Inflation perceptions and inflation expectation in South Africa: trends, determinants and comparisons (2006–2010)

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A B S T R A C T

This paper reports the results of a multinomial analysis of inflation perceptions and inflation expectations in South Africa. Inflation perceptions surveys among South African individuals have been undertaken since 2006. The introduction of these surveys followed on domestic inflation expectation surveys conducted in 2000, and the use of inflation perceptions surveys internationally. Domestic inflation perceptions surveys among individuals are a private initiative undertaken biennially, while domestic inflation expectation surveys among individuals are funded by the South African Reserve Bank and are undertaken quarterly. By comparing the results of domestic inflation perceptions surveys and inflation expectation surveys undertaken since 2006, this paper establishes common characteristics that impact on the formulation of inflation perceptions and inflation expectations. It supplements earlier research that focused only on the results of the 2006 and 2008 perceptions survey results. With the completion of the third biennial inflation perceptions survey in 2010, more data sets are available for the purposes of comparison. Furthermore, the questions on inflation perceptions were expanded in the third survey. Although this provides for a broader basis of analysis between inflation perceptions surveys and inflation expectation surveys, further periodic inflation perceptions survey data will be required to test whether current inflation figures determine and anchor inflation expectations.

Key words: inflation, inflation perceptions, inflation expectations, inflation perceptions, inflation surveys, multinomial analysis

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Introduction

A crucial objective of central banks in inflation-targeting countries is price stability. The expectation channel is one channel of the transmission mechanism, so anchoring inflation expectations is one of the ways (albeit an important one) that a central bank can use to maintain price stability. If the central bank is not seen as credible, it could lead to expected inflation exceeding a central bank's inflation target (Berk 2000). It is suggested that inflation expectations are in general partly formed on the basis of the past values of actual inflation (see Benford & Driver 2008). This highlights the importance of inflation perceptions, as expected inflation is more likely to be better anchored in a country where historic inflation rates are perceived as credible. Inflation expectations are related to expected future changes in price levels, and therefore in inflation (i.e. the rate of change in the price level over time), while inflation perceptions are used to describe backward-looking views on past price-level movements and historic inflation. This paper considers only the inflation expectations and inflation perceptions of households, because such research has never been undertaken among other groups of respondents anywhere in the world (e.g. trade unionists or business people).

An accurate measure of inflation expectations is an important objective for central bank policy. Most countries measure inflation expectations by means of a survey, asking respondents what they expect the inflation rate to be over the next 12 months. Clarity about the inflation expectations of different groups and their perceptions about historic inflation data can assist central banks in targeting more accurately their communication initiatives. This will serve as an early warning about groups with overly high inflation expectations or incorrect perceptions of historic inflation rates that might lead to wage demands exceeding the rate of inflation (see, for instance, Forsells & Kenny 2002 on such a link).

This paper assesses the results of surveys undertaken on inflation perceptions of households and their inflation expectations. The paper shows emerging trends that could be indicative of the underlying characteristics of both inflation perceptions and inflation expectations.

This paper is organised as follows: the next section summarises the literature on household inflation perceptions and inflation expectations in inflation-targeting countries; the results of South African inflation expectation and inflation perceptions surveys in terms of demographic differences are then considered; the survey results are analysed and compared; and the conclusions follow in the final section.

Summary of literature on inflation expectation and inflation perceptions

The literature shows that central banks pay considerable attention to inflation expectations (see, for instance, Banco Central de Chile 2008; Berk 1999; Forsells &

Kenny 2002; Mankiw, Reis & Wolfers 2003; Powers 2005; SA Reserve Bank 2008; Samuels 1967; or Sveriges Riksbank 2008). This research can be expanded to groups other than households in respect of inflation perceptions. However, to date the necessary funds to expand this research have been a limiting factor. This will be addressed in the next phase of this research, based on the lessons drawn from the research on households and the experience gained from such research.

The measurement of such expectations differs noticeably, and different combinations of methodology are employed, among inflation-targeting countries. In a comprehensive analysis of the recording or measurement of the assessment of inflation expectations by central banks in inflation-targeting countries, Rossouw, Padayachee & Bosch (2009) found that these central banks use various combinations of the following for the purposes of such assessment:

- Surveys of inflation expectations from groups of respondents (such as business people, trade unionists and households);
- Interest rate differentials of different classes of traded financial assets (such as conventional and inflation-linked bonds); and
- Inflation forecasts of financial market analysis.

The main purpose of inflation expectation surveys is to consider the extent to which inflation expectations are anchored to the inflation target. Inflation expectations are reported in considerable detail in the monetary policy reports (sometimes also called inflation reports) of central banks in countries targeting inflation (see, for instance, Bank of International Settlements 2008; Bank of Iceland 2003; Blinder, Ehrmann, Fratzscher, de Haan & Jansen 2008; Blinder & Wyplosz 2005; Ehrmann & Fratzscher 2005; Fracasso, Genberg & Wyplosz 2003; or Leeper 2003). Inflation expectations also receive considerable attention in the policy deliberations of central banks in inflation-targeting countries, as is evident from their publications.

Bryan and Ventaku (2002) suggest that the reliability of these survey-based measures of public inflation expectations is questionable, and that policy makers have turned to indirect measurement of the public's experience of inflation. After running a survey in Ohio, the authors tried to determine the basis for people's monetary decisions. They found that perceptions of past inflation and forecasts of future inflation were strongly correlated with respondents' demographic characteristics. Bryan and Ventaku (2002) conclude that respondents' expectations of future inflation might not be indicative of people's predictive abilities, but might rather be indicative of how they perceive actual (i.e. historical) price movements.

In countries targeting inflation, periodic inflation perceptions surveys are undertaken by, or on behalf of, central banks only in New Zealand and Sweden (Brachinger 2005; Jonung 1981; Palmqvist & Stromberg 2004; Bryan & Ventaku

2002; and Reserve Bank of New Zealand S.a.). South Africa is the only other inflation-targeting country where representative inflation perceptions surveys have been undertaken, albeit independently of the central bank. Owing to financial constraints, independent surveys have been undertaken every two years, with the first such survey in 2006. This was followed by similar biennial surveys in 2008 and 2010. The South African surveys confirmed the international experience of differences in the perceptions of inflation figures between different demographic groups, as also recorded in Sweden and Ohio (Palmqvist & Stromberg 2004; Bryan & Ventaku 2002; Rossouw et al. 2011).

Du Plessis (2011) shows that research on perceptions about the credibility of historic inflation rates in South Africa has largely been limited to the work of a few researchers. The body of literature on this topic is therefore also limited, for instance Rossouw et al. (2009, 2010, 2011). Other local researchers have hardly contributed to this area of research, which is also largely neglected internationally. This research accounts for a very specific subset of a larger body of research on South African inflation, dating back to at least 1949 (see Du Plessis 2011 for an analysis of research on South African inflation since 1949).

Household inflation expectation and inflation perceptions surveys in South Africa[1]

Quarterly household inflation expectation surveys are undertaken and published by the Bureau for Economic Research (BER), but are not reported in the SA Reserve Bank's biannual *Monetary Policy Review* (see, for instance, SA Reserve Bank 2011). The BER uses AC Nielsen market researchers to survey the inflation expectations of households. By means of face-to-face interviews, AC Nielsen samples 2 500 individual respondents. Their interviews cover both Black and White respondents in metropolitan areas, cities, towns and villages, and Asian and Coloured respondents in metropolitan areas.[2]

The question used in the inflation expectation survey has evolved over time. The question has changed slightly over time from "for the current year" to "over the next 12 months", as follows:

2007: Over the past five years prices increased by on average 4.9 percent per year. During 2006 prices increased by 4.7%. By about how much do you expect prices in general to increase in 2007?

2011: Over the past five years prices increased by on average 6.9 per cent per year. During 2010 prices increased by 4.3%. By about how much do you expect prices in general to increase over the next 12 months?

In the presentation of the average survey results, the views of respondents who stated that they "don't know" what the rate of inflation will be, and the views of respondents expecting inflation to be above 25 per cent per annum in response to any of these questions (i.e. in all the surveys) were excluded.

Biennial inflation perceptions surveys among households in South Africa have been undertaken three times since 2006, as highlighted above. Ipsos-Markinor (known as Markinor at the time of the research undertaken in 2006) is used for the biennial surveys. Their surveys on average cover 3 500 respondents, which is a larger sample than AC Nielsen's.

Ipsos-Markinor conducts biennial omnibus sampling research covering a broad number of questions on consumer perceptions and behaviour. As the infrastructure to conduct the sampling fieldwork is already in place, researchers can add additional questions to this survey at a prescribed fee. This survey uses personal interviews to avoid the sampling bias of telephone interviews, thereby providing a broad sample of responses from respondents. The use of omnibus sampling to contain the cost is a generally accepted research practice (see, for instance, Camponovo 2006; or Kearney, Kearney, McElhone & Gibney 1999), used also by other researchers (see, for instance Bryan & Ventaku 2001a, 2001b).

The sampling results are subject to a minimum back-check of 20 per cent (i.e. 20 per cent of respondents are contacted afterwards by the management of Ipsos-Markinor to ensure that they were indeed the subject of an interview), thereby preventing enumerators from pretending to have conducted interviews. Moreover, the Ipsos-Markinor sample is one of the largest in South Africa, with 3 500 respondents, and covers metropolitan, urban and rural areas. Ipsos-Markinor applies a statistically based sampling procedure, which implies that each qualifying South African aged 16 years or older has a measurable chance of inclusion as a respondent, thereby ensuring a nationally representative sample.

After the back-check, the actual number of respondents in the first survey was reduced to 3 493 (Markinor 2006) and to 3 481 in the second survey (Ipsos-Markinor 2008). The third survey actually covered more than 3 500 respondents (Ipsos-Markinor 2010), in that 3 558 responses were included in the final survey results.

It was not possible to ascertain from the survey results of the first two surveys (2006 and 2008) whether the respondents who answered "no" to the question of whether they regarded the historic rate of inflation as accurate perceived actual price increases at levels below or above the historic inflation rate. A large number of respondents also answered "don't know" to the question on whether the inflation rate was an accurate indication of price increases. In the third survey in 2010, the question was amended to ascertain whether those who said they did not regard the inflation rate as accurate perceived actual inflation to be higher or lower. The survey design in 2010

therefore differed considerably from the design of the first two surveys undertaken in 2006 and 2008, but the results are nevertheless comparable. Bryan and Ventaku (2002) found in their study in Ohio that respondents overestimated past inflation to a greater extent than their expectations of future inflation.

In the 2010 survey, the sampled population was divided into two groups, and different questions were put to the respondents. This was possible because a survey sample of 3 500 respondents is sufficiently large to ensure that only half the sampling population (in this instance an estimated 1 750 respondents) will provide sufficiently representative responses. One half of the sample (in this case 1 785 respondents) was asked to respond to the question: "South Africa's official rate of inflation was 3.5 per cent in August 2010. Do you think this is a true reflection of average price increases?" As a follow-up, those respondents who answered "no" were asked: "If no, by how much do you think prices have changed in per cent?" The other half of the sample (1 773 respondents) was asked to respond to the question: "South Africa's prices increased by 3.5 per cent over the past year between August 2009 and August 2010. By how much do you personally think prices have changed in per cent?" (Ipsos-Markinor 2010). The main difference in approach was that one group of respondents had to choose from a menu of options with a further response in one instance, while the other group of respondents had to provide an actual figure (i.e. their perception of the percentage increase in prices). The questions used in the 2006, 2008 and 2010 surveys are reported in Table 1.

Table 1: Summary of historic inflation perceptions questions

2006	2008	2010
Q1: South Africa's official rate of inflation, called the CPI, was 5,4% (five point four percent) in August 2006. Do you think this is a true reflection of average price increases?	Q1: South Africa's official rate of inflation, called the CPI/Consumer price index, was 13,7 per cent in August 2008. Do you think this is a true reflection of average price increases?	Q1a: South Africa's official rate of inflation was 3,5 per cent in August 2010. Do you think this is a true reflection of average price increases?
Yes No Don't know	Yes No Do not know	Yes No Don't know
		If no, by how much do you think prices have changed in per cent?
		Q1b: South Africa's prices increased by 3,5 per cent over the past year between August 2009 and August 2010. By how much do you personally think prices have changed in per cent?

Sources: Markinor (2006); Ipsos-Markinor (2008); Ipsos-Markinor (2010)

The results of the inflation perceptions survey in 2006 showed that around 18.5 per cent of respondents accepted the inflation rate as accurate, while in 2008 and 2010, these percentages were 15.2 and 25.3 per cent respectively (see Figure 1). It is also worth noting that high acceptance rates prevailed during periods when the reference year-on-year inflation rate was within the target range of 3 to 6 per cent, while a smaller percentage accepted the inflation rate as accurate during a period when the reference inflation rate registered at double-digit levels. This might suggest that respondents experience price increases to be much higher in environments where actual inflation is already high.
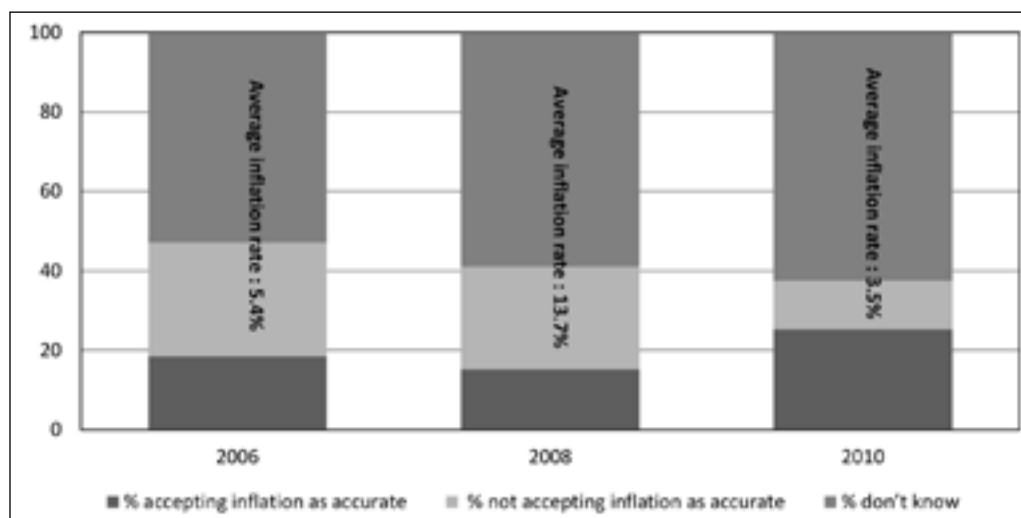
Figure 1: Summary of inflation perceptions outcome and the inflation rate

The aim of the two questions put to the two different subsamples in the 2010 survey was twofold. Firstly, this survey tested for differences in responses when the terminology "inflation rate" and "price changes" was used. This focused on the question of whether respondents understood the term "price changes" better than "inflation rate". Despite this change in approach, the results show similarity in terms of the number of "don't knows" (i.e. there was no large difference in responses).

Secondly, the 2010 survey tested the degree of difference between responses when respondents were presented with a "menu" of responses (i.e. "yes", "no" or "don't know") or provided with the option to state an actual figure for their perception of historic inflation (see Table 1 in this regard).

More respondents reported a perception of a lower inflation rate in response to the initial question than those who were asked what they thought the inflation rate

was if they did not believe it to be credible. Around 70 per cent of respondents to the initial question believed the inflation rate to be less than 40 per cent, while only around 50 per cent of respondents in the follow-up question (when they responded that they did not accept the inflation rate as accurate) responded that they thought the inflation rate was less than 40 per cent. In both instances, most respondents (after implementing a cut-off of 100 per cent) believed prices/inflation to have increased by between 35 per cent and 55 per cent, compared to the reference rate of 3.5 per cent that was provided in the question.

Comparison and analysis of inflation expectation and inflation perceptions surveys

Comparison of inflation expectation and inflation perceptions survey results

For comparability purposes, only those respondents who answered the follow-up categorical question are considered in the analysis in this paper. In 2006, a larger number and percentage of male respondents, compared to female respondents, accepted the perceptions of historic inflation figures, although male and female respondents recorded the same inflation expectations in 2006. The inflation perceptions survey conducted in 2008 also shows that male respondents attach higher perceptions of accuracy to historic inflation figures than female respondents. In this instance, the higher perceptions feed into lower inflation expectations, as is evidenced by the survey results. Female respondents expected inflation at a level of 9.2 per cent, while males expected inflation at a level of 8.9 per cent. In the 2010 survey, the percentage of male and female respondents who accepted the historic inflation figures as accurate was more or less the same. Similarly, there was no difference in the expectations of both these groups.

Consistently over all three periods, the share of respondents who accept the historic rate of inflation as accurate was higher for higher income earners. Similarly, the largest share of those in the two lowest income groups responded that they "don't know" whether the inflation rate accurately reflects historic price increases.

In 2006 respondents in the Western Cape, Free State and Gauteng had the highest inflation expectations, while in 2008 respondents in the North West/Northern Cape, Mpumalanga/Limpopo and the Free State had the highest inflation expectations. In the 2010 survey, respondents in the Western Cape, Free State and Mpumalanga/ Limpopo had the highest inflation expectations.

When considering respondents' educational levels, between 60 and 80 per cent of respondents with no schooling and some schooling reported that they "don't know", while only around 30 per cent of those who had a higher level of educational

attainment reported that they "don't know" in 2006, 40 per cent in 2008 and 45 per cent in 2010.

Overall, more respondents with a higher educational level reported that they accept historic inflation as accurate. It should be noted that domestic inflation was higher in 2008 than in 2006 and 2010. In terms of a comparison of the responses from these three surveys, it transpired that the acceptance of historic inflation figures as accurate is lower in a high-inflation environment than in a low-inflation environment.

Multinomial analysis

The different outcomes of these three surveys can be compared between 2006, 2008 and 2010. In respect of the inflation expectation surveys, the aim is to test whether there is a significant difference between the characteristics of those who expect inflation to be below or equal to 25 per cent, those who expect inflation to be above 25 per cent and those who respond that they "don't know", as surveyed by the BER. Similarly, for the inflation perceptions survey, it is possible to determine whether there are differences in the underlying characteristics of those who believe that the current inflation rate is accurate, those who do not believe that the current inflation rate is accurate and those who respond that they "don't know" across the three inflation perception surveys. Furthermore, it can also be tested whether the same characteristics that impact on inflation expectations also impact on inflation perceptions. This might enable the identification of a possible feed-through effect from inflation perceptions to inflation expectations.

The multinomial logit model was selected, as the "don't know" option always provides useful information regarding respondents' responses. It was therefore decided to include all three categories in the models in order to compare alternatives to the benchmark category.

A multinomial logit model was estimated for the inflation expectation and inflation perceptions surveys for 2006, 2008 and 2010. The multinomial logit model builds on a binary-choice model (Lancaster 2004). The general multinomial logit model is given by the probability for an individual i to choose the alternative j, where $j = 1, 2, 3\ldots, m$, where m represents the alternatives available. The logistic model can then be defined as:

$$P_{ij} = \frac{\exp(x_i b_j)}{\sum_{k=0}^{m} \exp(x_i b_k)} \qquad\qquad j = 1,2,3,...,m$$

(1)

Where P_{ij} is the observed outcome and x_i and b_j represent a vector of parameters associated with the alternative j. The multinomial logit model is given by:

$$P(Y_i = j | X_i) = \frac{\exp(x_i b_j)}{1 + \sum_{k=1}^{m} \exp(x_i b_k)} \qquad \text{for } j = 1,2,3,...,m \qquad (2)$$

The following is the probability of being in the reference group or group 0:

$$P(Y_i = 0 | X_i) = \frac{1}{1 + \sum_{k=1}^{m} \exp(x_i b_k)} \qquad \text{for } j = 0$$

(3)

For the inflation expectation surveys, the reference group comprised those who expected inflation to be below or equal to 25 per cent; group 1 represented those who expected inflation to be above 25 per cent; while group 2 represented those that responded "don't know". For the inflation perceptions surveys, the reference group comprised those who believe that the current inflation rate is accurate, and 1 represented those who did not accept the inflation rate as accurate, while 2 represented those who responded "don't know".

The coefficients are estimated by maximum likelihood, and the relative risk ratio (RRR) is reported in Tables 2 and 3. The RRR for the multinomial logit is represented by:

$$\frac{P_j}{P_0} = \exp(x_i b_j) \qquad (4)$$

Where $\exp(x_i b_j)$ is the discrete effect of variable X_k on the odds. The sign of $(x_i b_j)$ gives the sign of the odds effect, but does not depend on the values of X. The marginal effect can be derived by taking the first derivative of equation 1 with respect to x, holding all other variables constant:

$$\frac{\partial P_j}{\partial x} = P_j \left(b_j - \sum_{k=1}^{m} P_k b_k \right) \qquad (5)$$

The marginal effect or partial derivatives depend on the value of x, and the marginal effect changes as x changes.[3]

The same independent variables and benchmark categories were used for both the inflation expectations and inflation perceptions surveys, except for educational level which was only available in the perceptions surveys.

The explanatory variables aim to determine a set of characteristics that could determine how individuals see inflation. The results of the 2010 inflation expectation

survey can be compared to the 2008 and 2006 results as calculated by Rossouw et al. (2009, 2010). The variables included in the multinomial analysis were the following:

- Gender (reference = male)
- Population group (reference = Blacks)
- Age, with respondents divided into age groups 16–24, 25–34, 35–49 and 50+. The benchmark category is 25–34.[4]
- Income groups[5] were divided into R1–R799, R800–R3 999, R4 000–R7 999, and the reference category R8 000+.
- In terms of spatial distribution, respondents from the North West and Northern Cape provinces were grouped together, as well as those from Mpumalanga and Limpopo, as the original 2006 survey data were grouped in this way. The Western Cape was set as the benchmark category. For the inflation perceptions surveys, the provinces were not grouped together but coded 1 to 8, and the benchmark province (Western Cape) was coded 0.
- Information regarding education was available for respondents in the inflation perceptions surveys, and was included in the perceptions model. Education includes those with some schooling, matric, an artisan/university of technology/technical qualification and those with a university degree/professional qualification (reference = no schooling).

For both the inflation expectations and inflation perceptions surveys conducted in 2006, 2008 and 2010, the model show a goodness of fit that is significantly different from zero, as presented by the Pseudo R^2, which in binomial logistic models often falls between 0 and 0.333 (Pindyck & Rubinfeld 1981).

Results

Expectations model

The relative risk ratios (RRR) for the inflation expectations model for 2006, 2008 and 2010 were analysed at the 90 per cent confidence interval and are presented in Table 2 for the multinomial logit model for 2006, 2008 and 2010.

This analysis compares the results of the three surveys by establishing what percentage of which population group thinks that the expected inflation rate is higher than 25 per cent, as opposed to less than 25 per cent. The output presented in Table 2 suggests that the odds were less for Whites than for Blacks in both 2006 and 2010. In 2008, however, there was no significant difference between Whites and Blacks. In 2006 the odds were higher for Asians perceiving the inflation rate to be higher than 25 per cent, compared to Blacks. During the 2008 survey round, the odds

Table 2: Output from the multinomial regression model for inflation expectations (2006, 2008 and 2010)

	1 Average expected inflation rate above 25 per cent			2 don't know		
	Number of obs = 2423; LR chi2(14) = 150.81; Prob > chi2 = 0.0000; Pseudo R2 = 0.0467; Log likelihood = 1538.456	Number of obs = 2454; LR chi2(14) = 185.92; Prob > chi2 = 0.0000; Pseudo R2 = 0.0593; Log likelihood = -1473.4956	Number of obs = 2328; LR chi2(14) = 248.47; Prob > chi2 = 0.0000; Pseudo R2 = 0.0773; Log likelihood = -1482.2647	Number of obs = 2423; LR chi2(14) = 150.81; Prob > chi2 = 0.0000; Pseudo R2 = 0.0467; Log likelihood = 1538.456	Number of obs = 2454; LR chi2(14) = 185.92; Prob > chi2 = 0.0000; Pseudo R2 = 0.0593; Log likelihood = -1473.4956	Number of obs = 2328; LR chi2(14) = 248.47; Prob > chi2 = 0.0000; Pseudo R2 = 0.0773; Log likelihood = -1482.2647
	2006 RRR	2008 RRR	2010 RRR	2006 RRR	2008 RRR	2010 RRR
Female	0.836 (-0.92)	0.980 (-0.10)	1.047 (0.24)	1.184 (1.56)	1.082 (0.72)	1.235* (1.91)
Coloured	1.211 (0.48)	0.436 (-1.53)	0.365*** (-2.58)	0.996 (-0.02)	0.583** (-2.33)	0.618** (-2.20)
Asian	2.773*** (2.81)	0.218*** (-2.76)	0.447* (-1.58)	0.826 (-0.89)	0.752 (-1.21)	0.866 (-0.56)
White	0.365*** (-2.71)	1.125 (0.42)	0.506** (-2.36)	0.573*** (-3.37)	1.081 (0.48)	0.699** (-2.18)
16-24	1.144 (0.52)	0.877 (-0.46)	1.535 (1.57)	1.191 (1.09)	1.037 (0.23)	0.787 (-1.51)
35-49	0.975 (-0.09)	1.027 (0.09)	1.215 (0.69)	1.594*** (2.86)	0.842 (-1.00)	0.820 (-1.31)
50+	1.015 (0.05)	0.780 (-0.81)	1.238 (0.72)	1.447** (2.21)	1.006 (0.04)	0.713** (-2.11)
Income R4 000–R7 999	1.664 (1.51)	1.483 (1.32)	1.503 (1.55)	1.205 (1.21)	1.436** (2.22)	1.149 (0.93)
Income R800–R3 999	2.978*** (3.42)	2.121** (2.44)	2.552*** (3.41)	1.343* (1.88)	1.853*** (3.62)	1.915*** (4.02)
Income R1–R799	3.589*** (2.86)	1.839* (1.75)	2.181** (2.30)	1.716** (2.15)	2.569*** (5.12)	2.01*** (3.55)
Eastern Cape	0.968 (-0.07)	0.140* (-1.82)	0.195*** (-3.35)	0.723 (-1.31)	0.175*** (-5.16)	0.109*** (-7.17)
KwaZulu-Natal	0.468 (-1.46)	2.892** (2.28)	0.245*** (-3.26)	1.178 (0.75)	0.773 (-1.18)	0.210*** (-6.44)
Free State	1.585 (0.90)	0.507 (-0.82)	0.050*** (-2.83)	0.637 (-1.53)	1.505* (1.73)	0.827 (-0.81)
North West/ Northern Cape	0.000 (0.000)	4.082*** (2.82)	0.124*** (-2.68)	1.415 (1.35)	0.827 (-0.71)	0.563** (-2.13)
Mpumalanga/ Limpopo	1.962 (1.30)	2.045 (1.27)	0.097*** (-3.00)	1.428 (1.37)	1.309 (1.08)	0.205*** (-5.07)
Gauteng	2.261** (2.02)	2.044 (1.63)	0.909 (-0.30)	0.926 (-0.39)	0.626** (-2.45)	0.427*** (-4.59)

Outcome 0 (think that the actual inflation rate is below 25 per cent) is the base outcome. The reference groups are Black, males, earning higher than R8 000, in the Western Cape and aged 25–34. Results in brackets denote z-statistics. *Significant at the 10% level, **Significant at the 5% level, ***Significant at the 1% level

Sources: Bureau for Economic Research (2006, 2008, 2010) and own calculations

were 78.2 [i.e. 100(1-0.218)] per cent less for Asians than for Blacks in this regard, and in 2010 this difference was not statistically significant.

Gender

In the 2006, 2008 and 2010 survey results, there was no significant difference between the inflation expectations of males and females, although mean inflation expectations for females were higher than for males in 2008, and the same in 2006 and 2010.

Similar to gender, in 2006, 2008 and 2010 age did not significantly influence respondents' views of expected inflation.

Income

In terms of the income variable, in 2006 the odds of perceiving the inflation rate to be higher than 25 per cent increased by 197.8 and 258.9 per cent respectively for those who earned in the bottom two income brackets, compared to those who earned in the highest income bracket. A similar result was obtained during 2008 and 2010, although the increase in the odds was not as high.

Location

In 2006 the odds of expecting an inflation rate above 25 per cent for respondents in Gauteng increased by 126 per cent, compared to those in the Western Cape. In 2008, however, the odds were higher for KwaZulu-Natal and North West/Northern Cape to expect inflation above 25 per cent, compared to the Western Cape. In 2008, the odds of expecting inflation above 25 per cent decreased by 86 per cent for those in the Eastern Cape. In 2010, the odds were lower for all provinces, apart from Gauteng, which was significantly different from the Western Cape.

"Don't know" responses

This analysis also attempts to draw a comparison between 2006, 2008 and 2010 in terms of what percentage of which population group "did not know" what they expected the inflation rate to be, over those who expected an inflation rate lower than 25 per cent. The odds for Whites were 42.7 per cent less in this regard than for Blacks in 2006, and 30 per cent less in 2010. For Coloureds the odds were also significantly less in 2008 and 2010. In 2008, there was no significant difference between Whites and Blacks. Furthermore, the odds in 2006 were 60.4 per cent higher for respondents in the age group 35–49 than for those in the age group 25–34. Moreover, the odds increased by 44.7 per cent for people aged 50 years and older,

in comparison with those in the age group 25–34. In 2008, different age groups had no significant impact with respect to inflation expectations. In 2010, however, the odds were slightly less for those aged 50 years and older to "not know", compared to those who expected an average inflation rate of below 25 per cent, and compared to the benchmark category, 25–34. No significant difference between inflation expectations was found between male and female respondents in 2006 and 2008. However, in 2010, the odds were 24 per cent more for females in this regard than for males.

When considering the income variable, in 2006, 2008 and 2010 the odds were more by 71.6, 157 and 101 per cent respectively that the lowest income groups "did not know" what they expected the inflation rate to be, as opposed to those who thought that the expected inflation rate was lower than 25 per cent. Similarly, in all three survey periods, the odds were significantly higher that respondents in the second lowest income group "did not know", compared to those in the highest income group. In 2008 the odds were also significantly higher for respondents in the income group R4 000–R7 999 to indicate that they "did not know" at which level to pitch inflation.

In 2010 the odds were higher by 50.5 per cent for respondents in the Free State to respond that they "did not know" what they expected the inflation rate to be, as opposed to those who thought that the expected inflation rate was lower than 25 per cent. The odds were around 37.4 less for respondents in Gauteng in 2008 and 82.5 for respondents in the Eastern Cape. In 2010 the odds were significantly less for all provinces than for the Western Cape.

Perceptions model

Table 3 shows the results of an inflation perceptions multinomial logit regression model for 2006, 2008 and 2010. The RRR were calculated for the outcomes of the inflation perceptions surveys for 2006, 2008 and 2010 and evaluated at the 90 per cent confidence interval.

Gender

This analysis sets out to determine what percentage of each gender group did not accept the inflation rate as accurate, in comparison with those who did accept it as accurate. The odds in this respect in 2006 were 30.1 per cent higher for females than for males, while in 2010, these odds were even higher at 73.0 per cent. In 2008, however, there was no significant difference between male and female respondents, similar to the inflation expectations model.

Table 3: Output from the multinomial regression model for inflation perceptions for 2006, 2008 and 2010

	1 Do not accept inflation as accurate			2 Don't know		
	2006 RRR	**2008** RRR	**2010** RRR	**2006** RRR	**2008** RRR	**2010** RRR
	Number of obs = 2824; LR chi2(14) = 588.86; Prob > chi2 = 0.0000; Pseudo R2 = 0.1035; Log likelihood = -2550.982	Number of obs = 2689; LR chi2(14) = 495.66; Prob > chi2 = 0.0000; Pseudo R2 = 0.097; Log likelihood = -2306.0023	Number of obs = 1284; LR chi2(44) = 221.24; Prob > chi2 = 0.0000; Pseudo R2 = 0.0971; Log likelihood = -1028.5031	Number of obs = 2824; LR chi2(14) = 588.86; Prob > chi2 = 0.0000; Pseudo R2 = 0.1035; Log likelihood = -2550.982	Number of obs = 2689; LR chi2(14) = 495.66; Prob > chi2 = 0.0000; Pseudo R2 = 0.097; Log likelihood = -2306.0023	Number of obs = 1284; LR chi2(44) = 221.24; Prob > chi2 = 0.0000; Pseudo R2 = 0.0971; Log likelihood = -1028.5031
Female	1.301** (2.27)	1.204 (1.45)	1.732** (2.19)	2.012*** (6.36)	1.353*** (2.59)	0.88 (-0.84)
Coloured	0.667** (2.27)	2.132*** (3.02)	2.450*** (2.49)	0.556*** (-2.68)	0.867 (-0.59)	0.36*** (-3.52)
Asian	1.273 (0.84)	1.804* (1.72)	5.369*** (3.62)	0.567** (-1.96)	0.721 (-0.92)	0.75 (-0.66)
White	1.132 (0.72)	1.434 (1.56)	1.925* (1.88)	0.275* (-6.94)	0.569** (-2.42)	0.53** (-2.22)
16-24	1.001 (0.00)	0.687** (-2.01)	1.639 (1.42)	1.160 (0.94)	0.600*** (-3.04)	1.82*** (2.63)
35-49	1.238 (1.34)	1.030 (0.16)	1.328 (0.98)	1.200 (1.20)	0.817 (-1.19)	1.21 (1.02)
50+	1.303 (1.49)	0.840 (-0.85)	1.348 (0.91)	1.324* (1.64)	0.930 (-0.40)	1.44* (-1.74)
Some schooling	0.330** (-2.21)	0.862 (-0.29)	2.911 (1.37)	0.204*** (-3.39)	0.316*** (-2.65)	0.93 (-0.25)
Matric	0.358** (-2.01)	0.926 (-0.15)	4.063* (1.73)	0.116*** (-4.48)	0.218*** (-3.36)	0.73 (-0.92)
Artisan/ university of technology /Technical	0.205*** (-2.96)	0.802 (-0.39)	5.685** (2.03)	0.099*** (-4.58)	0.140*** (-3.97)	0.58 (-1.29)
University degree/ Professional	0.485 (-1.34)	0.896 (-0.19)	3.515 (1.29)	0.080*** (-4.72)	0.094*** (-4.35)	0.59 (-0.94)
Income R4 000–R7 999	0.792 (-1.18)	0.725 (-0.90)	0.871 (-0.43)	0.735* (-1.66)	0.404*** (-2.80)	1.12 (0.48)
Income R800–R3 999	1.209 (0.92)	0.641 (-1.27)	1.191 (0.56)	0.725* (-1.66)	0.383*** (-3.09)	1.74*** (2.45)
Income R1–799	1.023 (0.13)	0.672 (-1.23)	2.549** (1.94)	0.861 (-0.97)	0.497*** (-2.44)	2.03** (2.05)
Northern Cape	1.294 (0.52)	0.782 (-0.37)	0.860 (-0.13)	1.725 (1.17)	4.636*** (2.76)	4.52*** (2.69)
Free State	0.796 (-0.77)	0.496* (-1.68)	1.631 (0.84)	1.471 (1.33)	2.696*** (3.02)	1.76 (1.58)
Eastern Cape	1.394 (1.35)	1.313 (0.92)	2.087* (1.70)	2.454*** (3.69)	4.156*** (5.18)	1.84** (2.08)
KwaZulu-Natal	0.980 (-0.09)	1.587* (1.78)	2.093* (1.16)	1.536* (1.89)	2.033*** (2.82)	1.36 (1.11)
Mpumalanga	1.464 (1.24)	3.757*** (2.82)	2.202 (1.16)	1.061 (0.18)	5.379*** (3.71)	2.60** (2.30)
Limpopo	0.609 (-1.51)	4.178*** (3.56)	0.836 (-0.21)	1.944** (2.31)	4.598*** (3.95)	2.65*** (2.60)
Gauteng	0.743 (-1.54)	0.826 (-0.81)	2.630*** (2.61)	1.046 (0.22)	1.501* (1.76)	1.91** (2.45)
North West	1.557 (1.36)	1.686 (1.44)	6.308*** (3.00)	1.786* (1.80)	1.699 (1.53)	3.05*** (2.51)

Outcome 0 (Accept inflation as accurate) is the base outcome. The reference groups are Black, males, earning higher than R8 000, in the Western Cape, with no schooling, and aged 25–34. Results in brackets denote z-statistics.*Significant at the 10% level, **Significant at the 5% level, ***Significant at the 1% level

Source: Markinor (2006); Ipsos-Markinor (2008); Ipsos-Markinor (2010) and own calculations.

Age

In 2006 and 2010 the coefficient for the age group 16–24 was not significant; however, in 2008 the odds were 31.3 per cent lower for this group. In 2006, the odds increased by 33.3 for Coloureds not to accept the inflation rate as accurate, compared to Blacks. In 2008 the odds increased even more, by 113.2 per cent, for Coloureds not to accept the inflation rate as accurate, compared to Blacks. These odds increased even further in 2010 to 145.0 per cent. In 2008, the odds were also 80.4 per cent higher for Asians not to accept the inflation rate as accurate, *ceteris paribus*, and compared to the benchmark category, Blacks. This odds ratio increased to 436.9 per cent in 2010.

Education

In 2006 the odds were significantly less for those with any type of education (except for those with a university degree/professional qualification, which was not significant) not to accept the inflation rate as accurate, compared to those with no education. In 2010 the odds were higher for those with matric, or an artisan/university of technology/technical qualification to accept the inflation rate as accurate, compared to those with no education. In 2008 none of the education coefficients were found to be significant.

Location

In 2008 the odds decreased by 50.1 per cent for respondents in the Free State not to accept the inflation rate as accurate, compared to those in the Western Cape. In the same period, the odds were higher for KwaZulu-Natal (58.7 per cent), Mpumalanga (275.7 per cent) and Limpopo (317.9 per cent) not to accept the inflation rate as accurate. In the 2010 survey round, the odds were higher in the Eastern Cape, KwaZulu-Natal, Gauteng and North West province to not accept the inflation rate as accurate, compared to the results for respondents in the Western Cape.

Income

During 2010 the odds were 154.9 per cent higher for the lowest income category not to accept the inflation rate as accurate, compared to respondents in the highest income category.

"Don't know" responses

This analysis also determines the difference between the 2006, 2008 and 2010 survey results in terms of what percentage of each gender group "did not know" whether

they accepted the inflation rate as accurate or not, compared to those who did accept it as accurate. The results show that in 2006 and 2008 the odds increased by 101.2 per cent and 35.3 per cent, respectively, for female participants, compared to males, whereas in 2010 there was no significant difference. The output further shows that the odds decreased by 72.5 per cent for Whites to "not know", as opposed to Blacks in 2006. In 2008 the odds decreased by 43.1 for this group, compared to the reference group, and in 2010 the odds decreased by 47.0 per cent. In 2006 the odds were 43.3 per cent more for Asians than for Blacks to "not know". In 2008, the coefficient for Asians was not significant. In 2006 and 2010, the odds for Coloured respondents to "not know" was also lower at 44.,4 per cent and 64.0 per cent, respectively, compared to Blacks. This coefficient was, however, not significant in 2008.

This analysis also shows that the odds to "not know" in 2006 and 2010 increased by 32.4 per cent and 44.0 per cent, respectively, for participants aged 50 years or older, compared to those aged 25–34 years. In 2008 there was no significant difference between those aged 50 years or older and those aged 25–34. In 2008, however, the odds decreased in this respect by 40.0 per cent for those aged 16–24, compared to the benchmark category of 25–34, while in 2010 the odds were 82.0 per cent higher for the same group.

In both 2006 and 2008, the odds were significantly less for those with any type of education than for those with no education to respond that they "did not know", as opposed to accepting the inflation rate as accurate. In 2010 there was no significant difference between educational levels.

In 2006 the odds were higher that respondents in the Eastern Cape (145.4 per cent), KwaZulu-Natal (53.6 per cent), Limpopo (94.4 per cent) and the North West (78.5 per cent) would respond that they "did not know" if they accepted the current rate of inflation as accurate, compared to those in the Western Cape. In 2008, however, compared to the Western Cape, all provinces showed significant increases in the odds of "not knowing" if they accepted the inflation rate as accurate, except for the North West, which was not significant. Similarly, in 2010, the odds were higher for all provinces to "not know", except for KwaZulu-Natal and the Free State, compared to respondents in the Western Cape.

Furthermore, the odds that respondents "did not know" decreased by 27.5 and 26.5 per cent respectively for those who earned R800–R3 999 and R4 000–R7 999. In 2008 the odds in this regard were significantly lower for all income groups, *ceteris paribus*. However, in 2010 the odds were significantly higher for the lowest two income groups to "not know", compared to the highest income group.

Conclusions

This paper reports an analysis of research data not reported before in South Africa. Owing to the use of three rounds of survey results in the comparison in this paper, some trends are emerging that could be indicative of the underlying characteristics of inflation perceptions and inflation expectations. This approach highlights differences in perceptions between sub-categories of respondents, as well as changes in perceptions between different survey periods. The results show that in 2006 and 2010, when the average inflation rate was 5.4 per cent, more respondents seemed to believe that the inflation rate was accurate, whereas in 2008, when the average inflation rate was 13.7 per cent, a smaller percentage of respondents accepted the inflation rate as accurate.

This analysis provides evidence for a conclusion that inflation perceptions are anchored in current inflation figures (i.e. lower inflation figures contribute to lower inflation perceptions). There are indications that current inflation figures determine and anchor inflation expectations, but more data sets will in due course reconfirm or refute this tentative conclusion. However, it seems that central banks in inflation-targeting countries can reap benefits from sustained low inflation over time, thereby instilling confidence in inflation targeting as a monetary policy framework.

A comparison of the results shows that respondents in lower income groups are significantly less likely to accept the past inflation rate as credible. These lower income groups were also significantly more likely to expect a much higher future inflation rate. This might be linked to the fact that consumers in the lower income group tend to make direct purchases of goods (rather than indirect electronic purchases of services) and spend a proportionally larger amount on food. Central banks should therefore target these groups in communication campaigns.

Likewise, the comparisons in this paper show that inflation perceptions differ between male and female respondents, although this did not seem to feed through to higher inflation expectations. This could partly be explained by the high percentage of respondents who "did not know" what they expected the inflation rate to be.

Education also plays an important role in perceptions of the credibility of historic inflation. In general it was found that respondents with a higher level of education were more likely to perceive historic inflation as credible. However, due to data limitations, the feed-through effect to inflation expectations could not be determined. This matter should be addressed in future research of a similar nature.

Since the first introduction of inflation perceptions surveys in 2006, the statement and question used in successive fieldwork sampling were amended with each subsequent survey to ensure a better alignment with the statement and question used in inflation expectation surveys. The successive reformulations showed that

respondents thought prices increased at a higher rate than the historic rate of inflation. This shows empirically that the formulation of statements/questions has a direct impact on survey results. In future biennial surveys of a similar nature, there will be efforts to find even larger alignment between the questions/statements used in inflation expectation surveys and inflation perceptions surveys. This might result in easier comparability of survey results and attempt to establish a link between inflation perceptions and inflation expectations. This paper establishes common characteristics that impact on the formulation of both inflation perceptions and inflation expectations not shown before in South Africa, which will be used in future research in this important area of monetary policy.

As an area for further research, the surveys developed and used for sampling the inflation perceptions of households could be expanded to groups other than households (such as business executives or trade unionists). This will be a subsequent phase of this research, based on the lessons drawn from the research on households and the experience gained from such research.

Endnotes

1. This section draws on Rossouw et al. (2011).
2. This paper uses the same terminology, classifications and descriptions for population groups as Statistics South Africa (Statistics SA 2005).
3. The relative risk ratio can be interpreted as, holding all other variables constant, for a unit change in the x variable, the relative risk ratio of outcome m relative to the reference group is expected to change by a factor of the respective parameter estimate.
4. The benchmark category is automatically selected by the software package.
5. During the 2006 inflation expectation survey, the category was grouped R1–R899, which could have resulted in a higher proportion of respondents being grouped in the lowest income group, that actually belonged to the second-lowest income group. During the 2010 survey, the income categories were again adjusted, but it is still possible to make inferences on higher income levels compared to lower income levels.

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