BER
BUREAU FOR ECONOMIC RESEARCH

The BER's Inflation Expectations Surveys: Findings from Academic Research

Research Note 2 in a series of 2
2021 | No 4

June 2021

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Executive summary

In addition to the fact that the BER inflation expectations surveys are used regularly by the private sector and the SARB, they have attracted increasing academic attention over time. Well before the Global Financial Crisis (GFC), there was broad academic agreement that 'expectations matter', for the effectiveness of monetary policy and for forecasting inflation itself. The GFC only increased the attention these surveys attracted, given the need to rely on unconventional monetary policy tools such as central bank communication (much publicised experiences with forward guidance were the subject of many analyses at the time).

This research note provides a broad overview of the ways in which the BER's surveys of South African inflation expectations have been used to date and the broad conclusions reached. This literature grew notably from about the time of the GFC, partly due to the fact that the survey was old enough to enable time series analysis (there were enough observations collected), and partly due to the fact that the value of central bank communication as a separate monetary policy tool had been further acknowledged. Since then, the survey data has been used to ask a range of research questions. These are reviewed in this research note with the intention of reflecting the range of research that the BER data specifically has enabled and summarising the main findings.

The literature is arranged into six broad themes within this research note to enable us to identify robust findings across the academic literature and to build a narrative about how these findings relate to each other. We begin with the question of whether the inflation expectations are 'rational', which is important from a theoretical point of view as well as providing information about how efficiently the respondents use information available to them to forecast inflation accurately. The second theme turns to the question of the degree to which expectations in South Africa are anchored to the inflation target. If the SARB is viewed by the decision maker as 'credible' in that survey respondents believe that the SARB can be trusted to achieve its target, then the person would presumably offer a forecast in line with the inflation target.

In South Africa, as in all other inflation targeting economies, monetary policy makers are not 'inflation nutters'. Internationally, the Phillips Curve (in various forms) has been one of the standard ways of modelling the relationship between inflation and output (and sometimes wages) and this is the literature covered under the third theme. This is followed, under theme four, by a review of the literature on central bank communication, which both benefitted from the inflation expectations surveys and influenced the way the surveys are being used and designed. Finally, under the last two themes, we review what we have learnt about the factors that drive (influence) inflation expectations. The fifth theme considers a slightly older literature that compares the BER inflation expectations survey data to inflation credibility measures (which measure the extent to which the public has faith in the reported inflation figures themselves), and the sixth reviews the research about the drivers of inflation expectations (factors that influence the way expectations are formed).

The BER data has enabled the informed decision making in the private sector and policy institutions, as well as empowered academics and other analysts to keep learning more about the behaviour that underlies the aggregate economic experiences. This remains a work in progress.

Please refer to the glossary on the BER's website for explanations of technical terms.

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How has the BER data been applied in academic research?

Introduction

The BER inflation expectations survey data is used by the SARB and the private sector on a regular basis. Frequent references to the survey in the SARB monetary policy statements and in the media are also evidence of the manner in which the survey has become part of the discourse around inflation and monetary policy[1].

In addition, the survey has attracted increasing academic attention over time. Well before the Global Financial Crisis (GFC), there was broad academic agreement that 'expectations matter', for the effectiveness of monetary policy and for forecasting inflation itself (as argued in the first research note). When international financial markets began to collapse during the GFC and conventional monetary policy lost its effectiveness, central bank communication drew increasing attention as a monetary policy tool. Besides the need to support the credibility of central banks across the world, this focus on communication was precisely because of its ability to influence expectations and thereby affect both inflation and interest rates along the yield curve.

International academic literature has applied inflation expectations survey data in a range of ways. In this research note, we will give a broad overview of the ways in which the BER's surveys of South African inflation expectations have been used to date and the broad conclusions reached. There is of course a chance that we have missed academic papers that use the data, but we aim to include a good representation of the range of topics on which academic research has been published, using the BER's inflation expectations data. There are also some papers that have used other measures of inflation expectations[2] which we do not attempt to review in this note. We do, however, believe that, over the past 10-15 years, using the BER inflation expectations data as the measure of inflation expectations has become the first choice of most South African researchers.

[1] There is, however, some evidence that the media is not fully internalising the relevance of the inflation expectations measure in these discussions about inflation and monetary policy in South Africa. Media reports on inflation and interviews with financial journalists reveal that the media do not fully capture the longer-term horizon of monetary policy, which is crucial to reconciling the narratives about inflation from the SARB with the demands of the public it serves. See Reid *et al.* (2020) and Reid *et al.* (2021) for more details.

[2] Other measures likely to have been used are asset price based measures (typically bond data) or simply past inflation, based on the assumption that inflation is highly persistent and so forecasts of inflation often look much like past inflation.

The first formal academic publications using the BER data only began emerging in about 2007-2009

The BER began collecting and publishing the quarterly inflation expectations surveys for South Africa, on behalf of the SARB in 2000. The aggregate data has been freely available (downloadable from the BER website) since inception, but besides the initial papers written by Kershoff and collaborators (Kershoff, Laubscher and Schoombee (1999); Kershoff and Smit (2002)) as part of their research and presentation of the new dataset, the first formal academic publications using the data only began emerging in about 2007-2009. After the GFC, this literature grew notably, in line with the international experience. The micro level data (disaggregated, individual level data) is, however, still not available without the permission of the SARB. Access to this micro level data is increasingly important if we wish to understand the drivers of expectations. Aggregate numbers hide so much information about the real people that comprise a population, particularly in a country such as South Africa, in which heterogeneity is a defining characteristic.

The intention is to reflect the range of research that the BER data has enabled and summarise the main findings

The survey data has been used to ask a range of research questions, influenced by both academic developments internationally as well as policy questions. These will be reviewed in the sections that follow, with the intention of reflecting the range of research that the BER data has enabled and summarising the main findings. It is worth cautioning that academic research builds our knowledge in small increments. The results of each paper individually are not beyond question. However, as multiple papers (by different authors, using a range of methods) are published, supported by the (often slow) process of peer review, robust findings emerge that can be relied upon with increasing confidence.

In the sub-sections that follow, we use six broad themes to organize the review of the literature. Some papers span more than one of these, but the themes assist us to identify robust findings across the academic literature and to build a narrative about how these findings relate to each other. We begin with the question of whether the inflation expectations are 'rational', which is important from a theoretical point of view as well as providing information about how efficiently the respondents use information available to them to forecast inflation accurately. The next sub-section turns to another characteristic of inflation expectations that is particularly important to policy makers – the degree to which expectations are anchored to the inflation target. If the SARB is viewed by the decision maker as 'credible', in that survey respondents believe that the SARB can be trusted to achieve its target, then the person would presumably offer a forecast in line with the inflation target.

In South Africa, as in all other inflation targeting economies, monetary policy makers are not 'inflation nutters'[3] (there is plenty of evidence that they target inflation in a flexible manner, considering the impact of monetary policy on other macroeconomic variables). Internationally, the Phillips curve (in various forms) has been one of the standard ways of modelling the relationship between inflation and output (and sometimes wages). This literature is over 50 years old in South Africa, and in more recent times many of these efforts have used the BER inflation expectations data. We offer a brief review of the contribution of the BER data to this literature under the third research theme.

The experience of the GFC has influenced monetary policy worldwide in many ways, one notable way being the increased focus on using central bank communication as an explicit monetary policy tool. Communication is used as a separate tool with two interlinked goals – to build longer term institutional credibility and to manage expectations along the yield curve. In the fourth sub-section, we review how the BER inflation expectations data has contributed to this literature.

In the last two sub-sections we review what we have learnt about the factors that drive (influence) inflation expectations. The fifth theme considers a slightly older literature that compares the BER inflation expectations survey data to inflation credibility measures (which measure the extent to which the public has faith in the reported inflation figures themselves). Does a lack of trust in the inflation figures feed through to higher inflation expectations? In the sixth sub-section, we explore the more recent research about the drivers of inflation expectations. This literature represents attempts to better explain which other factors influence the way expectations are formed and, in concert with what is being learnt in the central bank communication literature, perhaps how the SARB can engage with the price setters more effectively to achieve an outcome that is in the interests of all South Africans.

[3] This was a label former Governor of the Bank of England, Mervyn King, used to describe a central bank that only considered inflation in its decision making.

1 The rationality of inflation expectations

The appropriate approach to modelling expectations has been an ongoing academic theme. Given the (now contentious) approach of academics to use the modelling assumption of 'rational expectations'[4], it was typical to start by asking how rational the recorded survey expectations are. The question of whether expectations are rational is also important from a policy perspective in that if expectations are rational then only unexpected inflation will affect the real economy. The question of whether expectations are rational was given further impetus in the wake of the GFC when macro models were found wanting.

Inflation expectations have become more anchored

Using Reuters Econometer (RIE) survey data that capture only financial analysts and a combination of the three BER survey groups administered by the BER (i.e. financial analysts, the business sector and trade unions), researchers from the SARB (Ehlers and Steinbach, 2007) found that inflation expectations had become more anchored. They divided the data into a disinflationary period (Jan 2000 – Dec 2003) and stable inflation period (January 2004 – March 2007) and found that in all three cases (the RIE six quarter ahead, BER 1 year ahead and BER 2 years ahead), the level and standard deviation of the expectations was lower in the stable period than in the disinflationary period.

Financial analysts were found to form unbiased expectations, business to form biased expectations and trade unions biased at longer horizons and unbiased at shorter horizons

The authors go on to distinguish between weak rationality (unbiased and efficient forecasts), sufficient rationality (forecasts that outperform other models), and strict rationality (forecasts that outperform a combination of various forecast methods). The RIE financial analysts, BER financial analysts, BER business sector and BER trade unions were tested separately for each definition of rationality as well as adaptive expectations (expectations that are backward looking in that future expectations are strongly influenced by historical inflation). There was some variation in the results, but generally the financial analysts were found to form unbiased expectations, business to form biased expectations and trade unions biased at longer horizons and unbiased at shorter horizons. However, all the groups were found to use information inefficiently (forecast errors contained information), and therefore fail to be classified as weakly rational. The predictive

[4] Rational expectations is the assumption that people incorporate all the information available to them at the time a decision is made. This does not mean that people are assumed to have access to full information or that no people ever make mistakes, but rather that on average they would not ignore information that is available. Led by the winner of the 2002 Nobel Prize in Economics, Daniel Kahneman, behavioural economists have challenged this assumption and are increasingly influencing how economists think about (and model) decision making.

ability of the different groups was also tested against some simple models[5]. All three of the BER groups outperformed the random walk model and the financial analysts also outperformed the ARMA model, suggesting that while these expectations are not rational, they are also not naïve. As part of her PhD thesis, Ehlers (2019) extended this sample on which these results were originally based and received very similar results about the rationality of the survey respondents.

The forecasts of business people and trade unions are linked to the lagged inflation rate

Similarly, Kabundi and Schaling (2013) also study the BER data and find that inflation expectations are not in line with the rational expectations hypothesis. Specifically, they report that inflation expectations are tied to the lagged inflation rate (they are backward looking). Acknowledging that aggregate numbers may hide information from heterogeneity, in a follow-up study, Kabundi, Schaling and Some (2015) find that forecasts of price setters (business people and trade union representatives) are linked to the lagged inflation rate, but this holds only to a lesser extent for the forecasts of financial analysts. Thus their conclusions were in line with Ehlers and Steinbach (2007).

It was important to have access to micro level data to truly assess the rationality of survey respondents

Pierdzioch, Reid and Gupta (2016) extend earlier analyses of the rationality of inflation expectations of the different groups by relaxing the implicit assumption that forecasters have a symmetric loss function (that they care equally about over and under prediction). The authors argue that reporting the rationality of forecasters as a group can be misleading as the incentives facing individuals within a group can differ (captured by different loss functions). For example, literature suggests that analysts from different industries are likely to face differing incentives to forecast accurately.[6] Using Bloomberg micro data (disaggregated to the level of the individual respondent), the authors found some heterogeneity with respect to the shape of the loss functions of forecasters, and that in most cases the statistical results revealed the forecasters were rational. In contrast, when they used more aggregated data - pooled Bloomberg data and pooled BER sectoral level data (financial analysts, business sector and trade unions), they found more evidence of asymmetry and against forecast rationality. They concluded that it was important to have access to micro level data to truly assess the rationality of survey respondents.

The survey data contains useful information

Related to the question of the rationality of inflation expectations is whether these forecasts assist us to forecast inflation itself more accurately. Pierdzioch, Reid and Gupta (2018) studied the directional accuracy of both short-term and long-term forecasts from the BER data. They used relative operating characteristic (*ROC*) curves, to compare the rate of true signals to false signals. In other

[5] A random walk model and an ARMA.

[6] See Reid and Du Plessis (2011) for a brief summary of how the incentives facing financial analysts when asked to forecast can differ.

about the direction of change of the inflation rate

words, when the respondents forecast a particular outcome, how often does this actually materialise as predicted (a true signal). They found consistent evidence that the survey data contains useful information about the direction of change of the inflation rate.

2 How well anchored are inflation expectations?

Given that the BER inflation expectations surveys were initiated by the SARB as a way to provide information to assist in the implementation of the new inflation targeting policy regime, it was unsurprising that the academic research has also addressed policy relevant questions. A dominant focus has been the extent to which inflation expectations have become better anchored to the SARB's inflation target (thereby improving the efficiency of monetary policy). By this, academics generally mean that the inflation expectations at medium to longer horizons are close to the level of inflation targeted by the central bank (they are consistent with the target), but it needs to be acknowledged that there is not wide agreement about how to measure the extent to which expectations are well anchored.

Using the aggregate data, they concluded that the SARB failed to anchor expectations over the period 01Q1-11Q4

Kabundi and Schaling (2013) use aggregate data from three of the BER's inflation expectations surveys (i.e. the financial analysts, business sector and trade unions) to estimate a model assuming that private sector expectations are a linear function of the inflation target and lagged inflation (assuming the private sector expectations are influenced by the inflation target and past inflation in a simple proportional manner). They conclude that lagged inflation (past inflation) has a large impact on the expectations of economic agents and that the SARB had therefore not been successful in anchoring these expectations over the period 2001Q1 to 2011Q4. They also argued that the SARB's implicit inflation target lay above the upper bound of the official target band and that the SARB had placed too much weight on output stabilisation relative to inflation stabilisation, providing evidence of poor credibility over the period.

This finding at first appears to contradict related research by Reid (2009), where asset price data were used to test the sensitivity of inflation expectations in South Africa to macroeconomic news (surprises), but it should be noted that inflation expectations derived from asset price data captures the expectations of financial market participants and so these most closely match the financial analysts survey from the BER data, rather than an aggregate that incorporates analysts, the business sector and trade unions.

Subsequent research indicated that the expectations of financial analysts are well anchored, whereas those of the business sector and trade unions are often outside the target band

Subsequent research by Kabundi, Schaling and Some (2015) confirms that this distinction is important. Kabundi (*et al.*, 2015) extend their previous work, using disaggregated data[7] from the three BER inflation expectations surveys to distinguish between the reactions of the three groups and the role of each in the success of inflation targeting in South Africa. Again, they use a simple macroeconomic model which estimates inflation expectations as a linear function of the inflation target and the lagged inflation[8], for the period 2000Q3 to 2013Q1. They find that inflation expectations differ notably across the different groups, and that those of the financial analysts are well anchored within the official target band over the period, whereas those of the business sector and trade unions are often outside the target band (and influenced by past inflation). They note the similarity between the expectations of the latter two groups. Another paper that considers differences in the degree of anchoring in a way similar to that of Kabundi (*et al.*, 2015) is Miyajima and Yetman (2019). They too find that the inflation expectations of financial analysts fall within the inflation targeting range but that those of the other two groups are typically around the top end of the inflation targeting range.

Kabundi (*et al.*, 2015) argue that the results in the second paper showed that the results in their first paper (using aggregate data) were driven by those of the price setters (business sector and trade unions). 'It means that these two agents drive aggregate expectations' (Kabundi, *et al.*, 2015: 4). It may be worth reflecting on this statement – should this be interpreted as proof that the price setters are responsible for higher inflation expectations (and therefore inflationary pressure) or is this simply a result of how the authors aggregated the data.

The value of evaluating the expectations of the three groups separately has become clear because they are not all alike. How to weight these meaningfully when aggregating is unclear and so we recommend that they are considered separately.

What does anchoring means in the South African context?

Another interesting thing to ask is about what anchoring means in the South African context? Within academia the concept of whether inflation expectations are anchored is (in the simplest sense) often measured relative to the target, but in the case of a target range how to measure policy success can be less clear. Some academics naturally create a point target (the midpoint of the target range) to compare the actual level of inflation expectations to. This is particularly typical when comparing the South African experience to that of other countries. But this needs to be questioned. During periods of the inflation targeting regime

[7] Data at the level of the individual.

[8] Assuming the private sector expectations are influenced by the inflation target and past inflation in a simple proportional manner.

in SA, it was widely (if informally) accepted that the SARB was targeting the upper limit of the target band. In fact, once the SARB decided to lower inflation to the midpoint, the previous implicit target of just below the upper band was even acknowledged in the April 2018 Monetary Policy Review. If it was the case that the analysts (and public more broadly) were maintaining inflation expectations in quite a stable fashion just below the band, *in a position consistent with the SARB's implicit target,* then it is quite reasonable to argue that monetary policy was in fact predicable and expectations were anchored around the upper end of the target range.

In the following section we turn to the Phillips Curve[9]. The historical development of the Phillips curve literature in many ways captures our learning about how the expectations of the public influences the choices faced by the policy maker. For example, the degree to which expectations have become anchored recently has been singled out as one of the most likely reasons for the flattening of the Phillips Curve over recent years. The policy choices open to policy makers have been influenced by the reaction of the public – monetary policy is a strategic game[10].

3 Phillips Curves

What is the relationship between inflation and output (or employment)?

There is a long history of trying to model the Phillips Curve for South Africa[11] (as elsewhere in the world), and some of the earliest South African research modelled the Augmented Phillips Curve, which recognizes the impact of inflation expectations on the traditional relationship between inflation and output. It is, however, only more recent models that would have been able to use the BER survey data whereas previous models relied on various other proxies for inflation expectations, including using the historical inflation number (under the assumption that inflation is persistent). Given the extent of this literature, this section of the research note will be limited to a brief overview of some of the research questions that have been addressed by the South African literature that uses the BER inflation expectations surveys. We will not review all the technical challenges faced in the effort to model the Phillips Curve or review the findings. For a good summary of the earlier literature, we recommend Hodge (2002). To the

[9] The Phillips Curve captures the relationship between inflation and output (or unemployment).

[10] Monetary policy is a strategic game in the sense that the outcome of monetary policy depends not only on the actions of the central bank, but also on the actions of the public in response (or even pre-empting) to these policy actions. In other words, the ultimate outcome depends on the actions of both the central bank and the public, who are each influenced by their anticipation of the others reaction.

[11] Phillips Curves can be used for forecasting purposes and also offer insight into the nature of the choices the SARB has.

best of our knowledge, none of the more recent papers fully reviews the more recent literature (which has grown substantially), but we do recommend Botha, Kuhn and Steenkamp (2020) for a careful comparison of a range of approaches to explaining the 'missing Phillips Curve' experienced after the GFC.

Phillips Curves are often used as part of standard macroeconomic models used to understand the working of the economy. The first question is what the relationship between inflation and output (or employment) looks like and whether it is stable (Hodge (2006); Nel, (2000), (2006)). Such a model would be able to guide monetary policy with respect to its impact on both inflation and output (or employment). A second dominant question is how well the Phillips Curve performs with regard to forecasting inflation (Fedderke & Liu, 2018).

It became increasingly difficult to find a simple specification of the Phillips Curve that matched both theory and experience in South Africa'

The South African literature mirrors the wider international experimentation with a number of variations of the Philips curve over time, including the triangular model (Burger and Marinkov (2006) and (Vermeulen, 2017)), the New Keynesian Phillips Curve (Burger and Du Plessis (2013) and many others) and the Sticky Information Phillips curves (Reid & du Rand, 2013). The version of the Phillips Curve most widely accepted by the mainstream over the last few decades has undoubtedly been the New Keynesian Phillips Curve. However, in line with the struggle internationally to model the Phillips Curve relationship, Burger and Du Plessis (2013) state that over the 40 years before their study, published in 2013, 'it became increasingly difficult to find a simple specification of the Phillips Curve that matched both theory and experience in South Africa'.

Besides a choice between the different forms of the Phillips Curve, the results can be quite sensitive to choices such as which measure of the output gap or inflation expectations to use. The merit of these different measures have been the focus of a number of papers (some recent papers that discuss these choices include Reid and du Rand (2013) and Botha, Kuhn and Steenkamp (2020)). Relevant to this research note is the conclusion by Reid and du Rand (2013) that they prefer to use the survey expectations as the measure of inflation expectations, from both a theoretical and empirical perspective.

In line with international narratives, a number of South African researchers have recently been exploring the extent to which the Phillips Curve has flattened and whether it is still a useful way to understand inflation dynamics or whether it is now 'dead' ((Reid & Siklos, 2021), (Vermeulen, 2017), (Botha *et al.*, 2020)). To think about these questions, it is perhaps worth noting that this relationship has clearly changed during previous periods in history (Lucas, 1995) and is likely to change again. In the words of Harvard economist Gregory Mankiw, the Phillips curve is both 'inexorable and mysterious'. While we face challenges modelling

the relationship, 'it is impossible to make sense of the business cycle, and in particular the short run effects of monetary policy, unless we admit the existence of a trade-off between inflation and unemployment' (Mankiw, 2001: 1). The shape may change over time, but researchers are likely to continue to work hard at understanding this relationship.

As stated above, Phillips Curves can be used to capture the way agents view the economy in order to better understand their behaviour and to inform policy actions. For example, the New Keynesian Wage Phillips Curve for South Africa was used to investigate the responsiveness of nominal wages to labour market conditions (Viegi & Dadam, 2020), and both price and wage Phillips Curves were estimated for different industries within the South African business sector to explore variation across industries and consider how these compare with the views of financial analysts (Reid & Siklos, 2021).

In summary, modelling the Phillips Curve is a task central to monetary economics, but researchers have faced a range of challenges in this pursuit. Current questions of whether the Phillips Curve is 'dead' are not unique – in the wake of the stagflation experience in the 1970s researchers grappled with similar questions. The BER inflation expectations surveys have contributed to the progress in SA in that they have offered a measure for inflation expectations that is both deliberately designed for this purpose and offers some of the richness that is inherent in measuring the opinions of a large population of people as diverse as in South Africa.

4 A way to measure the effectiveness of central bank communication

Communication or "forward guidance" is used as a monetary policy tool to manage inflation expectations and build central bank credibility

One of the notable influences of the GFC on the way monetary policy is implemented is that there has been a growing interest in the use of central bank communication as a way to manage inflation expectations (as a distinct monetary policy tool). While the South African literature on this topic is fairly young, the international literature is already extensive. For those that are interested, Reid and Siklos (2020) offer a survey of the literature from an emerging market perspective. Communication (mostly widely associated with the term 'forward guidance') is used as a monetary policy tool to manage inflation expectations and build central bank credibility (to support institutional stability). Alan Blinder (Blinder, 2004) described the move over the past few decades towards increased transparency and greater use of central bank communication as the 'Quiet Revolution' within central banking. More recently, Andrew Haldane and co-authors

(Haldane, Macaulay & McMahon, 2019) have identified two waves in this revolution – the first being the general increase in transparency and the second a greater focus on communicating more broadly (i.e. the public and not just financial professionals).

Some research papers on central bank communication would naturally focus mostly on characterising the communication of a central bank, without trying to measure its effects. For example, some papers simply asked if the SARB's communication was consistent with its actions (Reid and Du Plessis (2010) and (Erasmus and Hollander, forthcoming)), with the implication that its words would be useful for forecasting future monetary policy. There are also efforts to describe how the SARB's communication has evolved over time in terms of content and how this can be explained as part of the historical context at the time (Du Rand *et al.*, forthcoming).

How does the SARB's communication reaches the public

But if the purpose of central bank communication is to build credibility and manage expectations then its success requires researchers to examine how the communication affects these. In this sense the BER survey is then crucial to the investigation. Researchers need to explore how the SARB's communication reaches the public, with the media likely to be an important channel. Using the fact that the BER surveys separate sectors, Reid (2015) explored how the expectations of the price setters (as captured by the trade unions and business sector) follow those of the financial analysts. This may be because the expectations of the analysts are generally quoted in the media and the expectations of the business sector and trade unions tend to be relatively more adaptive (backward looking) and to therefore lag the expectations of the financial analysts.

Coco and Viegi (2019) also use the BER survey data to explore how the SARB's communication has influenced its credibility over time. Their results show that inflation expectations have become better anchored over the inflation targeting period and support the position that the SARB has been successful in its pursuit of its mandate and is admired for its institutional credibility.

Study the differences across social groups and heterogeneity within the groups

As a consequence of developments in the international literature that emphasise the need to communicate with the public, as well as the fact that the SARB is increasingly giving permission for academics to have access to the disaggregated data, there are now also more papers that explore differences across social groups and heterogeneity within the groups. This will allow the possibility to tailor communication for different groups, recognising that this distinction could be economically significant. We still have limited knowledge about how the central bank's communication reaches the public, which is likely to differ notably across different groups within society. Some literature is focusing on characterising the

role of the media at present[12], which will be helpful, but in the end determining the success of communication will require some measure of the way in which the opinions and actions of the public are influenced by this communication (irrespective of how it reaches the public). The richness of the BER surveys is extremely valuable in this sense. There is opportunity for researchers to use computer assisted textual analysis of large datasets of written text (using machine learning to analyse reports, for example) to capture the reaction of the public to communication, but the surveys offer the advantage that we can say something more concrete about whose opinions have been captured, and we can disaggregate these further based on other respondent characteristics.

In the following two sections, we focus on what we have learnt about what factors influence the formation of inflation expectations.

5 South African household inflation expectations and inflation credibility surveys

Inflation credibility refers to the respondents' perceptions of the accuracy of historical inflation rates

There is a literature that explores the inflation credibility as opposed to inflation expectations, where inflation credibility refers to the respondents' perceptions of the accuracy of historical inflation rates. In South Africa a series of articles were published by Prof Jannie Rossouw and various collaborators, based on a set of surveys which asked the following question:

> 'South Africa's official rate of inflation (CPI) was 5,4 per cent in August 2006. Do you think this is a true reflection of average price increases?'[13] (Rossouw, Padayachee & Bosch, 2011)

A comparison of the findings (Rossouw, Joubert & Padayachee, 2012) about inflation credibility in South Africa with the results of similar surveys in Switzerland and New Zealand found quite robust evidence of a negative relationship between actual inflation and the perception of inflation in all but one case. The discrepancy between actual inflation and the median perception in South Africa was larger in South Africa compared to New Zealand and Sweden, which the authors speculated was possibly due to a relatively poorer knowledge of inflation among South African respondents. Of course, it could also reflect a relatively weaker

[12] A(Reid *et al.*, 2020), (Reid, Siklos, T. Guetterman, *et al.*, 2021), (Reid & Du Plessis, 2011)

[13] Note that the historical inflation number provided in the question would obviously differ depending on the most recent relevant inflation numbers.

trust in the authorities responsible for the inflation figures (or policy makers more generally) – this is not tested.

The extent to which various socio-economic factors influenced the level of inflation credibility

One of the main concepts investigated across the set of South African articles was the extent to which various socio-economic factors influenced the level of inflation credibility, and whether inflation credibility influenced inflation expectations (whether there is a pass through from inflation credibility to inflation expectations). The survey was conducted in 2006Q4 and 2008Q4. Some of the results were not robust across these two surveys, but the authors did find that males and respondents with higher incomes were more likely to accept the inflation figures as credible. Despite this, they did not find robust results that lower reported inflation credibility always fed through to higher inflation expectations.

Notably, the authors also comment on the high levels of respondents that report that they 'don't know'. Unsurprisingly, the level of 'don't knows' tends to be higher amongst those with lower education. This finding may be making it difficult to accurately measure the pass through to inflation expectations. It also illustrates the value in being able to work with the disaggregated data in empirical analysis. The survey respondents are diverse along a number of dimensions. Being able to characterise these differences will allow researchers and policy makers to take a step closer to understanding the factors that determine the behaviour of the public that influences inflation dynamics. Policy makers can use this to communicate more purposefully with different groups and increase the chances of policy outcomes that are collectively beneficial.

6 What drives inflation expectations?

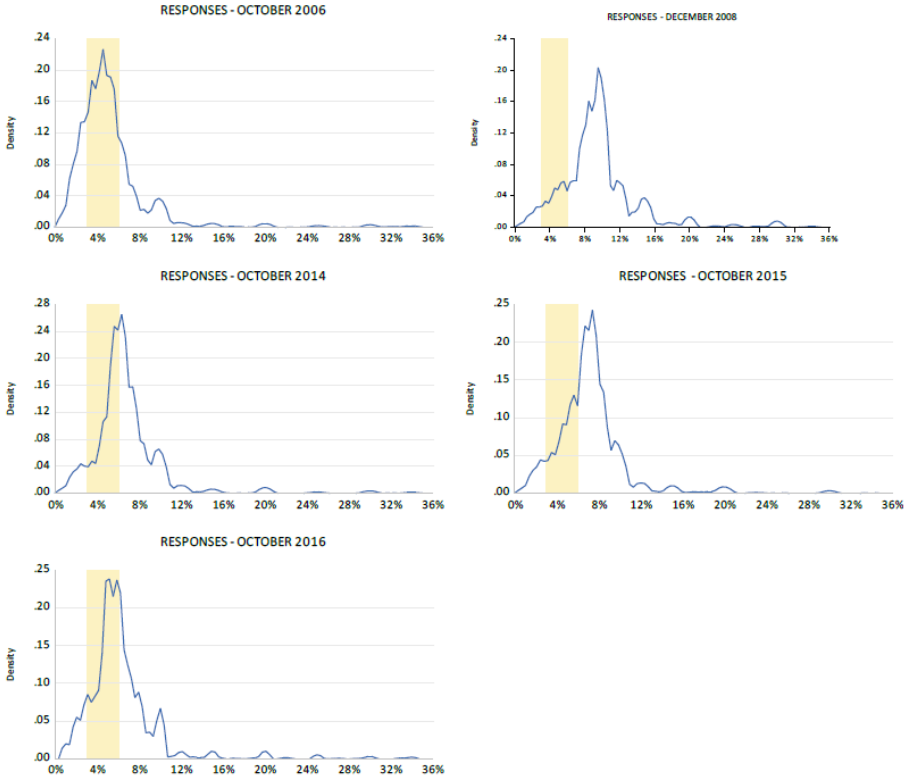
Influenced by the literature on central bank communication and the need for policy makers to influence expectations, in order to achieve their policy objectives for inflation, many researchers are beginning to try to better understand the way in which inflation expectations are actually formed. They are attempting to address the lament by Daniel Tarullo (2017), former member of the Board of Governors of the United States Federal Reserve Board, that there remains a lack of a 'working theory of inflation'.

Which demographic factors determine inflation expectation formation in the household

Earlier in this review, the question of the rationality of inflation expectations in South Africa was considered. Earlier studies focused on characterizing expectations as rational or adaptive with only limited discussion of the behavioural sources of any bias observed. Du Plessis, Reid & Siklos, (2021) explored which demographic factors determine inflation expectation formation in the household inflation expectations survey, using the BER's household inflation expectations data. Using five surveys over the period 2006-2016, the authors adopt a range

of regression techniques to assess whether factors such as gender, income, education, race and age, impact one year ahead inflation expectations. Generally, in line with international results, they find that education and income tend to be inversely related to inflation expectations, and females tend to have higher expectations than males. A finding that is not in line with international findings is that younger individuals have lower inflation expectations, which the authors argue may be due to the adoption of inflation targeting early in the lives of young people. Finally, the authors also find that the demographic characteristics interact with communication by the South African Reserve Bank, and the context of either rising or falling inflation. For example, pessimistic SARB communication tends to lower the inflation expectations of the young.

Figure 1 The Density of Inflation Expectations: Weighted Estimates



Source: Reid, Siklos and Du Plessis (2021)

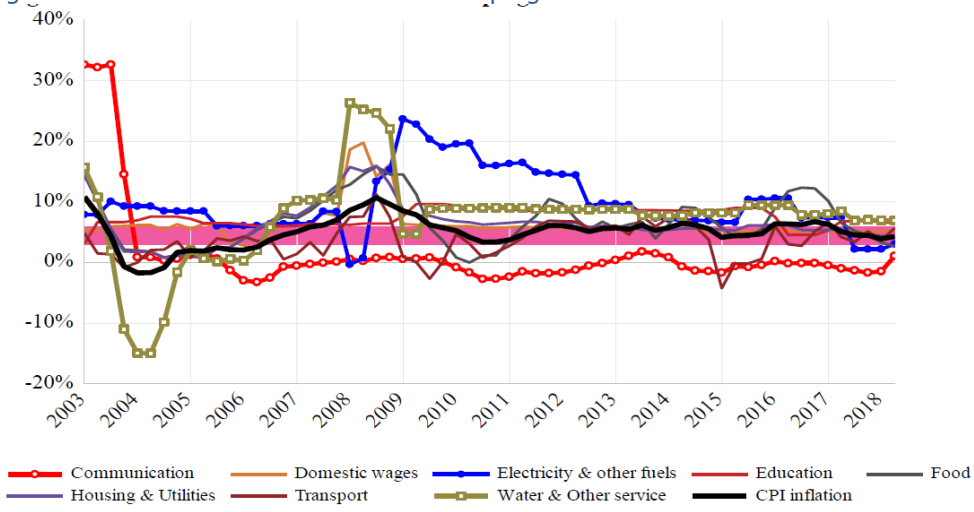
Figure 1 presents the densities for the household inflation expectations in each of the five surveys studied by Reid, Siklos and Du Plessis (2021), which shows that the distribution of the inflation expectations is often skewed to the right and experiences sizeable shifts over time. The shift is most notable around the time of the GFC, when the sharp rise in energy and commodity prices is also likely to have played a role. The authors point out that it is reasonable to argue that this feature is at least partly due to an informal institutional feature of inflation targeting in South Africa during this period – that there was a general understanding between the SARB and the financial markets that the SARB was targeting a

level just below the upper band of the target range. In 2018 the SARB acknowledged this explicitly in its April Monetary Policy Review that "monetary policymakers have taken the strategic decision to anchor inflation expectations close to the 4.5% midpoint of the 3-6% target range, and not to treat the upper bound of that range as the de facto target" (SARB, 2018: 40).

Inflation expectation formation in the business sector

More recently, Reid and Siklos (2021) focused on the BER's Business Sector data, which they were able to compare to that of the financial analysts and to the results from the earlier paper looking at the expectations of South African households. The results of the paper revea6l that inflation expectations became less volatile after the GFC and tended to remain near the top of the SARB's inflation targeting band until about 2018, when there were signs that they may be starting to move toward the midpoint of the band in line with deliberate communication by the SARB. In support of research discussed earlier in this note, the authors also find significant differences between the views of the financial analysts and the business sector about future economic activity (as represented by Phillips curves relationships). The diversity of expectations across different industrial sectors is of particular importance as they again show how much information is lost when we focus on the average from a large, diverse population. We can see that the experience of inflation across sectors can differ notably (figure 2) and pressure from particular relative prices, such as wages (figure 3), can be far from uniform. There remains a lot to learn from this data.

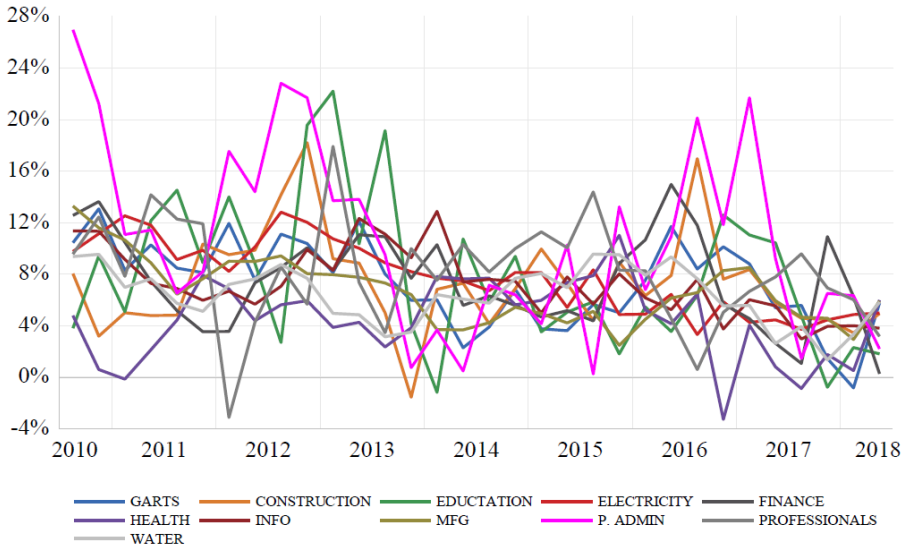
Figure 2 CPI Inflation: Selected Sub-Groupings



Note: Annual inflation rates for the categories shown. CPI inflation is for headline inflation. Data from StatsSA. CPI data before 2007 were generated separately by StatsSA (2008=100). Thereafter data are 2016 December = 100. The shaded area is the SARB's inflation target range (3-6%).

Source: Reid and Siklos (2021)

Figure 3 Growth Rates in Salaries and Wages in Select Industries



Note: Constructed from data on Employment from StatsSA Quarterly Employment Survey (QES) for 2-digit SIC codes (see earlier Table for details). Data refer to salaries and wages. Growth rates are annualized (i.e., year to year percent change).

Source: Reid and Siklos (2021)

Summary Discussion

The BER inflation expectations surveys have supported a range of academic research, particularly after about 10 years of survey collection enabled time series analysis. Studies have shown that the degree of rationality of inflation expectations differs across groups and that reporting rationality may even be misleading if we recognise that respondents can have asymmetrical loss functions that reflect the different incentives they face. It is clear that inflation expectations became more firmly anchored over the inflation targeting period, although the interpretation of the fact they were generally stable around the top end of the target band can vary. The value of evaluating the expectations of the sub-groups separately is clear because financial analysts are consistently better anchored than the other groups. Difficulties modelling the Phillips Curve remain, but the contribution of the BER surveys as a measure of inflation expectations is becoming clear. Furthermore, distinction between industrial sectors in the Business Sector survey, enabled through using the disaggregated data, offers valuable insight into sources of inflationary pressure. In the quest to understand the drivers of inflation, inflation credibility has been found to have an impact on inflation expectations, but the extent of this differs across some socio-economic characteristics. Investigating the BER household, business sector and financial analyst inflation expectations separately has also confirmed that far more information is available from disaggregated data. If we wish to understand the behaviour that underlies inflationary pressure, more research on these differences will be valuable.

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30 June 2021

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