely on indirect tools to manipulate asset prices. With this reasoning, Blinder (1998) and Bernanke (2004) make a sound case for communication as a critical means for central banks to sway asset prices, but this relies indispensably on the credibility of the central bank.

As submitted by Gertler et al., (2019), much central bank communication literature has concentrated on exploring how economic fundamentals drive financial market co-movements and trying to explain this movement by means of the underlying economic fundamentals. However, a gap remains in exploring central banks' communication and their impact on what drives co-movements and subsequently whether the respective communications about these policies matter at all (Gertler et al., 2019).

Although Beck et al. (2013) explored co-movement of central bank communication and financial market co-movement with the US and Canadian bond and stock markets as case studies, this particular study – which examined whether policy actions and communications of central banks in the US and Canada influence the correlations between these two markets–is strictly tied to North American markets and is detached from African markets. The same can be said for Albuquerque and Vega's (2009) study, which examined US and Portugal macroeconomic and earnings news releases and how these trickle-down stock market co-movements in the two countries.

It is important to understand the drivers of communication clarity, for two main reasons. First, as argued by Jansen (2011a), clarity is an important precondition for transparency. Even if a central bank communicates frequently, but does so opaquely, it can hardly be called transparent. Second, clarity may carry direct benefits. As noted by Blinder (2009), clearer communication has a higher signal-to-noise ratio and carries more information. So far, there has been little work to investigate this hypothesis empirically, but the evidence at hand does suggest that clarity is beneficial. Fracasso, et al. (2003) have found that well-written inflation reports are associated with higher predictability of decisions.

Jansen (2011b) finds that greater clarity of the Humphrey-Hawkins testimonies by the US Federal Reserve Bank chairman has gone hand in hand with lower volatility in financial markets.

More recently however, Gertler et al., (2019) undertook a rather unorthodox study using an extensive dataset of the unscheduled communication of the European Central Bank (ECB) governing council members, examining how their communications affected financial market co-movements in the euro area. Rather unorthodox given that the dataset was 'unscheduled' communication which occurred outside of any scheduled release of a central bank. Consequently, in a bid to explain the co-movement phenomenon in central bank communication, Pastor and Veronesi's (2012) findings reveal that Eurozone stock market co-movements can be attributed to political uncertainty as the latter drives increases in the volatility of individual stocks.

The second strand of the empirical literature has investigated the effect that announcements of an inflation target may have on inflation expectations and inflation outcomes (Ekkehard and Merola, 2018). This work complements that of Ranaldo and Rossi (2010), who revealed how intraday data reacted to monetary policy announcements, interviews and speeches released by Swiss National Bank. They find that financial markets significantly react to scheduled written communication in addition to unscheduled verbal communication.

While there is a large body of literature on the merits of communication, the effect of its absence or ineffectiveness is all too clear. A common example is the Taper Tantrum of 2013 in the US, where a speech by the US Federal Reserve Bank chairperson at the time, Ben Bernanke, insinuated that the FOMC was pondering slowing asset purchases if economic conditions improved sufficiently. In what was a rather unexpected message, the markets hastily moved to leading to an unintended a rise in longer-term rates.

Furthermore, it is imperative for monetary policy economics scholars to not only understand the merits of central banking transparency but 'clarity' as a whole given the argument first put forth by Jansen (2011a), who argued that clarity precedes transparency and therefore it is impossible to have transparency without clarity in the first place.

This premise is supported by Blinder (2009), who connotes that clearer communication has a higher signal-to-noise ratio and carries more information, and is reaffirmed by Fracasso et al., who (2003) revealed that well-written inflation reports are associated with higher predictability of decisions. This further validates the need for clear and effective communication.

1.1. Monetary policy rules and transmission mechanism

It is almost impossible to unpack monetary policy rules without appreciating monetary policy rules. Svensson (1999) reasons that in a closed economy, typical monetary policy transmission channels include an aggregate demand channel and this has to be complemented by an expectations channel. Through the aggregate demand channel, a central bank is able to manipulate aggregate demand, with a lag through its effect on the short real interest rate, but this can also be achieved through easing or tightening credit. Through this process, aggregate demand affects inflation through an aggregate supply equation (a Phillips curve) albeit with a lag.

On the other hand, the expectations channel permits a central bank to manipulate inflation expectations which, in turn, affect inflation, with a lag. It should be noted that this is due to wage- and price-setting behaviour.

However, in an open economy, the ideal central bank has more monetary policy transmission alternatives.

The core distinguishing variable here is the fact that the open economy's currency exchange rate is affected by the difference between domestic and foreign nominal interest rates and expected future exchange rates – a consideration universally referred to as the interest parity condition (Svensson, 2010).

Interestingly, adding the aspect of sticky prices yields a situation where the nominal exchange rate influences the real exchange rate and in a reactionary manner, the same real exchange rate will impact the relative price margins between domestic and foreign goods. Resultantly, this trickles into both domestic and foreign demand for the same domestic goods and in turn influences aggregate demand. Through this action, the aggregate demand channel is influenced, albeit the attainment of monetary policy transmission.

In addition, an open market offers a relatively direct exchange rate channel for the transmission of monetary policy directly into Consumer Price Index (CPI) inflation given the fact that the exchange rate manipulates the domestic currency prices of imported final goods. As noted by Svensson (1999) however, this particular lag of this direct exchange rate channel is considered to be shorter than that of the aggregate demand channel, meaning monetary policy can influence CPI inflation with a shorter lag by inducing exchange rate movements.

Relevant to this study however it is critical to appreciate that studies have been conducted that confirm that domestic inflation is heavily contingent on expected future inflation, the expected future output gap, and the expected future real exchange rate (Svensson, 1999, 2010). Furthermore, monetary policy scholars have also come to concede that aggregate demand depends on an expected future long real interest rate (which is also greatly dependent on expected future short real interest rates) and the expected future real exchange rate. This then affirms the relevance of communication tone and sentiment of a central bank in 'expectations management' if both aggregate demand and domestic inflation are dependent on future expectations.

1.2. Inflation targeting: An overview

Inflation can be defined as a sustained or continuous rise in the general price level or alternatively, as a sustained or continuous fall in the value of money (Labonte, 2011). As maintaining inflation at bearable bands is core to any central bank's mandate, inflation targeting has in the past three decades gained popularity as a monetary policy tool.

In order to achieve low levels of inflation, policymakers must make credible announcements regarding policy paths and the economic outlook, which in turn act as a roadmap for future policy actions.

Geanina (2010. 3) submits:

> "If an announcement about low-level inflation targets is made but not believed by private agents, wage-setting will anticipate high-level inflation and so wages will be higher and inflation will rise. A high wage will increase a consumer's demand (demand-pull inflation) and a firm's costs (cost push inflation), so inflation rises. Hence, if a policymaker's announcements regarding monetary policy are not credible, policy will not have the desired effect."

Pétursson (2005) defines inflation targeting as a monetary procedure that involves the formal establishment of price stability as the primary objective of monetary policy, with precedence over any other listed objectives. However, inflation targeting can conflict with other more important macroeconomic objectives, such as attaining maximum employment; a high, but sustainable, rate of economic growth; and keeping the balance of payments in equilibrium. Despite the criticism, inflation targeting has ushered in a new dawn for monetary policy as hyperinflation has been kept at bay. This has been argued to be a core ingredient to an economy's growth, as is the case in New Zealand, Canada and the United Kingdom.

Under a flexible inflation targeting framework, the objective is approximated by a quadratic loss function consisting of the sum of the squared inflation deviation from target and a weight times the squared output gap, and possibly also a weight times the squared policy-rate change (Svensson, 2010).

Theoretically, inflation targeting is implemented when a monetary authority announces a numerical inflation target that is typically around 2 percent at an annual rate for the CPI. In the event that a monetary authority is looking at a target band (as is the case for many emerging markets), the rule of thumb is to aim for the middle of the range.

Svensson (2010. 1) states:

> "The edges of the range are normally interpreted as 'soft edges', in the sense that they do not trigger discrete policy changes and inflation just outside the range is not considered much different from just inside. In practice, inflation targeting is never 'strict' inflation targeting but always 'flexible' inflation targeting, in the sense that all inflation-targeting central banks not only aim at stabilizing inflation around the inflation target but also put some weight on stabilizing the real economy."

An inflation targeting framework is founded on three pillars, which are: (1) a mandate for price stability, (2) independence, and (3) accountability for the central bank.

For new inflation targeters, however, the first step is an attainment of "credibility" before any considerations to stabilise the real economy; over time, this credibility is transferred into the real economy. It should be noted however that upon the affirmation of the credibility of the central bank's inflation targeting framework, flexibility can then be tabled.

This premise is reiterated by Svensson (2010.1), who concedes that:

> "Over time, when inflation targeting matures, it displays more flexibility in the sense of putting relatively more weight on stabilizing resource utilization."

In a bid to achieve credibility, inflation targeters are known to announce their monetary policy information, which includes inflation forecasts, detailed methodology behind the forecast approach, and their rationale for the policy decision at the time.

Because modern central banking has morphed into the art of expectations management armed with effective communication (Woodford, 2001; De Haan et al., 2007; Cosimano and Van Huyck, 1993; King, 1997; Blinder, 1998; Buiter, 1999; Bernanke, 2004; Issing 2005), it is no surprise that under an inflation targeting framework, private-sector expectations of inflation affect current pricing decisions and inflation for the next few quarters. With this notion, a central bank's ability to fasten the private sector's inflation expectations on the inflation target is a crucial precondition for the stability of actual inflation.

Svensson (2010.2) vividly confirms with an unorthodox comprehension of 'credibility', submitting:

> "The proximity of private-sector inflation expectations to the inflation target is often referred to as the 'credibility' of the inflation-targeting regime. Inflation-targeting central banks sometimes appear to be obsessed by such credibility, but this obsession is for good reason. If a central bank succeeds in achieving credibility, a good part of the battle to control inflation is already won."

Because a high degree of credibility accords a central bank liberty to be "flexible" and also stabilise the real economy inflation, targeters strive to appear transparent, with frequent monetary-policy reports that are consistent in nature. To this end, inflation targeters are today synonymous with a relatively high degree of accountability.

Over the past decade, critics of inflation targeting across both developed and developing countries have raised a grave challenge in the framework, which is a lag in transmission especially during the control lag, which ultimately yields an "imperfect control" in inflation.

The "imperfect control" primarily attributed to lags in the transmission mechanism, the state of the economy at the time in question and the possibility of future shocks to the economy subsequently makes monitoring and implementation of inflation targeting almost impossible. Cecchetti and Ehrmann (2002) add that another challenge of inflation targeting is the framework's ceaseless fixation on inflation, which sees the central banks attempt to obsessively control inflation, ultimately creating instability in the real economy and possibly also lowering economic growth.

Despite the criticism however it should be noted that although macroeconomic experiences in both inflation targeting and non-inflation targeting developed economies have been similar, inflation targeting has improved macroeconomic performance among developing economies (Svensson, 2010). In practical terms, inflation targeting offers a goal and a precise objective for a central bank. This is coupled with transparency but more importantly, a clear direction on the central bank's monetary decision-making process. Svensson, (2010. 13) substantiates:

> "Inflation targeting provides stronger possibilities and incentives to achieve optimal monetary policy than previous monetary-policy regimes. Therefore, a theory of inflation targeting is to a large extent a theory of optimal policy, with the objective function given by the objective function of flexible inflation targeting."

2. SOUTH AFRICAN RESERVE BANK COMMUNICATION: HAS TIME YIELDED CLARITY?

2.1. Introduction

In the ultimate pursuit of central bank transparency, effective central bank communication has in the past two decades emerged as one of the most crucial tools in achieving policy targets (Geraats, 2002; Woodford, 2005; Blinder et al., 2008; Bulíř et al., 2013a, Bulíř et al., 2013b). As argued by Blinder (1999: 71).

> "A central bank that is inscrutable gives the markets little or no way to ground these perceptions [on monetary policy] in any underlying reality. Thereby opening the door to expectational bubbles that can make the effects of its policies hard to predict".

While central bank communication is the new normal in the inflation targeting and post-crisis era (Blot and Hubert, 2018), there is substantial academic work that shows that effective communication is not necessarily a matter of increasing the quantity of information from the central bank but more about enhancing the quality of information from the central bank. For instance, Fracasso et al., (2003) illustrated how the quality of central banks' written statements negatively correlated with monetary surprises[1], concluding that clarity in writing erases uncertainty in the financial markets on inflation forecasts. It is essential however to define 'quality' as Fracasso et al. (2003) determine that well-written central bank texts are an extension of consistency among various communication tools, such as monetary policy reports and press releases.

In their-study of inflation reports from nineteen central banks, they concluded that for an inflation report to be deemed 'good', it needs to lead to an improved understanding and ultimately interpretation of monetary policy decisions (Fracasso et al., 2003).

[1] Fracasso et al. (2003) were able to investigate written central bank statements and the negative correlation with monetary 'surprises' by constructing a measure of the surprise in interest-rate movements associated with the meetings of the MPCs of the set of countries. They constructed a regression equation that studies the measure of 'surprise' in the financial markets due to monetary policy decisions.

Today however, it is widely accepted that a central bank's clarity[2] communication anchors market expectations (Jansen, 2011a; Montes et al., 2016).

Rosa and Verga (2007) went on to illustrate how market expectations are influenced by macroeconomic data published by the ECB at its monthly releases. Jansen (2011b) also investigated former US Federal Reserve Bank chairs Paul Volcker and Allan Greenspan's clarity in communication during their tenures. Jansen (2011b) established that a substantial quantity of former US Federal Reserve Bank chairs, such as Volcker and Alan Greenspan's Humphrey-Hawkins testimonies were often incredibly hard to follow given their 'incoherence'. This view is augmented by Resche (2004:1) who affirms:

> "Mr Greenspan seems to have developed a style of his own. It is often referred to as 'evasive', 'nebulous' 'opaque' or even 'oracular' and 'Delphic'. It is true that discretion is an essential feature for the chairman of the world's leading central bank: Mr Greenspan himself once remarked that 'if people could understand what he was saying, he would not be doing his job' (Time, 31 May 1999:41)."

In a relatively novel methodology[3] at the time, Bulíř et al., (2008) illustrated how some of the sample central banks had not necessarily been clear[4] on what they communicated to the public.

[2] As determined by Bulíř et al., (2013a) clarity can be defined by relying on textual characteristics such as the number of words, sentences, and syllables. Another measure of clarity however proposes the length of the reports. In their study, Bulíř et al., (2013a), examine how clarity of various types of communication by seven central banks has evolved over the past decade, further unpacking how the inflation outlook and uncertainty around the outlook affected clarity.

[3] Bulíř et al., (2008) study relies on a simple forward-looking policy rule and an assessment of inflation reports. This was a pioneering methodology which managed to provide an empirical evaluation of consistency in central bank communication. Bulíř et al., (2008) concluded that the three communication tools—inflation targets, inflation forecasts, and verbal assessments of inflation factors contained in quarterly inflation reports—provided a consistent message in five out of six observations between 2000 and 2005. The study sampled Chile, the Czech Republic, Hungary, Poland, Thailand, and Sweden.

[4] Bulíř et al., (2008:10) define clear central bank communications by examining it in three steps and in the end verifying whether the central bank communicated its decisions clearly. First, they examine, "if the public scrutinizes the inflation forecast and target for the suggested direction of monetary policy, anticipating that forecasts projecting inflation above/below target signal monetary tightening/loosening in the period ahead. Second, actual policy rate changes either validate or contradict the signal extraction based on the inflation-forecast. If the observed policy decisions correspond to the anticipated direction of monetary policy, then the public's expectations about the rule-based policymaking are validated."

South African Reserve Bank (SARB) communication takes the form of several avenues, ranging from governor (and deputy governor) speeches to quarterly bulletins, macro- and micro-economic reviews, financial position statements, MPC statements, SARB webinars and research papers.

As discussed by Fracasso et al., (2003), every one of these communication avenues has a predetermined intended audience with a particular and deliberate function that aligns with the central bank's communication strategy.

Furthermore, Fracasso et al., (2003) concluded that carefully and prudently articulated[5] monetary policy statements yield a substantially higher predictability of their future policy actions. It should be noted that regardless of the communication path in question, it is critical to pursue clarity in conveying monetary information.

This paper focuses on SARB's MPC statements, thereby unpacking how these have evolved over the governorships of Tito Mboweni, Gill Marcus and Lesetja Kganyago and offering a retrospective inquiry into SARB's communication over the past twenty-one years.

[5] Blinder et al., (2001) establish a framework for what good central bank communication should entail. They establish that the: "essential message any central bank must convey to the public is its policy regime: what it is trying to achieve, how it goes about doing so, and its probable reactions to likely contingencies. Of course, no central bank can spell out in advance its reaction to every conceivable contingency; nor is it necessary to reveal every detail of its operations. Two guiding principles apply. First, the bank should reveal enough about its analysis, actions, and internal deliberations for interested observers to see the logic behind each policy decision. Second, the burden of proof should be on those who would withhold information. There are valid reasons for secrecy, but they are the exception not the rule" (Blinder et al., 2001:20).

2.2. Why communicate anyway?

Central banks including the SARB have in the past made strides in enhancing accountability, buoyed by their migration towards inflation targeting (Montes and Nicolay, 2017). A stand-out benefit of increased effective communication is asserted by Woodford (2005) who submits that central banks' increased willingness to share their assumptions about future policy with the public has enhances policy predictability in ways that reciprocally improved central bank's ability to achieve their stabilisation[6].

In 2001, Woodford[7] concluded that if monetary policy has morphed into the art of managing expectations and because literature on central bank communication has found a relationship between those speeches by central bank officials and interest rates (Blinder et al., 2008), effective communication has become an ineluctable responsibility for the modern central bank.

As many central banks migrated to inflation targeting over the past thirty years, the fundamentals of the regime, such as transparency, accountability and clarity[8] (see Walsh, 2003) have never been more profound; but relevant to this paper is clarity[9] buoyed by effective communication.

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[6] Woodford's (2005) study on central bank communication offers two detailed contexts in which central banks have been forced to consider how much they are willing to say about the future path of interest rates. The first is an experiment with policy signaling by the Federal Open Market Committee in the US using the statement released following each committee meeting, since August 2003. The second is selected central banks' need to make some assumption about future policy when producing the projections (for future inflation and other variables) that are central to inflation-forecast targeting procedures. In both cases, he finds that that an increased willingness to share the central bank's own assumptions about future policy with the public has increased the predictability of policy in ways that are likely to have improved central banks' ability to achieve their stabilisation objectives.

[7] Woodford (2001) explores two premises: firstly, that challenges around improvements in private-sector information-processing capabilities may pose for the effectiveness of monetary policy. It first considers the consequences of improved information about central-bank actions, and argues that the management of expectations will become even more important to effective monetary policy. The paper next considers the consequences of the potential erosion of private-sector demand for central-bank money. He however concludes that while advances in information technology may well require changes in the way in which monetary policy is implemented in countries like the United States, the ability of central banks to control inflation will not be undermined by advances in information technology.

[8] Communication clarity as argued by Jansen (2011a), remains a conduit towards a central bank's transparency. In his submission, he argues that a central bank may communicate frequently but does so opaquely and therefore would not be deemed transparent.

[9] This study relies on central bank communication clarity methodology through the readability index proposed by Jansen (2011a, 2011b). Bulíř et al., (2013b) further examine central bank clarity of inflation, reports the Czech National Bank, the European Central Bank, the Bank of England, and Sveriges Riksbank. Relying on the Flesch-Kincaid grade level as a measure of textual clarity (Kincaid et al., 1975), they were able to quantify the inflation reports' readability.

The roles of communication in an inflation targeting regime are underscored by Fracasso et al., (2003: 1) who concluded that:

> "Merely announcing IT and publishing inflation forecasts is not enough: the benefits from IT only accrue to central banks that convince the public that their decisions are rooted in the relatively tight constraints [depending on the specifics of the regime] imposed by a process that starts with forecasts, considers the optimal responses and ends with decisions which, year after year, appear as derived from the same logic."

Because the inflation targeting framework is explicitly outlined by the central bank (and typically imposed by the Treasury in question), it becomes fundamental for the monetary authority (that could theoretically be a central bank that is not independent) to share their inflation forecasts in a bid to justify their actions.

In the same way, by efficaciously communicating their inflation forecasts, growth outlooks, and future policy actions, central banks advertently but heedfully find themselves guiding expectations (Blinder et al., 2008).

Another critical aspect of communicating is the push towards accountability. Now, despite accountability being theoretically a separate concept from central bank communication, Walsh (2003: 2) has argued that by a central bank establishing an explicit target, this advertently "strengthens accountability by providing a clear goal against which the public can judge the conduct of the central bank". Today, a central bank's accountability is almost wholly evaluated by its transparency. Amato et al., (2003: 495) affirm this conception, remarking[10]:

> "In general, greater accountability has meant an increase in communication with the public regarding the beliefs of policy-makers and the operations of monetary policy. In turn, fair evaluation of central bank performance can only be achieved through greater transparency".

[10] There has been some criticism here that all this would assume is the central bank's understanding of the economy, in reality imperfect knowledge. However, as argued by Walsh (2003), the ability to monitor can also be pronounced in terms of the "transparency" of policy given the fact that a transparent policy improves the ability to monitor. Ergo, if monitoring is perfect, the central bank is instructed to care only about achieving a state contingent target for inflation; this solves the accountability problem without distorting stabilisation policy.

Furthermore, as argued by Solnik (1983), because there is a clear relation between stock returns and inflationary expectations[11], central banks can undeniably guide stock market performance using effective communication as a conduit to containing and managing expectations. This is affirmed by Lee et al., (2016) whose study examines changes in stock market liquidity in response to the monetary policy announcements of the Bank of Korea. They conclude that results indicate that central bank communication plays a significant role in reducing liquidity impairment by enhancing the predictability of policy actions, and therefore, mitigating information asymmetry.

However, Blinder et al., (2008: 9) thwart this notion, submitting that because central banks broadly manage only the overnight interest rates, "central bank communication has no independent role to play".

Blinder et al., (2008: 9) advance:

> "Nowadays, it is widely accepted that the ability of a central bank to affect the economy depends critically on its ability to influence market expectations about the future path of overnight interest rates, and not merely on their current level. The reason is simple. Few, if any, economic decisions hinge on the overnight bank rate. According to standard theories of the term structure, interest rates on longer-term instruments should reflect the expected sequence of future overnight rates."

Amato et al., (2003) note that shorter-term interest rates, such as the one-year rates, are often steered by the market's projection of future overnight rates for the year in question.

[11] Solnik's (1983) study reveals empirical evidence of the relation between stock returns and inflationary expectations for nine countries between 1971 and 1980. This study rejects the Fisherian assumption that real returns are independent of inflationary expectations, and concurs with the Geske and Roll model, which hypothesises that stock price movements signal (negative) revisions in inflationary expectations.

Amato et al., (2003) note that the links from the overnight rate to the prices that matter depend almost entirely on market expectations, citing an example that if one-year rates are affected by the market's expectations of overnight rates over the year, then market expectations of the intentions of the central bank are pivotal in determining prices. With this logic, then, "communication between the central bank and the market is critical" (Amato et al., 2003:3). In other words, market expectations (which are buoyed by effective central bank communication) of future policy actions of the central bank would become a vital variable in shaping asset prices; thereby rationalising the need for effective communication.

Woodford (2005) made a case for central bank communication by citing the complexity of central banking as a whole. Woodford (2005: 2) reasoned:

> "Central banking is not like steering an oil tanker, or even guiding a spacecraft, which follows a trajectory that depends on constantly changing factors, but that does not depend on the vehicle's own expectations about where it is heading. Because the key decision makers in an economy are forward-looking, central banks affect the economy as much through their influence on expectations as through any direct, mechanical effects of central bank trading in the market for overnight cash."

It is worth underscoring that communication arms market participants with certain modelling tools that shed light on how the central bank in question determines its nominal interest-rate setting (Eusepi and Preston, 2010).

In absolute agreement, Eusepi and Preston (2010: 250) submit:

> "Perfect knowledge about the central bank's policy framework does not guarantee that the agents' learning process converges to the rational expectations equilibrium, since market participants do not fully understand the true model of the economy. However, it does tighten the connection between the projected paths for inflation and the normal interest rates. This property proves fundamental."

It is this same information that answers the expectations predicament alluded to earlier, as it eases the 'forecasting problem' as substantiated by Eusepi and Preston (2010:250).

Nonetheless, central bank communication is an ongoing concern and improvements are made day by day (Arseneau, 2020; Reid et al., 2020; Su et al., 2020; Anand et al., 2021; Anderes et al., 2021; Candian, 2021; Möller and Reichmann, 2021; Rholes and Petersen, 2021). Therefore, making communication relatable to the general public would foster their understanding of monetary communications (Bholat et al., 2019)[12].

Communication today is a vital instrument in any central bank's tool kit. Nevertheless, as accentuated by Jansen (2011b), however much a central bank may communicate, if this is done in an unintelligible fashion then it simply will not pass as a transparent central bank. To this end, this study will examine SARB's clarity in its MPC statements simultaneously relying on word count for detail and the Flesch indexes (Flesch, 1948) to examine readability and clarity.

2.3. Quantifying SARB MPC communication clarity

A widely accepted method for measuring central bank communication clarity is through probing whether the public can easily comprehend the information put out by the central bank in its communication (Čihák et al., 2012).

Relying on this premise, central bank communications' clarity can be quantified using either the Flesch or the Flesch-Kincaid grade level indices, as these can accurately assess the number of years of education required by a reader to adequately grasp any text[13].

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[12] Bholat et al., (2019) further probe the public's understanding of the Bank of England's Monetary Policy Summaries, the Visual Summaries, and the Inflation Report, which was sanctioned to simplify economic information and thereby make the information more relatable. To this end, they provide a measure and suggestions for how central banks could structure their communications by testing additional techniques for communicating economic information.

[13] Relying on the work of Flesch (1948) and Kincaid (1975), the study relies on textual analysis that follows text characteristics, such as lengths of words and sentences, as good predictors of readability. The two methods denote the words, sentences and syllables which, as noted by Bulíř et al., (2013b), are three key textual characteristics of individual communications given that a higher average number of words per sentence, or longer words (syllables=words) makes it harder to understand the text.

Given the Flesch and the Flesch-Kincaid indices' reliance on plain text to quantify readability, both have in the past decade gained prominence as a means to elucidate central bank communication readability[14], attested by the work of (Jansen, 2011a; Jansen 2011b). It should be noted that the Flesch-Kincaid index offers comparability with other readability scales on other disciplines, and offers adequate contrasts with other readability indices such as the fog index. Comparability is fostered by the high correlation of the Flesch-Kincaid index with alternative indices such as the fog index. As expounded by Čihák et al., (2012: 13): "As documented in the literature (i.e., Kincaid et al., 1975), the correlation between the Flesch-Kincaid measure and these alternative measures is quite high (about 0.9)."

In their ground-breaking study of central bank communications across 17 central banks, the work of Čihák et al., 2012: 8) revealed that length might not necessarily yield readability, concluding that:

> "On the one hand, crafting a more precise, more nuanced message in an uncertain environment typically requires a longer communication. On the other hand, such a communication risks burying the message in a long or complex document, and ultimately becoming less clear."

Indeed, this creates another course of inquiry as it is empirically proven that a steeper word count may not yield clarity.

2.3.1. Data sources

SARB's MPC statements, which are the primary data source, are publicly available on the SARB website and can be directly downloaded: https://www.resbank.co.za/en/home/publications/statements. This tally is made up of statements from January 2000 to January 2021. These are converted from PDF to text files, which are recognisable in the readability scoring software.

[14] Montes and Nicolay (2017) note that readability is important to the public in order to understand the information that the central bank reports. In addition, Jansen (2011a) submits that complicated texts can lead to missed or misunderstood information.

After converting the files to text format, these text files are 'cleaned' some more by ridding them of stop words and 'white spaces'. Using the approach described in the methodology section, the researcher tallies the word count for each MPC statement.

It should be noted that this study solely relies on monetary policy committee statements that are publicly available on the SARB's website and without access to unpublished minutes of MPC meetings.

2.3.2. Text analysis

This study examined SARB MPC statements from 13 January 2000 to 21 January 2021, which encompasses post-SARB MPC meeting statements from three governors. Central bank communication takes many forms, as stated earlier, and one of them is the detail and quantity of information a central bank disseminates (Blinder et al., 2001; Weidmann, 2018).

As this study examines MPC statements from the past twenty-one years, there is a clear fluctuation in the word count from the MPC statements from former governor Tito Mboweni in the 2000s to his predecessors in the 2010s, but queries remain whether this equates to effective communication.

An exploration of the SARB statements quickly reveals how the SARB has evolved over the past two decades. For instance, the MPC statement from January 2000 was over 2,840 words but by January 2021, the MPC statement's word count had dropped to a mere 1,356 words but with more detail. As noted by Flesch (1948), text characteristics such as length of words and sentences, are good predictors of readability. Furthermore, a higher average number of words per sentence makes it harder to understand the text. This notion hence provides an entry point into the comparative examination of the MPC statements.

In addition, by 2021, SARB's MPC communications were accompanied by assumptions and forecasts such as the Quarterly Projection Model[15] projections and quarterly projection model projections forecasts and it is critical to highlight that these are alluded to in the later SARB MPC statements[16] as a rationalisation for the MPC decisions in question.

2.3.2.1. Reading Ease scores and indexes

2.3.2.1.1. Flesch Reading Ease score

This study relies on the Flesch Reading Ease score to analyse the readability and ultimately the clarity of SARB's MPC statements. The Flesch Reading score, initially developed in 1948, allows researchers to explore textual facets of a statement through inquisitions into numerous variables, such as the number of words per sentence and syllables per word (Flesch, 1948), and ultimately to score the statement on a scale of 0 to 100.

The Flesch Reading Ease score formula for readability, is:

$$206.835 - 1.015\left(\frac{\text{total words}}{\text{total sentences}}\right) - 84.6\left(\frac{\text{total syllables}}{\text{total words}}\right) \quad (1)$$

Source: Flesch (1948)

The index scores the text with 100, indicating that the text is easy to understand; 70 reveals it is easy to comprehend for adults; and 30 shows it is very difficult to understand. The underlying premise is that by increasing the words per sentence, readability is decreased too, and in essence a surge in syllables per word decreases readability. Again, this is in line with the assumption that the MPC statements are being directed to the intended market agents, who grasp the macroeconomic discussion in question. Assuming this criterion is met, then readability will foster clarity, which then ultimately buoys credibility.

[15] As noted by Botha et al., (2018), the Quarterly Projection Model is a simplified, user-friendly version of the more rigorous dynamic stochastic general equilibrium models that enable central banks to analyse the nature of the shocks that are impacting the economy, as well as the longer-term equilibrating forces that influence economic behaviour over time.

[16] An example here is the SARB MPC statement dated 21 January 2021, where SARB (2021) states: "Global growth in the QPM model is a trade-weighted average of South Africa's trading partners. For 2020 this is now at -3.6% (up from -3.9% in November) and revised up to 5.0% for 2021. Based on the October 2020 World Economic Outlook, the IMF expects global growth of 5.2% in 2021".

2.3.2.1.2. The Flesch-Kincaid readability test

Kincaid et al. (1975), later augmented Flesch's (1948) formula, yielding the Flesch-Kincaid Reading Ease Score from Flesch's initial work. The Kincaid et al. (1975) index denotes the years of study one would need to adequately comprehend the text in question. This interpretation makes it easier to compare different values. The Flesch Reading Ease Score is arrived at by using this equation:

$$0.39\left(\frac{\text{total words}}{\text{total sentences}}\right)+11.8\left(\frac{\text{total syllables}}{\text{total words}}\right)-15.59 \quad (2)$$

Source: Kincaid *et al.* (1975)

As affirmed by Luangaram and Wongwachara (2017: 5):

> "The Flesch-Kincaid Reading Ease Score is probably the most widely cited measure of readability in the literature on central bank communication".

As Graesser et al., (2004: 7) cautioned, however, the Flesch-Kincaid grade level score yields best results if the text being studied has more than 200 words. This reservation does not apply to this study, as all the SARB MPC statements are well over the 1000-word mark. This study relies on the two methods, as the Flesch ease score (Flesch, 1948) can examine the ease of reading the SARB MPC statements, whilst the Flesch-Kincaid grade level index simultaneously acts as a proxy to clarity (Jansen (2011a).

2.4. Results

The computation results are consistent with the graphical evidence discussed under the methodology. As per the discussion, the readability of SARB's MPC statements is measured by the Flesch reading ease score and the Flesch-Kincaid grade level.

The SARB MPC statement data was structured at a two-month interval, which is in line with SARB's MPC meetings and hence post-MPC meeting statements. The first set of results is a computation of SARB's Flesch-Kincaid Grade Level, as illustrated in figure 1.

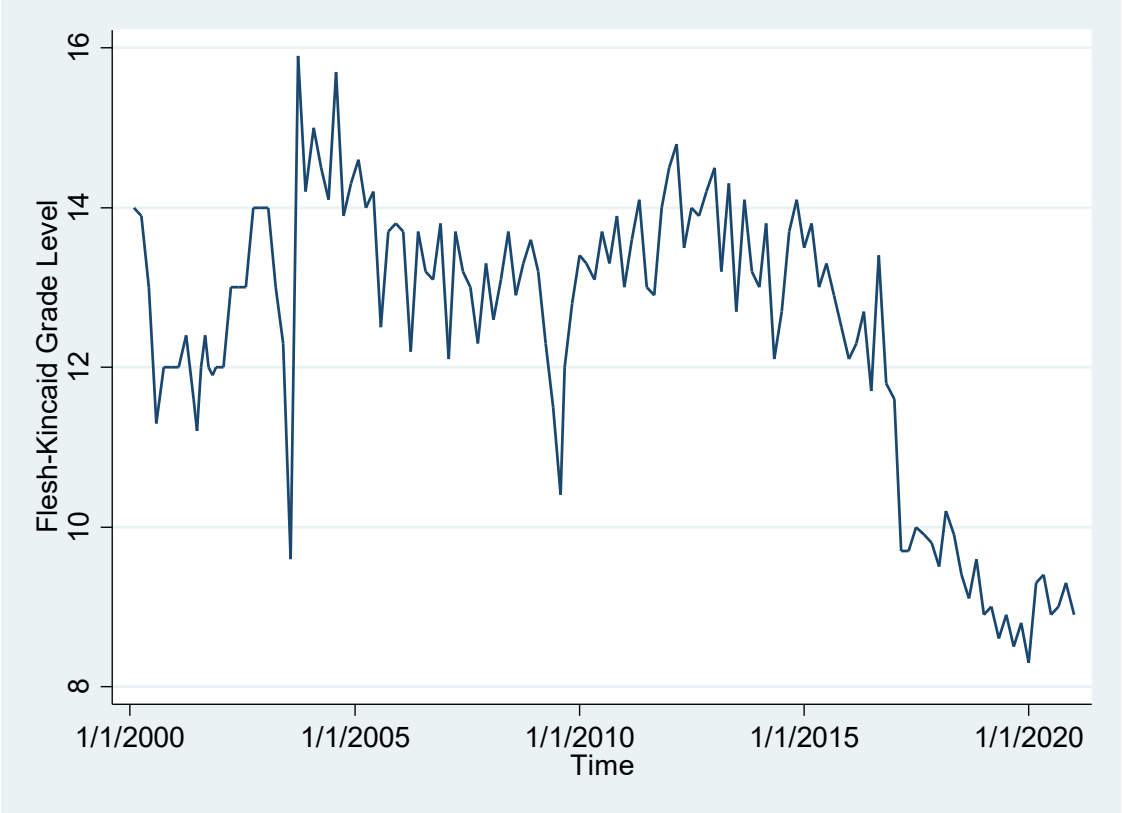

Figure 1: Flesch-Kincaid Grade Level computation.

As highlighted earlier, the Flesch-Kincaid Reading Ease Score represents the years of study needed to fully understand the text. The computation ably illustrates how SARB's earlier MPC statements averaged around 13, which by any standard is a high score. It is however clear that by 2016, the score had dropped to below 10, illustrating higher readability and perhaps more clarity in communication.

Notably, despite the Flesch-Kincaid Reading Ease Score dropping post-2016, the Flesch Reading Ease Score computation post-2016 only climbed, illustrating conversely more syllables, longer sentences and ultimately more complexity in overall sentence structure and phraseology. The series fluctuated randomly around 40 from 2000 to January 2015. Thereafter there was an upward trend between 2015 and 2020.

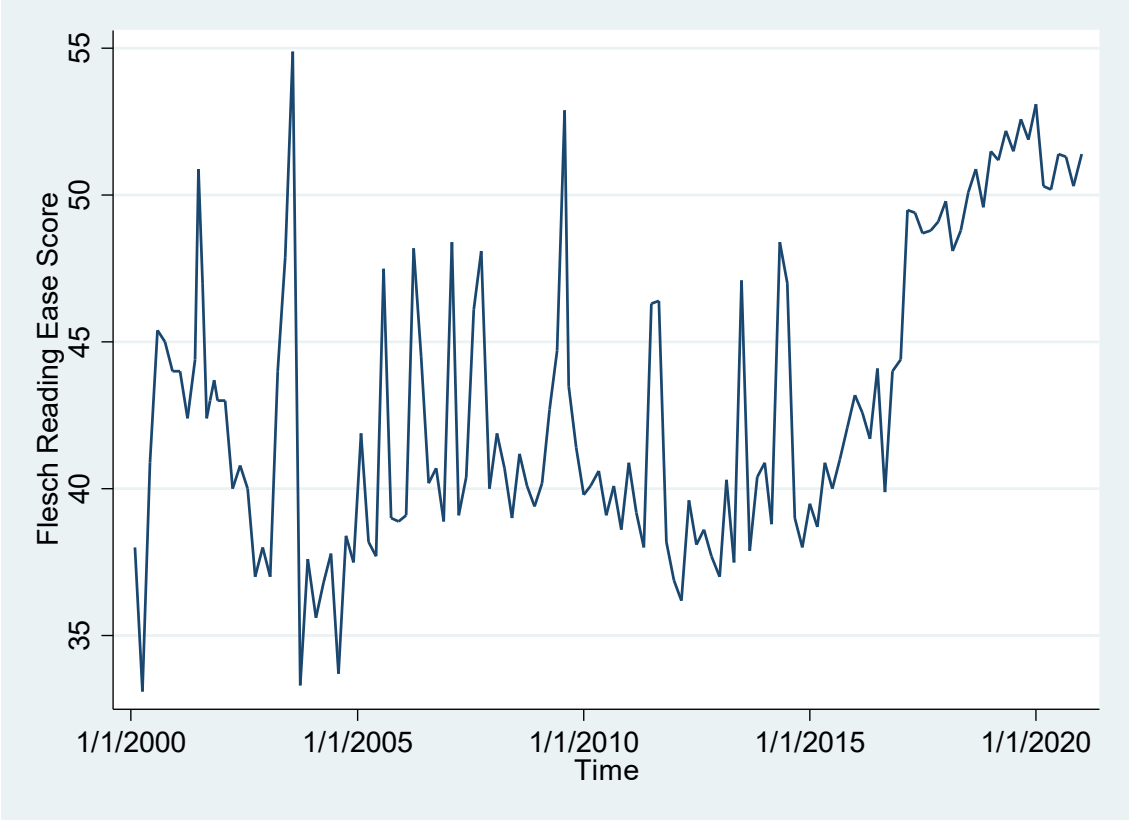

Figure 2: Flesch Reading Ease Score computation

This makes for an interesting trend as Rudolf Flesch's initial submission for formulating his Flesch formula (see equation (1)) was the fact that some 'text' was "designed to make reading as difficult as possible". Because Flesch scholarship on readability was premised on the sentence quantity and length, it is clear why the Flesch score signals' readability deteriorated over time in the SARB statements while the computation for the Flesch-Kincaid index signals improved readability over time.

As the SARB cut down on the syllables over the past two decades, the sentence count over the same period of time only increased, as illustrated in figure 3.



Figure 3: Flesch-Kincaid Grade Level and Flesch Reading Ease Score computations

Furthermore, a comparison of the Flesch Reading Ease Score Computation with the Flesch-Kincaid grade level index exhibits that the Flesch reading ease score fluctuates considerably more than the Flesch-Kincaid Grade Level Computation, as illustrated in Figure 3. Although computation shows a fluctuation between 2000 and 2015, the Flesch Reading Ease Score computation showed an upward trend with random fluctuations while the Flesch-Kincaid Grade Level computation showed a downward trend with random fluctuations.

2.5. Discussion

Over the twenty-year span, the Flesch-Kincaid Grade level exhibits a significant drop from the highs of the early 2000s of about 14 to averages of 9 in the late 2010s. This indeed draws attention to SARB's communication framework and whether this was a deliberate effort to ease readability in a bid to aid comprehension. However, over the past twenty years, time has not aided the public's capacity to absorb and comprehend more complex and nuanced SARB statements as the MPC statements have only decreased in complexity.

The findings of this study clearly show that, over the past 20 years, although SARB's MPC statements' Flesch-Kincaid Grade Level score revealed improved readability, the Flesch Reading Ease Score equally exhibited a higher fluctuation and a drop in readability post-2016. This can be attributed to longer sentences during 2016, which drove up the Flesch Reading Ease Score while the fewer syllables post-2016 resulted in an improvement in readability on the Flesch-Kincaid Grade Level score.

One possible explanation for this is a strategic move by SARB that would see it increase its transparency by offering the rationale behind its policy decisions, which was announced on 21 May 2015. In the relatively longer eleven-page MPC statement, Governor Lesetja Kganyago (South African Reserve Bank, 2015: 11) stated:

> "From the next meeting in July the Bank will take further steps to increase transparency by publishing the assumptions underlying the Bank's forecast with the MPC statement." (South African Reserve Bank, 2015: 11).

This was immediately exhibited in the subsequent MPC statement dated 23 July 2015, where Kganyago uses the noun 'assumption' and the verb 'assume' six times, compared to only once in the May 2015 MPC statement.

The results also offer a cross-survey of communication clarity at the time of the global financial crisis. As submitted by Bulíř et al (2013b: 13):

> "The global financial crisis has presented unique challenges for monetary policy, including on the communication front, as policymakers have aimed to simultaneously reassure the public and communicate the potential vulnerabilities."

As illustrated in Figures 1 and 2, the computation exhibits more prominent movements in the Flesch Reading Ease Score Computation and the Flesch-Kincaid grade level index. Although Bulíř et al (2013b) determine that central banks sought to reassure the public during the global financial crisis, SARB's MPC communications clearly illustrate subdued readability during the crisis. The computation analysis here is however inverse. As illustrated in Figure 1, in 2009 the Flesch-Kincaid Grade Level drops from 13 to just over 10 while the Flesch Reading Ease Score soars from 40 to 53 (see Figure 2). The explanation here goes back to Bulíř et al (2013b), who affirm central banks' determination to reassure the public at the height of the global financial crisis, and this was evident in the sentence count in addition to the relatively wordier text. However, the way that the Flesch-Kincaid Grade Level drops from 13 to just over 10 is explained by another variable, which is the commencement of the tenure of Gill Marcus as the governor of the SARB from 2009 to 2014. Unlike her predecessor, she was revered as relatively 'dovish'.

Overall, the study concurs with Luangaram and Wongwachara (2017), whose study revealed that despite central bank communications becoming more readable in terms of syntactic structure, the amassed reliance on academic language over time has in turn seen the overall level of complexity surge.

2.6. Conclusion

This paper employed Flesch-Kincaid Grade Level and Flesch Reading Ease Score textual analysis to SARB MPC statements from January 2000 to January 2021 to measure the readability of the statements in question and also evaluate if there has been a movement in SARB's MPC clarity. The study was able to illustrate, using computation analysis, the movement in SARB's MPC communications readability, bearing in mind the complex nature of appraising central bank communication.

In so doing, the study was able to add to the only emerging literature on African central bank communication while offering a wide time frame given the twenty-one-year span of MPC statements examined. This study paper contributed to the only emerging African central bank communication literature by firstly deploying the Flesch Reading Ease Score and the Flesch-Kincaid grade level index to 133 SARB MPC statements to gauge readability and hence SARB's clarity. Secondly, using computation analysis, the study was able to quantitatively digest the data, applying methodologically sound methods in central bank communication to create a foundation for future studies on the evolution of SARB's MPC communications and clarity.

Overall, the study finds clarity has varied over the past twenty years. However, relying on the Flesch-Kincaid Grade Level, there has been an improvement in clarity from 2016 as the communications are more readable.

Nonetheless, there are limitations to this study. Both the Flesch Reading Ease Score and the Flesch-Kincaid grade level index judge readability on metrics such as word complexity and length of sentence, while most of the central bank MPC communications target a specific group, also called the "attentive public" (see Reid 2011b). This can be a limitation as the same "attentive public" is quite savvy about macroeconomic language.

Even so, this study contributes to the literature in novel ways and creates a foundation for future comparative inquisitions into the clarity of SARB's communications.

3. CAUSALITY ANALYSIS OF THE SOUTH AFRICA RESERVE BANK'S MONETARY POLICY STATEMENTS AND COMMUNICATION

3.1. Introduction

As submitted by Blinder et al., (2008: 941), "Virtually all research to date has focused on central bank communication with financial markets. It may be time to pay some attention to communication with the general public." To this end, this paper will explore monetary policy communication sentiment[17] and contrast it with what is reported in the financial mainstream media.

Unpacking the role, and subsequent classification of communication, in modern-day central banking is critical to appreciating its relevance.

In their work on central bank communication, Blinder et al., (2008:4) delve into the subject with a clear classification of central bank communication that takes on a two-pronged approach, namely: "how communication manages the expectations by creating news and by reducing 'noise' in markets". Rationally, the process of news creation inadvertently dictates what the central bank is effectively communicating, and the reverse would indicate that the central bank's communication is ineffective.

[17] Picault et al., (2020) define sentiment as the net degree of positivity (optimism) or negativity (pessimism) of the content, in line with the connected literature.

3.2. Media and monetary policy

Mere communication of central bank policy actions however cannot be enough, as the complexity[18] of monetary policy communications creates a critical role for the media, which acts a gatekeeper and disseminator of monetary news.

Hayo et al., (2008: 27) expound:

> "Financial market news is not necessarily created at the time when the information becomes available, but comes into existence only after it goes through a filtering process by the media," (Hayo et al., 2008: 27)[19].

This proposition is further affirmed by Neuenkirch (2009: 52), who submits that, what we absorb as economic news, "comes into existence only after it goes through a filtering process by the media". Given the media's 'filter bubble' position, a study contrasting original central bank data (as the central bank filters raw data to create news) and subsequent communications with what is covered in the media becomes vital.

In spite of the advancements in central bank communication[20] over the past three decades, literature around African central banks' communication and media engagement remains scanty (Reid, 2011a). In addition, Mishkin (2004: 16) submits that, "most of the literature on central bank communication has focused on the quantity and quality of the original communication sent by central banks, emphasizing the need to be simple".

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[18] It should be noted that central bank communications' textual complexity is a product of their readability, as observed by du Rand et al., (2021) whose study on the evolution of SARB's MPC statements concluded that SARB's linguistic complexity (readability) varied over time, peaking after the exchange rate crisis and the global financial crisis. They subsequently theorise that this was rather unsurprising as SARB had to communicate new technical concepts in a bid to contextualise and explain their policy responses.

[19] Hayo et al.'s, (2008) work on financial news finds that the United States' Federal Reserve System Federal Open Market Committee's communications, such as speeches and post-meeting statements, have causal effects on both returns and volatility. Interestingly, the effects are more pronounced when the communication channel is more formal. Furthermore, their study finds that the Fed's communications hierarchy has an effect, as the Board of Governors members have a greater impact than regional presidents.

[20] Notable categorisation of central bank communication evolution is outlined by du Rand et al., (2021) who determine that the first evolution of central bank communication practices was a deliberate move away from deliberate opacity in communication. This was later followed by a greater engagement with the public.

However, there is a gap in unpacking the relationship between the media and SARB, bearing in mind that SARB's policy actions directly affect interest rates, mortgage loan approvals and money supply (Segawa, 2018).

It should be noted that a lot of scholarly work is emerging showing the relationship between the media and economic agents. For example, Berger et al., (2011) managed to analyse how print media coverage was influenced by the amount of information communicated by the European Central Bank (ECB) and furthermore, the media reported more negatively[21] on ECB policy decisions when inflation exceeded the inflation target. Prior to this, Doms and Morin (2004) had surmised that consumer opinion[22] and ultimately expectations[23] were influenced by the sentiment and frequency of economic news, asserting the duty of the media in fostering monetary policy transmission.

Interestingly, Carvalho and Nechio (2014) confirmed that the public's knowledge of the process[24] of a central bank's policy actions (for example the relationship between interest rate actions and expected inflation, in the near term) would give the general public a clear view of the inflationary outlook on the horizon.

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[21] Berger et al., (2011) assessed the 'favourableness' of media reportage on the ECB with a sample of 57 newspapers from 1999 to 2010. They concluded that much as the ECB enjoyed positive reporting from a centralised communication effort, the same centralised communication efforts bore no fruit when inflation exceeded the 2% mark.

[22] Doms and Morin's (2004) study explores how news reports in the USA affect perceptions of economic performance among consumers, with particular focus on the University of Michigan's Survey of Consumers from January 1978 to May 2003.

[23] Doms and Morin (2004) examine the effects of economic reportage on consumer perceptions, with a focus on the relationship between The Economist's tone and volume of media reports and consumer perception. Their study concludes that in times of high-frequency news, consumers tended to adjust their expectations faster, and the opposite holds true.

[24] Many central banks today subscribe to Taylor's (1993) work to guide their monetary actions. This recommends that a central bank set interest rates according to a 'Taylor rule' that specifies a "specific band target for the policy rate as a function of deviations of inflation from its objective and some measure of slack in economic activity, such as the output gap".

Bernanke, (2010: 8) further reiterates:

> "Improving the public's understanding of the central bank's policy strategy reduces economic and financial uncertainty, helps households and firms make more-informed decisions. Moreover, clarity about goals and strategies can help anchor the public's longer-term inflation expectations more firmly and thereby bolsters the central bank's ability to respond forcefully to adverse shocks."

Perhaps the most challenging aspect of central bank communication however is the vastness of any central bank's audience and their differing grasp of monetary policy actions.

Kabundi et al., (2014) affirm this with their study on the relationship between inflation and inflation expectations of analysts, business, and trade unions in South Africa between 2000 and 2013.

The study concluded that inflation expectations of South African businesses and unions were closely related to each other relatively higher than the upper bound of the official SARB target band while analysts' expectations were within the target band[25].

As detailed by Blinder and Wyplosz (2004), the financial audience takes the shape of the financially literate and the inattentive general public, with the majority of the players in financial markets acquiring their monetary information directly from the central bank whilst the inattentive public acquires information from the media.

[25] Kabundi et al., (2014) reaffirm the relevance of businesses' and unions' perceived inflation targets lying outside the official target band, noting that inflation expectations of business people and workers may influence each other given the relationship between the two groups. They conclude that left unattended, the deviation could spark an expectations trap, leaving the SARB merely accommodating inflation expectations.

This principle is underscored by Reid (2011b)[26], who explored the role of the South African newspaper media in the expectations channel of the transmission mechanism of the SARB and concluded that not only does the South African inattentive public acquire their information from the media, but the media goes a step further and increases the extent of coverage when the SARB is outside of the target range.

It should be noted however that central banks' audiences are heterogeneous in nature and as emphasised by Reid (2011a), they are not all equally attentive to central bank policies. So, in essence, central bank communication frameworks need to accommodate this heterogeneity in their communication strategies so as to reach their wide audience. To accommodate this wide audience, SARB communicates through many channels, such as monetary policy statements, monetary policy forums, monetary policy reviews, quarterly bulletins, press releases, speeches by the governor, and the presentation of a report at least three times a year to the parliamentary portfolio committee on finance (South African Reserve Bank, 2006).

More pressingly, as earlier highlighted, the heterogeneity of inflation expectations across analysts, business, and trade unions in South Africa during the inflation targeting regime further fortifies the variances in the grasp of monetary policy across different agents (see Kabundi et al., 2014) and reaffirms the role of the media in acting as a conduit to reaching the inattentive public.

[26] Reid (2011) constructed two index variables to describe the extent of coverage and assessment of the SARB"s monetary policy decisions by South African newspapers. Relevant newspaper reports were collected from the week following each MPC meeting from January 2000 to September 2009 to construct a qualitative and quantitative index. The qualitative index focused on examining the newspaper articles as each article or cartoon was read and evaluated independently by two researchers to allow the construction of the two sub-indices. The second index was a quantitative index created to measure the extent of the media coverage given ranging from 1, representing poor media coverage, to 5, representing very extensive media coverage.

Cukierman (2009: 20) reaffirms this, emphasising:

> "Most members of the general public are rationally inattentive to the original forms of central bank communication as these are costly to acquire and process. This rationally inattentive audience relies (to varying degrees admittedly) on the media to gather, condense and interpret this primary information on their behalf. As a result, reporting on monetary policy in the media, of which the central bank's communication forms part, is one point of strategic interaction between the stakeholders who codetermine the path of inflation."

Nonetheless, Cukierman's (2009) submission, however, makes two assumptions. Firstly, the media fully understands central banks' policy actions in line with its objectives. Secondly, the media can aptly filter out the central banks' objectives and subsquently condense the message in language relatable to the inattentive public without altering the original message. This is not the case, as exposed by Reid's (2011a:60) findings on South African newspapers' coverage of SARB's MPC decisions:

> "Even years after the introduction of the inflation targeting framework, misunderstandings of the fundamental issues were not uncommon. For example, in June 2006, the editorial of the Business Day displayed a misunderstanding of the forward-looking nature of monetary policy and the flexibility with which the SARB conducts inflation targeting."

Even so, Cukierman (2009) and Neuenkirch (2009) argue for a premise that the media condenses financial information for the public in a more digestible form of commentary.

The idea of condensing is best explained with two media studies theories. Firstly, agenda-setting theory, which refers to the idea that there is a strong correlation between the emphases that mass media place on certain issues (McCombs and Shaw, 1972).

Over the past fifty years, agenda-setting scholars have examined the "cross-lagged relationship" between mainstream media and how they may set the agenda of the public (Servin and Tankard, 2001). Findings have revealed that agenda-setting has linked the public's perception of what is important to issues mentioned in mainstream media. This is a phenomenon that is conceptualised as salience. From agenda-setting follows the Katz et al. (1955)[27] two-step theory, which states that mass media information is channelled to the "masses" through opinion leadership.

The people with most access to media, and who have a more literate understanding of media content, explain and diffuse the content to others.
Gentzkow and Shapiro (2010), however, caution that news reporting responds strongly to consumer preferences[28] as they find that the demand side can account for a large share of the variation in media slant, whereas the identity of a newspaper's owner (i.e., a proxy for the supply side) is far less important. As a result of the media slant, as established by Gentzkow and Shapiro (2010), there arises a need for more scrutiny on the media's 'gatekeeping' and filtering role given the different agendas (see McCombs and Shaw, 1972) of the media, thereby creating a trade-off: 'simplicity' at the expense of the original message, which is more complex.

Monetary policy communication characteristically adopts two forms, namely communication through original documents, such as inflation reports and policy announcements, and communication through speeches, presentations or interviews by the policymakers during the inter-meeting period (Demiralp et al., 2012), with the media acting as an intermediary in the dissemination of some of this data.

[27]Katz et al. (1955) put forward the idea that given the media's reportage, perceptions tend to flow from respected commentators from the media houses to opinion leaders in the public, who then pass this information on to the relatively inattentive public.
[28] Gentzkow and Shapiro (2010) examine the tone of the media in line with partisan language in the reporting the news on Democrats and Republicans in the US Congress. Their results then rely on ZIP code placement data to pinpoint the leaning of the newspaper readers and consumer predispositions.

Furthermore, the media fosters monetary policy transmission in the expectations channel since domestic inflation is profoundly dependent on anticipated future inflation, the expected future output gap, and the expected future real exchange rate (Svensson, 1999). In addition, because private-sector expectations of inflation affect current pricing decisions and inflation for the next few quarters, it is essential to anchor private-sector inflation expectations in line with the inflation target so as to achieve the stability of actual inflation (Svensson, 2010).

3.3. What counts as central bank clarity?

With the popularity of inflation targeting as a monetary framework, the prominence of managing agents' expectations has somewhat become a prerequisite of central banks as the same agents react[29] to central bank communications (Blinder et al. 2008). However, in the same light, it is critical to remember that given the vastness of central bank audiences (ranging from opinion-makers in the media to politicians and ultimately to the whole electorate), their communication paths differ respective of the audience in question, hence the motivation for clarity over 'mere transparency' (Reid et al., 2019; Fracasso et al., (2003). In other words, different communication styles are relied on, depending on the audience, and this heterogeneity is critical in achieving a central bank's mandate.

For instance, SARB issues Monetary Policy Committee statements and Monetary Policy Forum reviews, with the latter being less complicated, with the clear intention to reach different audiences.

[29] Studies have emerged, such as Andersson et al., (2006), who find that various monetary policy signals such as repo rate changes, inflation reports, speeches and minutes from monetary policy meetings affect the term structure of interest rates. Furthermore, their study determines that unexpected movements in the short end of the yield curve are mainly driven by unexpected changes in the repo rate. Nonetheless, published inflation reports and speeches also have some impact on short rates, with speeches being a more critical determinant for the longer end of the term structure.

Consequently, a central bank not only communicates its future policy action but also its reaction function and in so doing, fosters the process of monetary policy transmission and financial stability[30].

Relying on Montes and Nicolay's (2017: 3168) definition, clarity in central banking communication concerns the quality[31] of information provided and the public's capacity for comprehension of what the central bank communicates. "Furthermore, a clearer message helps central banks in the task of guiding the expectations of the public in an easier way than a more opaque message." This then rationalises the need for increased readability of central bank communications as readability aids central bank transparency, and as exposed by Jansen (2011), it is almost inconceivable to achieve transparency without readability.

Over the past decade, central bank scholars have relied on two methods to examine central bank communication clarity, ergo: the Flesch ease score (Flesch 1948) and the Flesch- Kincaid grade level (Kincaid et al. 1975). Similarly, one way to quantify central bank communication clarity is by asking how easy it would be for someone to understand the information contained in the central bank document. This concept of clarity motivates the choice for the Flesch ease score and the Flesch-Kincaid grade level methods in quantifying SARB's MPC statements clarity.

[30] Filardo et al. (2019) examine whether monetary policy reaction function matters for financial stability by measuring how responsive the Federal Reserve's policy appears to be imbalanced in the equity, housing and credit markets. They find that when monetary policy appears to respond more countercyclically to market overheating, imbalances tend to decline over time. This effect is distinct from that of current and anticipated interest rate levels – the risk-taking channel. The evidence highlights the importance of a "policy reaction function" channel of monetary policy in shaping the financial cycle and achieving financial stability.

[31] Montes and Nicolay (2017) define communication quality as the capacity of comprehension that the public has about any information reported. Hence, in the context of the information provided by the central bank, the readability of a text is important to the public in order to understand the information that the central bank reports. Jansen (2011) further suggests that difficulties to read a text can lead to missed or misunderstood information as one may abandon reading the text given its complexity.

Another facet of central bank clarity is the unwavering consistency in clarity as laid out by Issing (2005: 71), who states:

> "An appropriate strategy, a convincing track record, and thus a consistent communication policy complement each other and are a sign of an effective monetary policy. A clear strategy can also provide stability to the analytical framework and decision-making process for monetary policy."

3.4. Media data analysis

A core pillar of modern-day central banking is the endless search for credibility, and this has vastly buoyed central banks' search for transparency.

The trial for any central bank, however, is the fact that its intended audience is extremely vast. Also, as noted by Berger et al. (2011), some members of a central bank's audience can be easily reached, namely financial and economic practitioners, but these are the minority. This rather attentive public (Segawa, 2018; Reid, 2011a) also reacts almost immediately to monetary news given their proximity to the 'central bank noise'. The pressing question however, as asserted by Blinder et al. (2008: 6) is:

> "Whether communication contributes to the effectiveness of monetary policy by creating genuine news (e.g., by moving short-term interest rates in a desired manner) or by reducing noise (e.g., by lowering market uncertainty). There are two main strands in the literature. The first line of research focuses on the impacts of central bank communications on financial markets. The basic idea is that, if communications steer expectations successfully, asset prices should react and policy decisions should become more predictable… The second line of research seeks to relate differences in communication strategies across central banks or across time to differences in economic performance. For example, does announcing a numerical inflation target help anchor the public's long-run inflation expectations?"

Meanwhile, the real challenge is with the inattentive public, which is often oblivious to central bank news, policies and action plans.

Arguably the gravest challenge is the fact that this same inattentive public (which influences inflation expectations) take longer to adjust their inflation expectations and are backward-looking in their forecasts and are mostly interested in the highest nominal wages possible irrespective of what the SARB says about future inflation (see Kabundi et al., 2014).

Brand, et al., (2010) added a premise noting that a decent combination of transparency and communication can easily moderate uncertainty, therein calming[32] the public's expectations.

This rather delicate yet critical relationship between the media and central banks is flawlessly summed up by Berger et al., (2011: 690) who state that the role of the media in monetary policy communication and, ultimately, transmission is as follows:

> "The general public rarely directly reacts to central bank communication but 'gets its news' indirectly through the media. The question, thus, becomes whether and how central banks are able to get their message out through the media as an intermediate transmitting device and how this affects the views and possibly the behaviour of the public."

Gentzkow and Shapiro (2006) further assert the relevance of the media, adding that at moments of economic ambiguity in the information source, the general public leans towards more traditional media sources, reaffirming the role of the media in monetary transmission. It should be noted that this premise only applies to the attentive public (for example, analysts) who are apprised with the complexity of central bank policy actions and can hence qualify 'economic ambiguity'.

[32] Brand, et al., (2010) examine intraday movements in the money market rates. Using this data, they generate specific indicators on monetary policy news with keen focus on the ECB. Their study illustrates the role of communication in managing expectations while empirically illustrating that the ECB's communication has an impact on longer maturities' interest rates.

3.5. Methodology

3.5.1. Reading Ease scores and indexes

3.5.1.1. Flesch Reading Ease score

This study relies on the Flesch Reading Ease score to analyse the readability and ultimately the clarity of the SARB's MPC statements. The Flesch Reading score, initially developed in 1948, allows researchers to explore the textual facets[33] of a statement through analysis of several variables such as the number of words per sentence and the number of syllables per word (Flesch, 1948), and ultimately score the statement on a scale of 0 to 100. The Flesch Reading Ease score formula for readability is:

$$206.835 - 1.015\left(\frac{\text{total words}}{\text{total sentences}}\right) - 84.6\left(\frac{\text{total syllables}}{\text{total words}}\right) \quad (1)$$

Source: Flesch (1948)

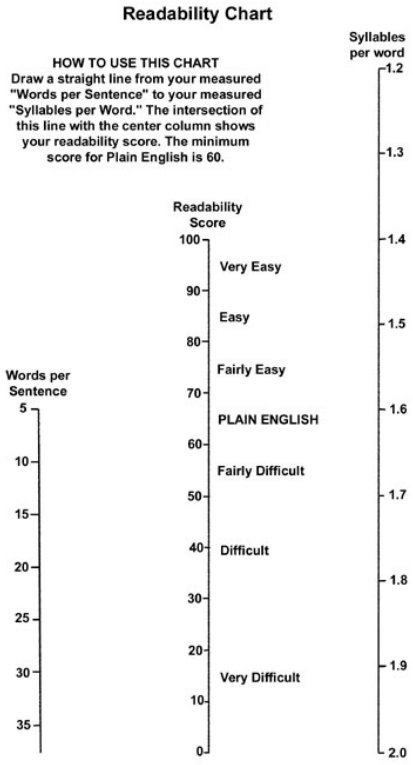
The Flesch-Reading-Ease Formula lies between 1 and 100, defining 100 as very easy to understand and 0 as very difficult. The underlying premise is that readability is decreased as the number of words per sentence increases, and that a higher number of syllables per word also reduces readability. Again, this is in line with the assumption that the MPC statements are being directed to the intended market agents who grasp the macroeconomic discussion in question. Assuming this criterion is met, then readability will foster clarity, which then ultimately buoys credibility.

It should be noted that the Flesch (1948) formula accounts for many aspects of readability, such as the word count and number of syllables, in a bid to measure the mental work the reader will have to do to comprehend a text. As submitted by Flesch (1948), a sentence: "John loves Mary" is short and presents no reading difficulties.

[33] Flesch (1979) developed a series of steps to quantify a text's readability. Step 1: Count the words. The words should be single-word contractions, hyphenated words, abbreviations, figures, symbols and their combinations. Step 2. Count the syllables, abbreviations, figures, symbols and their combinations as one-syllable words. Step 3. Count the sentences, with each full unit of speech marked off by a period, colon, semicolon, dash, question mark or exclamation point. Step 4. Figure the average number of syllables per word by dividing the number of syllables by the number of words. Step 5. Figure the average number of words per sentence, then divide the number of words by the number of sentences.

To this end, its Flesch Reading ease score is 93.8, which means “very easy”, as illustrated in Chart 1. However, if one adds more complexity to it, such as: “John has a profound affection for Mary”, then its Flesch Reading ease score drops to 64.4.

Chart 1: An interpretation of the Flesch reading ease score



Source: Flesch (1979)

A further appreciation for the word count and syllables is underscored if the same sentence is altered to: “Even though John is not normally given to a display of his deeper emotions, he allegedly has developed a profound affection for Mary, as compared to the more equable feelings he seems to have for Lucy, Fran and, to a lesser extent, Sue.” This has a Flesch reading ease score of 36.3. As a yardstick, this sentence’s difficulty compares with the Harvard Law Review.

3.5.1.2. The Flesch-Kincaid grade level

The study goes on to use Kincaid's grade level formula to complement Flesch's reading ease score. Kincaid et al. (1975), later augmented Flesch's (1948) formula, yielding the Flesch-Kincaid grade level index from Flesch's initial work.

The index devised by Kincaid et al. (1975) denotes the years of study one would need to adequately comprehend the text in question. This interpretation makes it easier to compare different values.

The Flesch Reading Ease score is arrived at by using this equation:

$$0.39\left(\frac{\text{total words}}{\text{total sentences}}\right)+11.8\left(\frac{\text{total syllables}}{\text{total words}}\right)-15.59 \quad (2)$$

Source: Kincaid et al. (1975)

From the Flesch-Kincaid grade level formula, texts can be scored from 0 to 18 with the conclusion that the higher the grade level, the more difficult to read. The Flesch-Kincaid grade level formula distinguishes itself from Flesch's Reading ease score as it offers a more precise number of years of education one should have in order to comprehend the text in question. This premise is founded on the assumption that increasing the length of both words and sentences makes it harder to read and to understand a text (Hensel, 2014). Furthermore, the overall score of the Flesch-Kincaid grade level is founded on the American education system and in essence specifies the number of years of education the reader has had since age six. To this end, if a text registers an 8, then that text should be comprehensible for an average American student that has had eight years of education, ergo an adolescent between the ages of 13 and 14.

A contrast of both the Flesch Reading Ease Formula and the Flesch-Kincaid grade level is illustrated in Table 1.

Table 1

Interpretation of the Reading Ease scores with estimated reading grade by Flesch (1949)

Reading Ease Score	Interpretation	Estimated Reading Grade
0 to 30	Very difficult	College graduate
30 to 40	Difficult	13th to 16th grade
50 to 60	Fairly difficult	10th to 12th grade
60 to 70	Standard	8th and 9th grade

70 to 80	Fairly easy	7th grade
80 to 90	Easy	6th grade
90 to 100	Very easy	5th grade

Source: Hensel, (2014).

As affirmed by Luangaram and Wongwachara (2017: 5), "the Flesch-Kincaid Reading Ease Score is probably the most widely cited measure of readability in the literature on central bank communication". As Graesser et al., (2004:7) cautioned, however, the Flesch-Kincaid grade level score best yields results if the text being studied has more than 200 words. This reservation does not apply to this study, as all the SARB MPC statements are well over the 1000-word mark. This study relies on the two methods, as the Flesch ease score (Flesch, 1948) can examine ease of reading the SARB MPC statements and the subsequent Mail & Guardian newspaper article, whilst the Flesch-Kincaid grade level index simultaneously acts as a proxy to clarity (Jansen, 2011). The study relies on 55 Mail & Guardian newspaper articles published between 2010 and 2021.

3.6. Results

The computation results are consistent with the graphical evidence discussed under the methodology. As per the discussion, the readability of SARB's MPC statements is measured by the Flesch reading ease score and the Flesch-Kincaid grade level.

The SARB MPC statement data was structured at a two-month interval, which is in line with SARB's MPC meetings and hence post-MPC meeting statements. The first set of results is a computation presentation of SARB's Flesch-Kincaid Grade Level, as illustrated in figure 1.

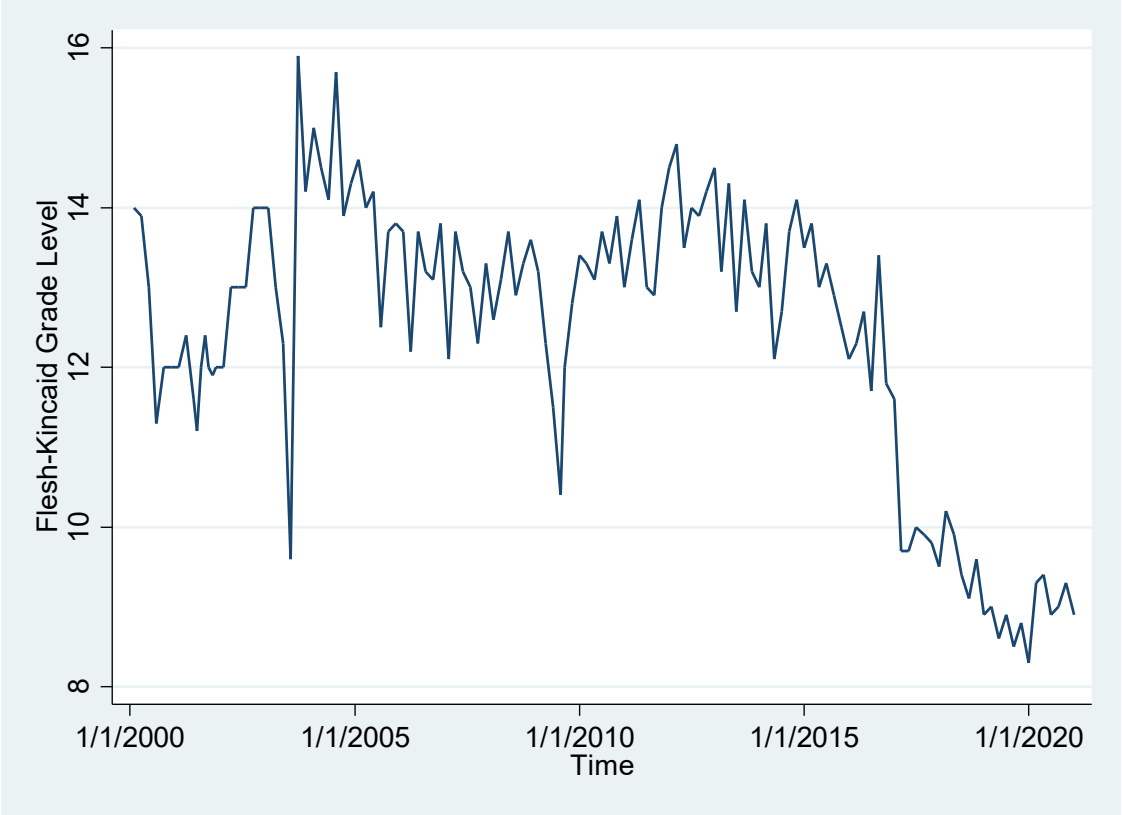


Figure 4: SARB Flesch-Kincaid Grade Level computation

As highlighted earlier, the Flesch-Kincaid Reading Ease Score represents the years of study needed to fully understand the text. The computation ably illustrates how SARB's earlier MPC statements averaged around 13, which by any standard is a high score.

It is however clear that by 2016, the score had dropped to below 10, illustrating higher readability and perhaps more clarity in communication.

Notably, despite the Flesch-Kincaid Reading Ease Score dropping post-2016, the Flesch Reading Ease Score computation post-2016 only climbed, illustrating conversely more syllables, longer sentences and ultimately more complexity in overall sentence structure and phraseology. The series fluctuated randomly to about 40 from 2000 to around January 2015. Thereafter, there was an upward trend between 2015 and 2020.

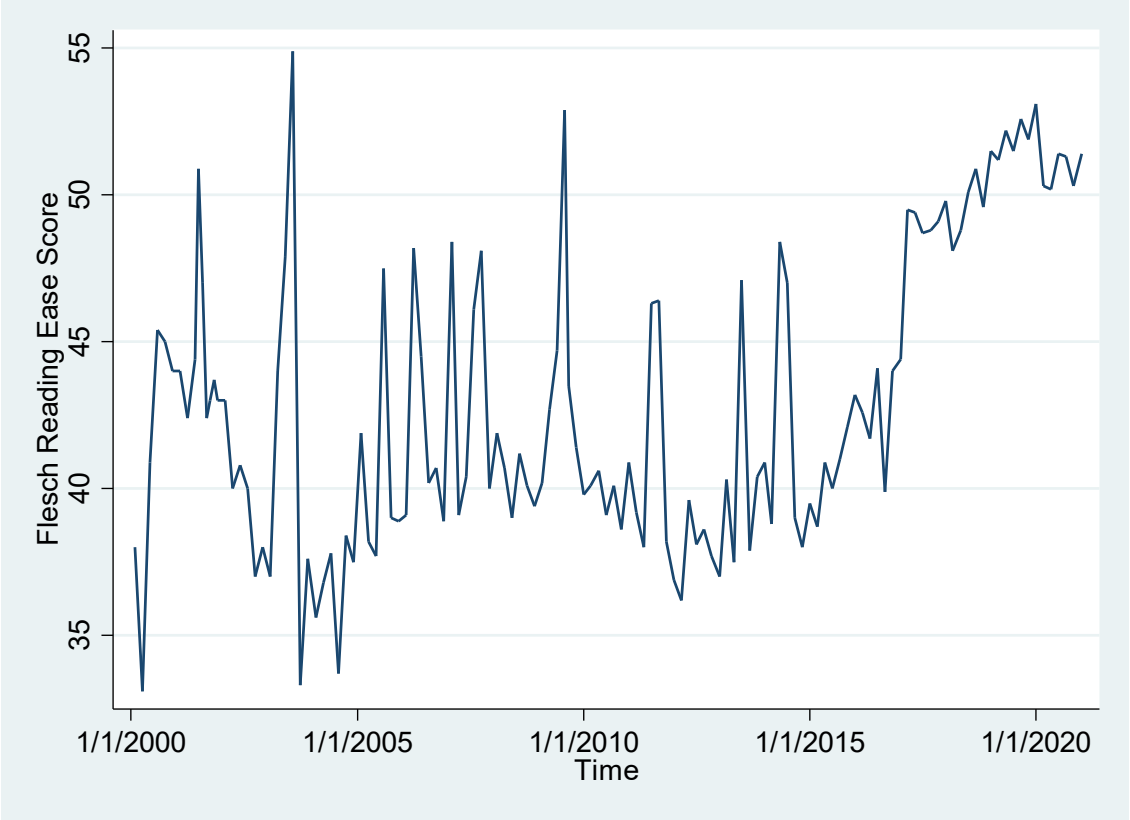


Figure 5: SARB Flesch Reading Ease Score computation

This makes for an interesting trend as Rudolf Flesch's initial submission for formulating his Flesch formula (see formula 1) was the fact that some text was "designed to make reading as difficult as possible".

Because Flesch scholarship on readability was premised on the sentence quantity and length, it is clear why the Flesch score signals deteriorating readability over time in the SARB statements while the computation analysis for the Flesch-

Kincaid index signals improved readability over time. As the SARB has cut down on the syllables over the past two decades, the sentence count over the same period of time only increased.



Figure 6: SARB Flesch-Kincaid Grade Level and Flesch Reading Ease Score computation

As highlighted earlier, the Flesch-Kincaid grade level index represents the years of study needed to fully understand the text. The computation ably illustrates how the SARB's earlier MPC statements averaged around 13, which by any standard is a high score. As illustrated in Table 1, a Flesch-Kincaid grade level of 13 is difficult to comprehend. However, it is clear that by 2016, the score had dropped to below 10, illustrating higher readability and perhaps more clarity in communication.

Given the inverse nature of the Flesch Reading Ease Score and Flesch-Kincaid grade level score, the Flesch Reading Ease Score computation (see Figure 2) post-2016 only affirms the Flesh-Kincaid findings as it soars above the 50 score, which

markedly indicates that the MPC statements were relatively easier to read post-2016.

On the other hand, the Mail & Guardian Flesch-Kincaid Grade Level computation fluctuates randomly around the 10 mark, with no visible cyclic trends, downward or upward, as illustrated in Figure 4.

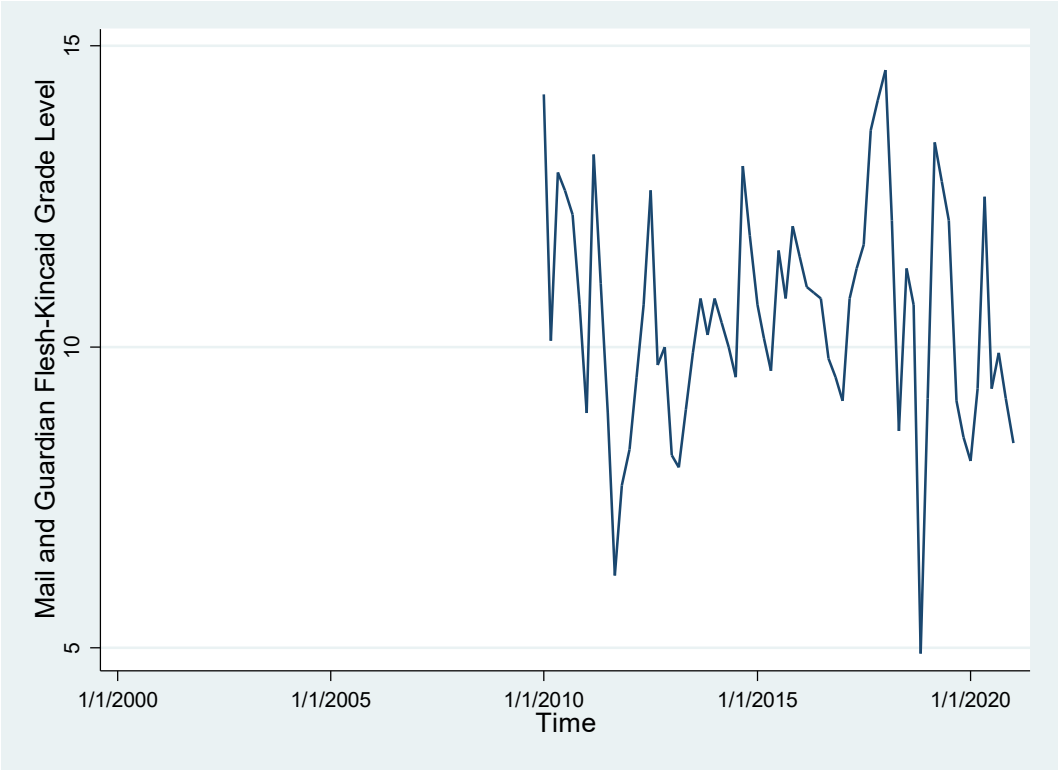


Figure 7: Mail & Guardian Flesch-Kincaid Grade Level computation

The same is evident for the Mail & Guardian Flesch Reading Ease Score computation, which fluctuates around the 50 mark, as illustrated in Figure 5.

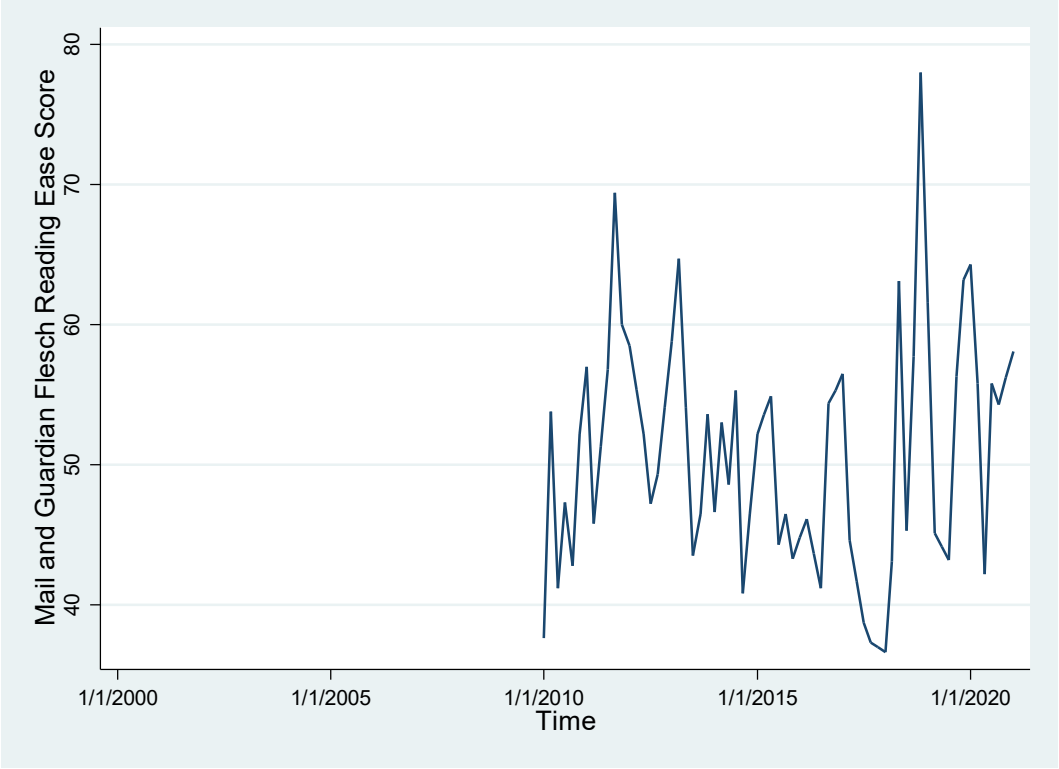


Figure 8: Mail & Guardian Flesch Reading Ease Score computation

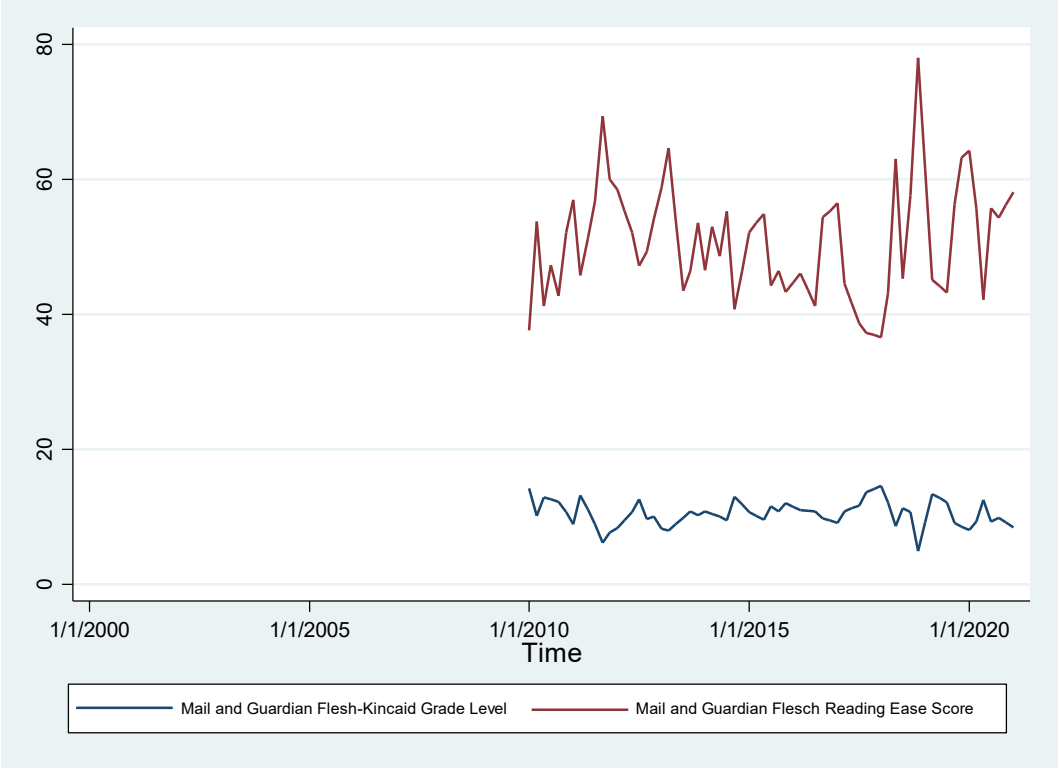


Figure 9: Mail & Guardian Flesch-Kincaid Grade Level and Flesch Reading Ease Score computation

It should be noted that the Mail & Guardian Flesch Reading Ease Score computation fluctuates more in comparison to the Mail & Guardian Flesch-Kincaid Grade Level computation, and this is attributed to the differing Flesch and Kincaid scales (see methodology).

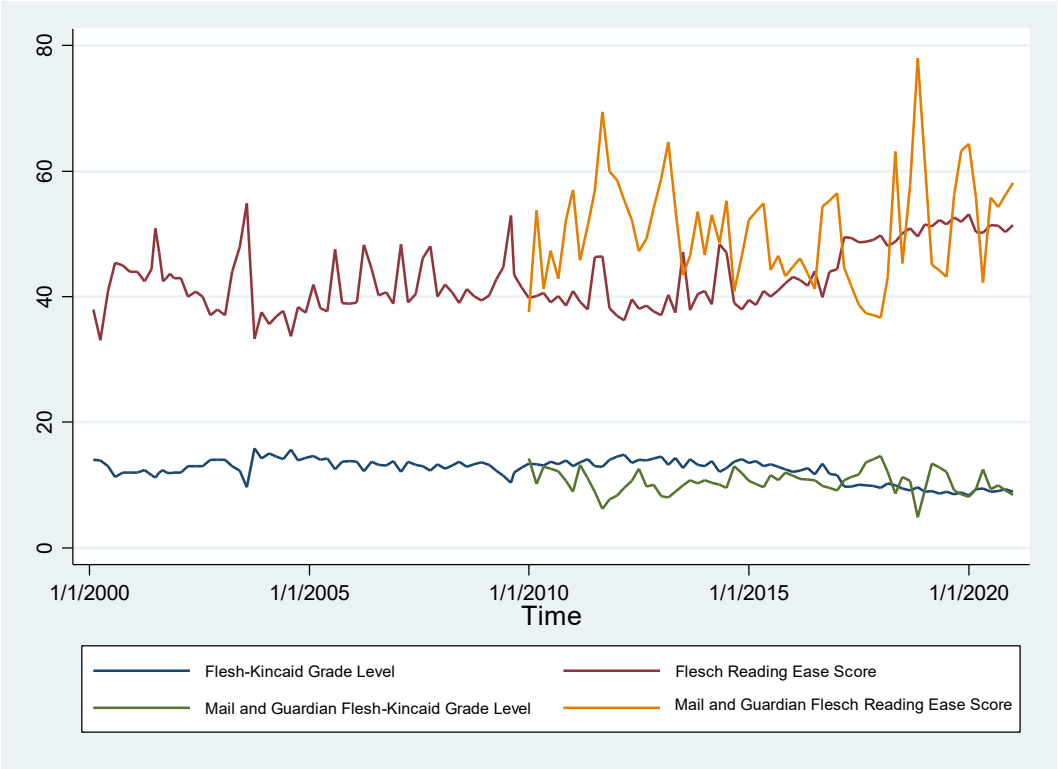


Figure 7: SARB Flesch, Flesch-Kincaid & Mail &Guardian Flesch, Flesch-Kincaid

The study conducted a test for stationarity with the hypothesis below:

HO: The series is non-stationary (has unit root).

H1: The series is stationary.

Rejection criteria: Reject H0 if the absolute value of the test statistic is greater than the absolute value of the critical value.

```
. dfuller SARB_Flesh_Kincaid, regress

Dickey-Fuller test for unit root                   Number of obs   =       129

                               ---------- Interpolated Dickey-Fuller ---------
                  Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)             -3.066            -3.500            -2.888            -2.578
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0292

------------------------------------------------------------------------------
D.                |
SARB_Flesh_Kincaid |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------------+----------------------------------------------------------
SARB_Flesh_Kincaid |
               L1. |  -.1495166   .0487636    -3.07   0.003    -.2460109   -.0530223
                   |
             _cons |   1.822584   .6133051     2.97   0.004     .6089641    3.036204
------------------------------------------------------------------------------
```

From the results, the test statistic is -3.066. Since the absolute value of the test statistic (5.030) is > the absolute value of the critical value at 5% significance level (2.888), the null hypothesis is rejected, and it is concluded that SARB's Flesch-Kincaid Grade Level series is stationary or does not have unit root. That is Flesch-Kincaid Grade Level is I (0).

```
. dfuller SARB_Flesch , regress

Dickey-Fuller test for unit root                   Number of obs   =       129

                               ---------- Interpolated Dickey-Fuller ---------
                  Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)             -5.073            -3.500            -2.888            -2.578
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000

------------------------------------------------------------------------------
D.            |
 SARB_Flesch  |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 SARB_Flesch |
         L1. |  -.3440561   .0678183    -5.07   0.000    -.4782562   -.2098559
             |
       _cons |   14.86415   2.929347     5.07   0.000     9.067499     20.6608
------------------------------------------------------------------------------
```

In addition, relating to SARB's Flesch Reading Ease Score, the absolute value of the test statistic registered at (5.073), which was greater than the absolute value of the critical value at 5% significance level (2.888), which infers that that SARB's Flesch Reading Ease Score was also I (0).

```
. dfuller M_G_FleshKincaid , regress

Dickey-Fuller test for unit root                   Number of obs   =        66

                               ---------- Interpolated Dickey-Fuller ---------
                  Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)             -5.163            -3.558            -2.917            -2.594
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000

------------------------------------------------------------------------------
D.                |
M_G_FleshKincaid |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------------+----------------------------------------------------------
M_G_FleshKincaid |
             L1. |  -.5669368   .1097982    -5.16   0.000    -.7862839   -.3475897
                 |
           _cons |   5.886003   1.174884     5.01   0.000     3.538902    8.233103
------------------------------------------------------------------------------
```

The results for the Mail & Guardian regress showed that the absolute value of the test statistic registered at (5.163), which is greater than the absolute value of the critical value at 5% significance level (2.917); ergo, the Mail & Guardian Flesch-Kincaid Grade Level was also I (0).

```
. dfuller M_G_Flesch , regress

Dickey-Fuller test for unit root                   Number of obs   =        66

                               ---------- Interpolated Dickey-Fuller ---------
                  Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)             -5.003            -3.558            -2.917            -2.594
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000

------------------------------------------------------------------------------
D.M_G_Flesch |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  M_G_Flesch |
         L1. |  -.5484055   .1096262    -5.00   0.000     -.767409   -.3294021
             |
       _cons |   28.11103   5.631628     4.99   0.000     16.86056     39.3615
------------------------------------------------------------------------------
```

Furthermore, the Mail & Guardian Flesch Reading Ease Score absolute value registered a test statistic of (5.003), which is also greater than the absolute value of the critical value at 5% significance level (2.917) and therefore the Mail & Guardian Flesch Reading Ease Score is I (0).

Subsequently, since all the series were stationary, a vector autoregressive was used to test for Granger causality. It should be noted that vector autoregressive was used in this study specifically to examine the possibility of a relationship between SARB MPC statements' readability and the corresponding Mail & Guardian newspaper articles' readability. Having established a computation for Flesch and Flesch-Kincaid indices for SARB's MPC statements, the study relies on the Granger causality test to examine if at all there exists a causality between SARB's MPC statements' Flesch and Flesch-Kincaid computation and the Mail & Guardian's Flesch and Flesch-Kincaid computation. This in essence provides an empirical test for whether SARB's MPC statements' readability trickles down to the corresponding Mail & Guardian articles' readability.

Relying on Granger (1969), whose work examines whether the prediction of one computation is improved by incorporating the knowledge of a second computation, the study is able to examine the potential causality of the Mail & Guardian's Flesch and Flesch-Kincaid scores being influenced by the readability, or lack thereof, of SARB's MPC statements.

Steps for the Granger causality test

Granger causality test on the SARB Flesch-Kincaid Grade Level with the Mail & Guardian Flesch-Kincaid Grade Level.

There are two sets of hypothesises to be tested:

Set 1:

HO: SARB's Flesch-Kincaid Grade Level does not Granger cause Mail & Guardian Flesch-Kincaid Grade Level.

H3bi: SARB's Flesch-Kincaid Grade Level Granger causes Mail & Guardian Flesch-Kincaid Grade Level.

Set 2:

HO: Mail & Guardian Flesch-Kincaid Grade Level does not Granger cause Flesch-Kincaid Grade Level.

H3bii: Mail & Guardian Flesch-Kincaid Grade Level Granger causes Flesch-Kincaid Grade Level.

Lag estimation

The varsoc command was run to determine the optimal lag.

```
. varsoc SARB_Flesh_Kincaid M_G_FleshKincaid, maxlag(8)

Selection-order criteria
Sample:  72 - 130                       Number of obs      =        59
```

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-245.972				15.3339	8.40582	8.43331	8.47624
1	-177.562	136.82	4	0.000	1.72781	6.22244	6.30491	6.43371
2	-168.626	17.873	4	0.001	1.46252*	6.0551*	6.19256*	6.40723*
3	-168.179	.89354	4	0.925	1.65209	6.17555	6.36799	6.66853
4	-166.617	3.1226	4	0.538	1.79906	6.25822	6.50564	6.89204
5	-164.976	3.2821	4	0.512	1.95669	6.33818	6.64059	7.11286
6	-159.424	11.105*	4	0.025	1.86731	6.28556	6.64294	7.20108
7	-159.04	.76896	4	0.943	2.12797	6.40812	6.82049	7.46449
8	-156.971	4.1368	4	0.388	2.2966	6.4736	6.94095	7.67082

```
Endogenous:  SARB_Flesh_Kincaid M_G_FleshKincaid
 Exogenous:  _cons
```

Four of the criteria selected lag 2 and one selected lag 2. Thus, since majority indicated lag 2, that was the one used.

Vector autoregression

Sample: 66 - 130		Number of obs	=	65
Log likelihood = -186.7614		AIC	=	6.054198
FPE = 1.460901		HQIC	=	6.186188
Det(Sigma_ml) = 1.073315		SBIC	=	6.388719

Equation	Parms	RMSE	R-sq	F	P > F
SARB_Flesh_Kin~d	5	.672553	0.9022	149.8514	0.0000
M_G_FleshKincaid	5	1.66878	0.2383	5.084733	0.0014

	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
SARB_Flesh_Kincaid						
SARB_Flesh_Kincaid						
L1.	.5016803	.1088776	4.61	0.000	.2838927	.7194679
L2.	.4794348	.110021	4.36	0.000	.25936	.6995095
M_G_FleshKincaid						
L1.	.0418017	.0491296	0.85	0.398	-.0564721	.1400755
L2.	-.0529508	.0476754	-1.11	0.271	-.1483159	.0424142
_cons	.2474716	.7603272	0.33	0.746	-1.273409	1.768352
M_G_FleshKincaid						
SARB_Flesh_Kincaid						
L1.	-.239061	.2701541	-0.88	0.380	-.7794497	.3013277
L2.	.2200899	.2729912	0.81	0.423	-.3259738	.7661536
M_G_FleshKincaid						
L1.	.5324931	.1219035	4.37	0.000	.2886498	.7763363
L2.	-.1387276	.1182954	-1.17	0.246	-.3753535	.0978984
_cons	6.550009	1.886573	3.47	0.001	2.776302	10.32372

. **vargranger**

Granger causality Wald tests

Equation	Excluded	F	df	df_r	Prob > F
SARB_Flesh_Kinc~d	M_G_FleshKincaid	.70116	2	60	0.5000
SARB_Flesh_Kinc~d	ALL	.70116	2	60	0.5000
M_G_FleshKincaid	SARB_Flesh_Kinc~d	.39287	2	60	0.6768
M_G_FleshKincaid	ALL	.39287	2	60	0.6768

Set 1 Conclusion: The results shows that SARB's Flesch-Kincaid Grade Level does not Granger cause Mail & Guardian Flesch-Kincaid Grade Level (p-value = 0.6768 > 0.05).

Set 2 Conclusion The results shows that Mail & Guardian Flesch-Kincaid Grade Level does not Granger cause SARB Flesch-Kincaid Grade Level (p-value = 0.5000 > 0.05).

Thus, it is concluded that there is no Granger causality between SARB's Flesch-Kincaid Grade Level and the Mail & Guardian Flesch-Kincaid Grade Level.

Granger causality test on the SARB Flesch Reading Ease Score with the Mail & Guardian Flesch Reading Ease Score.

There are two sets of hypothesises to be tested:

Set 1:

HO: SARB Flesch Reading Ease Score does not Granger cause Mail & Guardian Flesch Reading Ease Score

H1: SARB Flesch Reading Ease Score Granger causes Mail & Guardian Flesch Reading Ease Score

Set 2:

HO: Mail & Guardian Flesch Reading Ease Score does not Granger cause SARB Flesch Reading Ease Score

H1: Mail & Guardian Flesch Reading Ease Score Granger causes SARB's Flesch Reading Ease Score

Lag estimation

```
. varsoc SARB_Flesch M_G_Flesch, maxlag(8)
```

Selection-order criteria
Sample: 72 - 130 Number of obs = 59

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-392.894				2231.66	13.3863	13.4137	13.4567
1	-351.663	82.462*	4	0.000	631.816*	12.1242*	12.2067*	12.3355*
2	-348.323	6.68	4	0.154	646.525	12.1466	12.284	12.4987
3	-346.765	3.1165	4	0.539	703.321	12.2293	12.4218	12.7223
4	-345.402	2.7261	4	0.605	771.053	12.3187	12.5661	12.9525
5	-341.338	8.1281	4	0.087	772.484	12.3165	12.6189	13.0912
6	-340.056	2.5638	4	0.633	852.026	12.4087	12.7661	13.3242
7	-339.917	.27727	4	0.991	979.086	12.5396	12.9519	13.5959
8	-337.893	4.0489	4	0.399	1058.25	12.6065	13.0739	13.8038

Endogenous: SARB_Flesch M_G_Flesch
Exogenous: _cons

All five criteria selected lag 1 and. Thus, lag 1 was used for testing for Granger causality.

Vector autoregression

Sample: 65 - 130		Number of obs	= 66
Log likelihood =	-390.7597	AIC	= 12.02302
FPE =	571.0013	HQIC	= 12.10168
Det(Sigma_ml) =	476.0143	SBIC	= 12.22208

Equation	Parms	RMSE	R-sq	F	P > F
SARB_Flesch	3	3.06176	0.6879	72.73553	0.0000
M_G_Flesch	3	7.46523	0.2100	8.773187	0.0004

	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
SARB_Flesch						
SARB_Flesch L1.	.8361178	.0694417	12.04	0.000	.6973497	.974886
M_G_Flesch L1.	.0085133	.0443028	0.19	0.848	-.0800188	.0970455
_cons	6.96767	3.736876	1.86	0.067	-.4998811	14.43522
M_G_Flesch						
SARB_Flesch L1.	.0324919	.1693135	0.19	0.848	-.3058541	.3708379
M_G_Flesch L1.	.4507144	.1080197	4.17	0.000	.2348543	.6665745
_cons	26.72349	9.111293	2.93	0.005	8.51602	44.93095

. **vargranger**

Granger causality Wald tests

Equation	Excluded	F	df	df_r	Prob > F
SARB_Flesch	M_G_Flesch	.03693	1	63	0.8482
SARB_Flesch	ALL	.03693	1	63	0.8482
M_G_Flesch	SARB_Flesch	.03683	1	63	0.8484
M_G_Flesch	ALL	.03683	1	63	0.8484

Set 1 Conclusion: The results shows that SARB's Flesch reading ease score does not Granger cause Mail & Guardian Flesch reading ease score (p-value = 0.8484 > 0.05)

Set 2 Conclusion: The results shows that Mail & Guardian Flesch reading ease score does not Granger cause SARB Flesch reading ease score (p-value = 0.8482 > 0.05).

3.7. Discussion

The findings of this study clearly show that, between 2010 and 2021, although there might appear to be a co-movement between SARB's MPC statements' Flesch-Kincaid Grade Level score and Flesch Reading Ease Score to the Mail & Guardian's statements' Flesch-Kincaid Grade Level score and Flesch Reading Ease Score, the Granger causality test reveals that there is no causality between the two variables. However, there are clear instances where a spike in SARB's MPC statements' Flesch-Kincaid Grade Level score and Flesch Reading Ease Score is evidently reflected on the Mail & Guardian's corresponding Flesch-Kincaid Grade Level score and Flesch Reading Ease Scores, as was the case for the 26 October 2010 SARB MPC statement, which recorded a Flesch-Kincaid Grade Level score of 13.4. This was a standout score in the ten-year dataset, and interestingly the score is reciprocated on the Mail & Guardian's Flesch-Kincaid Grade Level score, which registered at 14.2. This occurrence is repeated on 22 July 2010, when the SARB MPC statement scored 13.7 on the Flesch-Kincaid Grade Level score, only for the Mail & Guardian score to also soar to 12.6.

An explanation for this occurrence is the direct quotation reporting style which is evident on both dates.

On 22 July 2010, the SARB MPC statement read:

> "The sovereign debt crisis in Europe appears to have had a short-term respite, but significant longer term risks and uncertainties persist."

In reciprocity, the Mail & Guardian article dated 22 July 2010 reads:

> "We see that the global economic outlook remains uncertain. The sovereign debt crisis in Europe has had a short risk, but significant long-term risks and uncertainty persist."

The same direct reportage is repeated for the monetary policy stance, which is a clear copy of the statement from the SARB MPC statement.

The Mail & Guardian article reported that:

> "The monetary policy committee assesses the risk to the inflation outlook as being evenly balanced and views the current monetary policy stance as appropriate."

This is the same statement from the 22nd July 2010 SARB MPC and in essence explains the co-movement between the two as direct reportage from the newspaper articles creates an 'artificial' co-movement. But as argued by Reid et al., (2019: 33) the media is often drawn towards "the real economic consequences of monetary policy and tends to over-simplify". This is a theme that emerges in the Mail & Guardian articles with headlines such as:

> "Consumers have a little more money for Easter eggs"

Mail & Guardian, 2018.

In summation, if the Mail & Guardian is directly quoting a SARB MPC statement, then any spike or drop in SARB's readability will trickle down to the corresponding Mail & Guardian newspaper article.

Admittedly, this is contrary to Cukierman's (2009) argument that most members of the general public are rationally inattentive and rely on the media to gather, condense and interpret this primary information on their behalf as the Mail & Guardian categorically disseminates SARB's message, to an extent, in its original form — thus undermining the earlier discussed filtering role of the media.

3.8. Conclusion

While central banks communicate to a wide range of market participants, their interaction with the media has remained a complex facet of monetary policy transmission. While many studies have explored the media and monetary policy, such as media coverage when central banks announce a 'shock' rate movement, there has been little to no literature on African central banks' causality on media reportage, thereby validating this study.

This paper employed Flesch-Kincaid Grade Level and Flesch Reading Ease Score textual analysis to SARB MPC statements and corresponding Mail &Guardian newspaper articles from January 2010 to January 2021.

The study sought to examine the relationship between the SARB MPC statements and corresponding Mail & Guardian newspaper articles and examine the causality of SARB's MPC statements' Flesch-Kincaid Grade Level and Flesch Reading Ease Scores on the Mail & Guardian's Flesch-Kincaid Grade Level and Flesch Reading Ease Scores. The study was able to illustrate, relying on the Granger causality test, that although there appears to be a co-movement on the computation analysis, SARB's Flesch-Kincaid Grade Level and Flesch Reading Ease Scores have no Granger causality on the Mail & Guardian's Flesch-Kincaid Grade Level and Flesch Reading Ease Scores.

In so doing, the study was able to add to the scarce emerging literature on African central bank communication literature while offering a wide time frame given the ten-year span of MPC statements and corresponding newspaper articles examined. This study paper contributed to the only emerging African central bank communication literature by firstly deploying the Flesch Reading Ease Score and the Flesch-Kincaid grade level index to 55 SARB MPC statements to gauge readability and hence SARB's clarity, and subsequently testing for Granger causality using a causality of SARB's MPC statements on the Mail & Guardian's newspaper articles. In so doing, it added to the only emerging literature on African central bank clarity and the interaction with the media.

4. SENTIMENTAL OUTLOOK FOR THE MONETARY POLICIES OF THE SOUTH AFRICAN RESERVE BANK

4.2. Introduction

In the past decade, effective communication[34] has emerged as part of the monetary policy toolkit in the execution of modern monetary policy (Reid, 2011a). As central banks have had to deal with financial crises, their communication with the outside world has evolved considerably over the years (Cœuré, 2017).

Despite communicating prior to the global financial crisis, central banks appear to have made significant strides in enhancing their communication frameworks after the crisis. Siklos's (2013) study of forty central banks to ascertain how their communication strategies have changed since 2007 found that firstly, the public disclosure gap between inflation targerters and their non-inflation targeting counterparts has narrowed since 2007, and transparency[35] has improved worldwide[36]. Siklos (2018) later surveyed the Reserve Bank of Australia, the Bank of Canada, the Reserve Bank of New Zealand, the Bank of England and the US Federal Reserve Bank's language; exploring changes since 2003 in their communication stance around financial stability and uncertainty, and their respective economic outlooks.

[34] De Haan et al. (2007) define effective central bank communication as the provision of information by the central bank to the public on the objectives of monetary policy, the monetary policy strategy, the economic outlook, and (the outlook for future) policy decisions. To this end, well-communicated information fosters more efficient markets as it reduces uncertainty and lowers volatility, ultimately aiding central banks to achieve part of their monetary policy objectives (Kahn 2007).

[35] Poole (2003) describes transparency as "accurately conveying accurate information including all the information market participants need to form opinions on monetary policy that are as complete as possible".

[36] Siklos (2013) reports that central banks around the world hold on to the view that they should not surprise markets, whether or not crisis conditions are in effect.

The study concluded that the central banks in all the countries considered began to display greater awareness[37] around the need to convey a message about the state of financial system stability as well as signal about the level of uncertainty about the economic outlook in their respective economies.

Despite this, Siklos (2018) concludes that relatively less effort was devoted to communicating the stance of monetary policy or in the aggressiveness in the wording about economic conditions in policy statements. Furthermore, all the central bank statements surveyed reflected the view that they complemented changes in policy rates as well as the introduction of novel policies such as quantitative easing.

Moving from a position of relative opacity[38] three decades ago, today central banks pride themselves on sharing timely and clear macroeconomic information in a bid to contain expectations. This timely dissemination of information has consequently yielded monetary policy transparency, which is not only a necessary complement to central bank independence but more pressingly, fosters accountability and safeguards the democratic legitimacy of independent central banks (Geraats, 2002).

Admittedly, central bank accountability may be one of the toughest aspects to measure in the age of monetary transparency. As submitted by Woodford (2005:2): "Central banking is not like steering an oil tanker, or even guiding a spacecraft, which follows a trajectory that depends on constantly changing factors, but that does not depend on the vehicle's own expectations about where it is heading."

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[37] Siklos's (2018) study examined changes in central banking operations along the monetary policy, and financial stability dimensions may have evolved differently. It went on to examines various facets of central bank communication, including the various means used by central banks to communicate as well as the frequency with which the monetary authorities communicate with the public. It however pays attention to specific details of a central bank's communication strategy such as whether central banks publish macroeconomic forecasts, the assumptions and the role of judgment in producing these forecasts, and how these are explained to the public. Finally, the study launches an inquiry into whether the crisis changed attitudes to the role of monetary policy surprises versus an emphasis on predictability in the implementation of monetary policy.

[38] Geraats (2002) contrasts central bank transparency and opacity, noting that the former involves the presence of symmetric information while the lack of transparency, or opacity, refers to asymmetric information, ergo opacity generates uncertainty. However, transparency is not equivalent to complete certainty or perfect information. For instance, in the case of monetary policy, the central bank and private sector could both face uncertainty about the structure of the economy; but, as long as both share the same information and are aware of it, transparency prevails.

The forward-looking nature of central banking means central banks affect the economy through their influence on expectations and as a result, it may be challenging for an outsider to set central bank performance yardsticks for central bankers to be measured against.

Central Bank Governance Group and Martinez (2009: 139) substantiate:

> "First, it may be hard to clearly define the objectives, or there may be multiple objectives that are potentially conflicting. Without a precise specification and prioritisation of the central bank's goals, it can be difficult to evaluate its achievements. Second, it may be hard to identify appropriate and verifiable performance criteria with respect to the objectives that are defined. For many central bank functions, and especially the most critical ones, the central bank's actions are only one out of many influences on the outcomes. It may require a specialist's expertise and a lot of judgment to relate specific actions to intended outcomes and to assess their contribution to the achievement of objectives."

Nonetheless, despite the age of transparency and accountability, there are some critics of transparency who argue that there are circumstances in which uncertainty effects could influence average inflation and make opacity desirable (Geraats. 2002). Cukierman (2001) asserts that central banks have a motive to be opaque about their preferences if they have an asymmetric concern about output. He defends this premise, submitting that if a central bank primarily cares about output stabilisation and the output in question falls short of the natural rate, this could trigger inflation bias when it faces uncertainty about supply shocks. To counter an increase in inflation expectations, the central bank is better off keeping this information outside the public domain. In agreement, Geraats (1999) advances that this heightened concern about decreases in output ultimately yields a convex response of inflation to supply shocks and therefore an average inflation bias.

Later, Amato et al., (2003) reaffirmed this notion as they examined some of the economic defects and benefits of a monetary authority sharing information with the public, concluding that this can be a double-edged tool as it can influence actions through coordination, which in some instances, can coordinate actions away from fundamentals[39].

Central banks have not always been this transparent. For instance, it was not until 1967 that the US Federal Reserve Bank commenced publishing statements of their policy actions more frequently than once a year. This was followed in 1976 by more regular announcements of the Federal Open Market Committee (FOMC) policy decisions (McKee, 2001).

Nonetheless, one should note that Italy, Greece and Portugal had published their inflation targets at times during the early 1980s, with Sweden[40] briefly operating a form of inflation targeting in the 1930s (see McDermott and Williams, 2018). The Swedish experiment meant that the Riksbank's commitment to price stability was overseen by the Riksdag through its banking committee. In a pioneering approach, the Riksbank governor was questioned annually by the banking committee while the monetary policy was evaluated in bills put forward by the government. In a bid to keep the public apprised of the Riksbank's policy actions, monitoring of Sweden's central bank occurred through an open political process well covered by the press.

[39] Amato et al., (2003) highlight the double-edged nature of public information when used for policy purposes. They prove that while it is very effective at influencing the actions of agents when they are strategic complements, public information can also be too effective in doing so and consequently lead agents to overreact to public information and, thus, any unwarranted public news or mistaken disclosure may cause damage. More generally, when public information becomes entrenched in the prevailing 'climate of opinion', it begins to take on a life of its own, suppressing the private information of individual agents, and disrupting the channel through which the market mechanism aggregates and disseminates information on the economic fundamentals.

[40] Upon leaving the gold standard in 1931, Sweden introduced a monetary programme of stabilisation of the domestic price level, with the goal of arresting the fall in prices as well as mitigating widespread fears of rising prices. The monetary declaration of 1931 evolved in several steps into a full monetary programme before it was finally approved by the Parliament, the Riksdag, in 1932. It should be remembered, however, that the price stability target adopted by the Riksbank in 1931-32 was a price level target, in contrast to the inflation targets adopted by several central banks in the 1990s (Berg and Jonung, 1999).

However, although Italy, Greece and Portugal published their inflation targets in the early 1980s, the Reserve Bank of New Zealand (RBNZ) was the first to adopt inflation targeting[41] as we know it and with that came the inevitable push towards credibility. This was ensured through the Reserve Bank Act of 1989, which explicitly laid out the framework for the RBNZ. In line with transparency and credibility, the RBNZ Act Section 15 demanded that the bank publish regular statements on its monetary policy decisions and for these to be laid before parliament. Consequently, the governor's deliberations also had to be monitored and assessed by a board consisting of members appointed by the finance minister (McDermott and Williams, 2018). This laid the foundation for transparency in inflation targeting as we know it today.

By 1996, the US Federal Reserve Bank too had migrated to an inflation-targeting regime with proponents such as the former vice chairperson of the Board of Governors of the US Federal Reserve Bank system, Alan Blinder, motivating for more openness in the monetary field. Blinder reasoned that, through transparency and effective communication, a central bank can contain expectations by regularly providing market participants with actionable data about its own assessment of the core vital dynamics guiding monetary policy and, ultimately, its policy actions. Blinder (1998: 70) advanced:

> "Greater openness might actually improve the efficiency of monetary policy… [because] expectations about future central bank behaviour provide the essential link between short rates and long rates."

A year later, in May 1999, the FOMC commenced releasing an appraisal of its 'leaning', with respect to future changes in monetary policy in its statements.

This development came with more detailed monetary statements, and more interestingly, this path was followed even when the policy rates were unchanged.

[41] Bernanke and Mishkin (1997) characterise inflation targeting as a framework where the monetary authority announces official target ranges for the inflation rate at one or more horizons, and by explicit acknowledgment that low and stable inflation is the overriding goal of monetary policy. In addition, other important features of inflation targeting include increased communication with the public about the plans and objectives of the monetary policymakers, and, in many cases, increased accountability of the central bank for attaining those objectives.

The dissemination of monetary statements even when policy rates were unchanged, by and large, was in line with Woodford's (2005) argument that more transparency is better than less, since greater transparency reduces uncertainty about central bank objectives and enhances accountability. Soon after, the US Federal Reserve Bank would go further and announce that the FOMC would vote immediately after each meeting.

Today, transparency and effective central bank communication has become the norm, with inflation targeters combining elements of both 'rules' and 'discretion' in monetary policy to yield an inflation-targeting framework that combines both a precise numerical target for inflation in the medium term and a response to economic shocks in the short term (King, 2005).

Table A illustrates different countries' inflation targets and target horizons, bearing in mind that the target horizon depends on whether inflation is within the price stability range.

Table A. Summary Statistics by Country

Monetary Policy Frameworks

	Inflation Targeting			Central Bank Independence	Central Bank Transparency			
Country	N	Mean	Adoption date	Mean	Mean	S.D.	25th %	75th %
Argentina	170	0.11	Jan-16	0.60	4.93	0.88	3.50	5.50
Armenia	119	1.00	-	0.76	8.17	0.47	7.50	8.50
Azerbaijan	124	0.00	-	0.38	4.50	-	4.50	4.50
Bangladesh	76	0.00	-	0.33	3.50	-	3.50	3.50
Bolivia	126	0.00	-	0.51	-	-	-	-
Brazil	169	1.00	Jun-99	0.21	5.75	1.03	4.50	6.00
Bulgaria	172	0.00	-	0.76	5.65	0.57	5.50	6.50
Chile	170	1.00	Sep-99	0.64	7.02	0.50	6.50	7.50
China	170	0.00	-	0.37	3.15	0.23	3.00	3.50
Colombia	138	1.00	Oct-99	0.48	7.06	1.22	5.50	8.00
Costa Rica	170	0.00	-	0.58	-	-	-	-
Croatia	168	0.00	-	0.68	3.22	0.25	3.00	3.50
Dominican Republic	120	0.54	Jan-12	0.64	-	-	-	-
Ecuador	112	0.00	-	0.78	-	-	-	-
Egypt	155	0.00	-	0.49	3.26	0.59	3.50	3.50
Guatemala	101	1.00	Jan-05	0.71	3.83	2.23	2.00	7.00
Honduras	101	0.00	-	0.49	-	-	-	-
Hungary	170	1.00	Jun-01	0.50	12.28	1.68	11.00	13.50
India	169	0.07	Aug-16	0.30	2.91	0.64	3.00	3.00
Indonesia	170	0.85	Jul-05	0.46	8.55	0.51	8.50	9.00
Kazakhstan	170	0.18	Aug-15	0.46	5.66	0.86	6.00	6.00
Macedonia	122	0.00	-	0.65	-	-	-	-
Malaysia	170	0.00	-	0.41	6.00	-	6.00	6.00
Mexico	170	1.00	Jan-01	0.49	5.95	0.22	6.00	6.00
Pakistan	168	0.00	-	0.27	4.16	0.78	4.00	4.50
Paraguay	166	0.43	May-11	0.48	-	-	-	-
Peru	169	1.00	Jan-02	0.61	8.02	0.50	7.50	8.50
Philippines	167	1.00	Jan-02	0.52	9.74	0.44	9.00	10.00
Poland	170	1.00	Jan-98	0.46	9.22	1.25	9.00	10.50
Romania	167	0.89	Aug-05	0.45	7.26	0.67	7.50	7.50
Russia	170	0.25	-	0.58	4.00	1.59	3.00	6.00
South Africa	170	1.00	Feb-00	0.29	9.00	-	9.00	9.00
Serbia	112	0.84	-	0.58	4.00	1.59	3.00	6.00
Sri Lanka	85	0.00	-	0.59	5.50	-	5.50	5.50
Taiwan	171	0.00	-	0.19	-	-	-	-
Thailand	170	1.00	May-00	0.16	7.41	0.87	6.50	8.50
Turkey	170	0.82	Jan-06	0.60	9.67	0.63	10.00	10.00
Ukraine	133	0.14	Mar-16	0.62	4.20	0.46	4.00	4.00
Uruguay	170	0.00	-	0.36	3.42	1.51	2.00	5.00
Vietnam	170	0.00	-	0.15	-	-	-	-

Source: Marques et al., (2021)[42]

[42] Table A illustrates statistics for the variables representing monetary policy frameworks: the adoption of inflation targeting with Garriga's (2016) index of central bank independence, and Dincer and Eichengreen's (2014) index of central bank transparency. S.D. stands for standard deviation. 25 percent and 75 percent are the 25th and 75th percentiles, respectively.

Furthermore, Table B illustrates different inflation targeters' mechanisms of accountability given the relationship between central bank independence and accountability and transparency.

Table B: A summary by country showing accountability and transparency.

	Open letter	Parliamentary hearings?	Press notice/ conference	Minutes	Votes	*Inflation Report*	Frequency
Armenia	No	Yes, annual	PR	Yes, within ten days	No	Yes	4
Australia	No	Yes, twice yearly	Notice	Yes, after two weeks	n/a	Yes	4
Brazil	Yes	Yes, six per year	PR + PC for *IR*	Yes, after eight days	Balance of votes	Yes	4
Canada	No	Yes, twice yearly	PR + PC for *IR*	No	n/a	Yes	4
Chile	No	Yes, four times per year	PR	Yes, after two weeks	Yes	Yes	4
Colombia	No	Yes, twice yearly	PR, PC for *IR*	Yes, after two weeks	Majority or unanimous	Yes	4
Czech Republic	No	No (Report)	PR, PC for *IR*	Yes, after eight days	Yes	Yes	4
Ghana	No	No	PR + PC	No	n/a	Yes	4 to 6
Guatemala	No	Yes, twice a year	PR + PC	Yes, after four weeks	No	Yes	3
Hungary	No	Yes, once a year	PC	Yes	Yes	Yes	4
Iceland	Yes	Yes, twice yearly	PR + PC	Yes	Balance of votes	Yes	2 plus 2
Indonesia	No	No	PR	No	n/a	Yes	4
Israel	No	Yes, twice yearly	PR	Yes, after two weeks	Balance of votes	Yes	2
Mexico	No	Yes, not regular	PR	Yes, after two weeks	n/a	Yes	4
New Zealand	Other	Yes, four times a year	PR, PC for *IR*	No	n/a	Yes	4
Norway	No	Yes	PR + PC	No	n/a	Yes	3
Peru	No	Yes, once a year	Teleconference	No	No	Yes	4
Philippines	Yes	No	PR + PC	Yes, after four weeks	No	Yes	4
Poland	No	No[(a)]	PR + PC	Yes, after three weeks	Yes in *IR*	Yes	4
Romania	No	No	PR + PC for *IR*	No	No	Yes	4
Serbia	Yes	No[(b)]	PR + PC	No	No	Yes	4
South Africa	No	Yes, at least three per year	PR + PC	No	n/a	Yes	2
South Korea	No	Yes	PR + PC	Yes, after six weeks	No	Yes	2
Sweden	No	Yes, twice yearly	PR	Yes, after two weeks	Yes	Yes	3 plus 3
Thailand	Yes	No	PR + PC	Yes, after two weeks	Balance of votes	Yes	4
Turkey	Yes	Yes, twice a year	PR	Yes	No	Yes	4
United Kingdom	Yes	Yes, three per year	PR + PC for *IR*	Yes, after two weeks	Yes	Yes	4

Note:
IR = *Inflation Report*.
PC = Press conference.
PR = Press release.

(a) Governor reports to Lower House once a year on monetary policy in the preceding year.
(b) Governor explains reports to National Assembly. See page 38.

Source: Hammond (2012).

It should be noted that all inflation targeters listed on Table B publish details of their monetary policy decision immediately after the MPC meeting and this is followed by a press release to accompany the decision. In addition, 19 of the listed inflation targeters on Table B hold press conferences either to explain their decision or on releasing their inflation report.

The phylogeny of central bank communication has seen scholarly work on monetary communication explicate from mere quantification of central bank communication to macroeconomic cross-examination. For instance, Davis and Wynne (2016) explored the US Federal Reserve Bank's FOMC's communications in contrast with their ability to moderate shocks[43]. Bernanke et al., (1999) underlined the significance of central bank communication in an inflation-targeting framework. In their pioneering study, Bernanke et al., (1999) exposed that given the rather relatable[44] yet open nature of inflation targeting, the general public are accorded a rare opportunity to grasp and understand the effects of monetary policy.

Guthrie and Wright (2000) went on to unpack the rationale for effective central bank communication by exposing how the Reserve Bank of New Zealand took on a stance of 'simply communicating' where it desired its short-term interest rates to be and in doing so, elicited a market response without necessarily engaging in any open-market operations or moving the repo rate. Blinder et al. (2001) undertook a retrospective study of an evolution of central bank communication at the turn of the century, concluding that much as there is consensus that central bank communication is an essential tool in modern monetary policy, there remained colossal variations in communication approaches across central banks; ergo, a lack in agreement on what constitutes an effective central bank communication framework among central banks.

Blinder et al. (2008) unpacked the vast literature from central bank communication and observed that there needs to be convergence and consensus on what passes for an "optimal communication strategy" (Blinder et al., 2008: 910).

[43] Davis and Wynne (2016) study examined texts of the 131 post-FOMC meeting statements issued by the FOMC under chairpersons Greenspan and Bernanke, illustrating an evolution of the length of the post-meeting statement (as measured by the number of words in the statement). By categorising linguistic features of the statements, they empirically illustrate and correlate their findings with estimates of monetary policy shocks. The analysis suggests that the increased length and complexity of the statement during the Zero Lower Bound period was responsible for statements having such a large impact.

[44] In an attempt to contrast nominal GDP targeting and inflation targeting, Bernanke et al., (1999) argued that perhaps the most important facet of inflation targeting is that it seems likely that the concept of inflation is better understood by the public than is the concept of nominal GDP, which in his view could easily be confused with real GDP.

Blinder (2008) cites on an example from October 2000, when then ECB president Wim Duisenberg hinted to an interviewer that there would be no further ECB intervention to support the Euro, and this triggered an almost immediate depreciation of the currency and heavy criticism of Duisenberg. This to an extent validates Amato et al.'s (2003) earlier submission.

Meanwhile, Berger et al., (2011) analysed how ECB communications are unpacked[45] by the media. They then went on to quantify the media's reaction to ECB policy rate changes when the policy decision was largely unexpected. To this end, there is widespread agreement (Mishkin, 1995; Geraats, 2002; Blinder et al., 2008; Sturm and De Haan, 2011) that central bank communication limits expectations and is a cornerstone of modern central banking.

Unpacking the role, and subsequent classification of communication, in modern-day central banking is critical to appreciating its relevance. In their work on central bank communication, Blinder et al., (2008:4) delve into the subject with a clear classification of central bank communication that takes on a two-pronged approach, namely: "how communication manages the expectations by creating news and by reducing 'noise'[46] in markets". Rationally, the process of news creation inadvertently dictates that the central bank is effectively communicating and the reverse would dictate that the central bank's communication is ineffective. The process of creating news alludes to the effectiveness of communication, for example how a monetary authority's communications affect expectations and financial markets.

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[45] Berger et al., (2011) assessed the favourable news coverage the ECB received when making monetary policy decisions in the international and national press, relying on a data set that quantifies press coverage in the 12 countries of the euro area and internationally, based on 57 newspapers reaching back to 1999. They identified a large number of determinants for the 'favourableness' of press coverage as their conclusions showed that the media was influenced substantially by the nature of the decisions as well as by the general economic environment. In particular, less favourable reporting prevailed if a decision was unanticipated and in an environment of relatively high inflation. On the other hand, their study illustrated clear indications that the role of communication has its limits as the media's reporting on ECB policy decisions was always more negative in tone when inflation was higher than 2%, even when pre-meeting communication was intense or the information content of press conferences was high.

[46] Blinder et al., (2008) explore the idea of central banks creating 'news' with the premise that central banks' pronouncements influence expectations and therefore move asset prices with some circumstances where communication acts as an anchor and guides market expectations, ergo becoming the main tool of monetary policy. In contrast, reducing noise involves the mechanisms in which central bank talk increases the predictability of central bank actions, which should in turn reduce volatility in financial markets.

4.3. Central bank communication: A theory

Another way to approach the theoretical relevance of central bank communication is through its influence on the future path of interest rates. As aforementioned, it is widely accepted (Blinder et al., 2008) that the ability of a central bank to affect the economy depends on its ability to influence market expectations about the future path of overnight interest rates. This is the case as few economic decisions hinge on the overnight bank rate given the fact that interest rates on longer-term instruments should reflect the expected path of future overnight rates. For instance, if the n-day rate is approximately:

$$R_t = \alpha_n + (1/n)(r_t + r^e_{t+1} + r^e_{t+2} + \dots r^e_{t+n-1}) + \varepsilon_{1t} \qquad (1)$$

Assuming r_t is the current overnight rate and r^e_{t+1} is the present expectation of tomorrow's overnight rate while α_n is the term premium, and the error term indicates that the term premium might be stochastic, then equation (1) illustrates the reliance of intermediate and long-term rates on the public's expectations of future central bank policy (see Blinder et al., 2008).

Let us now embed this idea in a simple macroeconomic framework to further illustrate the role of central bank communications. Assuming that $E_t^{PS}\pi_{t+1}$ is the private sector's forecast of next year's inflation; typically (and practically) this would be based on their information set at a time t, that is I_t , denoted as $\left(E_t^{PS}\middle|I_t\right)\pi_{t+1}$. The central bank itself has its own information set Ω_t but we assume that it is aware of the private sector's information, that is, $I_t \in \Omega_t$; however, the reverse is not true, i.e., $\Omega_t \notin I_t$. To this end, there is scope for the central bank to expand the private sector's information set via announcements, press conferences, inflation reports, and MPC statements among others (communication).

Here if successful and effective, $\Omega_t \in I_t$ after the announcement. With this logic, the argument then turns towards who possesses what information exactly and when they do. So, assuming the central bank's inflation forecast is $\left(E_t^{CB}\middle|\Omega_t\right)\pi_{t+1}$. Now, here we may find that the central bank's forecast (assuming it is published) influences the private sector forecast (even without revealing what Ω_t contains).

This can be represented as:

$$\left(E_t^{PS}\middle|I_t\right)\pi_{t+1} = f\left(\left(E_t^{CB}\middle|\Omega_t\right)\pi_{t+1}\right) \tag{2}$$

where f stands for function. If the above holds true, it may be the case that $\left(E_t^{CB}\middle|\Omega_t\right)\pi_{t+1}$ 'Granger causes' $\left(E_t^{PS}\middle|I_t\right)\pi_{t+1}$.

Despite the advances in the empirical literature about central bank communication, there remains a divergence between some researchers as one school of thought believes effective communication[47] $\Omega_t \in I_t$ from a central bank is effective only when there is a noticeable movement in financial markets (Born et al., 2014; Lehtimäki and Palmu, 2018). Needless to say, this is not necessarily always the case.

Another school believes communication is only effective when private-sector agents react to the central bank communication. In the context of equation (2), this could mean $I_t = f\left(\Omega_t\right)$; however, the private sector reaction to central bank communications does not necessarily actuate a movement in financial markets, or asset prices, for that matter.

Hayo and Neuenkirch (2014) explored whether central bank communication had an effect on market participants' perception of the central bank in question. It should be noted that Hayo and Neuenkirch's (2014) research was indeed far-reaching as it contrasted these market participants' perceptions on the respective central bank's credibility and independence, looking at more than 550 financial market participants.

In their more recent work, Reid and Siklos (2020) advanced that following the financial crisis, monetary policy evolved as central bank communication transcended from a mere complement to a substitute for monetary policy actions.

[47] Blinder et al., (2008) say central bank communication can be defined as the provision of information by the central bank to the public regarding such matters as the objectives of monetary policy, the monetary policy strategy, the economic outlook, and the outlook for future policy decisions.

For purposes of this work, the researcher relies on the latter school, which believes effective central bank communication is achieved when private-sector players react to the communication given. This study examines whether SARB's tone and sentiment in its communication Granger causes private-sector inflation expectations.

4.4. Communication and monetary policy

Monetary policy actions can be strengthened by an effective monetary policy communication strategy (Blinder, 1998; Woodford, 2001, 2005; De Haan et al., 2007). With an adept and effective communication strategy, monetary policy aids monetary predictability and more pressingly, contains the market's expectations (Geraats 2002; Cruijsen, 2008; Cruijsen and Eijffinger, 2008; Cruijsen and Eijffinger, 2008b; Cruijsen et al., 2010).

Central banks communicate via various channels, ranging from press conferences to post-meeting statements, reports and notes on projections, among others, and this is motivated by the audience in question. For instance, the SARB's MPC statements and Monetary Policy Forum reviews differ in complexity, with the latter being less complicated in line with a deliberate intention to reach different audiences. In addition, the MPC statements are published together with documents detailing the key forecasts and assumptions used in the meeting for variables such as headline inflation, economic growth and the future (model-determined) policy rate. In contrast, the differing complexity is attested by SARB Monetary Policy Forums piloted in 2017 and hosted in Soweto (Johannesburg), aimed at reaching new audiences. On these occasions, the SARB raised the attendees' awareness of the fundamentals of banking licences (South African Reserve Bank, 2018a).

Theoretically, the essence of central bank communication is to anchor long-term inflation expectations ex ante and ultimately reinforce accountability ex post (Leiderman and Svensson, 1995; Bernanke and Mishkin, 1997; Svensson, 1997; and Bernanke et al., 1999; Binder, 2017).

Consequently, well-anchored expectations would facilitate inflation stabilisation. This has a caveat however, as it only holds true if expectations affect inflation via, for example, wage-setting. However, assuming expectations affect inflation via wage-setting but wages are set above the central bank's inflation target, then it would not apply.

In South Africa, literature is emerging examining SARB's overall communication, with some going as far as looking at macroeconomic variables' movements in reaction to SARB's monetary communications. For instance, the earlier work of Reid and Du Plessis (2010) on SARB, sorts SARB's MPC statements into negative, neutral or positive, ultimately building a SARB inclination backed by the date on which the central bank shares the information.

Reid et al., (2014) went on to examine how South African newspapers cover SARB policy actions. It should be noted that this study is analogous to Berger et al., (2011), with the latter focusing on the ECB. Reid et al., (2014: 8) expose how the inattentive public relies on the media $I_t^{IN} \in I_t^{MED} \in \Omega_t$ to "gather, condense and interpret this primary information on their behalf" $E_t^{IPS}\left(I_t \middle| \pi_{t+1}\right) = E_t^{MED}\left(M_t \middle| \pi_{t+1}\right)$.

Reid et al., (2020) further follow their literature up with an exploration of the biases of financial journalists in transmitting SARB's MPC communications to the inattentive public. In a rather more qualitative inquisition, this study unpacks the journalists' knowledge and cognition of inflation plus monetary policy as a whole. Additionally, Reid and Siklos (2020) document how central bank credibility is built, cognisant of the role of communication in influencing market expectations.

As aforementioned, because central bank communication contains expectations (Mishkin, 1995; Geraats, 2002; Blinder et al., 2008; Sturm and De Haan, 2011), it then becomes vital for a central bank's communication framework to contain expectations in a bid to achieve central bank credibility.

This section seeks to add to the emerging literature on South Africa's central bank communication by examining SARB communications using text analysis techniques to gauge SARB's tone and sentiment[48]. Such an inquiry would create a basis for future evaluation of co-movements, such as SARB's sentient and business sentiment.

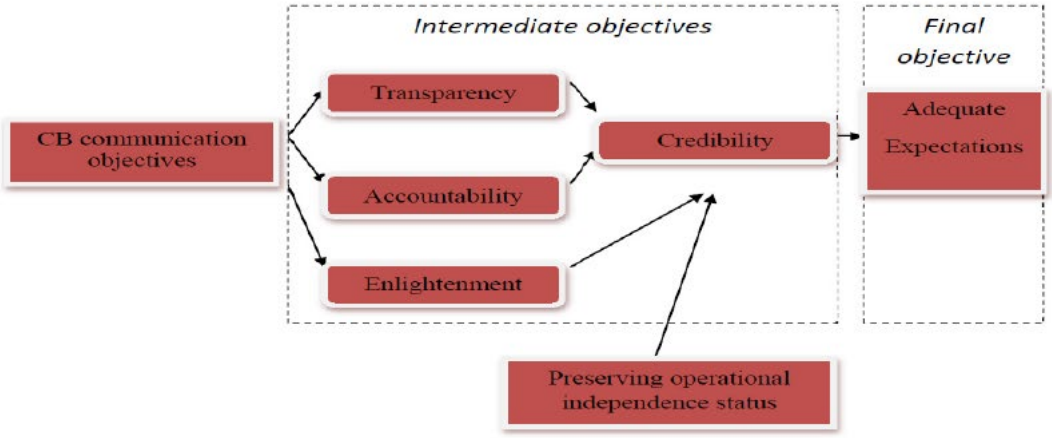
4.5. How do central banks communicate?

Central banks' communication can be studied from two perspectives: the short-term and long-term management of expectations through predictable monetary policy Kahvecia and Odabaş (2016). Subsequently, however, the monetary authority has to be accountable under an inflation-targeting framework. Accountability relates to the functions and objectives of the central bank as well as to its use of resources, and exhibits the following characteristics: scrutiny by others, regular accounting for one's actions, and the risk of negative repercussions if performance is considered unsatisfactory (Central Bank Governance Group and Ortiz-Martinez, 2009).

In central banking, the banks' accountability could be formal or informal. Formal accountability constitutes specific binding documents, such as the constitution and central bank statutes, to clarify the central bank's objectives and responsibilities. Take, for instance, the regulation on monetary policy in Norway: the policy targets agreement between the governor of the RBNZ and the minister of finance. To this end, the central bank is formally accountable to the executive branch of government, depending on the constitutional delegation of responsibilities. On the other hand, informal accountability constitutes reports to the markets and the general public (Central Bank Governance Group and Ortiz-Martinez, 2009). In the pursuit of managing expectations, many central banks today find themselves having to rely on an effective communication strategy characterised by giving signals of forthcoming monetary policy actions prior to short-term monetary policy decisions.

[48] Hubert and Labondance (2017) define sentiment as soft information conveyed through the tone of policymakers' communication beyond traditional quantitative and qualitative information conveyed through the content of their communication.

Because of this, the more monetary authorities rely on effective communication to provide a clear path of the future trajectory of interest rates to market participants, the sounder the impact on long-term interest rates (Issing, 2005).



Source: Naghadiyev, 2011, 20

In line with the characteristics of central bank accountability aforementioned, the SARB specifically releases MPC statements and holds a press conference after the MPC meeting after they have set the policy rate. In addition, the SARB publishes monetary policy reviews and quarterly bulletins, press releases and speeches (South African Reserve Bank, 2014; 2018b). In contrast, the US Federal Reserve Bank has released FOMC meeting statements since March 2002, including voting details, a comprehensive explanation for dissents and dot plots (Stegmann, 2019). It should be noted that monetary policy communication is still evolving as forward guidance gains momentum. At the 2019 Jackson Hole Conference, US Federal Reserve Bank chairperson Jerome Powell accentuated the role of communication in modern central banking, calling it "the new normal". He went on to add that, "we are conducting a public review of our monetary policy strategy, tools, and communications -- the first of its kind for the US Federal Reserve Bank. In addition, we are looking at how we might improve the communication of our policy framework."

4.6. South Africa: An overview

The SARB migrated to inflation targeting in February 2000, as noted by Mboweni (2004:2), who stated:

> "With the adoption of this framework, the Bank moved away from an eclectic monetary policy framework or informal inflation targeting. In the eclectic monetary policy framework, the growth in the money supply and bank credit extension were used as intermediate guidelines for the determination of short-term interest rates. In addition, in deciding on the most appropriate monetary policy stance, developments in a number of other variables were also taken into consideration, because the monetary aggregates had lost some of their usefulness as indicators of future inflation due to structural changes in the economy."

Mishkin (2001:1) adds that "inflation targeting encompasses five main elements: the public announcement of medium-term numerical targets for inflation, an institutional commitment to price stability as the primary goal of monetary policy, an information-inclusive strategy in which many variables, and not just monetary aggregates or the exchange rate, are used for deciding the setting of policy instruments. Increased transparency of the monetary-policy strategy through communication with the public and the markets about the plans, objectives and decisions of the monetary authorities and increased accountability of the central bank for attaining its inflation objectives." In addition to Mishkin's submission, an inflation-targeting framework encompasses the reaction function, which concerns how (optimal) the repo responds to deviations of inflation from the inflation target and the output gap.

4.6.1. South Africa's inflation target

In the case of South Africa, however, the monetary policy framework of the SARB encompasses an inflation target (3%-6%) that is set by the government. The inaugural announcement of this target was first made by the minister of finance in February 2000. At the time, inflation was hovering at about 7% (Mnyande, 2008).

Consequently, a more pressing issue that surfaced was whether the SARB would announce its target on an annual basis or embark on a more longsighted avenue, which would mean clearly sharing its multi-year path (Mnyande, 2008).

At the time, SARB decided on a path that would see its MPC embark on a more near-term approach, which would only share annual targets and not shed light on the disinflation outlook. It should be noted that this was a quick fix to the inflation at the moment, and the annual approach would accord policymakers relatively more flexibility in their monetary policy recalibration.

Mnyande (2008: 134) expands:

> "The objective was to bring inflation down to acceptable levels, while implicitly recognising that an excessively fast reduction in inflation to within the target range through high interest rates, would have had high costs in terms of output foregone. The target has been altered several times since February 2000. The initial target range was set as an annual average rate of increase in the CPIX (the consumer price index excluding mortgage interest costs) of 3-6% for the calendar year of 2002. This range was maintained for 2003, while a range of 3-5% was announced for 2004 and 2005."

It is important to note that much has changed in the 20 years since SARB's adoption of inflation targeting, as the bank works hand in hand with the fiscal body in a joint National Treasury/SARB Inflation Targeting Technical Committee. A standout trait of the taskforce is its composition, as it simultaneously serves as an advisory body to the SARB governor and the finance minister.

4.6.2. SARB's Monetary Policy Committee (MPC)

SARB's MPC consists of seven resident members, including the SARB governor, two deputy governors and four senior central bank officials. Meetings are held on even months; however, ad-hoc meetings can be arranged if a need arises, as was the case in January 2002, when the MPC raised the repo rate from 9.5% to 10.5% in response to the rand crisis during 2001 and 2002.

However, the MPC meeting process is not straightforward; for the right monetary decisions to be arrived at, the research teams need to compile data that will inform the MPC members sufficiently to make the right vote.

Mnyande (2008:135) expounds:

> "The first day of the scheduled MPC meeting starts with presentations on items of topical interest that are prepared on an ad hoc basis, usually at the request of the MPC. A review of economic and financial developments then follows, which entails presentations on different aspects of the economy prepared by various departments of the SARB and presented by senior staff members. The following morning begins with a summary of the discussions of the previous day, followed by a discussion of the monetary policy stance by the committee members only. In general, decisions are taken by consensus or with a majority view, without a formal vote. Once the decision is taken, the statement to be issued is finalised and is released to the press at the same time as the Governor reads the statement live on national television."

The SARB MPC is generally forward-looking in its policy actions, but is careful to watch the variables in the CPI basket, which are bound to have a heavy hand in turning the 'inflationary wheels'. This poses a question for inflation targeters as a whole: is it possible to rely effectively on inflation targeting without effective forecasting? Some antagonists, such as Mnyande (2008), have argued that for variables such as changes in wage settlements, productivity and money supply, there is no target other than Consumer Price Index [excluding mortgage interest costs] (CPIX), which is a fundamental point of reference for monetary policy decisions.

Now this might create a challenge if SARB solely relies on only CPIX given the criticism that CPI tends to exhibit both an upward bias (overstating inflation) and a downward bias (understating inflation), in addition to substitution bias (Reed and Rippy, 2012).

4.7. Methodology: Appraising 'SARB-speak'

This section will explore the method to be used to extract data from the MPC transcripts. This study will explore SARB's MPC communications from November 2000 to January 2021; applying the Besigye-Segawa's TextBlob polarity and subjectivity calculator to the MPC statements.

It should be noted that there are two text sentiment mining methods recognised by central bank scholars. This study chose to solely rely on the dictionary method at the expense of the Boolean technique, which relies mainly on internet cache as it is already embedded in search engines for text analysis. This makes the analysis much simpler, as Bholat et al., (2015: 7) explain:

> "Since Boolean search is incorporated in most major internet search engines, one advantage of this technique is that researchers do not have to have access to the raw texts if they already have been indexed."

It is stressed that the researcher will not use the Boolean technique given that it best gauges 'naturalistic language' tone, yet central banking is best analysed with the Loughran-McDonald dictionary[49] due to the fact it measures the intensity of word use. In addition, since Boolean searches are incorporated in most major internet search engines, the study would lack rigour given the differing tone and sentiment of 'naturalistic language' from 'economic language'. Loughran and McDonald (2011:3) address this, noting that:

> "Almost three-fourths of the words identified as negative by the widely used Harvard Dictionary are words typically not considered negative in financial contexts."

[49] Given the vastness of the Loughran and McDonald dictionary, the study does not list the words comprised in the lexicon but it is available at: https://sraf.nd.edu/textual-analysis/resources/#LM%20Sentiment%20Word%20Lists

This informs the choice of the dictionary technique as the study relies on Loughran and McDonald's (2011) dictionary, which is specifically compiled to gauge central bank texts. This study relies on Loughran and McDonald's (2011) dictionary as the backend to create a sentiment and tone calculator. However, because Loughran and McDonald's (2011) dictionary is often deemed as obsessively negative (see Sardelich and Kazakov (2018), the Besigye-Segawa TextBlob Sentiment Calculator was also embedded with a naturalistic lexicon (which is a dictionary with natural language) to counter this shortcoming. Despite numerous sentiment measurement methods emerging in the past fifteen years, such as Apel and Grimaldi (2012), which was criticised for failing to capture the failure to capture the "forward-looking content of the ECB introductory statement" by Picault and Renault (2017), this study relies on the relatively widely accepted Loughran and McDonald (2011) method.

Literature is emerging with a keen focus on quantifying sentiment from text. More recent examples are Coco and Viegia (2020), who applied Natural Language Processing (NLP) techniques to SARB monetary policy statements and revealed that the bank is moving towards a more 'forward-looking' and balanced communication strategy. Sardelich and Kazakov (2018) developed a novel sentiment lexicon for financial text mining that comprises social media messages with a particular focus on comments on stocks by Yahoo Message Board service users. It should be noted that the messages comprised user opinions, with 74,641 messages covering 492 stocks over a period of two years. This study's potency lies in the fact that it captures 'naturalistic language' as most of the participants comprise the 'inattentive public' (see Reid, 2011b). In addition, it is able to capture sentiment from the formal and informal language of financial stock markets.

Hubert and Labondance (2017) explored whether central bank tone conveyed in FOMC statements contains useful information for financial market participants by quantifying central bank tone using computational linguistics and identifying exogenous shocks to the US Federal Reserve Bank's tone to the state of the economy[50].

Their study concluded that positive central bank tone increases interest rates at the one-year maturity and proceeded to investigate which potential pieces of information could be revealed by central bank tone. They reasoned that this movement relates to the dispersion of views among FOMC members.

A method that has gained scholarly recognition, however, is the 'bag of words' or lexical approach, which relies on predefined dictionaries of words that are associated with particular sentiments (Shapiro and Wilson, 2019).

In this approach, the researcher relies on a recognised dictionary such as that of Loughran and McDonald (2011), which has already compiled a list of negative and positive words and is recognised in the central banking communication dominion.

As mentioned before, this study relies on the Loughran and McDonald (2011) dictionary as it is superior to other dictionaries for classifying economic and financial texts. For example, the Harvard Psychosociological Dictionary is known for misplacing words that are neutral in a financial/economic context such as tax, costs, capital and expense. The Loughran and McDonald (2011) dictionary has over 2,355 negative words and 354 positive words.

As is recommended by Loughran and McDonald (2016), this study ignores positive and negative words preceded by \not" or \n't" as these distort the message.

[50] Hubert and Labondance's (2017) study relied on an event-study methodology to estimate the effects of central bank tone on interest rates. Initiated by Cook and Hahn (1989), this method focuses on movements in asset prices in a narrow window around FOMC policy announcements, with the assumption that the reaction of interest rates is continually affected primarily by monetary news on the day of the policy announcement.

4.7.1. Sentiment analysis using dictionary technique

Central bank communication requires utter consistency, as conveyed by Jansen and De Haan (2011:2):

> "An important requirement for communication to be effective is consistency. If central bankers too frequently change their vocabulary, it will be difficult for observers to properly infer the message that central bankers are trying to convey."

Although this rationale for central bank communication consistency is valid, there needs to be a window for vocabulary adjustment in dictionaries during uncertain times, such as the global financial crisis, which saw the emergence of quantitative easing.

An emergent body of economics research is growing to adopt textual and sentiment analysis to examine the tone and sentiment of financial and economic documents in addition to other official releases. It should be noted that 10-K reports are annual reports of a firm's operations filed with the US Securities and Exchange Commission, and are renowned for being more detailed than annual reports sent to stockholders. They contain more financial statistics, including information on legal proceedings and management compensation.

The past two decades have seen the work of Li (2008); Engelberg (2008); Antweiler and Frank (2004); and Tetlock (2007) emerge with ground-breaking studies on textual analysis. With regards to central banking, however, Loughran and McDonald's (2011) work on textual analysis, dictionaries and 10-K documents is still the gold standard as they have compiled 80,000 words in their dictionary that have special relevance to central bank communications.

Loughran and McDonald (2015: 1) submit:

> "About 83% of the Diction optimistic words and 70% of the Diction pessimistic words appearing in a large 10-K sample are likely misclassified. Frequently occurring Diction optimistic words like respect, security, power, and authority will not be considered positive by readers of business documents. Similarly, over 45% of the Diction pessimistic 10-K word-counts are not and no. The Loughran-McDonald (2011) dictionary appears better at capturing tone in business text than Diction."

As mentioned earlier, the dictionary technique of choice will rely on the Loughran-McDonald dictionary as the back-end lexicon to gauge subjectivity and polarity.

Loughran and McDonald (2011) pioneered their Loughran-McDonald dictionary, which built on the flaws of the popular Harvard IV-4 dictionary to make a more 10-K-relevant dictionary.

Stegmann (2019: 12/13) further defends:

> "The Loughran-McDonald dictionary is discussed in Loughran and McDonald (2011). They did a study on the Harvard IV-4 dictionary and found that it lacked the context necessary to perform accurate analysis for finance, as a lot of words that were considered negative are either positive or neutral industry specific words in a finance context. They studied over fifty thousand 10-Ks and from their findings of how the Harvard IV-4 dictionary performed created their own sentiment dictionary. One inherent flaw in any textual analysis that they recognize is the fact that many words are polysemes, which means they have multiple meanings."

Chen's (2016) code was applied to US Federal Reserve Bank communications and a positive correlation was found between stock volatility indicators such as VIX and the US Federal Reserve Bank's sentiment, suggesting that stock markets are sensitive to negative sentiment. Dictionary techniques characteristically commence by identifying key words to examine the content of interest and, in this case, the list of words has already been defined by the Loughran-McDonald dictionary. This will be the database to be used by the dictionary code.

The next phase is to construct a normalised frequency of words that will categorise the words in the document being examined for tone and sentiment (see Bholat et al., 2015).

Unlike the Boolean techniques, dictionary techniques go a step further and can measure the concentration of word use. This is one of the defining features that informed the researcher's preference for using the dictionary technique above the Boolean techniques.

Furthermore, given that forward guidance and economic outlook in central banking tones are often emphasised in central bank communications, using a technique that measures word intensity adds gravitas to the study.

In addition, it is always preferable to use dictionary techniques when a researcher has the raw data, as is the case in this study (Bholat et al., 2015). The researcher has all the SARB MPC transcripts, which further informed the choice of this methodological approach.

4.7.2. Text mining methodology

The initial step is turning the MPC transcript text into data that is readable by the 'Besigye-Segawa TextBlob polarity and subjectivity calculator'. As expounded by Luangaram and Wongwachara (2017), it is essential to eliminate common words from the MPC statements such as 'a', 'an', 'the', 'of' and many more. This is done by adding stop words to be used as reference for the exclusion of non-informative text in the processing. Stop words are words that are classified as being distracting to the NLP algorithm, and reduces down on the render time thereby improving model accuracy.

The next step is topic modelling, which is a thematic approach to data quantification that enables the researcher to analyse patterns in the data and easily pick up on themes. Categorisation assists in the data processing too as specific words are often used in relation to growth while others are particular to price stability discussions.

Running the SARB monetary policy statements through the Besigye-Segawa TextBlob polarity and subjectivity calculator code, the document's contents are then contrasted with the Loughran and McDonald dictionary irrespective of any repetition, language syntax or location in the PDF document. Through the thematic analysis tool, the Besigye-Segawa TextBlob polarity and subjectivity calculator can also pick up on themes, such as word clusters, which appear at specific locations of the MPC statements in addition to positivity, negativity, objectivity and subjectivity.

This paper relies on the 'Python code' first advanced by Chen (2015; 2016), but applies the Loughran and McDonald dictionary to the database to come up with a text mining model. A more sophisticated approach to using machine learning for text interpretation is the application of the human cognitive element, which seeks to distinguish between facts and opinions, as represented in the Besigye-Segawa TextBlob.

4.7.2.1. Besigye-Segawa's TextBlob polarity and subjectivity calculator: Calculating polarity and subjectivity

The TextBlob library for Python is a convenient way to do many symbolic and statistical Natural Language Processing (NLP) tasks. This study will rely on natural language sentiment analysis (which measures polarity and subjectivity) in addition to the Loughran-McDonald dictionary-powered Chen (2015; 2016) programme, which looks at the positivity and negativity of MPC communications. This methodological path is motivated by the earlier noted delimit of the Loughran-McDonald dictionary as it often struggles to process 'naturalistic language' as eminently submitted by Cannon (2015)[51].

The Besigye-Segawa TextBlob calculator, for example, can gauge the polarity and subjectivity in a naturalistic sentence in the example (code) below:

```
TextBlob("not a very great calculation").sentiment

##Sentiment(polarity=-0.3076923076923077,subjectivity=0.5769230769230769)
```

[51] Cannon (2015) noted in her study on the effects of FOMC sentiment on economic activity that the Loughran-McDonald dictionary misses some nuance of the speech patterns contained in FOMC transcripts, but nonetheless, she concluded that it remains the best option for financial text tone and sentiment analysis.

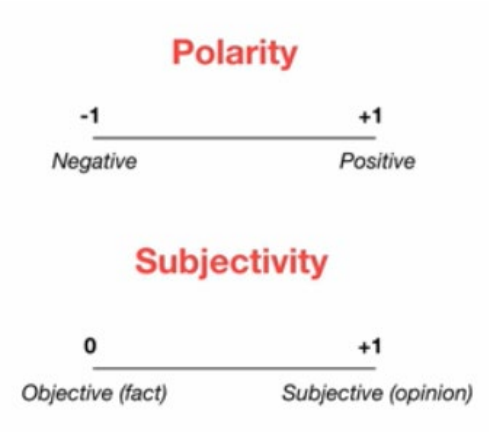
The result shows us first that the sentence “not a very great calculation” has a polarity of 0.307 and subjectivity of 0.576, which translates it as slightly negative but contrastingly, its subjectivity registers at about 0.6, which means it is fairly subjective.

It should be noted that the subjectivity and polarity sentiment calculation is defined in _text.py code (‘Python’ code), which credits the pattern library (Swarnalatha et al., 2019). In other words, the text to be analysed must be converted to a ‘Python’-friendly file format. Thereafter, add the Loughran-McDonald dictionary and run the text through the software.

For a breakdown of the results:

1) Polarity: negative vs. positive (-1.0 => +1.0)

2) Subjectivity: objective vs. subjective (+0.0 => +1.0)



The Besigye-Segawa TextBlob polarity and subjectivity calculator also handles modifier words such as ‘very’, which can easily change the meaning of the preceding word. To this end, recognising ‘very’ as a modifier word, the Besigye-Segawa TextBlob polarity and subjectivity calculator will ignore polarity and subjectivity and skip over to the subsequent word.

The Besigye-Segawa TextBlob polarity and subjectivity calculator also ignores one-letter words in its sentiment phrases.

For example:

TextBlob ("not a very great").sentiment

##Sentiment(polarity=-0.3076923076923077, subjectivity=0.5769230769230769)

The original TextBlob ignored words that it didn't know anything about, but the Besigye-Segawa TextBlob polarity and subjectivity calculator was modified by using the Treebank tokeniser, which uses regular expressions to tokenise text. Simply put, the library breaks down text into linguistic units that are in the simplest language form. The benefit of using NLP is that a piece of text gets deconstructed into its simplest form before being reconstructed into a basic sentence without losing the meaning of the text.

4.8. Measuring SARB sentiment

This study relies on SARB's scheduled MPC meeting statements, with particular emphasis on the governor's speeches. The succeeding section details how the study quantified the negative and positive words in the SARB governors' speeches.

4.8.1. Data sources

SARB's governors' speeches are the primary data source and are publicly available on SARB's website. They can be directly downloaded from the SARB website: https://www.resbank.co.za/en/home/publications/statements. This tally is made up of speeches from January 2000 to January 2021. These are converted from PDF to text files and then deconstructed to generate individual text files.

After converting the files to text format, these text files are further 'cleaned' by ridding them of stop words and 'white spaces'[52]. Using the approach described in the methodology section, the researcher tallies the negative and positive words for each MPC statement.

[52] White space is any section of a document that is unused or space around an object. White spaces help separate paragraphs of text, graphics, and other portions of a document, and helps a document look less crowded.

It should be noted that this study is an independent exploration, and has been conducted with publicly available information without access to the unpublished minutes of MPC meetings.

The study also relies on the Bureau for Economic Research's (BER) inflation expectations survey to examine the potential causality to SARB's tone and sentiment. The reasoning here is to examine causality of SARB's tone and sentiment on subsequent BER inflation expectations as the study looks at the BER inflation expectations dataset ex post the SARB MPC statements and not ex ante. For instance, if SARB released its MPC on 11 December 2008, the study would then examine for causality with BER's inflation expectations for the first quarter of 2009.

BER's inflation expectations survey is in line with SARB's inflation-targeting framework and has conducted quarterly inflation expectation assessments among a wide range of market participants, from financial analysts to business people, trade union officials and households (Bureau for Economic Research, 2021). Because BER's inflation expectations results are readily available to the public on their online portal, the study contrasts SARB's tone and sentiment in their MPC statement with BER's inflation expectations survey from 2001 to 2021, offering a twenty-year dataset. The breadth of the data therein allows for an extensive inquiry into causality.

Since BER's inflation expectation survey results are provided on a quarterly timetable, the study is able to adequately explore causality in SARB's tone and sentiment to BER's inflation expectations results. In addition, although BER's inflation expectations survey also covers the market participants' outlooks and forecasts for other macroeconomic variables, such as wage hikes, foreign exchange movements and aggregate economic growth, this study only focuses on the overall inflation outlook as reported in the survey.

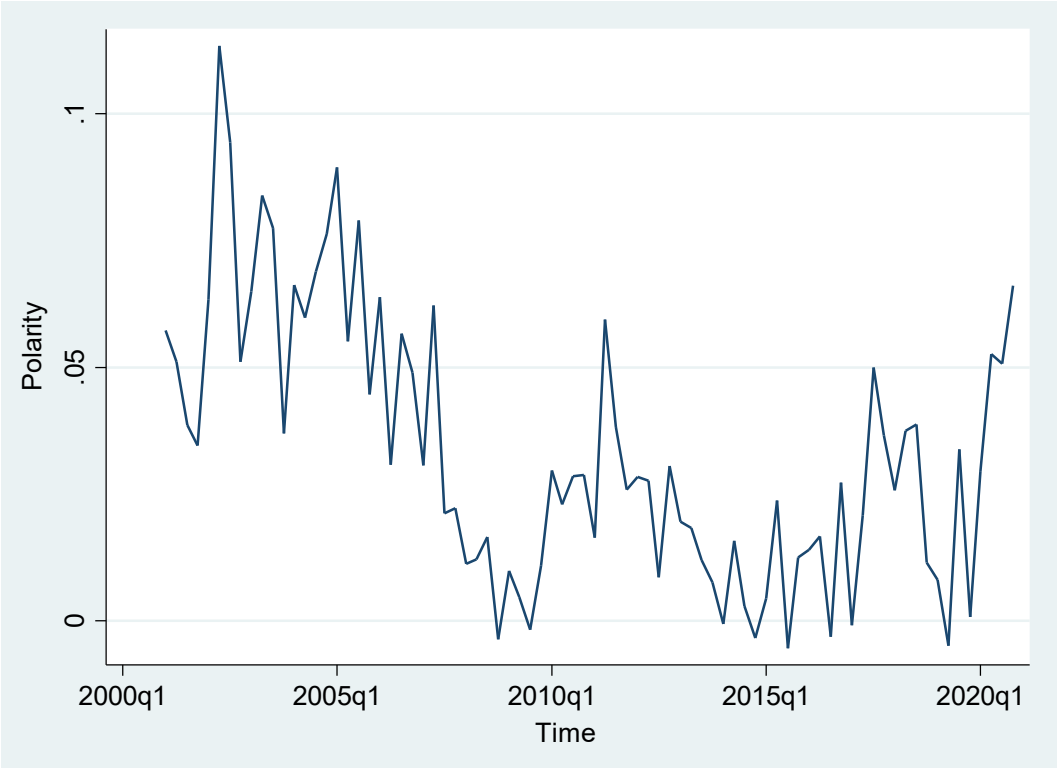
The study relies on BER's average inflation expectations and not a particular group. This is informed by Kabundi et al., (2014), who studied the relationship between inflation and inflation expectations of analysts, business and trade unions in South Africa between 2000 and 2013.

The study concluded that inflation expectations of South African businesses and unions were closely related to each other and were relatively higher than the upper bound of the official SARB target band, while analysts' expectations were within the target band. With these findings, using the average BER inflation expectations would counter this bias from any of the economic agents, namely analysts, business and trade unions.

4.9. Results

As earlier highlighted, this study relies on public SARB MPC statement data which is readily available on their website. The data studied is from from January 2001 to January 2021. The first set of results generated comes from the sentiment analysis of SARB's MPC transcripts from January 2000 to January 2021.

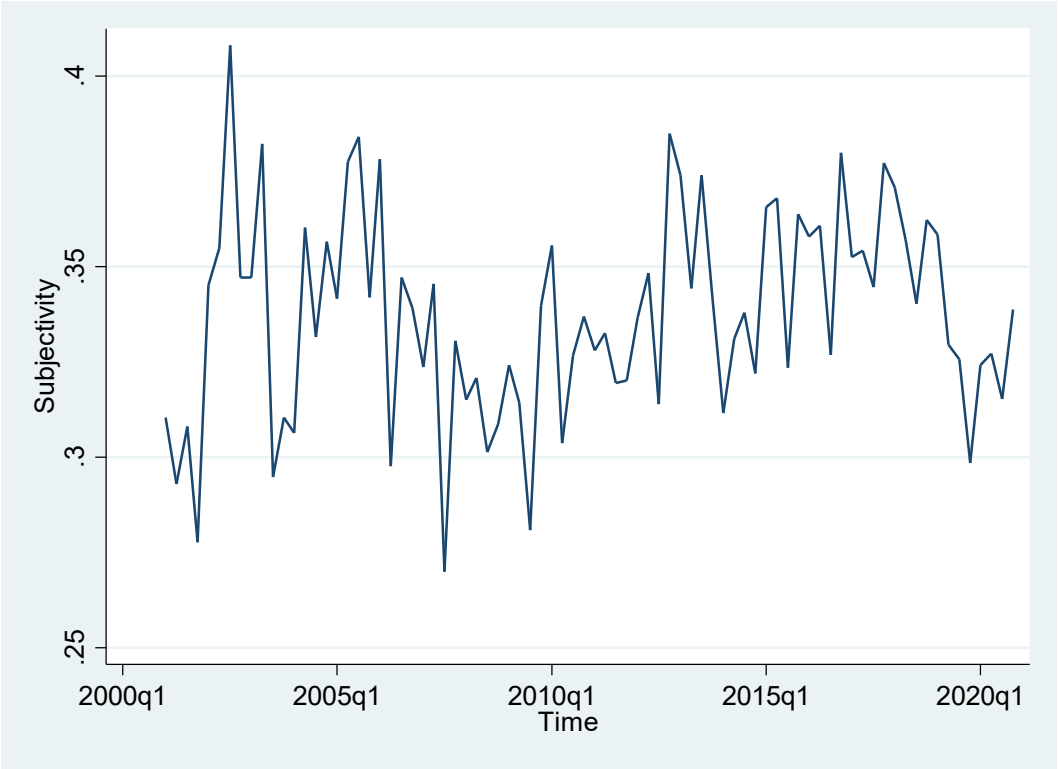
Figure 1. Computation showing the polarity of SARB MPC statements



Running the SARB MPC statements through the Besigye-Segawa TextBlob polarity and subjectivity calculator, a computation was generated that revealed a sudden downward trend in 2008. In 2011, another downward trend is observed.

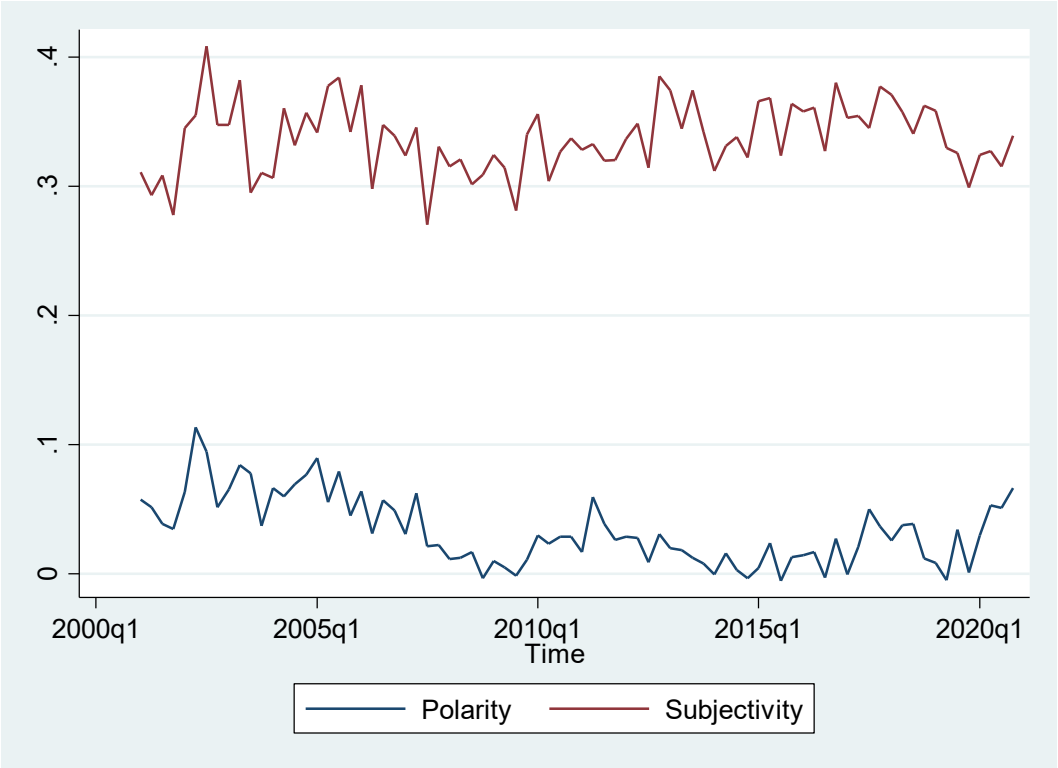
As noted earlier, the higher polarity would signal more positive words in the SARB MPC statements and a lower polarity, signalling more negative words or tone. The trend of lower polarity in the SARB MPC statement dated 28 May 2009 reads at - 0.0104589329589329, and this downward trend troughs in the MPC statement dated 13 August 2009 reading at -0.0144406365239698.

Figure 2. Computation showing SARB MPC statements' subjectivity



On the other hand, the SARB MPC statements between 2001 and 2020 exhibited relatively more objectivity, with over 80% of the statements having traits of fact as opposed to opinion. As was the case for the polarity, the objectivity veers sharply towards subjectivity in 2008, which is in line with the global financial crisis. To reiterate, a higher subjectivity reveals that the MPC statement is leaning towards opinion while a lower subjectivity connotes objectivity. With this logic, the global financial crisis ushered in more communication and ultimately the acceptance of the forward guidance era as many central banks had arrived at their effective lower bound.

Figure 3. Computation showing SARB MPC statements' subjectivity and polarity



Contrasting both the polarity and the subjectivity figures presents a premise that higher polarity is accompanied by higher subjectivity in the statements. In other words, higher positivity ushers in more opinion in the central bank's communications. This is observed in many of the statements, such as the SARB MPC statement dated 13 June 2002, which registers a polarity of 0.113357781 and a subjectivity of 0.35486607, both relatively high.

Figure 4. Computation showing BER's inflation expectations survey results

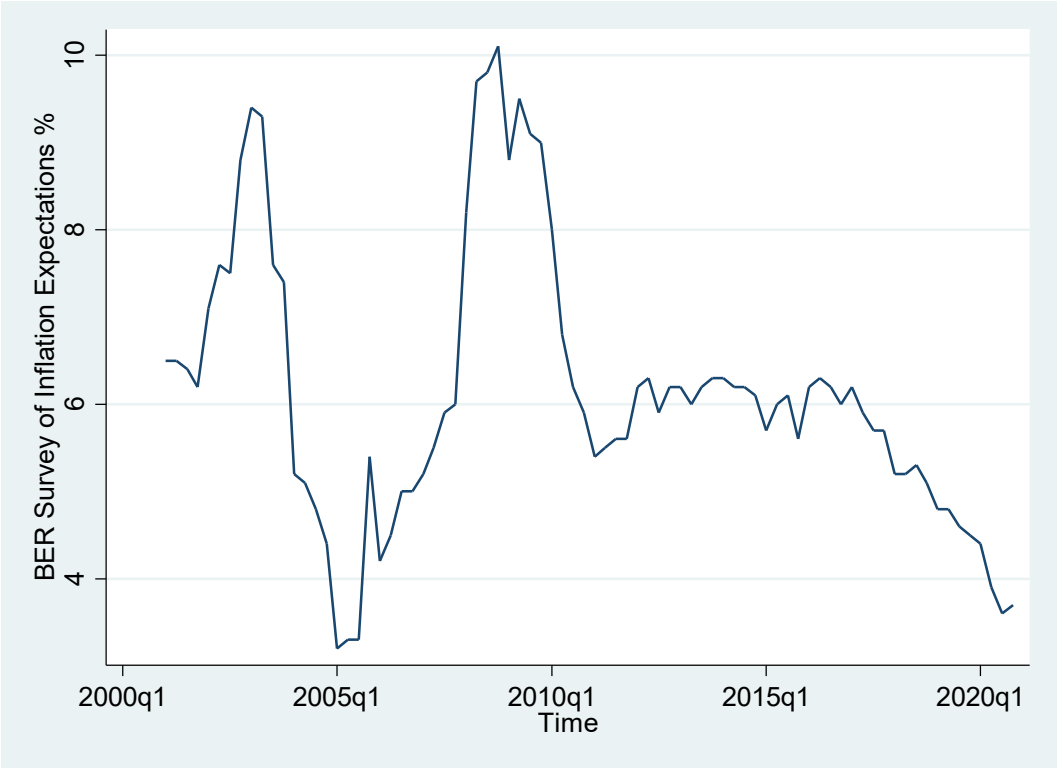
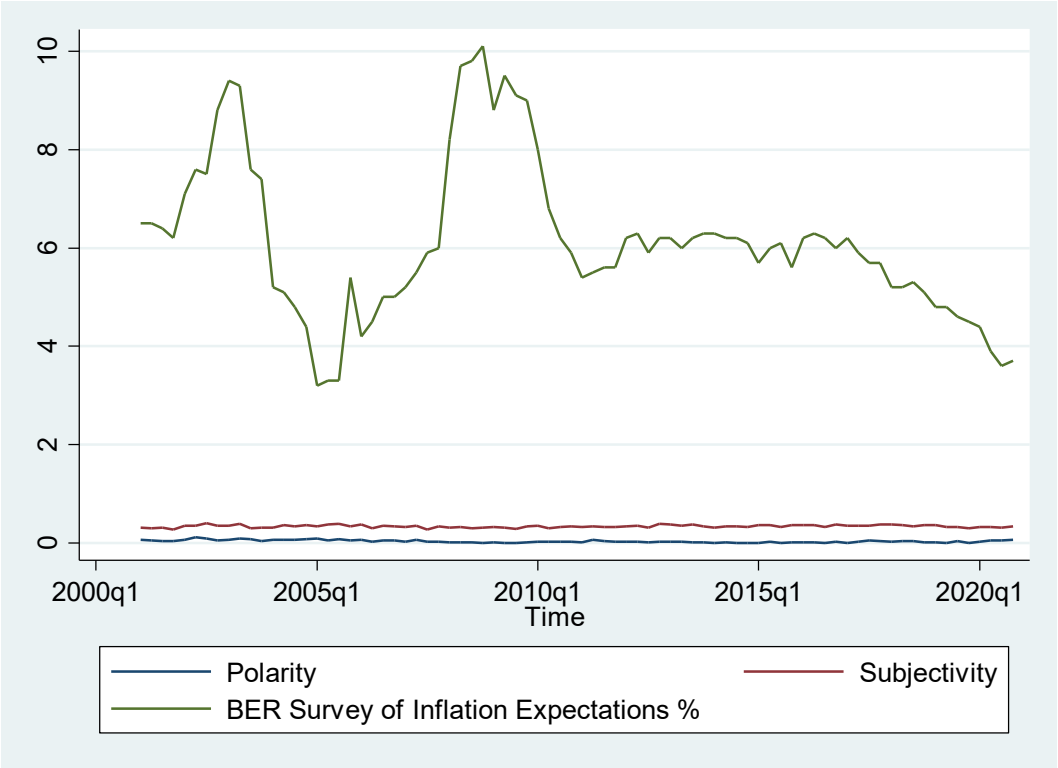


Figure 5. Computation showing BER's inflation expectations survey results and SARB MPC statements' subjectivity and polarity



Lag selection

The varsoc command was run to determine the optimal lag.

```
. varsoc BERSurveyofInflationExpectat Polarity Subjectivity, maxlag(8)

   Selection-order criteria
   Sample:  2003q1 - 2020q4                  Number of obs      =        72
```

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	198.736				8.7e-07	-5.43711	-5.39934	-5.34224
1	295.2	192.93	9	0.000	7.7e-08	-7.86667	-7.71561	-7.48723*
2	307.806	25.213	9	0.003	7.0e-08	-7.96685	-7.70249	-7.30282
3	326.081	36.55	9	0.000	5.4e-08*	-8.22448*	-7.84684*	-7.27587
4	333.462	14.762	9	0.098	5.7e-08	-8.17951	-7.68857	-6.94631
5	338.62	10.316	9	0.326	6.4e-08	-8.07279	-7.46855	-6.55501
6	344.254	11.267	9	0.258	7.1e-08	-7.97927	-7.26174	-6.17691
7	356.988	25.469*	9	0.002	6.6e-08	-8.083	-7.25218	-5.99605
8	359.043	4.1097	9	0.904	8.2e-08	-7.89008	-6.94597	-5.51855

```
Endogenous:  BERSurveyofInflationExpectat Polarity Subjectivity
 Exogenous:  _cons
```

Three of the five criteria selected three lags, one suggested one lag while another method selected seven lags. Thus, since the majority indicated three lags, further analysis was done using three lags.

The Johansen test for co-integration

The study relied on the assumption that the variables are non-stationary at level but they are converted to bridge the difference, ergo they must be stationary.

The null hypotheses at rank zero were:

HO: There is no co-integration

H1: There is co-integration

The null hypothesis is rejected in favour of the alternative if the trace statistics is more than the 5% critical value. The results are presented below.

```
. vecrank BERSurveyofInflationExpectat Polarity Subjectivity, trend(constant) lags(3) max

                       Johansen tests for cointegration
Trend: constant                                        Number of obs =      77
Sample:  2001q4 - 2020q4                                        Lags =       3
-------------------------------------------------------------------------------
                                                          5%
maximum                                        trace    critical
  rank    parms       LL       eigenvalue  statistic    value
    0      21      313.39548           .     26.4575*   29.68
    1      26      321.61022     0.19214     10.0280    15.41
    2      29      325.03763     0.08518      3.1732     3.76
    3      30      326.62423     0.04037
-------------------------------------------------------------------------------
                                                          5%
maximum                                         max     critical
  rank    parms       LL       eigenvalue  statistic    value
    0      21      313.39548           .     16.4295    20.97
    1      26      321.61022     0.19214      6.8548    14.07
    2      29      325.03763     0.08518      3.1732     3.76
    3      30      326.62423     0.04037
-------------------------------------------------------------------------------
```

At zero, the test statistics was 26.4575, which was less than the 5% critical value of 29.68. This means that the null hypothesis could not be rejected, and implies that the three variables do not have a long run association. This implies that since the long run the variables do not move together, there is simply no correlation.

As a result, the ideal model is Unrestricted VAR since there is no co-integration.

The VAR model

A VAR model was fitted to assess for short run causality. The results are shown below.

Vector autoregression

Sample:	2001q4 - 2020q4	Number of obs	= 77
Log likelihood	= 326.6242	AIC	= -7.704526
FPE	= 9.09e-08	HQIC	= -7.339265
Det(Sigma_ml)	= 4.15e-08	SBIC	= -6.791355

Equation	Parms	RMSE	R-sq	chi2	P>chi2
Polarity	10	.01795	0.6094	120.134	0.0000
Subjectivity	10	.026759	0.1417	12.71198	0.1761
BERSurveyofInf~t	10	.608335	0.8757	542.3631	0.0000

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Polarity						
Polarity						
L1.	.5420322	.1259305	4.30	0.000	.295213	.7888514
L2.	.1632438	.1356612	1.20	0.229	-.1026473	.4291349
L3.	.1678827	.1195053	1.40	0.160	-.0663433	.4021087
Subjectivity						
L1.	-.1217709	.0845409	-1.44	0.150	-.287468	.0439262
L2.	-.1009054	.0838209	-1.20	0.229	-.2651913	.0633806
L3.	.0258891	.0836396	0.31	0.757	-.1380415	.1898197
BERSurveyofInflationExpectat						
L1.	.0046288	.0031098	1.49	0.137	-.0014664	.0107239
L2.	-.0118696	.0046943	-2.53	0.011	-.0210702	-.002669
L3.	.0066964	.0032121	2.08	0.037	.0004008	.0129921
_cons	.0743043	.03825	1.94	0.052	-.0006644	.149273
Subjectivity						
Polarity						
L1.	.0110525	.1877308	0.06	0.953	-.3568931	.3789981
L2.	.0217281	.2022369	0.11	0.914	-.3746489	.4181051
L3.	.0064245	.1781524	0.04	0.971	-.3427478	.3555968
Subjectivity						
L1.	.1412273	.1260293	1.12	0.262	-.1057856	.3882401
L2.	.1807534	.124956	1.45	0.148	-.0641558	.4256626
L3.	.0811774	.1246857	0.65	0.515	-.1632021	.3255569
BERSurveyofInflationExpectat						
L1.	.0008446	.004636	0.18	0.855	-.0082417	.009931
L2.	-.0059656	.006998	-0.85	0.394	-.0196814	.0077503
L3.	.003024	.0047885	0.63	0.528	-.0063612	.0124092
_cons	.2139836	.0570212	3.75	0.000	.1022241	.3257431

BERSurveyofInflationExpectat						
Polarity						
L1.	-2.8513	4.267904	-0.67	0.504	-11.21624	5.513637
L2.	-8.978828	4.597688	-1.95	0.051	-17.99013	.0324739
L3.	13.26185	4.050147	3.27	0.001	5.323708	21.19999
Subjectivity						
L1.	1.352935	2.865171	0.47	0.637	-4.262697	6.968567
L2.	2.216172	2.84077	0.78	0.435	-3.351635	7.783979
L3.	-8.531076	2.834626	-3.01	0.003	-14.08684	-2.975311
BERSurveyofInflationExpectat						
L1.	1.052747	.1053951	9.99	0.000	.8461767	1.259318
L2.	.0551154	.1590941	0.35	0.729	-.2567034	.3669341
L3.	-.2467804	.1088619	-2.27	0.023	-.4601458	-.033415
_cons	2.462223	1.296329	1.90	0.058	-.0785365	5.002982

The study found that the polarity is significantly affected by polarity lag 1 (p-value = 0.000) and BER Survey of Inflation Expectations % lag 2 (p-value = 0.011) and Lag 3 (p-value = 0.037) in the short run.

Subjectivity is significantly affected by polarity lag 1 (p-value = 0.000) and BER Survey of Inflation Expectations % lag 2 (p-value = 0.011) and Lag 3 (p-value = 0.037) in the short run.

BER Survey of Inflation Expectations % is significantly affected by Polarity lag 3 (p-value =0.001), subjectivity lag 3 (p-value = 0.003), BER Survey of Inflation Expectations % (p-value = 0.000) and BER Survey of Inflation Expectations % lag 3 (p-value = 0.023) in the short run.

Granger causality in the short run

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. vargranger
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Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
Polarity	Subjectivity	5.0033	3	0.172
Polarity	BERSurveyofInfl~t	7.0348	3	0.071
Polarity	ALL	12.457	6	0.053
Subjectivity	Polarity	.10072	3	0.992
Subjectivity	BERSurveyofInfl~t	2.1151	3	0.549
Subjectivity	ALL	2.4544	6	0.874
BERSurveyofInfl~t	Polarity	10.925	3	0.012
BERSurveyofInfl~t	Subjectivity	9.1941	3	0.027
BERSurveyofInfl~t	ALL	14.779	6	0.022

The results show that there is short run causality running from SARB's MPC statement subjectivity lags (p-value = 0.012) to succeeding BER Survey of Inflation Expectations and also a short run causality running from subjectivity lags (p-value = 0.027) to Survey of Inflation Expectations.

Therefore, there is a short run causality running from both variables' polarity lags and subjectivity lags (p-value = 0.022) to BER's Survey of Inflation Expectations.

4.10. Discussion

The findings of this study clearly show that, between 2001 and 2021, SARB's MPC statements exhibit a short run causality, with BER's inflation expectations survey reaffirming the rationale for transparency and clarity in central bank communications given the impact on the 'expectations channel' as prescribed by Svensson (1999). As determined by Svensson (1999), monetary policy transmission in the expectations channel is greatly dependent on anticipated future inflation, the expected future output gap, and the expected future real exchange rate.

Relying on this proposition then, SARB's ability, or lack of it for that matter, to achieve its monetary policy transmission effortlessly and ultimately its goals (away from open-market operations) is inherently reliant on the ability to effectively communicate. This is evidenced by the fore-proven empirical short run causality for both SARB polarity and subjectivity to BER's inflation expectations survey.

4.10.1. Shock, polarity — inflation

The results reveal snap movements in SARB's polarity, especially related to economic shocks; an example is the SARB MPC statements from 2008 to 2010, which clearly exhibit negativity in SARB's tone. As this was during the global economic crisis, a grim economic outlook was expected. In the SARB MPC dated 11 December 2008, the opening paragraph read:

> "Since the previous meeting of the Monetary Policy Committee, domestic inflation has moderated and is expected to decline further over the coming months. At the same time, the South African economy has been affected by the significant global slowdown that has intensified recently. The domestic economy experienced negligible growth in the third quarter, while a number of sectors contracted."

This particular MPC statement recorded one of the few negative polarity scores at -0.00367090671885191. As the results reveal a causality between SARB's tone and sentiment and BER's inflation expectations, this is outrightly reflected in the BER inflation expectations results, which registered at 10.1% for the 2008 fourth-quarter reading.

4.10.2. SARB sentiment soothes 'unconventional times'

SARB's sentiment and tone, just like any other central bank, is highly influenced by the business cycle. At times of heightened economic distress, South Africa's central bank tends to share more information. However, keen focus is paid to communication during 'unconventional times', as coined by Reid et al (2019).

In their study, they refer to 'unconventional times' as a period in the economy when monetary policy becomes ineffective, and conclude that during these 'unconventional times' communication acts as a vital monetary tool, and in some extreme cases even as a substitute for more conventional monetary policy. Evaluating SARB sentiment data, there is a clear spike in subjectivity during 'unconventional times'. One of the spikes is evident in the SARB MPC statement issued on 19 November 2020, at the height of South Africa's Covid-19 pandemic. This statement scores 0.3388155874858 on the subjectivity index, a score that indicates more opinion than fact. It alludes to SARB's efforts to calm the market through reassurance during 'unconventional times'.

Another example is cited in 2002, when SARB announced in its MPC statement that inflation was on a path to double figures. The statement, issued on 12 September 2002, read:

> "The year-on-year increase in the consumer price index for metropolitan and other urban areas, excluding the influence of mortgage interest cost (CPIX), increased from 5,8 per cent in September 2001 to 9,9 per cent in July 2002. The acceleration in the quarter-to-quarter CPIX inflation rate was even more pronounced from an annualised rate of only 3,8 per cent in the second quarter of 2001 to 11,5 per cent in the second quarter of 2002. The twelve-month rate of increase in the all-goods production price index also rose from 7,8 per cent in September 2001 to the high level of 15,2 per cent in July 2002."

The inflationary pressure, coupled with soaring oil prices, left SARB sounding a grim tone and noting that, "This requires a concerted effort by all concerned." As this too counts for an 'unconventional time', as designated by Coenen et al., (2017), it came as no surprise that SARB's sentiment reading for this particular MPC statement dated 12 September 2002, scored a steep 0.408046218487394. As aforementioned, often during 'unconventional times', communication acts as a critical monetary tool and may even become a substitute for more conventional monetary policy (Coenen et al., 2017; Reid et al., 2019).

The high subjectivity score of this MPC statement affirms this premise as the soaring inflation, depreciating rand and rising crude oil prices left SARB at a loss for monetary options, hence the reassurance through monetary policy communication.

4.10.3. SARB reassurance cushions inflation expectations

Building on the premise of communication being vital during 'unconventional times', the study contrasted BER's inflation expectations during these times, when SARB sought to reassure the market. Although this study has already established a short run causality running from SARB's polarity and subjectivity with a p-value of 0.022 on BER's Survey of inflation expectations, a further inquiry into the BER reading during unconventional times only reasserts the rationale for more SARB communication.

Taking the two examples of the SARB MPC statements issued on 19 November 2020 and 12 September 2002 during unconventional times, a contrast to the BER inflation expectations survey affirms not only the causality but also the effect SARB's subjectivity has on inflation expectations as a whole.

First, for the SARB MPC statements issued on 19 November 2020, BER's inflation expectations for the fourth quarter of 2020 registered at 3.7%. As for the SARB MPC statements issued on 12 September 2002, inflation expectations for the fourth quarter of 2002 registered at 8.8%, which was significantly lower than the actual recorded consumer price index, which registered at 9.9% in July 2002.

4.10.4. Conclusion

As inflation expectations in principal drive households to spend more before the expected price increases emerge (see Yellen, 2018), it is almost impossible for a central bank to practise inflation targeting without surveying where the market forecasts inflation to stand. To this end, if a central bank's tone and sentiment has causality on inflation expectations, then this affirms the need for effective communication in the modern monetary policy era.

As many African central banks have adopted inflation targeting over the past two decades, it has almost become impossible for them to evade their obligation to effectively communicate; especially if they opt for the expectations channel.

In the quest for more clarity in communicating, however, there has emerged a determined inquisition into what and how central banks communicate. And although some literature has emerged on how and what central banks communicate (see Blinder et al., 2001; Blinder et al., 2004; Blinder et al., 2008; Bulír et al., 2013; Bholat et al., 2015; Kahvecia and Odabaş, 2016), going further to textually analyse what is communicated is only emerging in the African context.

Given the twenty-year sample size of this study, this paper is able to offer an insight into SARB's tone and sentiment over the past two decades, with a novel sentiment and polarity textual analysis that compensates for the McDonald and Loughran dictionary naturalistic language shortcomings. The study then went on to empirically prove a short run causality between SARB's tone and sentiment and BER's inflation expectations, therein reaffirming the essence of effective communication in achieving monetary goals in the modern monetary frameworks. However, there remains a great deal that can be done in the field, especially around tone and sentiment analysis. During the twenty-year span of this particular study SARB has had three governors and all have had their different traits and styles. This could be another avenue to be explored in future tone and sentiment studies, as has been the case for the US Federal Reserve Bank. For instance, Mehrling et al., (2007) effectively concluded that a central banker's personality is critical in overall financial leadership and helping to achieve monetary stability. Future studies could contrast the tone and sentiment of the rather vocal and forthright former governor, Tito Mboweni, with the calmer and more collected former governor Gill Marcus.

Another area of future research could be a deeper inquiry into whether SARB's polarity has a stronger causality to BER inflation expectations, or is it SARB's sentiment that sways inflation expectations? We leave this to future studies.

5. CONCLUDING REMARKS

This chapter presents the summary of results from the preceding ones, with a particular focus on key findings from the entire study. In addition, this section of the study presents potential areas of study that could be considered for further academic exploration in the field. Lastly, the chapter relays concluding remarks in line with the entire study.

5.2. Introduction

This thesis focuses on the SARB's MPC statements from 2000 to 2021, with particular focus on not only the trajectory of SARB's communications over the past two decades but also the interaction with the media and succeeding market agents' inflation expectations. By analysing SARB's MPC communications over a twenty-year period, this study lays a foundation for an examination of the central banks' communication as a whole before moving towards other variables that are dependent on the SARB's communications.

In the respective result sections of the study, it is clear that the SARB's communication structure has been buoyed by macroeconomic shock in 'unconventional times', further reaffirming the role of effective central bank communication in 'unconventional times'. Nonetheless, this finding further probes whether such emboldened communication should be the norm in the first place even during 'conventional times'.

As already established, it is widely accepted today that an economy's ability to achieve economic growth is inseparable from sound monetary policies that are not only predictable but rational in nature (Blinder, 1998; 2004; Woodford, 2005; Beck et al, 2013). However, with the emergence of inflation targeting as a monetary policy framework for many central banks in both the developing and developed world, many monetary institutions have migrated from positions of utter secrecy to relative transparency, as is a prerequisite for inflation targeters (Su et al., 2020). Upon this policy transformation, many central banks, including the SARB, have migrated towards policy transparency with keen focus, in line with 'rule-based monetary policy'. Integral to this new path is effective communication (Amato et al., 2003; Kuncoro, 2020).

Upon this policy migration, literature is fast emerging on central bank communication, as it has become clear that mere communicating is not enough but the quality of the communication is essential; ergo, clarity in communication. As already established, inflation targeters are required to announce their numerical inflation target and in essence, this means the private sector and other market agents rely on the central bank to follow through and make sure inflation is within this target bank in a bid to buoy credibility. Ergo, further affirming the vital nature of effective communication for inflation targeters as signalling to different market agents in essence steers the deviation between inflation and the pre-set inflation target.

In the case of the SARB, this study not only affirms the relevance of understanding and appreciating the interaction between effective communication, inflation expectations and ultimately inflation, but also empirically proves the delicate interface between central banks' communications and the market's inflation expectations in the short run. As illustrated in chapter two, the SARB's MPC statements' readability only improved post-2016 despite it having issued MPC statements since 2000. This therefore presents a challenge for the SARB as the general public appears to be omitted from these communications given their complexity. As submitted by Reid (2011a), because the financial market's inflation expectations are not necessarily an accurate depiction of the general public's, this could yield further deviations in different market agents' inflation expectations. Nonetheless, effective central bank communication plays a critical role in guiding inflation expectations and this thesis further empirically proves this in chapter four as the SARB's communications clearly have causal effects on inflation expectations. For developing and emerging economies, however, research on this issue is limited and this study provides a foundation for more exploration in the field.

5.3. South African Reserve Bank communication — Has time yielded clarity?

In the quest to achieve credibility, central banks are increasingly relying on effective communication as a core pillar of their monetary policy framework (see Ehrmann and Fratzscher, 2005; Blinder et al., 2008). Not only is this in line with the fundamentals of inflation targeting (see Svensson 1999) but also, it augments the clear finite reach of traditional monetary policy tools, such as interest rates. More so, given that the Fisher equation reasons that a nominal interest rate entails the real interest rate in addition to inflation expectations, then it becomes clear that nominal interest rates at a given time can be shaped at longer horizons by managing inflation (see Reid, 2011a).

In addition, since the global financial crisis in 2008, the potency of many traditional policy instruments has been questioned, giving rise to more unconventional tools such as forward guidance, whose foundation is premised on effective communication (Luangaram and Wongwachara, 2017). To this end, it is clear that the role of effective communication cannot be overemphasised in modern monetary policy and this further motivates for more literature in the field of monetary policy and effective communication.

The foundation of this study is the SARB's MPC communications since its migration to inflation targeting. This allows for further examination of the interaction of the SARB with other market agents only after a clear decompression of what the SARB has been communicating in the first place. This subsequently allows for this thesis to have a focal point and a point of origin before further delving into the delicate relationship between the SARB's communications and their implications on other market agents.

Despite literature emerging on central bank communication over the past decade, a challenge in the past has remained the rather quantitative cross-examination nature of central bank communications, and this is a challenge this chapter seeks to address.

In 2000, South Africa's central bank, the SARB, adopted flexible inflation targeting as a monetary regime, and in doing so, set its inflation target at 3-6% for the headline consumer price index (Coco & Viegi, 2020). Essential to achieving this inflation target is not only clear communication of ex-post policy actions, but a clear dissemination of the SARB's future actions.

This chapter examines how the SARB has been communicating, with particular emphasis on its MPC press statements between January 2000 and January 2021. The breadth of the sample space is informed by a necessity to explore changes in the SARB's communication strategies. In particular, this chapter considers the role of the SARB's MPC press releases, and given the wide span of the sample, it offers an inquiry into what has changed over the 21-year period, hence considering whether there has been more clarity in the SARB's communication over that time. This question is answered using the Flesch and Flesch–Kincaid methods, which are widely accepted in central bank communication literature (see Jansen, 2011; Bulíř et al., 2013a; Bulíř et al., 2013b). The two methods gauge how difficult a passage in English is to understand, and are thus used to assess readability and hence clarity. In evaluating central bank communications and surveying the data, the paper offers empirical evidence about the clarity of the SARB's MPC meeting statements spanning two decades and clearly exhibiting its evolution. This study finds that SARB communications' Flesch Reading Ease Score Computation is way above and fluctuates more than the Flesch–Kincaid Grade Level Computation, exhibiting a random fluctuation between 2000 and 2015. Therefore, despite SARB's MPC statements exhibiting more readability, their reliance on academic words has made them more complex and difficult to understand.

Chapter two solely examines the SARB's MPC communications and this is informed by Reid (2011a), who notes that despite an extensive amount of literature emerging on central bank communication, most of it is primarily invested in the relationship between financial markets. To this end, this chapter poses an inquiry into what the SARB communicates in the first place before any further interactions are examined.

As highlighted in chapter two, computation results, the readability of SARB's MPC statements, is measured by the Flesch reading ease score and the Flesch-Kincaid grade level.

The computation shows how SARB's earlier MPC statements averaged around 13, which by any standard is a high score. It is however clear that by 2016, the score had dropped to below 10, illustrating higher readability and perhaps more clarity in communication.

Notably, despite the Flesch-Kincaid Reading Ease Score dropping post-2016, the Flesch Reading Ease Score computation post-2016 only climbed, illustrating conversely more syllables, longer sentences and ultimately more complexity in overall sentence structure and phraseology.

It is clear that despite the SARB's timely MPC communications from 2000, the notable change emerges in 2016, when clarity is amplified, as attested by both the Flesch-Kincaid Reading Ease and the Flesch Reading Ease scores.

This shift in readability, ergo clarity, poses more questions on various facets of central bank communication: did the SARB purposely migrate towards easier MPC texts at the expense of more detail? As noted by Stein (2014) in his appraisal of the evolution of the US Federal Reserve Bank's communication, central banks need to focus more on achieving legitimate transparency as opposed to burdening themselves with forever monitoring how their communications will affect the market and financial agents. With this notion, Stein (2014) posits that a legitimate central bank can actually move financial markets in the desired direction given how its legitimacy can buoy transparency, accountability and ultimately, credibility.

This is clear, as on 21st May 2015, Governor Lesetja Kganyago (South Africa Reserve Bank, 2015: 11) revealed:

> "From the next meeting in July the Bank will take further steps to increase transparency by publishing the assumptions underlying the Bank's forecast with the MPC statement." (South African Reserve Bank, 2015: 11).

As noted by Turner (2014:17), however, communicating decisions in a convincing manner is not only a means to manage expectations but it also allows the central bank to "pragmatically monitor market resilience" and in essence, this would entail a clear evaluation of whether the market can absorb more assets. This however proves inconceivable if the central bank in question is not sharing enough information or being opaque about their assumptions and forecasts. This is where the readability facet, ergo clarity of central bank communication proves essential and critical (see Bulíř et al., 2013b). This chapter reaffirms the need for clarity in communication as a conduit to a central bank's interaction with other financial market agents.

From analysing how the SARB has communicated in the past twenty years, the study then moves on to the media for an inquiry into whether there is a co-movement between the clarity of SARB's statements and the media, with the Mail & Guardian being the case for this chapter.

5.4. Causality analysis of the South African Reserve Bank's Monetary Policy statements and communication

In order for monetary policy to prove effective, there needs be better knowledge of the economy so as to foster informed decision-making (Dräger et al., 2015). As advances are made in central bank communication, it has become clear that the process of monetary transmission is buoyed by the public having an understanding of not only the fundamentals of monetary policy but also the central bank's objectives and core goals (Binder, 2017).

Chapter three reconnoitres the delicate relationship between what the SARB communicates and what print media reports. This study takes shape in the form of an exploration of causality between the SARB's MPC statements' readability and the readability of the subsequent reports in the Mail & Guardian newspaper on the same subject.

As argued by Reid (2011a:123):

> "Although the SARB uses a range of communication tools, including monetary policy statements, monetary policy forums, the Monetary Policy Reviews and Quarterly Bulletins designed for different audiences, it is argued that very few members of the general public choose to pay attention to this communication."

With this premise, it is clear that the media is vitally important for the SARB, as the monetary institution simply cannot reach all its audiences at once but has to rely on other secondary agents to act as conduits to ferry its communications, which in some instances are riddled with complexities. Relying on Katz et al. (1955), two-step theory, which establishes that mass media information is channelled to the 'masses' through opinion leadership, the role of the media then becomes even more critical in transmitting SARB's messages.

To this end, this chapter examines whether a movement in SARB's MPC statements' readability (ergo clarity) as defined by Bulír et al., (2013b) causes clarity in the subsequent newspaper reports in the Mail & Guardian newspaper.

With a clear definition of clarity, this chapter surveys whether the SARB's MPC communications between 2010 and 2021 trigger causality in the subsequent news reports from the Mail & Guardian newspaper in South Africa. The study examines whether SARB's post-MPC statements' readability is reciprocated in the subsequent Mail & Guardian newspaper articles. The study relies on the Flesch-Kincaid Grade Level score and Flesch Reading Ease Score methodology to unpack both SARB's MPC statements and the corresponding Mail & Guardian newspaper articles to create a computation analysis, which is ultimately used to examine Granger causality. The study finds that, although there might appear to be a co-movement between SARB's MPC statements' Flesch-Kincaid Grade Level score and Flesch Reading Ease Score to Mail & Guardian's newspaper articles' Flesch-Kincaid Grade Level score and Flesch Reading Ease Score, the Granger casualty test reveals that there is no causality between the two variables. This is explained by the Mail & Guardian articles directly quoting SARB's MPC statements, in essence creating an 'artificial' co-movement.

This chapter allows for both qualitative and quantitative analysis as it relies on both Granger causality testing and analysis of the SARB's texts to uncover that, despite an absence in Granger causality, the textual analysis shows that many journalists copy and paste the SARB's MPC message and print it without necessarily following 'normative' journalistic norms such as 'corroborating a story'. This then relegates the media to a mere disseminator of the SARB's original MPC message without necessarily unpacking and deconstructing it for the 'inattentive public' (see Reid, 2011a; Reid, 2011b), who principally rely on the media to interpret monetary information.

Chapter three concludes that despite the SARB's relative improvement in clarity (post 2016), as evidenced in chapter two, there is no causality in the corresponding newspaper articles, creating a challenge for the SARB as easing readability does not appear to be reciprocated in the media.

5.4. Sentimental outlook for the monetary policies of the South African Reserve Bank

As aforementioned, the SARB adopted an inflation-targeting framework in 2000 and has since embarked on a trajectory of transparency and clarity in communication. This has taken the shape of releasing MPC statements and bulletins outlining policy actions and monetary policy related data. While the SARB has become more transparent (see Reid (2011; Reid et al., 2020; Reid and Siklos, 2020) over the past twenty years, a fundamental question has emerged on how market participants have received SARB communications, thereby rationalising the need to measure SARB's tone and sentiment over the past two decades. Chapter four examines SARB's MPC statements' tone and sentiment between 2000 and 2021 using the Besigye-Segawa's TextBlob polarity and subjectivity calculator, which measures central bank communication tone and sentiment using the Loughran-McDonald dictionary's word classification to gauge polarity (positivity and negativity) and subjectivity (objectivity and subjectivity). The study then uses SARB's tone and sentiment results as a leading indicator to examine causality with regard to inflation expectation results from the Bureau of Economic Research (BER) results survey.

The systematic analysis relies on the Granger causality test to show causality of SARB's MPC statements' tone and sentiment on successive BER's inflation expectations, thus justifying the need for effective communication as SARB's MPC communications' polarity and subjectivity ultimately have a causal effect on inflation expectations. The study then goes on to characterise three themes, namely: snap movements in SARB's polarity related to economic shocks, SARB's sentiment and tone is highly influenced by the business cycle and SARB's reassurance cushions inflation expectations.

As exposed by Coenen et al., (2017), monetary policy communication is particularly vital during 'unconventional times' as the drastic introduction of novel policy frameworks, tools and the probable confines to a central bank's toolkit often hinders the certainty of policy actions. With this logic, central bank communication during 'unconventional times' is today proving to be an anchor of reassurance for many central banks; the SARB is no exception.

It is critical to note that, as is usually the norm, policy rates are inhibited to the effective lower bound during 'unconventional times' and upon this bearing, effective communication in itself renders an alternative policy tool. In chapter four, the SARB's communication stance during the 'unconventional times' offers glimpses of the alternative options to SARB's toolkit in line with communication and managing expectations about the future course of policy. It should be noted that this is what happens under 'forward guidance' as the monetary institution moves beyond mere text and messages about the current monetary setting and moves towards making unambiguous statements about the future (Coenen, 2017). This chapter ably shows how communication in 'unconventional times' is more subjective, further reaffirming the SARB's reliance on communication during times of relative uncertainty. In addition, communication during 'unconventional times' has been proved to foster a central bank's transparency, which buoys credibility; all are vital attributes needed during times of monetary uncertainty (Blinder et al., 2008).

Conclusion

Although there is an apparent ubiquity of inflation-targeting frameworks for many central banks today, the state of communication across the wide monetary spectrum is simply not standardised. In addition, central bank communication literature on African central banks is only just emerging, thereby fortifying the need for more studies on the subject. This thesis aptly examines three stakeholders in the monetary spectrum, namely, the central bank, the media and market agents, for an inquiry into the delicate interaction among all three, which are conjoined by one phenomenon: effective communication.

Furthermore, this thesis depicts the link between rules-based monetary policy, with particular emphasis on Svensson's (1999) expectations channel and effective communication.

In terms of policy implications, it is clear that the media (in this case the Mail & Guardian) is yet to fully appreciate the complex nature of SARB's message and this has intrinsically been attested to by the 'copy and paste' nature of the subsequent reportage. This might not necessarily be desirable for the 'inattentive public' which, as already established, relies on the media for a deconstruction of the complex monetary information. One instantaneous implication is a creation of an 'echo chamber' as the SARB's message is simply reverberated in the media almost in its original form.

This research can be extended with three categorical analyses: firstly, the use of other readability indices such as the Gunning fog index, the SMOG index and the Coleman-Liau index. With such comparisons with, for instance, the Coleman-Liau index (which measures the understandability of a text), further studies can contrast readability and clarity with understandability to further probe whether the public even understands the SARB's messages in the first place.

Secondly, more can be done on the causality with other media houses not engaged in print media.

Although Segawa (2018), studied how the broadcast media, particularly CNBC Africa, covered the SARB's work, his study was entirely qualitative, looking at the sociological and psychological aspects of engaging guests in the CNBC Africa MPC panel discussions and what CNBC Africa regarded as salient in their live MPC panel discussions.

Thirdly, the data from the Besigye-Segawa's TextBlob polarity and subjectivity calculator can be used as a leading indicator to examine causality with other variables, such as business confidence, consumer confidence and purchasing managers' index. To this end, subsequent studies can elucidate on which market agents react fasters to SARB communications and which agents need more amplification.

References

Albuquerque, R., & Vega, C. (2009). Economic news and international stock market co-movement. Review of Finance, 13(3), 401–465. https://doi.org/10.1093/rof/rfn020

Allard, J., Catenaro, M., Vidal, J.-P., & Wolswijk, G. (2013). Central bank communication on fiscal policy. European Journal of Political Economy, 30, 1–14. https://doi.org/10.1016/j.ejpoleco.2012.12.001

Altavilla, C., Giannone, D., & Modugno, M. (2014). The Low Frequency Effects of Macroeconomic News on Government Bond Yields (Finance and Economics Discussion Series of Federal Reserve Board, No. 2014-052). Retrieved from https:// www.federalreserve.gov/pubs/ feds/2014/201452/201452pap.pdf

Amato, J. D., Morris, S., & Shin, H. S. (2003). Communication and Monetary Policy. Oxford Review of Economic Policy, 18(4), 495–503. http://www.jstor.org/stable/23606741

Antweiler, W., & Frank, M. Z. (2004). Is all that talk just noise? the information content of internet stock message boards. The Journal of Finance, 59(3), 1259–1294.

Anand, A., Basu, S., Pathak, J., & Thampy, A. (2021). The impact of sentiment on emerging stock markets. International Review of Economics and Finance, 75, pp. 161-177.

Anderes, M., Rathke, A., Streicher, S., & Sturm, J.-E. (2021). The role of ECB communication in guiding markets public Choice, 186 (3-4), pp. 351-383

Apel, M., & Grimaldi, M.B. (2014). The Information Content of Central Bank Minutes. Working Paper Series 261, Sveriges Riksbank (Central Bank of Sweden).

Arseneau, D.M. (2020). Central Bank Communication with a Financial Stability Objective. Finance and Economics Discussion Series 2020-087. Washington: Board of Governors of the Federal Reserve System, https://doi.org/10.17016/FEDS.2020.087

Beck, M.-K., Hayo, B., & Neuenkirch, M. (2013). Central bank communication and correlation between financial markets: Canada and the United States. *International Economics and Economic Policy*, *10*(2), 277–296. https://doi.org/10.1007/s10368-012-0211-x

Berg, C., & Jonung, L. (1998). Pioneering price level targeting: The Swedish experience 1931-1937. *The ICFAI Journal of Monetary Economics*, *43*(3), 525-551. https://doi.org/10.1016/S0304-3932(99)00004-5

Berger, H., Ehrmann, M., & Fratzscher, M. (2011), Monetary Policy in the Media. Journal of Money, Credit and Banking, 43: 689-709. Doi:10.1111/J.1538-4616.2011.00392.X

Bernanke, B., & Mishkin, F. S. (1997). Inflation targeting: a new framework for monetary policy? *Journal of Economic Perspectives*, *11*(2), 97.

Bernanke, B., Laubach, T., Mishkin, F. S., Posen, A. S., & Wagner, H. (1999). Inflation Targeting: Lessons from the International Experience. Princeton University Press. doi:10.2307/j.ctv301gdr

Bernanke, B. (2004) Fedspeak. Remarks at the Meetings of the American Economic Association. San Diego, California, January 3, 2004, available at www.federalreserve.govboarddocs/speeches/2004/200401032/

Bernanke, B. (2010). Monetary Policy Objectives and Tools in a Low-Inflation Environment, Speech at the Federal Reserve Bank of Boston (Revisiting Monetary Policy in a Low-Inflation Environment Conference)

Bholat, D., Hansen, S.E., Santos, P., & Schonhardt-Bailey, C. (2015). Text Mining for Central Banks. *European Economics: Macroeconomics & Monetary Economics eJournal*. http://dx.doi.org/10.2139/ssrn.2624811

Bholat, D., Brookes, J., Cai, C., Grundy, K., & Lund, J. (2017). Sending firm messages: Text mining letters from PRA supervisors to banks and building societies they regulate. Bank of England Staff Working Paper No. 688.

Bholat, D., Walczak, E., Broughton, N., & Ter, M. J. (2019). Enhancing central bank communications using simple and relatable information. *Journal of Monetary Economics*, *(2019)*. https://doi.org/10.1016/j.jmoneco.2019.08.007

Binder, C. (2017). Fed speak on main street: Central bank communication and household expectations. Journal of Macroeconomics, Elsevier, vol. 52(C), pages 238-251.

Blinder, A. S. (1995). The strategy of monetary policy. *The Region*, *9*(3), 4-4.

Blinder, A. S. (1998). *Central banking in theory and practice* Cambridge MA: MIT Press.

Blinder, A. S, Goodhart, C., Hildebrand, P., Lipton, D., & Wyplosz, C. (2001). How do Central Banks Talk? Geneva Reports on the World Economy.

Blinder, A. S., & Wyplosz, C. (2004). Central Bank Talk: Committee Structure and Communication Policy. Prepared for the session "Central Bank Communication" at the ASSA meetings, Philadelphia, January 9, 2005

Blinder, A. S., Ehrmann, M., Fratzscher, M., de Haan, J., & Jansen, D.-J. (2008), Central bank communication and monetary policy: a survey of theory and evidence. Journal of Economic Literature, Vol. 46 No. 4, pp. 910-945.

Blinder, A. S. (2009). Talking about Monetary Policy: The Virtues (and Vices?) of Central Bank Communication, BIS Working paper no. 274. (Basel: Bank for International Settlements). Available at: http://www.bis.org/publ/work274.htm.

Blinder, A. S., Ehrmann, M., De Haan J., Jansen, D-J. (2017). Necessity as the mother of invention: monetary policy after the crisis. Econ Policy 32(92):707–755

Blinder, A. S. (2018). Through a Crystal Ball Darkly: The Future of Monetary Policy Communication. AEA Papers and Proceedings, 108: 567-71

Blot, C., & Hubert, P. (2018). Central bank communication during normal and crisis time. *Sciences Po publications*.

Born, B., Ehrmann, M., & Fratzscher, M. (2014). Central bank communication on financial stability. *The Economic Journal*, *124*(577), 701–734.

Botha, B., de Jager, S., Ruch, F., & Steinbach, R. (2017). The Quarterly Projection Model of the SARB. Working Papers 8000, South African Reserve Bank.

Brand, C., Buncic, D., & Turunen, J. (2010). The impact of ECB monetary policy decisions and communication on the yield curve. *Journal of the European Economic Association, 8*(6), 1266-1298. Retrieved July 15, 2021, from http://www.jstor.org/stable/40961559Carvalho, C. and Nechio, F. (2014). Do people understand monetary policy? Journal of Monetary Economics, 66, pp. 108–23.

Briere, M. (2006). Market reactions to central bank communication policies: Reading interest rate options smiles. Working Papers CEB 38, ULB - Universite Libre de Bruxelles

Buiter, W. (1999) Alice in Euroland. Journal of Common Market Studies, 37:2, 181- 209.

Bulíř, A., Šmídková, K., Kotlán, V., & Navrátil, D. (2008). Inflation Targeting and Communication: It Pays Off to Read Inflation Reports. *Econometrics: Applied Econometrics & Modeling eJournal*.

Bulíř, A., Čihák, M., & Šmídková, K. (2013a). Writing Clearly: The ECB's Monetary Policy Communication. *German Economic Review, 14*, 50 - 72.

Bulíř, A., Čihák, M., & Jansen, D. (2013b). What Drives Clarity of Central Bank Communication About Inflation? *Open Economies Review, 24*, 125-145. https://doi.org/10.1007/s11079-012-9259-z

Bureau for Economic Research. (2021). Inflation Expectation Survey https://www.ber.ac.za/Reasearch/Surveys/Inflation-expectations/

Candian, G. (2021). Central bank transparency, exchange rates, and demand imbalances. Journal of Monetary Economics, 119, pp. 90-107.

Cannon, S. (2015). Sentiment of the FOMC: Unscripted. Federal Reserve Bank of Kansas City Economic Review, no. Fourth Quarter 2015, 2015, pp. 5–31

Carpenter, D. (2010). Reputation and power: Organizational image and pharmaceutical regulation at the FDA. Princeton, NJ: Princeton University Press.

Cecchetti, S. G., & Ehrmann, M. (2002). Does inflation targetting increase output volatility? an international comparation of policymakers' preferences and outcomes. *Working Paper Series*, *7426*(7426).

Central Bank Governance Group, & Ortiz-Martinez, G. (2009). Issues in the governance of central banks: a report from the Central Bank Governance Group. Basel, Switzerland, Bank for International Settlements.

Chen, K. (2015). Use Python to calculate the tone of financial articles

Chen, K. (2016). Interpreting the Fedspeak: Text Analysis on FOMC Statements." U.S. Economic Watch, 27 Sept. 2016, pp. 1–5.

Christelis, D., Georgarakos, D., Jappelli, T., & Rooij, M. (2016). Trust in the Central Bank and Inflation Expectations (De Nederlandsche Bank Working Paper No. 537).

Coco, A., & Viegi, N. (2020). The monetary policy of the South African Reserve Bank stance communication and credibility. Working Papers 10024, South African Reserve Bank.

Coenen, G., Ehrmann, M., Gaballo, G., Hoffmann, P., Nakov, A., Nardelli, S., Persson, E., & Strasser G. (2017). Communication of monetary policy in unconventional times (ECB Working Paper Series No. 2080). Retrieved from https:// www.ecb.europa.eu/pub/pdf/scpwps/ ecb.wp2080.en.pdf

Cœuré, B. (2017). Central Bank Communication in a Low Interest Rate Environment. *Open Economies Review, 28*, 813-822.

Cook, T., & Hahn, T. (1989). The effect of changes in the federal funds rate target on market interest rates in the 1970s. *Journal of Monetary Economics*, *24*(3), 331–351. https://doi.org/10.1016/0304-3932(89)90025-1

Cosimano, T. F., & Van Huyck, J. B. (1993). Central bank secrecy, interest rates, and monetary control. *Economic Inquiry*, *31*(3), 370–382

Cruijsen, C. (2008). The economic impact of central bank transparency, other publications TiSEM, Tilburg University, School of Economics and Management

Cruijsen, C., & Eijffinger, S. C. (2008a). Actual versus Perceived Transparency: The Case of the European Central Bank.

Cruijsen, C., & Eijffinger, S. C. (2008b). The economic impact of central bank transparency: a survey, DNB Working Papers, Netherlands Central Bank, Research Department, https://EconPapers.repec.org/RePEc:dnb:dnbwpp:132.

Cruijsen, C., Eijffinger, S. C., & Hoogduin, L. H. (2010). Optimal central bank transparency, Journal of International Money and Finance, 29, issue 8, p. 1482-1507

Cukierman, A. (2001). Are Contemporary Central Banks Transparent About Economic Models and Objectives and What Difference Does it Make?

Cukierman, A. (2009). The Limits of Transparency. Economic Notes, 38: 1-37. https://doi.org/10.1111/j.1468-0300.2009.00208.x

Davis, J., & Wynne, M. (2016). Central Bank Communications: A Case Study. Federal Reserve Bank of Dallas, *working paper* no. 283, September

de Haan, J., Eijffinger, S. C., & Rybinski, K. (2007). Central bank transparency and central bank communication: editorial introduction. *European Journal of Political Economy*, *23*(1), 1–9.

Demiralp, S., Kara, H., & Özlü, P. (2012). Monetary policy communication in turkey. *European Journal of Political Economy*, *28*(4), 540–556. https://doi.org/10.1016/j.ejpoleco.2012.06.001

Dincer, N., & Eichengreen, B. (2009). Central bank transparency: causes, consequences and updates. *Working Paper Series*, *14791*(14791).

Dincer, N., & Eichengreen, B. (2014). Central Bank Transparency and Independence: Updates and New Measures, *International Journal of Central Banking*, 10, issue 1, p. 189-259

Doms, M., & Morin, N. (2004) Consumer Sentiment, the Economy, and the News Media. Board of Governors Finance and Economics Discussion Series No. 2004-51.

du Rand, G., Erasmus, R., Hollander, H., Reid, M., & van Lill, D. (2021). The evolution of central bank communication as experienced by the South Africa Reserve Bank. *Economic History of Developing Regions, 36*, 282 - 312.

Dräger, L., Lamla, M.J., & Pfajfar, D. (2015). Are Survey Expectations Theory-Consistent? The Role of Central Bank Communication and News. Board of Governors: Finance & Economics Discussion Series (Topic).

Ehrmann, M., & Fratzscher, M. (2007). Communication by central bank committee members: different strategies, same effectiveness? J Money Credit Bank 39(2–3):509–541

Eijffinger, S., & Geraats, P. (2006). How transparent are central banks? *European Journal of Political Economy*, *22*(1), 1–21.

Engelberg, J. (2008). Costly information processing: Evidence from earnings announcements, Working paper, Northwestern University

Eusepi, S., & Preston, B. (2010). Central bank communication and expectations stabilization. *American Economic Journal. Macroeconomics*, *2*(3), 235–271. https://doi.org/10.1257/mac.2.3.235

Filardo, A.J., Hubert, P., & Rungcharoenkitkul, P. (2019). The Reaction Function Channel of Monetary Policy and the Financial Cycle. *ERN: Monetary Policy Objectives; Policy Designs; Policy Coordination (Topic)*.

Flesch, R. (1948). A new readability yardstick Journal of Applied Psychology 32:221–233. https://doi.org/10.1037/h0057532

Flesch, R. (1979). How to write plain English: A book for lawyers and consumers. New York: Harper & Row.

Facasso, A., Genberg, H., & Wyplosz, C. (2003). How do central banks write? An Evaluation of Inflation Reports by Inflation Targeting Central Banks. Geneva

Reports on the World Economy Special Report 2. Geneva: International Center for Monetary and Banking Studies / London: Centre for Economic Policy Research.

Friedman, B. M. (2008). Monetary policy and Central Bank communication: Complements or substitute? Discussion of Alan S. Blinder "Talking About Monetary Policy: The Virtues and Vices (?) Of Central Bank Communication", BIS Conference Lucerne June 26-27 2008

Garriga, A. C. (2016). Central bank independence in the world: a new data set. *International Interactions*, *42*(5), 849–868. https://doi.org/10.1080/03050629.2016.1188813

Gentzkow, M., & Shapiro, J. M. (2006). Media bias and reputation. *The Journal of Political Economy*, *114*(2), 280–316.

Gentzkow, M., & Shapiro, J. M. (2010). What drives media slant? evidence from u.s. daily newspapers. *Econometrica*, *78*(1), 35–71.

Geraats, P. M. (1999). Inflation and its variation: an alternative explanation. CIDER Working Paper C99-105, University of California, Berkeley.

Geraats, P. M. (2002). Central bank transparency. The Economic Journal 112(483), F532–F565.

Geraats, P., Eijffinger, S., & van der Cruijsen, C. (2006). Does Central Bank Transparency Reduce Interest Rates? CEPR Discussion Papers 5526.

Gertler, P., Horváth, R., & Jonasova, J. (2019). Central bank communication and financial market comovements in the Euro Area. (report) (author abstract). *Open Economies Review*, *31*(2), 257.

Goodhart, C., & Lastra, R. (2017). Populism and central banks. Open Economies Review 29(1): 49-68.

Graesser, A.C., McNamara, D.S., Louwerse, M.M., & Cai, Z. (2004). Coh-Metrix: Analysis of text on cohesion and language. *Behavior Research Methods, Instruments, & Computers, 36*, 193-202.

Graesser, A. C., McNamara, D. S., & Kulikowich, J. M. (2011). Coh-Metrix: Providing Multilevel Analyses of Text Characteristics. Educational Researcher, 40(5), 223–234. https://doi.org/10.3102/0013189X11413260

Granger, C. (1969). Investigating Causal Relations by Econometric Models and Cross-spectral Methods. Econometrica, 37(3), 424-438. doi:10.2307/1912791

Guthrie, G., & Wright, J. (2000). Open mouth operations. *Journal of Monetary Economics*, *46*(2), 489–516.

Haldane, A. (2017). A little more conversation, a little less conversation. Speech given at the Federal Reserve Bank of San Francisco Macroeconomics and Monetary Policy Conference. Available at: https://www.bankofengland.co.uk/-/media/boe/files/speech/2017/a-little-more-conversation-a-little-less-action.pdf

Haldane, A., & McMahon, M. (2018). Central Bank Communication and the General Public. *American Economic Review: Papers & Proceedings*.

Hammond, G. (2012). State of the art of inflation targeting. London, Bank ofEngland.http://www.bankofengland.co.uk/education/Documents/ccbs/handbooks/pdf/ccbshb29.pdf.

Hayo, B., Kutan, A., & Neuenkirch, M. (2008). Communicating with Many Tongues:FOMC Speeches, Media Coverage, and U.S. Financial Market Reaction, MAGKS Joint Discussion Paper Series in Economics 08–2008.

Hayo, B., Neuenkirch, M., & Kutan, A. M. (2010). The impact of U.S. central bank communication on European and pacific equity markets. *Economics Letters*, *108*(2), 172–174. https://doi.org/10.1016/j.econlet.2010.05.006

Hayo, B., & Neuenkirch, M. (2012). Domestic or u.s. news: what drives canadian financial markets? *Economic Inquiry*, *50*(3), 690–690.

Hayo, B., & Neuenkirch, M. (2014). Central Bank Communication in the Financial Crisis: Evidence from a Survey of Financial Market Participants. SSRN Electronic Journal. 59. 10.2139/ssrn.2376165.

Hayo, B., Kutan, A. M., & Neuenkirch, M. (2015). Financial market reaction to federal reserve communications: does the global financial crisis make a difference? *Empirica*, *42*(1), 185–203. https://doi.org/10.1007/s10663-014-9258-y

Heinemann, F., & Ullrich, K. (2007). Does it pay to watch central bankers' lips? The information content of ECB wording. Swiss Journal of Economics, 143(2), 155–185.

Hensel, T. (2014). Validation of the Flesch-Kincaid Grade Level within theDutch educational system.

Horváth, R., & Vaško, D. (2016). Central bank transparency and financial stability. *Journal of Financial Stability*, *22*, 45–56. https://doi.org/10.1016/j.jfs.2015.12.003

Hubert, P., & Labondance, F. (2017). Central Bank Sentiment And Policy Expectations. Kahn G (2007) Communicating a policy path: the next frontier in central bank transparency? Econ Rev First Quart 92:25–51

Issing, O. (1999). The Eurosystem: Transparent and Accountable, or 'Willem in Euroland'. Journal of Common Market Studies, 37:3, 503

Issing, O. (2005). Communication, transparency, accountability: monetary policy in the twenty-first century. *Federal Reserve Bank of St. Louis Review*, Vol. 87, No. 2, Part 1, pp. 65-83, this article is a revised English translation of the thünen lecture, given at the Annual Congress of the Verein für Socialpolitik, 29 September 2004, Dresden.

Istrefi, K. (2019). Comment on: Enhancing central bank communications using simple and relatable information. Journal of Monetary Economics, Elsevier, vol. 108(C), pages 16-20.

Jansen, D.-J., & De Haan, J. (2009). Has ECB communication been helpful in predicting interest rate decisions? an evaluation of the early years of the economic and monetary union. *Applied Economics*, *41*(16), 1995–2003. https://doi.org/10.1080/00036840802167384

Jansen, D.-J., & De Haan, J. 2010. An Assessment of the Consistency of ECB Communication using Wordscores. *European Economics: Macroeconomics & Monetary Economics eJournal*.

Jansen, D. (2011a). Does the Clarity of Central Bank Communication Affect Volatility in Financial Markets? Evidence from Humphrey-Hawkins Testimonies. Contemporary Economic Policy 29 (4): 494–509. doi:10.1111/coep.2011.29.issue-4.

Jansen, D. (2011b). Mumbling with Great Incoherence: Was It Really so Difficult to Understand Alan Greenspan? Economics Letters 113 (1): 70–72. doi:10.1016/j.econlet.2011.05.034.

Kabundi, A., Schaling, E., & Some, M. (2015). Monetary policy and heterogeneous inflation expectations in south africa. *Economic Modelling*, *45*, 109–109.

Kahn, G. (2007). Communicating a policy path: the next frontier in central bank transparency? Econ Rev First Quart 92:25–51

Kahveci, E., & Odabas, Aysun. (2016). Central banks' communication strategy and content analysis of monetary policy statements: the case of fed, ecb and cbrt. *Procedia - Social and Behavioral Sciences*, *235*, 618–629. https://doi.org/10.1016/j.sbspro.2016.11.039

Katz, E., Lazarsfeld, P. F., & Columbia University. Bureau of Applied Social Research. (1955). *Personal influence: the part played by people in the flow of mass communications* (Ser. Foundations of communications research). Free Press.

Kincaid, J.P., Fishburne, R.P., Rogers, R.L., & Chissom, B.S. (1975). Derivation of New Readability Formulas (Automated Readability Index, Fog Count and Flesch Reading Ease Formula) for Navy Enlisted Personnel.

King, M. (1997). Changes in UK Monetary Policy: Rules and Discretion in Practice. Journal of Monetary Economics, 39, 81-97

Kohn, D. L., & Sack, B. (2004). Central Bank Talk: Does it Matter and Why? Macroeconomics, Monetary Policy, and Financial Stability, edited by Bank of Canada, 175-206. Ottawa: Bank of Canada.

Lee, J., Ryu, D., & Kutan, A. M. (2016). Monetary Policy Announcements, Communication, and Stock Market Liquidity. Australian Economic Papers, 55: 227– 250. doi: 10.1111/1467-8454.12069.

Leiderman, L., & Svensson, L. E. O. (1995). Inflation Targets. London: Centre for Economic Policy Research.

LeRoy, S. E., & Porter, R. D. (1981) The Present-Value Relation: Tests Based on Implied Variance Bounds. Econometrica, 49:3, 555-74

Li, F. (2008). Annual report readability, current earnings, and earnings persistence. *Journal of Accounting & Economics*, *45*(2/3), 221–221. https://doi.org/10.1016/j.jacceco.2008.02.003

Loughran, T., & McDonald, B. (2011). When is a Liability not a Liability? Textual Analysis, Dictionaries, and 10-Ks. Journal of Finance, 66, 35–65.

Luangaram, P., & Wongwachara, W. (2017). More Than Words: A Textual Analysis of Monetary Policy Communication. Puey Ungphakorn Institute for Economic Research.

Lucca, D., & Trebbi, F. (2009). Measuring central bank communication: An automated approach with application to FOMC statements (NBER Working Paper (14468)). National Bureau of Economics Research, Cambridge, Massachusetts.

Marques, L. B., Gelos, G., Harjes, T., Sahay, R., & Xue, Y. (2021). *Monetary policy transmission in emerging markets and developing economies*. http://www.cepr.org/active/publications/discussion_papers/dp.php?dpno=15931.

Mboweni, T. (2004). Monetary Policy and the Markets: A two-way Street. Presented at The Star/Safmarine Breakfast, Johannesburg Country Club, 7 September 2006.

McCombs M. E. & Shaw, D. L. (1972). The Agenda-Setting Function of Mass Media. Public Opinion Quarterly, Vol.36(2): 176-187

McDermott, J., & Williams, R. (2018). Inflation Targeting in New Zealand: An Experience in Evolution. RBA Annual Conference Volume (Discontinued), in:

John Simon & Maxwell Sutton (ed.), Central Bank Frameworks: Evolution or Revolution?, Reserve Bank of Australia.

McKee, M. (2001). Central Banks and the Financial Press: What is Going Well and What can be improved. *Business Economics*, *36*(4), 71+.

Mehrling, P., Moss, L., Pixley, J., & Tavlas, G. (2007). What If the Leader of the Central Bank Told Hilarious Jokes and Did Card Tricks? A Panel of Experts. The American Journal of Economics and Sociology, 66(5), 863-888.

Ernst, E.C., & Merola, R. (2018). Central bank communication a quantitative assessment.

Mishkin, F. S. (1995). Symposium on the monetary transmission mechanism. The Journal of Economic Perspectives, Vol. 9 No. 4, pp. 3-10.

Mishkin, F. S. (2000). Inflation targeting in emerging-market countries. *The American Economic Review*, *90*(2), 105–109.

Mishkin, F. S. (2004). Can inflation targeting work in emerging market countries? *Working Paper Series*, *10646*(10646).

Mnyande, M. (2008). South Africa's experience with monetary policy within an inflation-targeting policy framework

Montes, G. C., Oliveira, L. V., Curi, A., & Nicolay, R. T. F. (2016). Effects of transparency, monetary policy signalling and clarity of central bank communication on disagreement about inflation expectations. *Applied Economics*, *48*(7), 590–590.

Montes, G. C., & Nicolay, R. T. F. (2017). Does clarity of central bank communication affect credibility? evidences considering governor-specific effects. *Applied Economics*, *49*(32), 3163–3180. https://doi.org/10.1080/00036846.2016.1254346

Möller, R., & Reichmann, D. (2021). ECB language and stock returns – A textual analysis of ECB press conferences Quarterly Review of Economics and Finance, 80, pp. 590-604.

Naghdaliyev, N. S. (2011). Central Banks' Communication in the Post-Crisis Period. The Harriman Institute, Columbia University.

Natvik, G. J., Rime, D., & Syrstad, O. (2020). Does publication of interest rate paths provide guidance? *Journal of International Money and Finance*, *103*. https://doi.org/10.1016/j.jimonfin.2019.102123

Neuenkirch, M. (2009). Studies on us and Canadian central bank communication (Unpublished doctoral dissertation).Munchen.

Pastor, L., & Veronesi, P. (2012). Uncertainty about government policy and stock prices. *Working Paper Series*, *16128*(16128).

Picault, M., & Renault, T. (2017). Words are not all created equal: a new measure of ecb communication. *Journal of International Money and Finance*, *79*, 136–156. https://doi.org/10.1016/j.jimonfin.2017.09.005

Picault, M., Pinter, J., & Renault, T. (2020). Media Sentiment on Monetary Policy: Determinants and Relevance for Inflation Expectations. *European Economics: Macroeconomics & Monetary Economics eJournal*.

Poole, W. (2001). Expectations. Federal Reserve Bank of St. Louis Review, 83(1), 1–10.

Poole, W. (2003). Fed Transparency: How, Not Whether. Federal Reserve Bank of St. Louis Review, November/December, 1-8. https://doi.org/10.20955/r.85.1-8

Ranaldo, A., & Rossi, E. (2010). The reaction of asset markets to swiss national bank communication. *Journal of International Money and Finance*, *29*(3), 486–486.

Reed, S.B., & Rippy, D.A. (2012). Consumer Price Index Data Quality: How Accurate is the U.S. CPI? Beyond the Numbers: Prices & Spending, vol. 1, no. 12 (U.S. Bureau of Labor Statistics, August 2012), https://www.bls.gov/opub/btn/volume-1/consumer-price-index-data-quality-how-accurate-is-the-us-cpi.html

Reeves, R., & Sawicki, M. (2007). Do financial markets react to bank of england communication? *European Journal of Political Economy*, *23*(1), 207–227. https://doi.org/10.1016/j.ejpoleco.2006.09.018

Reid, M. (2011a). Communication as a Strategic Monetary Policy Tool: An Evaluation of the Effectiveness of the South African Reserve Bank's Communication. Stellenbosch University, Department of Economics. (Unpublished doctoral dissertation)

Reid, M. (2011b). Talking to the Inattentive Public: How the media transforms the Reserve Bank's communications. Stellenbosch University, Department of Economics: 19/2011.

Reid, M., Bergman, Z., Plessis, S. D., Bergman, M. M., & Siklos, P. (2014). Inflation and monetary policy: what south african newspapers report in an era of policy transparency. *Journal of Economic Issues*, *54*(3), 732–754. https://doi.org/10.1080/00213624.2020.1787045

Reid, M., & Siklos, P. (2020). Building Credibility and Influencing Expectations- The Evolution of Central Bank Communication. Working Papers 10141, South African Reserve Bank.

Reid, M., Siklos, P., Guetterman, T., & Du Plessis, S. (2020). The role of financial journalists in the expectations channel of the monetary transmission mechanism. *Research in International Business and Finance*, *55*. https://doi.org/10.1016/j.ribaf.2020.101320

Resche, C. (2004). Investigating 'Greenspanese': From hedging to 'fuzzy transparency'. Discourse & Society, 15(6), 723-744. http://www.jstor.org/stable/42888649

Rholes, R., & Petersen, L. (2021). Should central banks communicate uncertainty in their projections? Journal of Economic Behavior and Organization, 183, pp. 320-341.

Rosa, C., & Verga, G. (2007). On the consistency and effectiveness of central bank communication: evidence from the ECB. *European Journal of Political Economy*, *23*(1), 146–175. https://doi.org/10.1016/j.ejpoleco.2006.09.016`

Sardelich, M., & Kazakov, D. (2018). Extending the Loughran and McDonald Financial Sentiment Words List from 10-K Corporate Fillings using Social Media Texts

Segawa, A. (2018). Media coverage of South Africa Reserve Bank Monetary policy committee work: A case study of CNBC Africa 2014-2017. University of the Witwatersrand, Department Journalism. (Masters dissertation).

Shafik, M. (2017). In experts we trust? Speech given at Oxford Union. Available at: https://www.bankofengland.co.uk/-/media/boe/files/speech/2017/in-experts-we-trust.pdf

Shapiro, A.H., & Wilson, D.J. (2019). Taking the Fed at its Word: A New Approach to Estimating Central Bank Objectives Using Text Analysis. *Federal Reserve Bank of San Francisco, Working Paper Series*.https://doi.org/10.24148/wp2019-02

Shapoval, Y., Anufriieva, K., Brus, S., & Bublyk, Y. (2019). Communication as an instrument for enhancing trust in a central bank: the case of Ukraine. *Banks and Bank Systems*, *14*(2), 106–119. https://doi.org/10.21511/bbs.14(2).2019.09

Siklos, P. L. (2013). The Global Financial Crisis and the Language of Central Banking: Central Bank Guidance in Good Times and in Bad. CAMA Working Papers 2013-58, Centre for Applied Macroeconomic Analysis, Crawford School of Public Policy, The Australian National University.

Siklos, P. L. (2014). Communications Challenges for Multi-Tasking Central Banks: Evidence, Implications. International Finance, 17: 77-98. https://doi.org/10.1111/infi.12043.

Siklos, P. L. (2018). Has Monetary Policy Changed? How the Crisis Shifted the Ground Under Central Banks. Working Paper series 18-10, Rimini Centre for Economic Analysis.

Solnik, B. (1983). The Relation Between Stock Prices and Inflationary Expectations: The International Evidence. The Journal of Finance, 38(1), 35-48. doi:10.2307/2327636

South African Reserve Bank. (2006). Communications Policy. Pretoria: South African Reserve Bank.

South African Reserve Bank. (2014). Communications Policy. Pretoria: South African Reserve Bank.

South African Reserve Bank. (2018a). Communications Policy. Pretoria: South African Reserve Bank.

South African Reserve Bank. (2018b). Statistical and Economic Information. Pretoria: South African Reserve Bank. Available at: http://www.resbank.co.za/: South African Reserve Bank.

Stegmann, J. (2019). Federal Open Market Committee communication: a text mining analysis. Honors Theses.

Stein, J. C. (2014). "Challenges for Monetary Policy Communication". Speech given to Money Marketeers of New York University, May 6, 2014.

Stiglitz, J. (1998). Central banking in a democratic society. *Economist - Haarlem Then Amsterdam Then Leiden-*, *146*(2), 199–226.

Sturm, J.-E, & De Haan, J. (2011). Does central bank communication really lead to better forecasts of policy decisions? new evidence based on a Taylor rule model for the ECB. *Review of World Economics*, *147*(1), 41–58. https://doi.org/10.1007/s10290-010-0076-4

Su, S., Ahmad, A.H. & Wood, J. (2020). How effective is central bank communication in emerging economies? An empirical analysis of the Chinese money markets responses to the people's bank of China's policy communications. Rev Quant Finan Acc 54, 1195–1219

Svensson, L. E. O. (1997). Inflation forecast targeting: implementing and monitoring inflation targets. *European Economic Review*, *41*(6), 1111–1146. https://doi.org/10.1016/S0014-2921(96)00055-4

Svensson, L. E. O. (1999). Inflation targeting as a monetary policy rule. (Special issue: monetary policy rules). *Journal of Monetary Economics*, *43*(3), 607.

Svensson, L. E. O. (2010). Inflation targeting. *NBER Working Paper Series*, *16654*(16654).

Swarnalatha, S., Kesavarthini, I., Poornima, S., & Sripriya, N. (2019). Med-Recommender System for Predictive Analysis of Hospitals and Doctors. *2019 International Conference on Computational Intelligence in Data Science (ICCIDS)*, 1-5.

Tetlock, P. C. (2007). Giving content to investor sentiment: the role of media in the stock market. *The Journal of Finance*, *62*(3), 1139–1139.

Tucker, P. (2018). Unelected power: The quest for legitimacy in central banking and the regulatory state. Princeton: Princeton University Press.

Turner, P. (2014). The exit from non-conventional monetary policy: what challenges? BIS Working Papers 448, Bank for International Settlements.

van der Cruijsen, C., & Eijffinger, S.C. (2007). The Economic Impact of Central Bank Transparency: A Survey. *De Nederlandsche Bank Research Paper Series*.

van der Cruijsen., Eijffinger, S. C. W., & Hoogduin, L. H. (2010). Optimal central bank transparency. Journal of International Money and Finance, 29(8), 1482–1507.

Walsh, C. (2003). Accountability, Transparency, and Inflation Targeting. *Journal of Money, Credit and Banking, 35*(5), 829-849.

Woodford, M. (2001). Monetary policy in the information economy. Proceedings - Economic Policy Symposium - Jackson Hole, Federal Reserve Bank of Kansas City, pages 297-370.

Woodford, M. (2005). Central-bank communication and policy effectiveness. Discussion Paper No. 0506-07, Department of Economics Columbia University, Columbia University, Department of Economics Discussion Paper Series, New York, NY, September and National Bureau of Economic Research (NBER) Working Paper No. 11898.

Yellen, J. (2018). Comments on monetary policy at the effective lower bound. The Fall 2018 conference of the Brookings Papers on Economic Activity for a symposium on the effective lower bound.