

**What Drives Household's Inflation Expectations?
Socio-Economic Conditions, Anchoring, and the South African Experience**

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Abstract

This paper examines the socio-economic determinants of inflation expectations in South Africa. Five surveys covering the period 2006-2016, and consisting of over 12000 observations, were empirically examined. We assess whether factors such as income, education, race, age, location, and non-core inflation impact one year ahead inflation expectations. In doing so we uncover clear behavioural biases in how respondents view the inflation outlook. For example, education and income are generally inversely related to inflation expectations. However, highly educated and upper income respondents are also among those who believe that inflation expectations can be high and exceed by a wide margin the South African Reserve Bank's (SARB) inflation target range. Regional differences across the various South African states are also observed and inflation expectations can be highly sensitive to non-core inflation rates. More educated respondents are also found to respond to pessimistic language conveyed by the SARB. To the extent that inflation is anchored it is sensitive to certain socio-economic characteristics of the population.

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1. Introduction

Almost ten years after the Great Recession of 2008-09 current Fed chair Yellen (2016) stressed that policy makers still do not properly understand what drives inflation expectations. The role of the expectations channel in the monetary transmission mechanism, which was well established before the financial crisis of 2007/2009, was further elevated in the aftermath of that event. In several economies, including many emerging market economies (EME), communication about monetary policy conditions is also backed by an explicit inflation target that is intended to anchor inflation expectations. The South African Reserve Bank (SARB) is one such monetary authority that has been at the vanguard among EME in adopting inflation targeting (IT) in 2000.

Inflation expectations provide insights into the future unfolding of macroeconomic conditions. Given that monetary policy has long been thought to be forward looking (e.g., Friedman, 1968, Woodford 2003) it is reasonable for policy makers to devote considerable attention to inflation forecasts. All the more reason for many central banks to monitor more closely broad developments in inflation expectations.

Generally, macroeconomic models treat inflation expectations as being adequately captured by a single point estimate. However, the more recent literature makes a convincing case, both empirically and theoretically, that disagreement in individuals' outlook about inflation and macroeconomic conditions more generally are linked to each other (e.g., see Siklos 2018, and references therein). Ignoring the heterogeneity of expectations is tantamount to omitting a potential role for critical determinants of expectations whose origins lie in the socio-economic sphere. As a growing body of empirical and theoretical research is making clear, the root causes of forecast disagreement remain unclear (e.g., see Siklos 2018, and references therein). Nevertheless, there are growing indications that various behavioural biases, which themselves

interact with indicators of socio-economic status, represent significant determinants of macroeconomic expectations.

Inflation expectations are typically measured in one of at least three ways. First, expectations of financial market participants can be derived from their behaviour as reflected in asset purchases.¹ Second, models employed by central banks, government agencies, and others, also provide some information about disagreement in the economic outlook and disagreement about the future as a function of model specification or the judgment of central bankers.² Finally, another approach to measuring inflation expectations consists of survey data. This is the focus of the present study.

While survey data have the disadvantage that they are often available at a relatively lower sampling frequency and ordinarily consist of smaller samples, these data enable researchers to measure the expectations of groups in society other than financial market participants who are likely to be better informed, have higher education and incomes. Moreover, surveys permit researchers to obtain some idea of individual expectations as opposed to ones determined by markets as a whole. Of course, not all surveys are alike. Many of the better known surveys (e.g., Survey of Professional Forecasters, Consensus Economics forecasts) reflect the views of ‘experts’. Alternatively, other surveys ask households to provide their opinion about the near to long-term inflation developments. Arguably, the Michigan Survey is the best known example of surveys of this kind. In any case, it is precisely in such surveys that disagreement is likely to

¹ Often break even inflation rates (the difference between the yields on nominal and inflation-linked bonds) are used, as in the case of the Monetary Policy Reports of several central banks. If a series of these bonds are used to estimate yield curves, then forward inflation compensation rates can be derived to provide more accurate measures of inflation expectations at various horizons along the yield curve. The advantages of the market-based measures include the high frequency and accuracy of these measures (Svensson 1997).

² A good example of judgmental forecasts, possibly supplemented by model-based staff forecasts, are the so-called ‘dot plots’ published in the U.S. Federal Reserve’s Monetary Policy Reports. See https://www.federalreserve.gov/monetarypolicy/mpr_default.htm. These provide an indication of the appropriate future policy rate according to members of the Fed’s policy making committee (the FOMC or Federal Open market Committee).

be rife and, possibly, to have macroeconomic consequences that central banks are keenly aware of.³

Blinder et. al. (2008) called on researchers to investigate more deeply the inflation expectations of non-financial markets segments of the general public because they give central banks ‘the democratic legitimacy, and hence their independence’ (Blinder, 2008:58). More recent research adds that differences that exist between the inflation expectations of households and financial market participants have economic implications that are non-negligible (Das, Kuhnen and Nagel 2017, Malmendier and Nagel 2015, Coibion and Gorodnichenko 2015). Many central banks concede that communication needs to be tailored specifically to this non-specialist audience (e.g., Binder (forthcoming), Haldane 2017). Indeed, an early lesson from the nascent literature that relies on microeconomic survey data is that socio-economic status, largely captured through education and income, is a critical ingredient in explaining the evolution of expectations, and macroeconomic conditions more generally, over time. Moreover, socio-economic status is also likely to be correlated with various cognitive biases (e.g., optimism, pessimism, age cohort specific views about the stance of policies).

In this paper we will focus specifically on the survey data of the inflation expectations of South African households, as collected by AC Nielsen on behalf of the South African Reserve Bank (SARB) and the Bureau for Economic Research (BER). As will be explained below the survey is unique not only because it offers households’ view about developments from the short to the long-term but because a considerable amount of socio-economic information is collected alongside data about inflation expectations. Finally, unlike the micro evidence of Coibion and

³ An implication of relying too heavily on ‘professional’ forecasts is that these are more likely to be unbiased (e.g, see Croushore (1998), Carroll (2003), and Mankiw, Reis and Wolfers (2003) for U.S. evidence) . This property is desirable in models but for central banks concerned with the credibility and effectiveness of their policies and, therefore, public support for their stance, this can provide a misleading impression about the effectiveness of their policy strategy.

Gorodnichenko (2015) for New Zealand who rely on a single survey, the evidence below is based on up to five surveys conducted over a period of a decade.

Despite the potential relevance of these expectations for the implementation of monetary policy, the BER to manage the collection of this data. From a policy perspective, the results suggesting the economic relevance of studying the inflation expectations of households separately raise a number of questions about the household survey. They include: (1) Do inflation expectations within South African households differ markedly across demographic groups? (2) Are the inflation expectations of some groups better anchored than others? and, (3) Why do they differ, beginning by asking which socio-economic factors drive inflation expectations?

In this paper, we address some of these questions using demographic data to ask how different groups within the population of households influence the aggregate inflation expectations figure published. The remainder of the paper is organized as follows. The next section provides a brief overview of what the anchoring of inflation expectations represents, why it matters in countries where a numerical inflation target range exists, as well as citing some of the relevant research that focuses on what can be learned from an examination of surveys of household inflation expectations. This is followed by a description of the data and some stylized facts before presenting some econometric evidence about the socio-economic determinants of inflation expectations. The paper concludes with a summary and areas where additional research and data are needed.

Briefly, we find that the degree to which inflation is anchored in South Africa is limited or, rather, it is sensitive to the socio-economic strata under considerations. As such, attempts to define different degrees of inflation anchoring are not always helpful. In line with international research education and income are generally inversely related to inflation expectations. However, this does not prevent highly educated and upper income respondents from believing that inflation expectations can be high and exceed by a wide margin the

SARB's inflation target range. More educated respondents are also found to respond to pessimistic language conveyed by the SARB. Regional differences across the various South African states are notable as is the sensitivity to non-core inflation rates. To the extent that inflation is anchored it is sensitive to certain socio-economic characteristics of the population.

2. Anchoring Inflation Expectations, Household Surveys, and Socio-Economic Factors

Central banks communicate with households for at least two reasons – to maintain democratic accountability and to anchor their inflation expectations. Surveys such as the survey of South African households' inflation expectations⁴, launched in 2000 shortly after the adoption of inflation targeting, are typically used to monitor inflation expectations to achieve the second objective.

Other than the U.S. where extensive data are available (e.g., see Bryan and Venkatu 2001, Souleles 2004, Branch 2004 and 2007, Pfajfar and Santoro 2008, Malmedier and Nagel 2015, Das, Kuhnen and Nagel 2017, and references therein) only a handful of advanced economies conduct surveys and these are sometimes a one-off snapshot of households' macroeconomic outlook. Surveys that are broadly comparable with the ones used in our study have been conducted, for example, in Germany (Menz and Poppitz 2013), the U.K. (Blanchflower and MacCoille 2009), Austria (Fritzer and Rumler 2015), the Netherlands (van der Crujisen et. al. 2015), and Sweden (Jonung 1981), and Japan (Nishigushi, Nakajima, and Imabuko 2014, and Hori and Kawagoe 2011).

While a range of proxies are used in empirical studies to capture the extent to which inflation expectations are anchored, this concept is often not clearly defined. Kumar et al (2015) provide

⁴ See Kershoff and Laubscher (1999) for a summary of the international usage of these surveys.

a systematic way to formalise different ways of defining anchored expectations, graphically represented by Figure 1.

Kumar et al (2015) identify five different definitions of anchored expectations in the literature. A closer look at these definitions also suggest that inflation expectations will be influenced by the amount of information individuals have at their disposal and their capacity to process information. Accordingly, disagreements about these expectations will likely be influenced by socio-economic conditions, as noted above. While the literature has tended to treat the anchoring of inflation expectations as on-off states, Kumar et. al. (2015) make clear that there exists a continuum of sorts along which inflation is anchored. The five categories they identify are as follows:

- i) Inflation expectations are *ideally anchored* when the average expectations are close to the target.
- ii) Inflation expectations are *strongly anchored* when they are not excessively dispersed across agents.
- iii) Inflation expectations are *weakly anchored* when agents show confidence in their forecasts, in that they believe that the range of likely outcomes will not be far from the forecast they made.
- iv) Inflation expectations are *consistently anchored* when agents make small forecast revisions.
- v) Inflation expectations are *increasingly anchored* when changes in short run expectations do not predict changes in long run expectation.

If being ideally anchored is the full definition of anchoring, then the other 4 can be presented as characteristics or components of this ideal anchoring. Independently, these weaker characteristics of anchoring do not ensure anchoring in the full sense. The data in this study permits us to directly assess how well expectations are anchored according to criteria (i), (ii),

and (iv) above. We have insufficient information to comment on the likelihood that conditions (iii), and (v) are met in South African data.

Coibion and Gorodnichenko (2015) and Binder (2015b) use household inflation expectations numbers to re-estimate the Phillips curve for the USA and find that (1) it explains the ‘missing disinflation’; that (2) the inflation expectations of high-income, college-educated, male, and working age people play a larger role in inflation dynamics than do the expectations of other groups of consumers or of professional forecasters. Malmendier and Nagel (2015) find evidence that individuals’ inflationary experience translates into their views about the inflation outlook. Equally important, different age cohorts have different inflation expectations because their exposure to the past history of inflation plays a critical factor in expectations formation. Experience also appears to potentially transcend the role of education since experts’ (e.g., central bankers) own views about the outlook impacts their views about the appropriate monetary policy stance (Malmendier, Nagel, and Yan 2017).

3. Data and Stylized Facts

South African household survey data are collected on behalf of the BER and SARB by the marketing research firm AC Nielsen. To ensure reliability, A.C. Nielsen need to strive that data ‘remain constant throughout variations in the measuring process’ (Kaplan and Goldsen, 1965). They do so by, for example, using a range of well-trained interviewers and interviewing a large, demographically representative sample (Nielsen, 2017). While reliability increases the chance of validity it does not guarantee it.

A.C. Nielsen conduct face to face interviews of approximately 2500 households every quarter. For this paper, we were able to obtain the disaggregated data for 5 quarters, spread over the period 2006 – 2016. These surveys are spread over a range of macroeconomic conditions. Each respondent is asked to answer the following question: “*Over the past five years prices increased by on average XX per cent per year. During YEAR prices increased by XX per cent. By about*

how much do you expect prices in general to increase during the next 12 months?" The values for XX will, of course, depend on the date (i.e., month and YEAR) the survey is taken. Note also that the survey question is framed to provide some context to reduce the possibility that answers are given at random.⁵ Note that the respondents are not told that the central bank targets inflation nor what the target range is (3-6% since inception). The respondents, with possibly one or two exceptions, are not sampled again in each subsequent survey. Hence, each survey is effectively a random draw from the population of respondents.⁶

Figures 2 and 3 provide some background in terms of headline inflation and the policy rate settings of the SARB. In 2006, both inflation and the SARB's policy rate (PR) are rising; in 2008 both indicators begin to fall from their peak around the time the global financial crisis (GFC) erupts in the last two quarters of 2008; in 2014 inflation is stable and remains inside the inflation target range while the policy rate reaches its lowest levels since IT was introduced in 2000; in 2015 the policy rate is increasing again while inflation also rises to the top end of the band; finally, in 2016, the policy rate ceases to rise while inflation just breaches the top of the IT range. The dates the survey data are generated are indicated in Figures 2 and 3 by the vertical dashed lines. For 2 of the 5 data points we have obtained, inflation is outside of the target range. Inflation is rising in three of the 5 surveys included in this study whereas the policy rate is stable or increasing in 2 of the surveys, and falling in the remaining survey. Overall, the data capture various phases in the inflation and policy rate setting process.

To provide some perspective, Figure 4 compares an average of the responses of households, excluding outliers, and plots these for the five surveys in the data set alongside the SARB's own inflation forecasts as well as the inflation forecasts from Consensus Economics. Only one

⁵ Whether respondents understand the manner in which the question is framed is another matter as they are not asked how well they understand the question.

⁶ Each respondent is assigned an id. Hence, we are able to check the number of respondents who answered the survey question more than once. With over 12000 observations the number of respondents who appeared more than once ranged from 0 (December 2008 survey) to 112 (October 2016 survey).

of the mean inflation forecasts by all households is within the IT range since 2006 but this is also the case for Consensus forecasts. Even the SARB's own forecasts tend to hover around the top edge of the IT range. Nevertheless, with the exception of the December 2008 households' expectations, the differences between the 'experts' and households does not appear to be large. As we shall see, however, this level of aggregation hides considerable diversity in the responses within the household sector.

Household inflation expectations data includes both the disaggregated inflation forecasts of the participants as well as a range of socio-economic characteristics about each respondent. Table 1 provides some summary statistics about the distribution of responses. As shown in Table 2, we have further breakdowns by age, race, income, gender, community size, education (the latter only for 2014, 2015 and 2016), and region where each respondent resides.

Part A of table 1 provides some general information about the number of respondents and some indications of how large the outlier problem is.⁷ The number of respondents is fairly stable over time. Although the proportion of respondents who gave no answer, or who simply do not know what their inflation expectations are, has declined it does remain well over 10% of the sample. Interestingly, none of the respondents believe that inflation is expected to be negative. In contrast, there is a relatively small fraction of households who believe that inflation is expected to exceed 25% or even 35%. The fraction of outliers⁸ declined substantially over time, at least until the October 2016 which registered an increase. Otherwise the number of outliers is quite modest.

⁷ The potential for outliers is not uncommon in surveys of this kind. See, for example, Detmeister, Lebow, and Peneva (2016), and references therein. Individuals' personal experience with changing prices, and so socio-economic indicators then become relevant. In any case, it can also be challenging to perform a mental calculation about aggregate price changes when individuals are faced with several individual prices that can move quite differently from each and over time. A plot relegated to the appendix illustrates for South Africa makes this point by showing differences in some key components of headline inflation (i.e., coal, oil, and wholesale prices).

⁸ There is no formal definition of an outlier. However, many would consider values greater than two or three standard deviations from the mean to be outliers. See, for example, Balke and Fomby (1994) for a macro application.

Part B shows the mean and standard deviations of the respondents as a function of whether outliers are excluded or not. Clearly, the exclusion of the outliers does make a difference. In the econometric evidence that follows we restrict the analysis to the responses that are within the 0% to 35% interval. Hence, by the standards of some outlier definitions, some outliers are included. We also show some average inflation expectations estimates obtained from the SARB's own Quarterly Bulletin as well as the mean inflation one year ahead forecast from Consensus Economics. Figure 4 provides a visual representation of some of the data in Table 1B. As expected, households' inflation expectations tend to be higher than either the professional forecasts or ones from the SARB.

Finally, part C of Table 1 provides a breakdown of households' inflation expectations in relation to the SARB's IT mandate of keeping inflation within a 3 to 6% range. Since the SARB has also indicated in its Quarterly Bulletin when the target might be breached we also indicate the fraction of responses that lie in the top end of the range (i.e., 4 to 6% or 5 to 6%) as well those expectations that lie +1% over the top of the IT band (i.e., greater than 6%). It is noteworthy that a fairly sizeable fraction of households, ranging from a low of 8.5% to a high of almost 40%, believe that the SARB's target would be breached in the year ahead. There are also sharp variations in the number of households who expect inflation one year ahead will be inside the IT target band of 3 to 6%. Interestingly, when observed inflation is close to expectations a slight majority of respondents expect inflation to be within the target range. Otherwise, that same fraction drops substantially. A visual confirmation is also provided by Figure 4.

Figure 5 plots the densities for the responses in each of the five surveys covering a ten year period. The shaded areas identify the SARB's inflation target range of 3% to 6%. Other than the October 2006 and October 2016 surveys the mass of the responses is clearly to the right of the IT range. The distribution of the responses are not only skewed to the right but the distributions experience sizeable shifts over time. This is especially noticeable in the December

2008 survey, that is, arguably, at the height of the global financial crisis, but it is equally the case that the mass of responses exceeds the SARB's stated objective in the October 2015 and 2016 surveys. There is, at least stylized evidence, that inflation expectations shift quite a lot over time and this clearly has implications for the degree to which they are anchored to the IT.

It is apparent from the summary statistics that differences in inflation expectations are most pronounced depending on the region where the respondents live, their education, followed by income and age. In the case of age cohorts older respondents typically expect higher inflation than the rest of the population, except for the October 2006 survey results. Turning to income respondents until the October 2014 survey with the highest incomes (5000 Rand per month and above) had higher expectations. This changes with the last two surveys in our data set where respondents with the lowest incomes (i.e., less than 2000 Rand per month) expected higher inflation over the next twelve months. In the case of residency the most populated regions (Gauteng, followed by KwaZulu Natal and the Western Cape) gave higher expected inflation responses than the smaller provinces.⁹ The most educated are also seen to have relatively lower inflation expectations and this is especially true in the most recent survey (October 2016). There are also difference according to race with blacks and coloured expecting lower inflation in the year ahead than their indian and white counterparts. The smallest differences in inflation expectations are observed when responses are sub-divided according to gender. In the first three surveys females respondents expected slightly more inflation than males but the results are reversed when the last two surveys are examined.

There are two other notable observations that can be made from the data in Table 2. First, inflation expectations appear to respond more quickly to last year's inflation rate than inflation over the past five years. This can be seen by comparing mean inflation outturns over the past

⁹ This may owe to the differences in the behavior of provincial inflation rates (not shown but see the appendix). Data since 2009 (earlier data are not available) show differences in these inflation rates especially around the time of the last survey (October 2016). We return to the role of regional factors later.

year and over a five year period (first two rows of Table 2). In contrast, the five year inflation rate rises but by far less over the 5 surveys for which we have detailed data. Second, whereas with very few exceptions, households of all types tended to under-estimate the observed annual inflation rate. Inflation expectations, except in one case (low income earners in the October 2014 survey), are higher than the previous year's inflation rate in headline CPI. The differentials are especially noticeable in the October 2015 survey. Figure 5 makes this visually clear and highlights how the October 2015 survey yielded sharply higher forecast errors for all of the socio-economic variables at our disposal. It is also the case that households respond to observed inflation since the last survey sees a substantial narrowing of the gap between expected inflation and recent headline inflation. Nevertheless, there continues to be persistence in overestimating future inflation in the sense that households consistently believe that future inflation will be higher than past inflation. Needless to say, given the outturns for inflation these errors are magnified when calculated relative to the top of the IT band. Put differently, the accumulated errors in forecasting next year's inflation rate are far from negligible.

A priori then there is some evidence suggestive of socio-economic differences and disagreement in inflation expectations that may also have been influenced by the general economic environment when the surveys were conducted. Nevertheless, there are also indications that the existence of an inflation target may also have an impact on one year ahead mean inflation expectations. We now turn to an examination of some econometric evidence.

4. Econometric Estimates

To investigate the determinants of households' inflation expectations we rely on variants of the following cross-sectional econometric specification¹⁰ written as

¹⁰ An earlier draft also estimates versions of (1) for each survey. See Table 4 below.

$$\pi_{it}^e = \alpha_{0t} + \beta_{0i}\Omega_{it} + \beta_{1i}\Omega_{it} \circ \Psi_{jt} + \varepsilon_{it} \quad (1)$$

π represents the one year ahead inflation expectations of individuals i surveyed at time t , where t =OCT 2006, DEC 2008, OCT 2014, OCT 2015, OCT 2016. Other than the fixed (individual survey) effects the determinants considered consist of a vector of socio-economic determinants Ω described below, again for the participating individuals, as well as a vector of interactions terms that proxy other potential sources of information that might influence individuals' responses when interacted with certain socio-economic determinants.

Table 3 provides details about the definitions and the coding of the variables that make up the vector Ω in equation (1). Notice that education, a potentially critical variable in related studies as discussed above, is only available for the last three surveys. The living standards variables, an attempt to measure the level of wealth, turns out to be highly insignificant as we show below and is dropped in later regressions when education is added as a determinant. As discussed above there are reasons to doubt that some of the responses in the tail end of the distribution of inflation expectations should be treated on an equal footing with the remaining responses. Although we show the potential impact of including all responses the bulk of the results described below use 35% are threshold level for responses above which the data are discarded.¹¹

Turning to the interaction effects, if the hypothesis that inflation expectations are also partially determined by local conditions then observed inflation at the local level may interact with other variables, notably the respondents' place of residence. Indeed, since most South African households are especially sensitive to food, energy and housing prices it is plausible that fluctuations in these prices could separately influence individuals' views about likely inflation in the year ahead.¹² We do not have data on what respondents believe is the observed

¹¹ Results do not change much if the threshold is reduced to 25%.

¹² Indeed, each Quarterly Bulletin published by the South African Reserve Bank devotes considerable space to discussing food, energy and housing developments.

inflation rate they experience personally. However, we do have, but only for the last three surveys, inflation rates by Province for food and energy, and housing prices. To economize on the number of interaction variables, as well as by virtue of their relative importance in the data set, we focus on interaction effects in KwaZulu Natal, Gauteng, the Western Cape, and the Free State.

Finally, a distinguishing characteristic of IT policy regimes is communication about the economic outlook, notably expected inflation and the likelihood of meeting the central bank's inflation objective. Accordingly, as a Quarterly Bulletin is published around the time each one of surveys was taken, we also attempt to measure the degree to which the SARB's quarterly statement of the Monetary Policy Committee¹³ is pessimistic about the future. To evaluate pessimism we rely on the DICTION 7.0 algorithm (see Hart, Childers and Lind 2013).

Essentially, the objective is to collect words that convey pessimism and assess the intensity with which a document can capture the content via the frequency with which these words appear in the document being examined.¹⁴

The content of central bank communication is typically evaluated by coding documents according to readers' interpretations (e.g., tightening or loosening of policy). Alternatively, content is quantified by estimating the frequency with which certain 'bags of words' appear in documents (e.g., Steckler and Symington 2016; Meade, Burk and Josselyn 2015). The use of a dictionary technique to capture the content or 'sentiment' of central bank texts, which is also used in the present study, is becoming more prominent in the relevant literature (e.g., Hubert and Labondance 2017).¹⁵

¹³ In the period investigated in this paper the statement can be found near the end of the Quarterly Bulletin. The statement tends to be considerably more detailed than comparable policy statement published by central banks in advanced economies. The statement is issued by the Governor of the central bank.

¹⁴ Since effectively only 3 to 5 observations were collected it is difficult to draw definitive conclusions about how well DICTION captures the sentiment of pessimism. However, in the SARB's case, DICTION's definition of optimism was found to be negatively correlated with pessimism and the latter negatively correlated with average responses by individuals in the various surveys considered. See the appendix for more details.

¹⁵ Despite central banks' efforts to improve the clarity of signals provided in official communications, interpreting the content of central bank announcements remains less straightforward than the signal from regular

We then interacted the sentiment of pessimism conveyed in the SARB's statement with individuals that earn the highest incomes and were the most highly educated. The reason is that it is plausible to assume that these groups of individuals are most likely to consume this kind of information published by a central bank.

The principal econometric results are shown in Tables 4 and 5. Table 4 examines all five surveys together. However, the education variable is omitted since the relevant data are available only for the last three surveys. The first column of Table 4 provides the results for the full cross-section of observations while the remaining columns provide estimates for the October 2006 and December 2008 surveys alone since these two surveys are excluded in the regression results shown in Table 5.

The results in Table 4 reveal that mean responses are higher for blacks and coloured individuals as well as female respondents while, on average, inflation expectations are relatively lower in the largest provinces.¹⁶ All income groups shown reveal lower responses on average although the higher income groups' responses (i.e., R5000 per month and above) are at least twice as large as the one estimated for lower income groups (i.e., R2000 to R4999 per month).

There are at least three problems with the results shown in the first column. First, the estimates are mean responses. Yet, as discussed above, there is considerable diversity on responses across various socio-economic strata. Second, interaction effects are omitted and, finally, there are no controls for the level of education of respondents. Data limitations noted above prevent us from dealing with some of these problems for all five surveys taken together are considered.

macroeconomic releases that are numerical in nature. Still, incorporating qualitative elements of monetary policy into our analytical toolkit is found to add considerable value to our understanding of the effectiveness of monetary policy and best practice in central banking (e.g., Sturm and De Haan 2011; Hansen, McMahon and Prat 2014; Neuenkirch 2012).

¹⁶ One is unable to reject the hypothesis that the fixed effects are not redundant (not shown).

In any case, columns (2) to (5) in Table 4 present estimates for the October 2006 and December 2008 surveys. Next to the mean estimates obtained via OLS we estimated quantile regressions for the top 10% of the distribution of respondents in order to examine whether the determinants of inflation expectations for respondents who provided relatively high estimates for their inflation outlook respond differently to socio-economic determinants. The first thing to note is that the measures of wealth (i.e., Groups i to iii) are highly insignificant in both surveys. Indeed, this indicator was similarly insignificant in all surveys (not shown) and was, consequently, dropped from further estimation. Next, what influenced mean responses in the October 2006 survey differs from what drove respondents in the December 2008 survey. Whether the global financial crisis plays a role we cannot say though this is likely to have played a role. Some signs also change with, for example, black and white respondents raising their one year ahead expectations in December 2008 after lowering them in October 2006. Finally, whereas income has no statistically significant impact in the December 2008 survey responses are lower for mid to higher income earners in the October 2006 survey. There is at least the hint that responses are highly sensitive to the particular economic conditions at the time the surveys were taken. If this is the case then this has implications for how well anchored expectations are. Alternatively, the degree to which expectations of inflation are anchored may well be highly sensitive to socio-economic conditions.

Columns (3) and (5) ask how respondents in the right tail of the distribution of responses react to the available socio-economic determinants. We focus on the highest 10% of the distribution of responses. The most noticeable impact is the size of the responses. In the October 2006 survey, the different racial groups responded much more than the average (column (2)). In contrast, responses were much more sensitive according to the place of residence (viz., Western Cape) and to whether the respondents live in larger urban centres (i.e., the METRO variable) than the average (column (4)). Incomes impact responses at the mean in much the same way that they do when the right tail of the distribution of responses in the October 2006

survey are considered. In the December 2008 survey age has no statistically significant impact on inflation expectations at the mean. However, among those respondents who have high inflation expectations, older individuals have a relatively more pessimistic outlook about one year ahead inflation in the December 2008 survey. As we shall see below, there is little consistent evidence that age and inflation expectations are related to each other across all of the states considered. Of course, we should be cautious about the results to date since the education variable is omitted as are the interaction effects discussed above. We now turn to adding these variables for the last three available surveys (October 2014, 2015 and 2016). The results are shown in Table 5.

As before we begin by discussing the mean response inflation expectations to available socio-economic factors. Perhaps the most noticeable result is the significance of all levels of education. Holding all else constant all of the respondents with some education have lower mean one year ahead inflation expectations. However, the more educated individuals have a much larger negative effect on inflation expectations than the less educated cohorts.¹⁷ Similarly, those with relatively higher incomes (i.e., R5000 per month and above) also tend to respond by responding with a relatively lower level of expected inflation. As noted previously, the distribution of inflation expectations is skewed to the right. Hence, the result that more educated and higher income individuals have relatively lower inflation expectations comes as no surprise.

The results in Table 4 also reveal some statistically significant regional differences with respondents in the Eastern Cape displaying lower than average inflation expectations. The same is true for residents in Gauteng and KwaZulu Natal although their lower than average

¹⁷ A Wald test (not shown) confirms that the coefficient estimates for EDUC_2 and EDUC_3 are statistically different from the response of those with PRIMARY education only.

response is not as large as the one for the Eastern Cape.¹⁸ Interestingly, urban residents (i.e., METRO) have higher than average inflation expectations as do coloured individuals.

The second column in Table 5 considers the same regression but for only those individuals in the right tail of the distribution of inflation expectations. As before we find no differences according to age group while race does not impact expectations among those in the right tail of the distribution of responses. Education and income remain significant determinants among high inflation expectations responders with the estimated coefficients on income comparable to the ones for the mean of the distribution.¹⁹ Even when respondents have high inflation expectations those with the highest levels of education among them have relatively lower inflation expectations. Finally, regional differences continue to matter but now it is individuals in the Free State and the Western Cape who are prone to believe that inflation will be higher one year ahead while the other states no longer significantly impact expectations when only respondents who believe inflation will be very high over the coming year are considered.

The final set of regression results displayed in columns (3) and (4) of Table 5 add the interaction variable discussed above. Most of the results shown in the first column of that Table remain largely unchanged. Nevertheless, it is noteworthy that the connection between inflation and education is sharper when interaction terms are included while only mid-level income individuals' expectations are significantly different from the rest. There is now a clear statistical difference according to an individual's level of education with an unambiguous negative relationship between the two variables, other things equal.²⁰ However, more education together with rising pessimism as measured from the quarterly statements from the

¹⁸ Again a Wald test (not shown) confirms this result.

¹⁹ Whereas relatively low income individuals (i.e., R2000 to R4999 per month) did not statistically impact mean expectations the same group has lower expectations in the right tail of the distribution of responses.

²⁰ Confirmed via a Wald test that the coefficient estimates for PRIMARY, EDUC_2, and EDUC_3 are statistically different from each other (not shown).

SARB combine to raise mean inflation expectations. In addition it is found that the recent inflation record in food, energy and housing prices combined with residency in the Free State combine to generate lower than average inflation expectations. Finally, when we examine the right tail of the inflation expectations distribution perhaps the most noticeable difference is that income levels cease to matter altogether. However, those with the highest levels of education continue to believe that inflation one year ahead will be relatively lower while the combination of more education and greater pessimism in the tone of SARB statements raises expectations as was previously true for the mean regressions. Instead, the recent history of food, energy, and housing inflation combined with the state of residence contribute significantly in all of the states considered, except in Gauteng, to have strong effects on inflation responses. It is clear that a rise in the non-core components of inflation rise so do inflation expectations. Many individuals, therefore, do not appear to look through such temporary inflationary impulses. Nevertheless, it does remain to be explained why residents in the Free State tend to reduce their estimate of expected inflation when price changes considered to be transitory rise.

5. Conclusions

If expectations are largely driven by local economic conditions then the results of this paper demonstrate that this is also true for South Africa. Moreover, our econometric estimates provide evidence that education and income also impact the formation of expectations over time. Nevertheless, this does not prevent highly educated and upper income individuals from expecting inflation rates that far exceed the SARB's inflation target. Finally, if only the relatively more educated portions of the population digest statements from the SARB, and expectations are also sensitive to the recent history of the non-core elements of overall inflation, then these results provide significant challenges for the SARB's attempts to anchor expectations. In other words, if inflation expectations are highly responsive to current economic conditions and less so to the SARB's stated inflation objective then there is

potentially room for the central bank to consider the effectiveness of their communications strategy. Moreover, while the survey question is framed via the provision of some historical inflation data it is unclear to what extent whether and which individuals surveyed are aware of the existence and constraints placed by the presence of an inflation target or their level of understanding about the size of changes in the cost of living since large portions of the distribution of inflation expectations are well outside the SARB's 3-6% inflation target. Finally, if socio-economic determinants improve our understanding of how inflation expectations are formed it is unclear to what extent these factors spill over to create broader macroeconomic effects. These implications are the subject of our ongoing research.

Table 1 BER Survey: Stylized Facts**A. Samples**

Date	Number of Observations	Fraction (%) & [Number] Who Answer “don’t know” or 0%	Extreme Forecasts‡		
			≤ 0%	≥ 25%	>=35%
October 2006 = Q4	2465	20.00%# [493: 42, 451]‡	0	124	102
December 2008 = Q4	2479	18.60% [461: 436, 25]	0	116	79
October 2014 = Q4	2628	16.74% [312: 252, 60]	0	69	65
October 2015 = Q4	2512	14.21% [330: 278, 52]	0	49	40
October 2016 = Q4	2532	12.16% [259: 259, 21]	0	92	76

‡ Numbers in brackets are total number of responses in each category.

Percent of total number of observations.

B. Means and Standard Deviations of Inflation Expectations Responses¹

Sample	Consensus	SARB	All observations‡‡	Excludes ≥25%¶	Excludes ≥35%¶
October 2006	4.98 (0.32)	6.33 (0.67)	8.26% (15.63)	4.99% (2.72)	5.28% (3.81)
December 2008	7.43 (0.67)	5.78 (0.63)	11.63% (12.17)	9.10% (3.49)	9.48% (3.49)
October 2014	6.21 (0.12)	5.86 (0.27)	8.10% (9.36)	6.61% (2.67)	6.78% (3.39)
October 2015	6.35 (0.18)	5.73 (0.57)	8.00% (7.60)	7.01% (2.89)	7.13% (3.32)
October 2016	6.92 (0.73)	6.60 (0)	7.83% (9.65)	6.04% (2.81)	6.29% (3.70)

1. After 2008, headline CPI; before 2008 CPIX (excludes mortgage); ‡‡ Excludes “don’t know” and 0%. ¶ Includes 0% responses. Consensus forecasts are for the month in question with the standard deviation over the calendar year. SARB forecasts are quarterly so the Quarter 3 (September) or Quarter 4 (December) forecasts for the calendar years shown were used. The standard deviation is for the available published forecasts for the calendar years shown.

C. Distribution of Inflation Expectations Responses¶

Sample	$3 \leq \pi_{t+12}^e \leq 6$	$4 \leq \pi_{t+12}^e \leq 6$	$5 \leq \pi_{t+12}^e \leq 6$	$6 \leq \pi_{t+12}^e \leq 7$
OCT2006	51.60 [1272]	40.49 [998]	25.60 [631]	14.00 [345]
DEC2008	13.19 [327]	11.01 [273]	8.43 [209]	8.47 [210]
OCT2014	44.03 [1157]	40.60 [1067]	36.53 [960]	39.84 [1047]
OCT2015	28.50 [716]	24.80 [623]	20.02 [503]	32.25 [810]
OCT2016	53.16 [1346]	46.56 [1179]	39.26 [994]	29.03 [735]

¶ Percent of sample [Number of observations].

Table 2 Inflation Expectations By Socio-economic Strata

Socio-Economic Variable	Item	OCT2006	DEC2008	OCT2014	OCT2015	OCT2016
Observed	Headline CPI ¹	5.75 (0.73)	9.62 (2.10)	5.83 (0.43)	5.03 (0.91)	5.43 (0.86)
	Past 5 years	4.71 (3.33)	4.92 (3.38)	5.23 (0.88)	5.20 (0.81)	5.50 (0.62)
AGE	Under 50 years	5.63 (3.30)	9.35 (4.44)	6.62 (3.41)	6.96 (3.15)	6.17 (3.58)
	Over 50 years	5.50 (3.97)	9.81 (4.27)	7.07 (3.35)	7.60 (3.70)	6.68 (4.05)
RACE	Black & Coloured	5.05 (3.88)	9.14 (4.32)	6.67 (3.59)	7.02 (3.23)	6.12 (3.38)
	Indian & White	5.61 (3.67)	10.00 (4.45)	7.01 (2.95)	7.34 (3.48)	6.63 (4.25)
INCOME	R1 to R1999	5.04 (4.08)	9.29 (4.15)	6.42 (3.81)	7.30 (3.39)	6.42 (3.45)
	R5000 to R9999	5.39 (3.68)	9.53 (4.67)	7.10 (3.35)	7.10 (3.35)	6.09 (3.31)
	R10000 and above	5.20 (3.50)	9.59 (4.37)	7.13 (3.21)	7.13 (3.21)	6.23 (3.65)
GENDER	Male	5.23 (3.73)	9.40 (4.52)	6.68 (3.22)	7.15 (3.53)	6.32 (3.81)
	Female	5.33 (3.88)	9.57 (4.26)	6.88 (3.56)	7.11 (3.09)	6.26 (3.59)
COMMUNITY SIZE	Metro	5.31 (3.89)	9.37 (4.32)	6.78 (3.39)	7.14 (3.61)	6.42 (3.57)
	Other Urban	5.23 (3.67)	9.72 (4.51)	6.72 (3.50)	7.14 (2.78)	6.03 (3.63)
EDUCATION	No school	NA	NA	5.50 (4.95)	8.60 (1.34)	7.50 (3.54)
	Some primary to High School	NA	NA	6.81 (3.46)	7.09 (3.30)	6.36 (3.85)
	Some Uni & Uni	NA	NA	6.78 (3.46)	7.27 (3.52)	6.10 (3.29)
REGION	Western Cape	5.98 (3.65)	8.94 (3.51)	7.09 (3.17)	6.62 (3.24)	7.40 (5.61)
	Gauteng	5.39 (4.41)	9.65 (5.24)	6.65 (3.14)	7.31 (3.54)	6.14 (3.12)
	KZN	5.09 (3.68)	9.33 (3.81)	6.78 (3.91)	7.40 (3.21)	5.77 (2.34)
	Rest of country	4.88 (3.02)	9.71 (4.05)	6.72 (3.56)	7.08 (3.08)	5.96 (3.08)

Note: headline inflation is for the 4 quarters prior to the survey (e.g., 2005Q4 to 2006Q3 for the October 2006 survey).

Table 3 Inflation Expectations and Their Socio-Economic Determinants: Variable Definitions

Socio-Economic	Coding	
Responses: "Over the past five years prices increased by on average <i>xx.x</i> per cent per year. During YEAR <i>xxxx</i> prices increased by <i>xx.x</i> per cent. By about how much do you expect prices in general to increase during the next 12 months?" A <u>fixed horizon</u> forecast.	Inflation expectations	= 888 means 0%; = 999 means "don't know" re: inflation expectations
Race	Black Coloured Indian White	1 2 3 4
Household Income (monthly)	R10000plus R5000_R9999 R2000_R4999 R1_R1999	1 2 3 4
Age	a16_24 a25_34 a35_49 a50plus	1 2 3 4
Gender	Male Female	1 2
Province	Western Cape Eastern Cape Kwazulu Natal Free State Northwest/Northern Cape Mpumalanga/Limpopo Gauteng	1 2 3 4 5 6 7
Community Size – see Stats SA	Metro Other Urban Rural	1 2 3
LSM (Living Standards Measure) – Asset Ownership + income: the lower the group number the lower the value of assets. No specific details about thresholds are available. Groups 1 through 5 were aggregated to form Group I; groups 6 through 8 form group ii, groups 9 and 10 form group iii. <i>Series eventually discontinued</i>	Group 1-3 Group 4 Group 5 Group 6 Group 7 Group 8 Group 9 Group 10	1 2 3 4 5 6 7 8
Level of education. Levels B, and C aggregated to create PRIMARY; levels D, E, and H aggregated to form EDUC_2; levels F and G aggregated to form EDUC_3. <i>Not available for October 2006 & December 2008</i>	A. No school B. Some primary school C. Primary school completed D. Some high school E. High school completed F. Some university G. University completed H. Other post matric qualifications I. Refused	1 2 3 4 5 6 7 8 9

Table 4 Determinants of Inflation Expectations: Five Surveys, October 2008 and December 2008

Independent Variables	Dependent Variables: Responses (one year ahead inflation expectations)				
	All data (1)	October 2006 (2)	October 2006 (3)	December 2008 (4)	December 2008 (5)
Constant	221.39 (19.92)*	16.04(2.79)*	60.50(18.16)*	11.35(2.14)*	20.55(7.86)*
Age: 25-34	-25.33(9.13)*	-0.90(0.99)	0.67(1.51)	0.06(0.79)	1.73(1.34)
Age: 35-49	-11.42(9.05)	-0.56(0.99)	-0.08(1.21)	0.49(0.77)	2.09(1.26)+
Age: 50+	7.18(9.27)	0.51(0.99)	-0.25(0.95)	0.19(0.77)	2.00(1.09)+
Black	42.55(12.58)*	-4.16(1.49)*	-13.92(6.99)**	2.30(1.11)**	4.27(3.31)
Coloured	56.10(15.64)*	-5.45(1.85)*	-14.33(7.21)**	0.32(1.34)	1.09(3.05)
White	13.78(12.88)	-5.91(1.52)*	-12.67(6.96)+	3.03(1.12)*	4.91(2.91)+
Female	17.18(6.06)*	-0.52(0.70)	-1.08(0.77)	0.43(0.54)	-0.09(0.74)
Eastern Cape	-107.69(13.52)*	0.07(1.62)	0.75(1.24)	-5.47(1.23)*	-14.82(6.61)**
Free State	-17.80(16.43)	0.95(1.66)	3.33(2.30)	-4.90(1.46)*	-13.27(6.79)**
Gauteng	-67.35(11.87)*	2.55(1.30)**	7.33(5.36)	-2.60(1.06)*	-9.36(6.73)
KwaZulu Natal	-48.37(13.18)*	-3.31(1.53)**	-0.33(0.90)	-1.55(0.17)	-9.73(7.41)
Western Cape	-46.10(13.04)*	0.56(1.62)	3.92(1.17)*	-2.78(1.28)**	-12.73(6.92)**
Metro	6.64(7.73)	0.41(0.90)	0.58(0.96)	0.65(0.76)	2.91(1.30)*
R10000+	-82.15(11.95)*	-5.78(1.98)*	-35.00(11.19)*	-1.58(1.06)	-2.45(1.48)+
R2000-R4999	-34.44(12.59)*	-1.68(1.72)	-28.83(10.65)*	0.80(0.90)	1.91(1.85)
R5000-R9999	-65.98(12.17)*	-4.63(1.90)*	-34.58(11.02)*	-0.38(0.96)	-0.82(1.36)
Group i		-0.98(1.80)	-6.58(11.49)	1.86(1.68)	0.36(2.15)
Group ii		1.06(1.85)	-4.83(11.47)	-0.38(1.72)	-0.91(2.59)
Group iii		0.43(2.14)	-6.42(11.52)	0.80(1.90)	0.73(2.86)
Summary Statistics					
R ²	0.03	0.04	0.03	0.03	0.03
F	19.81(0.00)	3.82(0.00)	121.15	3.17(0.00)	87.36
Observations	12520	1972	1972	2018	2018
Cross-sections	5	1	1	1	1

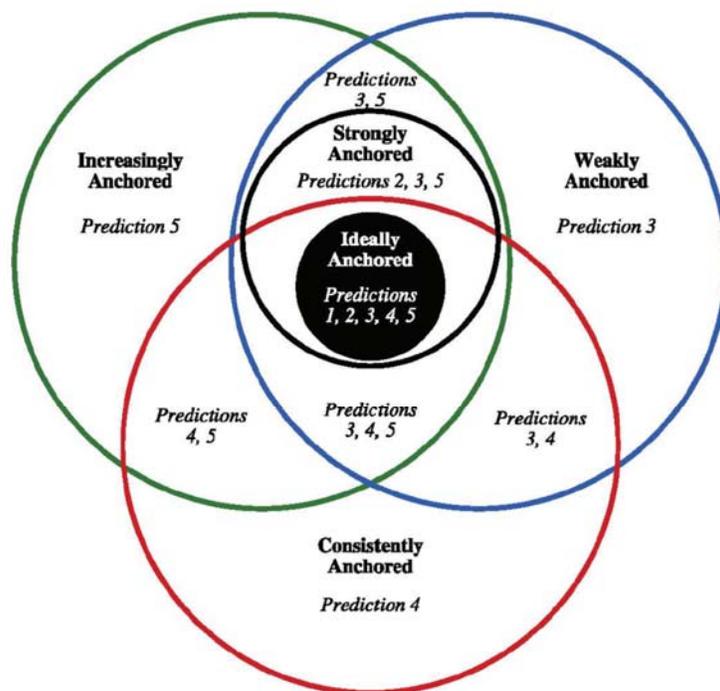
Note: columns (1), (2), and (4) estimated via least squares. Columns (3) and (5) are quantile regressions estimated for the last tenth of the distribution (i.e., .90 and above or the right tail). Results in columns (2) through (5) omit inflation responses higher than 35%. There were no negative inflation responses. For the quantile regressions (columns (3) and (5) the quasi-LR statistic is given instead of the F-statistic; Huber sandwich standard errors, Epanechnikov kernel and the Hall-Sheather bandwidth method were applied. Fixed effects not shown. See Table 3 for definitions of groups i, ii, and iii.

Table 5 Determinants of Inflation Expectations: Education and Interaction Effects

Independent Variables	Dependent variable: Responses			
	All data (1)	$\tau=0.9$ (2)	All data (3)	$\tau=0.9$ (4)
Constant	277.18(28.11)*	982.83(17.04)*	283.90(29.23)*	902.54(35.29)*
Age: 25-34	-8.47(9.53)	-0.33(3.79)	-8.81(9.53)	-0.44(3.27)
Age: 35-49	-0.09(9.31)	0.33(3.66)	-0.72(9.31)	0.60(3.21)
Age: 50+	4.21(9.60)	0.75(4.09)	4.22(9.60)	-0.11(3.51)
Black	15.98(10.24)	0.33(3.79)	13.76(10.30)	0.60(3.21)
Coloured	38.08(10.53)*	2.75(3.31)	32.10(10.89)*	0.38(2.95)
White	7.49(10.98)	1.83(4.07)	4.45(11.04)	2.96(3.39)
Primary	-66.31(27.81)**	-1.58(16.85)	-66.57(27.79)**	0.22(11.24)
EDUC_2	-119.28(22.67)*	-47.92(14.58)*	-119.24(22.67)*	-3.51(9.10)
EDUC_3	-130.35(23.90)*	-48.33(14.94)*	-284.22(95.13)*	-4319.23(180.19)*
Female	9.52(6.22)	0.17(2.70)	9.65(6.22)	0.33(2.24)
Eastern Cape	-71.40(14.40)*	-3.83(6.64)	-70.73(14.41)*	-4.78(5.49)
Free State	2.14(15.91)	16.67(6.82)*	511.41(169.68)*	564.50(214.06)*
Gauteng	-44.86(11.50)*	-2.42(5.13)	-196.52(261.74)	-103.81(196.72)
KwaZulu Natal	-49.78(12.53)*	-2.92(5.61)	-1337.84(1327.86)	-21512.8(1120.5)*
Western Cape	-14.02(11.98)	28.58(5.43)*	178.38(318.08)	-1429.54(616.48)*
Metro	14.99(7.95)+	1.08(6.64)	14.22(7.94)+	1.38(2.96)
R10000+	-41.50(11.96)*	-46.42(5.70)*	-82.83(78.33)	-9.30(58.64)
R2000-R4999	-13.30(12.27)	-15.58(5.93)*	-12.63(12.28)	-3.29(4.67)
R5000-R9999	-47.99(12.03)*	-45.92(6.20)*	-47.33(12.04)*	-6.73(4.62)
EDUC_3*PESS			4.40(2.62)+	111.79(4.64)*
R10000+*PESS			1.18(2.20)	0.05(1.51)
Gauteng* π^{FE}			5.49(6.65)	1.91(3.62)
Gauteng* π^H			18.96(37.18)	14.59(30.51)
Free State* π^{FE}			-10.36(5.36)**	-9.04(4.04)**
Free State* π^H			-73.17(25.24)*	-79.58(37.68)*
KZN* π^{FE}			16.04(11.17)	238.40(11.83)*
KZN* π^H			198.01(211.99)	3310.07(192.15)*
WCAPE* π^{FE}			-9.79(11.39)	53.94(23.16)**
WCAPE* π^H			-19.57(39.30)	176.77(75.57)**
Summary Statistics				
R ²	0.06	0.21	0.07	0.24
F	23.41(0.00)	6906.79	16.79(0.00)	9523.20
Observations	7317	7317	7317	7317
Cross-sections	3	3	3	3

Note: See note to Table 4. Data used in column (1) omits responses higher than 35%. Fixed effects are also excluded. EDUC_2 are individuals with more than primary education up to, and including, high school. EDUC_3 are individuals with some University to completing university education. PESS is the indicator of the degree of pessimism in SARB statements. KZN, WCAPE identify residents in KwaZulu Natal and the Western Cape. Also, see Table 3 for additional details regarding the education variables.

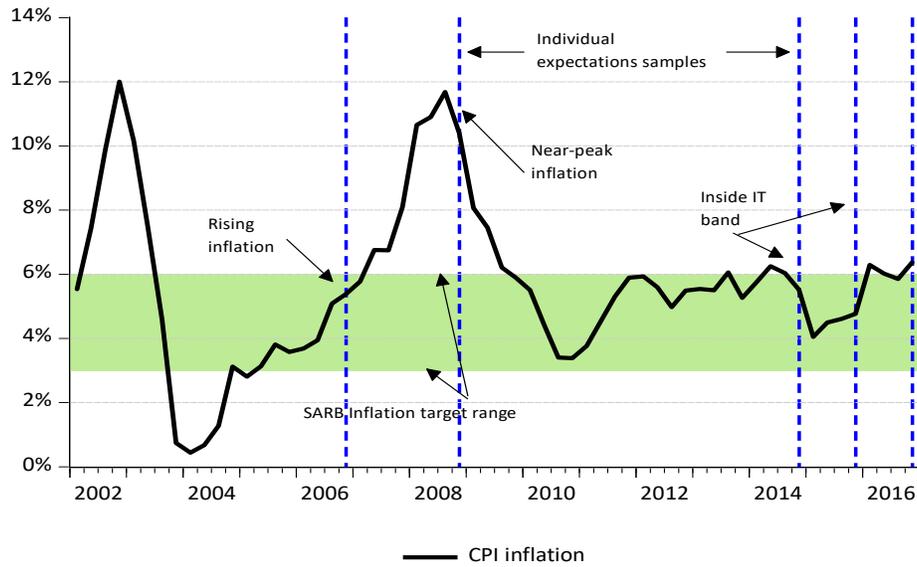
Figure 1: Defining of Anchored Expectations



a. This diagram shows how the five definitions of anchored expectations, and their predictions, relate to one another. Causality is established in the sense that if expectations are ideally ε_τ -anchored for all $\tau \geq 0$ given an arbitrary sequence of $\{e_t\}_{t=0}^\infty$, then expectations are also strongly, weakly, consistently, and increasingly anchored according to $\{e_t\}_{t=0}^\infty$, up to a scale.

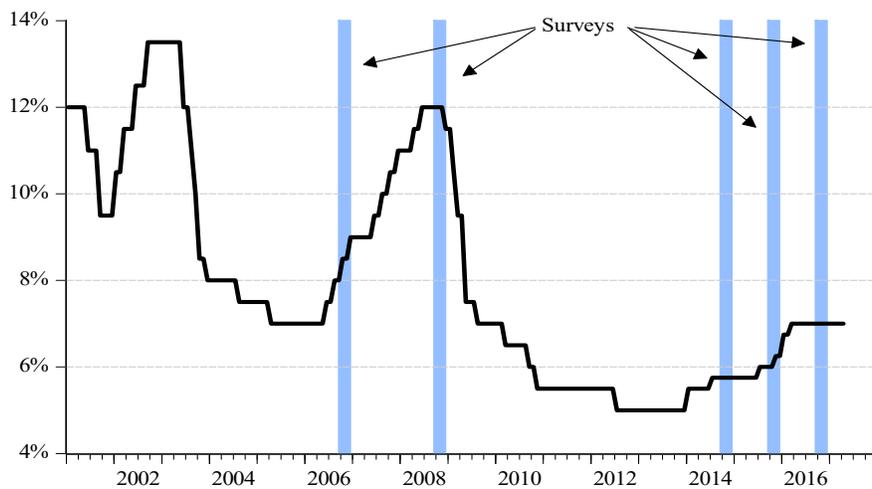
Source: Kumar et. al. (2015).

Figure 2 Headline Inflation in South Africa



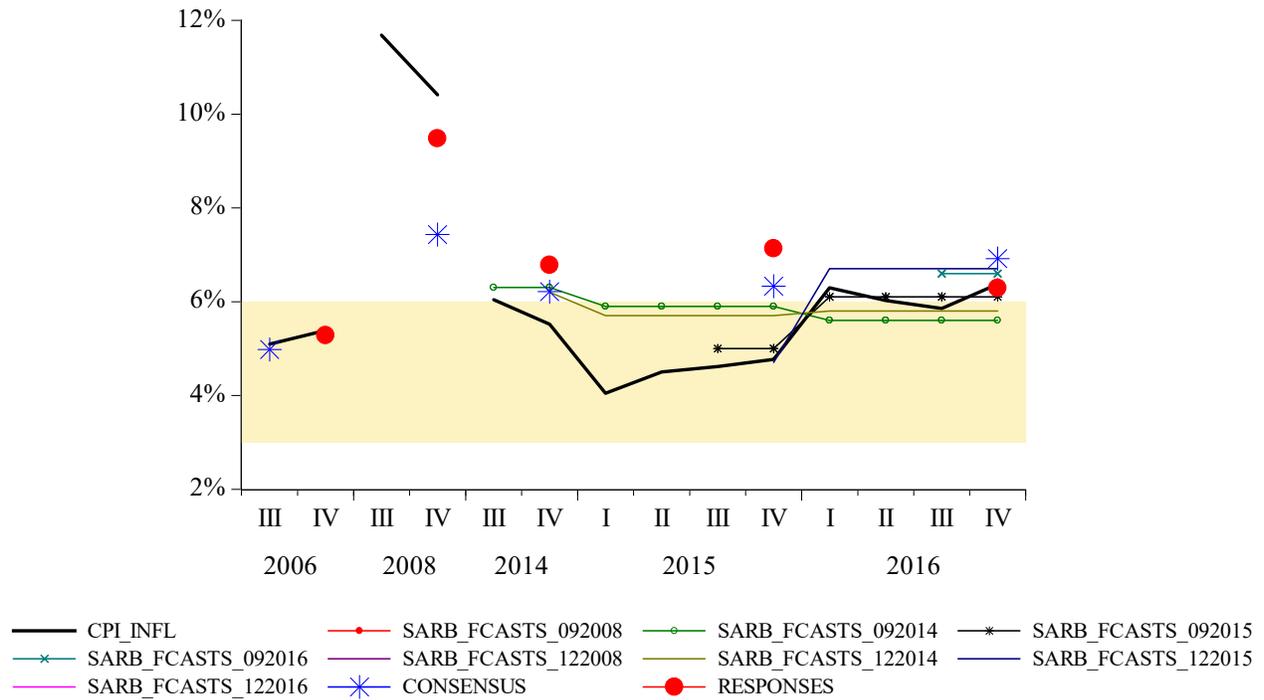
Source: SARB and authors' calculations. The vertical dashed lines indicate the survey dates considered in this study.

Figure 3 The SARB's Policy Rate



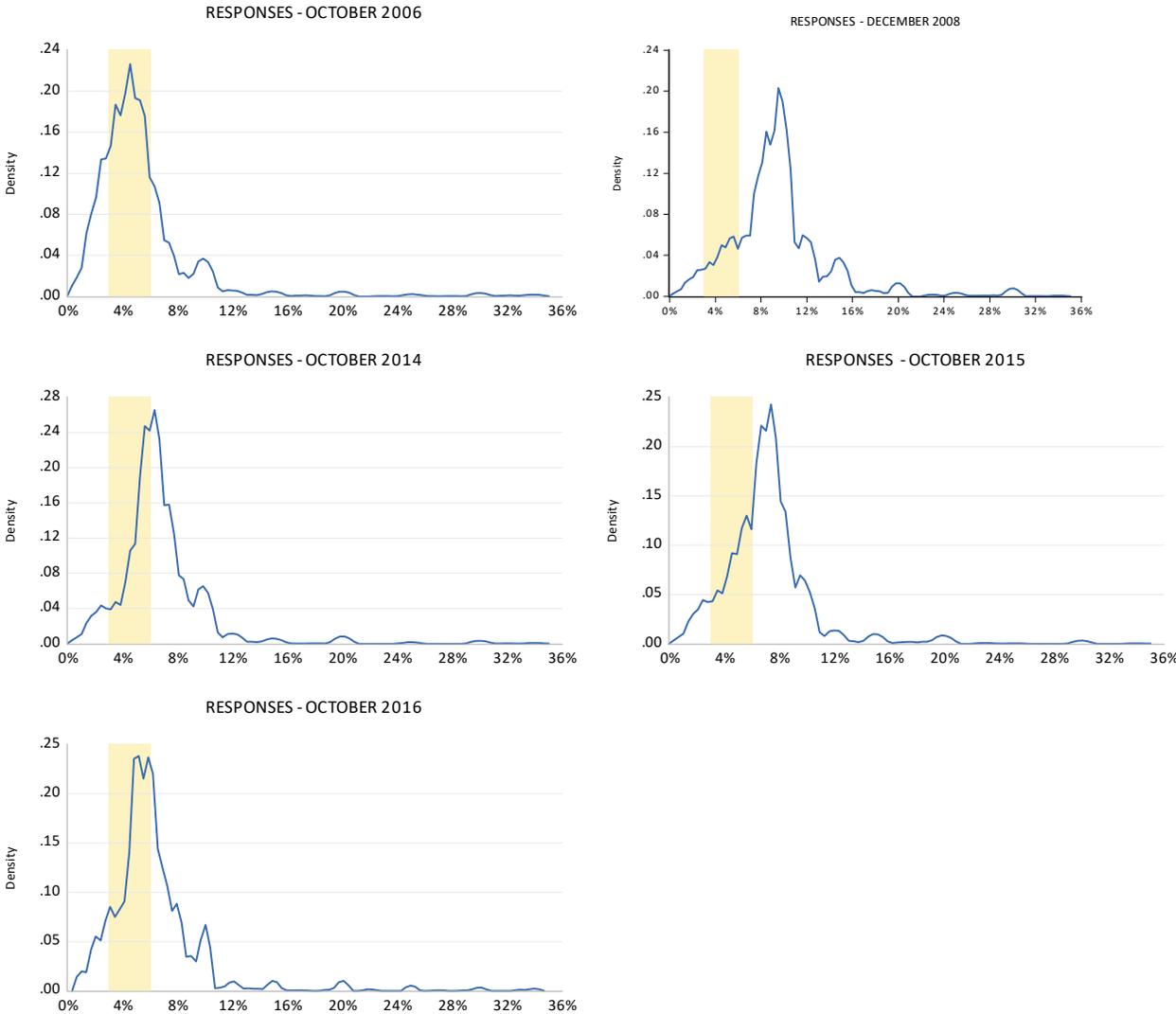
Source: See Figure 2. The vertical shaded areas represent the dates when the surveys were taken.

Figure 4 The SARB's Inflation Forecasts and CPI Inflation



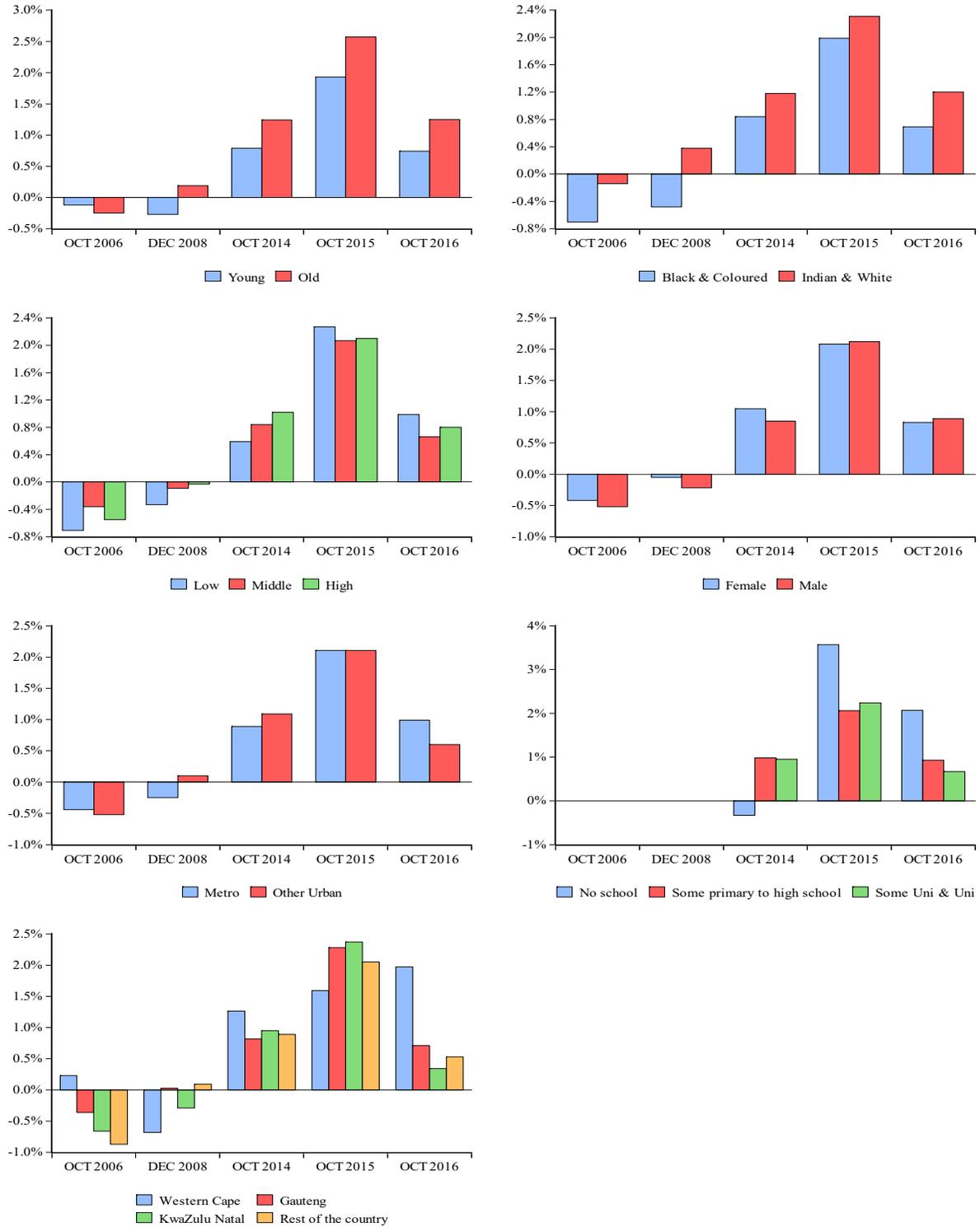
Note: SARB stands for inflation forecasts published in the QB dated mmyyyy. The arrows indicate direction of change in forecasts from SEPT to DEC QB in the years shown. With the exceptions of the 2016 forecast issued in DEC 2014, and the 2016 forecast issued in DEC 2015 the other forecasts were adjusted downward. Data are from the SARB's Quarterly Bulletin (various issues).

Figure 5 The Density of Inflation Expectations Responses



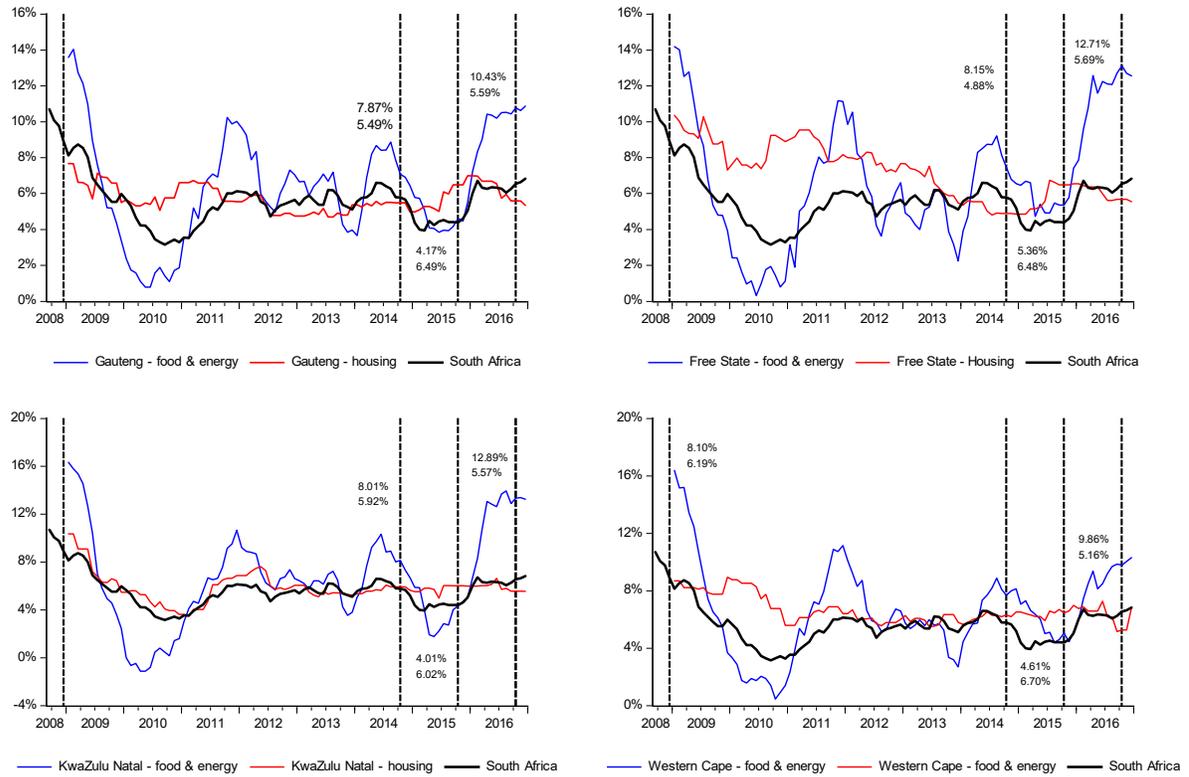
Note: the figures represent the kernel densities for survey responses excluding those who gave estimates that exceeded 35%. The vertical shaded areas represent the SARB’s inflation target range (3-6%).

Figure 6 Forecast Errors By Households By Socio-Economic Strata



Note: See Table 2. The bars represent the difference between the average responses by socio-economic strata and the observed one year headline inflation.

Figure 6 Inflation in Food, Energy and Housing By Province



Source: Statistics South Africa. Inflation is 100 times the annual log difference in price levels. The values used in the regressions (see text) rely on estimates for the September months for the last three surveys only. The numbers shown in the figures are point estimates for annual inflation in food and energy prices and housing, respectively, the month before the survey is taken.

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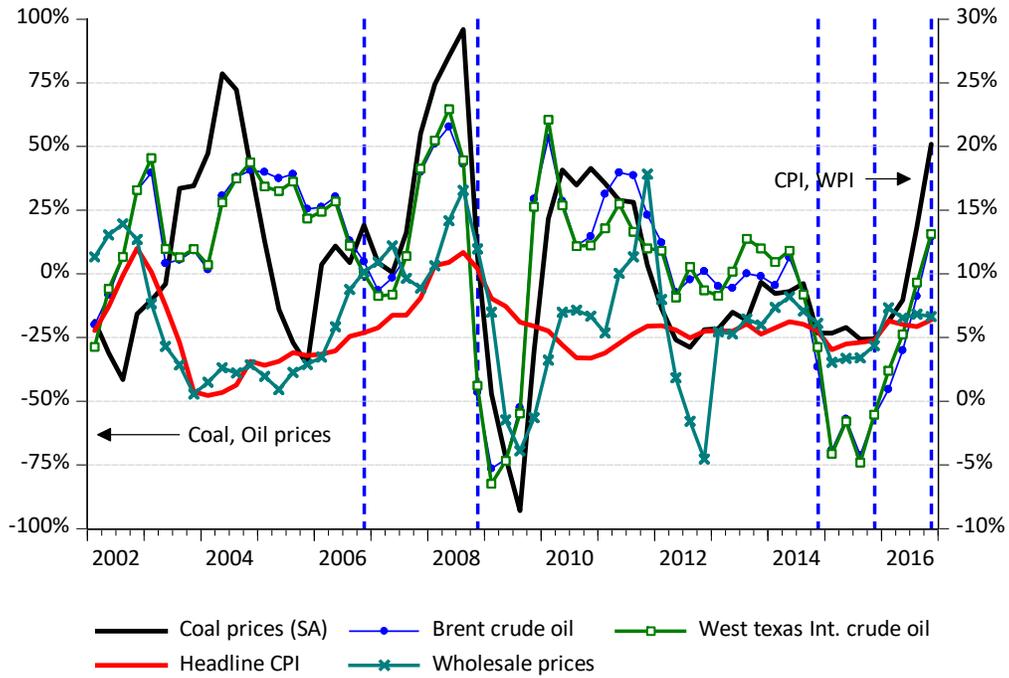
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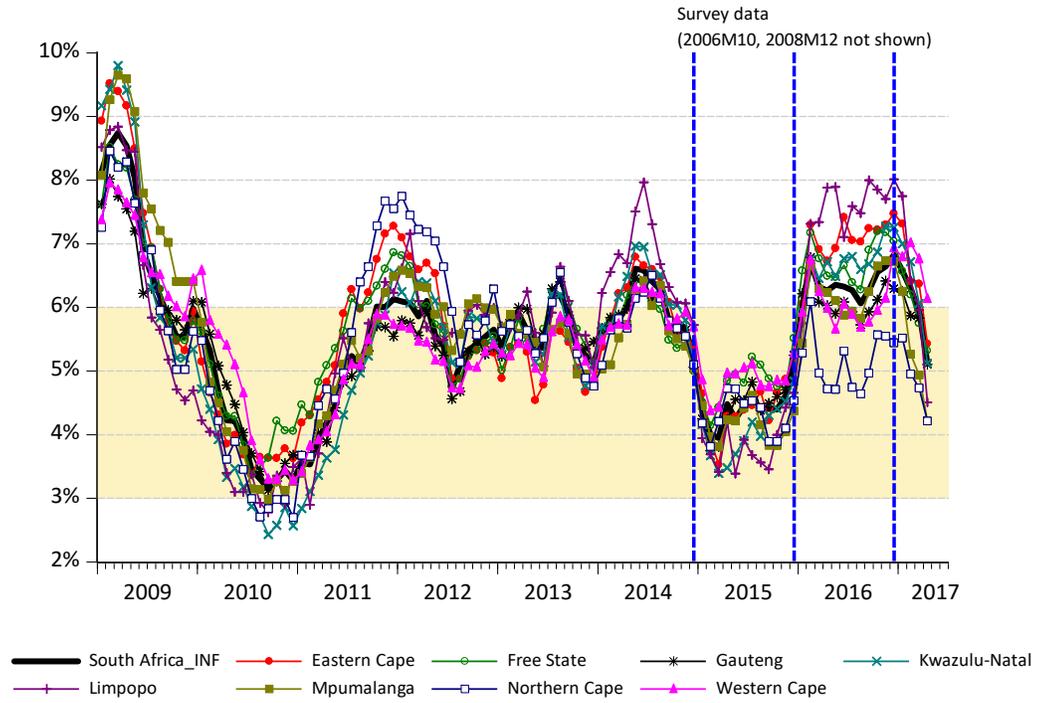
APPENDIX

Varieties of Inflation: South Africa



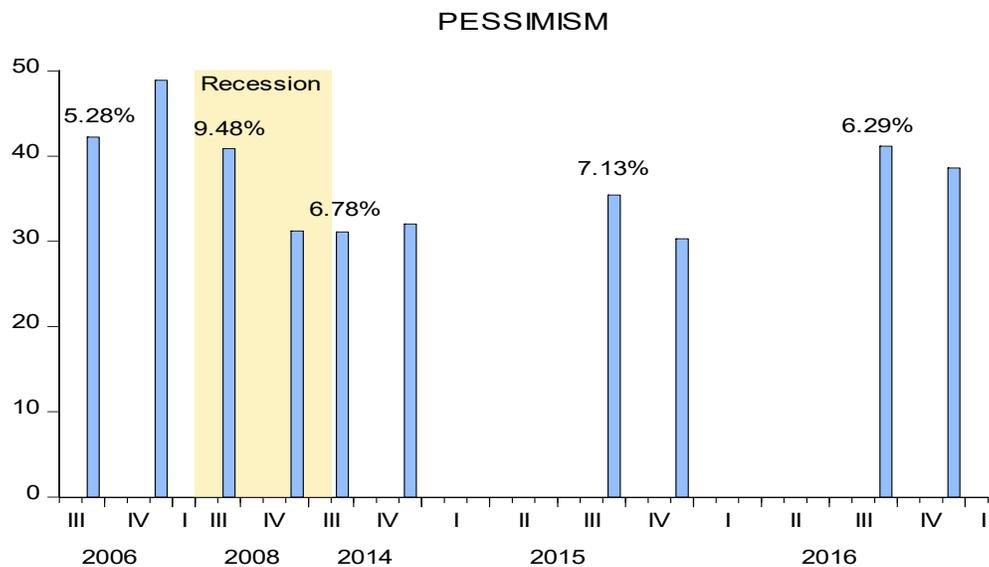
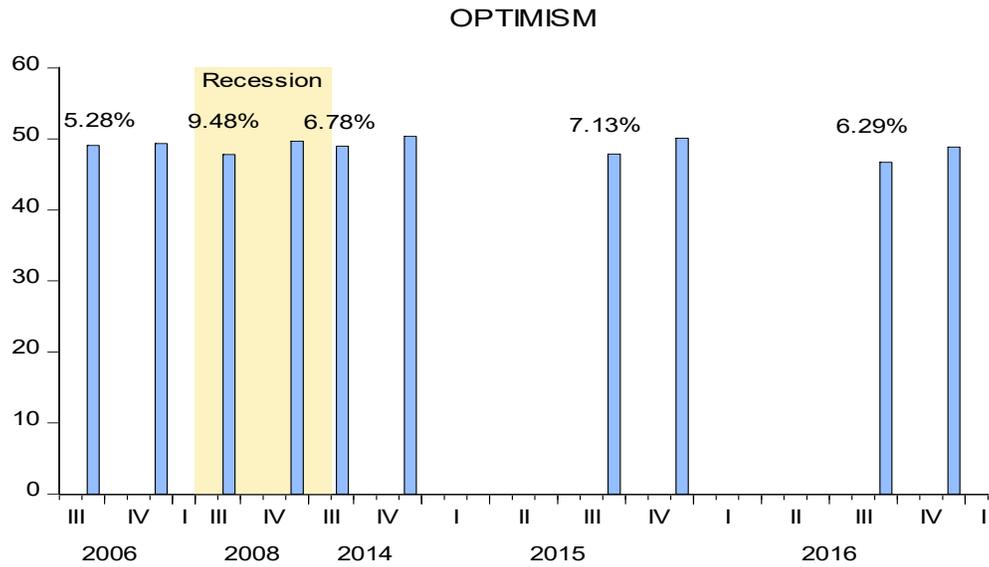
Sources: SARB, and International Monetary Fund International Financial Statistics (August 2017).

Provincial and National Inflation Rates



Source: Statistics South Africa.

The Tone of SARB Policy Statements



Note: Tone is measured according to the pessimistic language in the SARB's quarterly statement from the MPC published in its Quarterly Bulletin (QB). The bars are for the September and December Quarterly Bulletins since the surveys covered were taken (with one exception, namely the December 2008 survey) in October, that is, between the September and December issue of the QB. Values for pessimism were included for both of these for the 2014, 2015, and 2016 surveys since data limitations make it impractical to include data for the 2006 and 2008 surveys. Pessimism is evaluated according to the following terms: ambivalence, blame, passivity, and present concern. DICTION 7.0 was used to generate the index. The values above some of the bars show headline inflation for the month preceding when the BER's survey was taken.

Selected Wald Tests (Table 5)

Redundant fixed effects (column (1))	129.44(.00)
Free State \neq KZN (column (1))	0.24 (0.63)
Gauteng \neq ECAPE (column (1))	4.50 (0.03)
EDUC 2 \neq EDUC 3 (column (1))	1.74 (0.19)
Primary \neq EDUC 2 (column (1))	8.59 (0.00)
Redundant fixed effects (column (3))	53.77 (0.00)
EDUC 2 \neq EDUC 3 (column (3))	3.18 (0.07)
Primary \neq EDUC 2 (column (3))	8.51 (0.00)

F-test statistics with p-values in parenthesis.