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The Bureau for Economic Research's Inflation Expectations Surveys:

Know your data

Monique Reid¹ and Pierre Siklos²

Abstract

Inflation expectations are today keenly monitored by both the private sector and policy makers. Expectations matter, but whose expectations matter and how should this unobservable be measured? Answering these questions involves a number of choices that should be transparent and explicit. In this research note, we focus on these choices with respect to the South African inflation expectations data collected by the Bureau for Economic Research. Being willing to detail the strengths and weaknesses of a particular approach is valuable as it will enable us to choose the appropriate proxy for each application and to interpret the results with insight.

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Both authors acknowledge that they acted as consultants, hired by the Bureau for Economic Research (BER) to provide an external review of the survey dataset. They have, however, both published numerous published academic papers on which they draw for this review and these were all written without financial assistance from the BER. The authors are grateful to George Kershoff of the BER for useful comments.

1. Introduction

Inflation expectations are today keenly monitored by both the private sector and policy makers. There are a few reasons for the level of attention they get. Firstly, they give some indication of the future path of inflation itself. For the private sector this is important due to the number of long-term nominal commitments in modern economies. From a policy making perspective, price stability is an important measure of macroeconomic stability, influencing many economic decisions. In a Handbook of Forecasting paper, Faust and Wright (2013: 29) review the literature on forecasting inflation and conclude that subjective forecasts are ‘hard to beat’. Again in 2019, Wright (2019: 1187) still maintains that ‘Survey/institutional forecasts do best’.

Secondly, well anchored inflation expectations enhance the efficiency of monetary policy, in that less aggressive changes in the policy rate are required to achieve the price stability objective. In this case, there is a lower sacrifice ratio. Woodford (2005) claims that inflation expectations constitute the most important channel through which monetary policy affects inflation itself.

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

Finally, fluctuations in inflation expectations also provide some indication of the credibility of a particular central bank. Credibility is important from an institutional point of view in that a central bank that has the trust of the public is less likely to face institutional challenges. In addition, credibility enhances the effectiveness of monetary policy.

So, expectations matter, but whose expectations matter and how should this unobservable be measured? Answering these questions involves a number of choices that should be transparent and explicit. None of the measures of inflation expectations we currently have measure the concept perfectly, which is not an observation unique to the measurement of inflation expectations. Being willing to detail the strengths and weaknesses of a particular approach will enable users of the data to apply the data appropriately and improve interpretation. Feedback through this process may even allow us to improve measurement of the concept, as part of a natural process of research and innovation. Changes to a survey must, however, be weighed against the cost of causing a break in the series.

This paper begins with a review of the ways in which we measure inflation expectations and where surveys fit in. There is surprising variation in the way in which inflation expectations survey questions are asked internationally. A range of survey design choices are reviewed against this international position. We then briefly consider the local context within which the Bureau for Economic Research (BER) surveys were originally designed and detail some of the survey design choices made. Having considered the design of the survey questions, we will offer some exploratory analysis of the survey data³.

2. Measuring inflation expectations

2.1 Where do surveys fit in?

Measures of inflation expectations are typically extracted from asset prices or collected using surveys, each of which offer different advantages. In the case of asset prices, the Fisher Equation (equation 1) depicts how inflation expectations form part of the overall price of assets such as government bonds (most typically government bonds). The assumption is that financial market decision makers consider the impact of expected inflation in their choice to buy and sell these assets.

$$i_t = r_t + \pi_t^e + \rho_t \quad (1)$$

where

i_t is the nominal interest rate

r_t is the real interest rate

π_t^e is inflation expectations

ρ_t is the risk premia

Asset price-based measures of inflation have a number of advantages. They are available at very high frequencies; using yield curves, expectations can be extracted at a range of horizons; and asset price data captures expected inflation from the actual actions of economic participants (as opposed to opinions captured by surveys). Asset price data also circumvents typical survey problems such as falling response rates and the extended time lags inherent in the survey data collection process.

In countries that have inflation-indexed government bonds (such as South Africa), it is common to report 'break-even' inflation rates, where the difference between a nominal bond and an

³ In a BER research note (Reid and Siklos, 2021b), we review the academic literature enabled by the BER's inflation expectations survey data and make some suggestions for further research.

inflation-indexed bond of similar maturity is taken as an approximate measure of inflation. This can be taken a step further to use yield curves to match the horizons more accurately using a measure called ‘inflation compensation’ (Nelson and Siegel (1987), Svensson (1994), Svensson and Söderlind (1997) and Reid (2009)). These measures do, however, make strong assumptions about risk premia (ρ_t), with which we may feel less confident in less stable economic periods.

Survey based methods of inflation expectations on the other hand, are costly to administer and typically available at a lower frequency, but they have a number of important advantages. Surveys allow us to distinguish between some social groups. This is increasingly important as literature suggests that these differences may have economic significance (Binder (2015), Coibion, Gorodnichenko and Kamdar (2017)). In reality, there is substantial heterogeneity between survey respondents both in South Africa and elsewhere. It is very unlikely that we will soon be able to fully capture or model all the differences across the population (full heterogeneity). But, using surveys, we are able to differentiate large groups within society that are significantly different across groups and similar within groups. This can enable us to better understand the differences in inflation expectations across different sectors. It will also assist policy makers who might try to tailor their communication with particular groups in order to improve the chances of a ‘meeting of minds’ (Schelling, 1960).

Most countries have some survey-based measure of inflation expectations of financial analysts or professional forecasters, whether conducted locally or via international institutions such as Consensus Economics. There are also an increasing number of household level surveys internationally, although they are often not conducted regularly (no time series is available). However, increasingly academics have been recognising that the expectations of financial analysts may not capture the economy-wide price pressures as accurately as those of a broader survey (ideally that of firms). Leading policy makers (Bernanke (2007) and Yellen (2015)) have also admitted that there is limited information about firm’s inflation expectations, despite the fact that this group might most accurately capture the inflation expectations of the ‘price setters’.

What is far less common is a survey of business sector expectations (or trade unions) and there is reason to believe the BER’s Business Sector may be particularly valuable. The BER business sector survey is ‘arguably one of the richest of its kind’ (Reid and Siklos, 2021), particularly when considering data in emerging market economies.

2.2 Survey Design

Often quantifying a concept offers important insights and data visualization can assist analysis and communication substantially, allowing for more confident decision making. But survey design inevitably involves a set of choices, which determine the quality of the data as well as the way in which it can appropriately be applied. Careful design of the survey will increase the reliability and validity of the data. It is also important to note that variation in the design of survey questions across countries limits the direct comparability.

Despite the widespread use of inflation expectations surveys, there are differences across a number of dimensions including the social group surveyed, the number of survey questions asked, whether the survey questions are qualitative or quantitative, and the exact phrasing of the questions. Table 1, which presents details about a selection of business sector surveys, gives some perspective on the variation across those surveys internationally⁴.

Some notable choices that need to be made include the frequency of the surveys, the forecast horizons collected, whether to use a calendar year or fixed year horizons, and sampling decisions. Also necessary are decisions about whether to also collect socio-economic characteristics and other macroeconomic forecasts from each respondent, whether to collect qualitative or quantitative data, whether to use the term ‘inflation’ or some description of the term, such as ‘prices in general’, and whether to include some form of priming⁵. Table 2 illustrates the extent of the variation in the phrasing of the survey questions asked of households internationally.

⁴ Please note that some of the details recorded in this table about the BER survey are incorrect.

⁵ Priming is when extra information is provided to the survey respondent. For example, sometime the survey question includes a historical inflation figure, or respondents are asked which range inflation is likely to fall into (bins) rather than being asked to forecast a single number.

Table 1 Selected surveys and firms' inflation expectations

Country	Institution	Respondents	Price definition	Sampling	Freq.	Start date	Bins	Horizon	Question
Canada	Conf. Board of Canada	Firms	Prices in general	Convenience	Quarterly	1997	9	6 months	Do you expect prices, in general, in Canada to increase over the next six months at an annual rate of
Canada	Central bank	Firms	Inflation (CPI)	Quota	Quarterly	1997	4	1 year	The firm's expectation for the average annual rate of inflation over the next two years as measured by the consumer price index (CPI) is: ...
Czech Republic	Central bank	Firms	Inflation (CPI)	Representative	Quarterly	1999	Open	1 and 3 years	What year-on-year consumer price change in per cent do you expect in the next 12 months?
EU Members	European Commission	Firms	Prices for consumers	Probabilistic sample	Monthly	1985	(Up/down/same)	1 year	By what percentage you would say that prices will increase for the consumer in the next 12 months?
Iran	Central Bank	Mnfg. Firms, ≥ 100 workers	Inflation	Probabilistic Sample	Quarterly	2016	Open	1 year	What do you think the [yearly] inflation will be during the next year?
Israel	Ungar and Zilberfarb (1993)	Firms	Inflation (CPI)	Representative	Quarterly	1980	Open	1-4 quarters	The cumulative inflation rate (not monthly average), in %, which is expected for the following periods is as follows: The next 12 months
Italy	Central bank	Firms	Inflation	Probabilistic sample	Quarterly	1999	Open	1 year	The last [month] consumer price inflation, measured by the 12-month change in the harmonized index of consumer prices was equal to [IT] in Italy and to [EA] in the euro area. What do you think it will be in Italy.
Japan	Central bank	Firms	Prices in general (CPI)	Probabilistic sample	Quarterly	2014	10	1, 3, and 4 years	What are your institution's expectations of the annual % change in general prices (as measured by the CPI) for one year ahead, three years ahead, and five years ahead, respectively?
New Zealand	Central bank	Firms and professionals	Inflation (CPI)	Convenience	Quarterly	1987	Open	3 months and 1 year	What annual % change do you expect in the CPI for the:
Poland	Central bank	Firms	Prices	Sector representation	Quarterly	2008	5	1 year	In ... [month with the latest data is available] of the current year, the CPI (inflation) was equal to x% in annual terms. In the enterprise's opinion, during the next 12 months prices:
South Africa	Central bank	Firms and consumers	Inflation (CPI)	Convenience	Quarterly	2000	Open	1 year	What do you expect the average headline inflation rate (as measured by the % change in the CPI) to be during the year
Sweden	Central Bank	Firms with ≥ 200 workers	Inflation (CPI)	Random	Quarterly	2000	Open	1 year	n.a.
UK	Confed. of British Industry	Firms	Prices of competition	Convenience	Quarterly	2008	4	1 year	What has been the % change over the past 12 months in the general level of output prices in the UK markets that your firm competes in, and what is expected to occur over the next twelve months?
Ukraine	Central bank	Firms	Inflation	Random	Quarterly	2006	8	1 year	How do you think the level of consumer prices will change in the next 12 months?
USA	Atlanta Fed	Firms	Individual unit costs	Non-random (regional)	Monthly	2011	5	1 year	Projecting ahead, to the best of your ability, please assign a percent likelihood to the following changes to unit costs over the next 12 months.
USA	Livingston, Philly Fed	Large Firms	Inflation (CPI)	Convenience	Semi-Annual	1946	Open	1 year	n.a.
Uruguay	Central bank	Firms	Inflation (CPI)	Representative	Monthly	2009	Open	1 year	What do you believe is going to be the change in the CPI?
Turkey	Central Bank	Manufacturing Firms	Inflation (PPI)	Sector representation	Monthly	1987	Open	1 year	What is your expectation for inflation (producer prices) rate over the next 12 months (as an annual percentage)?

Source: Coibion et al. (2020)

Note: Coibion et al (2020) do not collect some of the details about the BER surveys correctly. It is more accurate to say the data is collected by the BER, and the BER collects separate surveys of financial analysts, the business sector, trade unions, and households. Convenience sampling is used for the Business sector part of the survey, and for households (which we think is what the authors mean by consumers) probability sampling is used for the face to face surveys and quota sampling for the telephonic surveys.

Table 2 Phrasing of the household inflation expectation question in selected countries

Country/region	Institution	Question	Justification for survey wording
Canada	Bank of Canada	What do you think the rate of inflation/deflation will be over the next 12 months?	Based on the New York Federal Reserve Bank survey; seen as 'cutting edge in survey design'.
Europe (done in a number of countries)	European Commission	<u>Qualitative</u> : By comparison with the past 12 months, how do you expect that consumer prices will develop in the next 12 months? The following options are provided: Increase more rapidly, increase at the same rate, increase at a slower rate, stay about the same, fall, don't know. <u>Quantitative</u> : By how much percent do you expect consumer prices to go up/down in the next 12 months? (Please give a single figure estimate): Consumer prices will increase by....% / decrease by....%	
UK	Bank of England/TNS	How much would you expect prices in the shops generally to change over the next twelve months?	
Australia	Melbourne Institute of Applied Economic and Social Research	<u>Qualitative</u> : Thinking about the prices of things you buy, by this time next year, do you think they'll have gone up or down? <u>Quantitative</u> : By what percentage do you think prices will have gone up/down by this time next year?	Decided against using 'inflation' in the survey question because it could mean different things to different people. In some cases, the term may not be familiar to an individual.
Japan	Bank of Japan	<u>Qualitative</u> : What is your outlook for prices of overall goods and services you purchase one year from now? <u>Quantitative</u> : By what percent do you think prices will change one year from now?	
US	University of Michigan	<u>Qualitative</u> : During the next 12 months, do you think that prices in general will go up, or go down, or stay where they are now? <u>Quantitative</u> : By about what percent do you expect prices to go (up/down) on the average, during the next 12 months?	Curtin (2017): 'We devised ways to ask questions using the terms most understood by most people. When we use the economist jargon, a few understand but many simple say they don't know. The true test of wording is how well the results line up with the actual subsequent data.'
SA	Bureau for Economic Research	Over the past five years, prices increased by on average 5.4 per cent per year. During 2016, prices increased by 6.3 per cent. By about how much do you expect prices in general to increase during the next 12 months?	Informed by the Michigan survey. Kershoff (2000) argues that it was not feasible to ask households directly what they expected inflation would be in future, as too few respondents would understand what was meant by inflation. When the BER survey was started, CPIX (headline CPI excluding mortgage costs) was the SARB's target inflation measure. It was argued that this would be a difficult concept for the general public to grasp.

Source: This table is a shortened version of the one in Pienaar (2018). It was shortened for practical purposes, but the full version is available using the reference list.

3. The BER Inflation Expectations Survey

The formal adoption of inflation targeting in South Africa was announced as part of the Budget Speech on 23 February 2000. The need to monitor inflation expectations as part of this system was clear and, preparing for the change in monetary policy framework, in 1999 the SARB chose to commission the BER to conduct inflation expectations surveys. The Livingston Survey (managed by the Federal Reserve Bank of Philadelphia since 1990) and the Survey of Expectations of the Reserve Bank of New Zealand were used as guidelines in the design of the BER's survey.

The BER conducts surveys of four societal groups. The BER itself administers the surveys of the financial analysts, the business sector and the trade unions, whereas it pays a respected market research company (Nielsen for most of the period) to administer the survey of households. Until

recently, the market research company conducted 2 000 to 2 500 individual, face-to-face interviews with a stratified sample of households in urban and metropolitan areas across South Africa, taking responsibility for ensuring that, with the use of sample weights provided with the data, the data set is representative of the population studied. They also took measures to ensure the reliability of the data (Nielsen, 2017). Due to weak demand, the three market research companies in South Africa⁶ could not always guarantee surveys with a quarterly frequency between 2016 and 2019. Internationally, the majority of household surveys are based on telephone call surveys. As a result, the BER switched to telephone call surveys in the third quarter of 2019. The results per location (i.e. metro and other urban) are consequently no longer produced. The number of respondents declined from 2 000 to 2 500 for face-to-face interviews to 500 for telephone calls. While the face-to-face surveys are weighted to the population and strict rules for substitution are applied, quota sampling is used for telephone call surveys and the results are not weighted to the population. Non-responses could increase demographic skews further⁷.

In contrast, the surveys of the financial analysts, the business sector and trade unions are conducted by the BER itself. For the responses of survey respondents to be generalisable to the full population from which they are drawn, the selection and response have to mirror (or be proportional) to that of the population universe. Given that the same respondents are surveyed over time, a panel exists. A random sample is not put together each time and margins of error at various confidence intervals cannot be calculated. A detailed discussion of considerations at the time the survey was first designed are presented in Kershoff and Smit (2002), and in section 4 of this paper we review some of these features with the benefit of almost two decades of data.

3.1 Survey Design and Data Collection

The BER inflation expectations surveys (aggregate numbers) are downloadable from the BER website and are accompanied by extensive information about the history of the survey and the details of the survey design (Kershoff (2000), (2002))⁸. Permission to access the disaggregated data must be requested from the SARB. The disaggregated data⁹ of the financial analysts, business sector and labour unions are managed by the BER itself, whereas the disaggregated household data must be purchased from Nielsen directly.

⁶ Nielsen, Ipsos Markinor and TNS Kantar.

⁷ The results of the telephone call surveys are likely to be more volatile than face-to-face interviews due to the smaller sample size, non-weighting and treatment of non-respondents. Care should therefore be taken when considering the results of consecutive quarters especially for smaller demographic groups.

⁸ Pienaar (2018) and Reid, Siklos and Du Plessis (2021) also offer detail about the survey conducted by Nielsen on behalf of the BER.

⁹ De-personalised/anonymised individual responses.

3.1.1 Inflation Survey Questions

The inflation expectation survey question asked of households:

“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?”

Note that the values for XX will depend on the date on which the survey is taken.

The inflation expectation survey question asked of financial analysts, the business sector and trade unions:

“What do you expect average headline inflation rate (as measured by the percentage change in the CPI) to be during the year.”

Respondents are then asked to fill in boxes for the current calendar year and the next two (and more recently the 5 year ahead inflation rate). Note that in the first box, the respondent is given the inflation rate of the previous calendar year and the average over the previous 5 years¹⁰.

3.1.2 Features of the Survey Design

In this section we review some features of the design of the BER surveys. We aim to focus on the most notable choices that are covered in the literature, but do not claim that the list is complete in an absolute sense. Research will continue to improve our knowledge.

The BER surveys inflation of four separate socio-economic groups. All four have been conducted at a quarterly frequency since 2000, and as a result the BER can offer more than two decades of time-series data for four socio-economic groups. With a few exceptions (most notably the US), not even many advanced economies conduct regular surveys of households, and even fewer of the business sector. As far as we know, Australia is the only other country that survey trade unions.

The datasets are rich in that the surveys include forecasts of multiple horizons, a range of macroeconomic variables, and some socio-economic characteristics of respondents. The forecast horizons for which expectations are collected are the current calendar year, the next calendar year,

¹⁰ For more detail about the wording of the survey questions about the other macroeconomic variables, refer to Kershoff (2002) and Reid and Siklos (2021).

the calendar year 2 years ahead and 5 years ahead for the three groups the BER surveys, but only the current year (next twelve months since 2011) for the Nielsen survey of the household sector.

In addition, the three groups the BER surveys are also asked to forecast a range of other macroeconomic variables (Table 3), which is quite impressive by international standards. For sampling purposes, the surveys also collect demographic information at the time of recruitment, such as which industrial sector the respondent firm is from.

Table 3 Contents of the BER Survey of the Business Sector, Trade Unions and Financial Analysts

Businesses and Trade Unions	Financial Analysts
Inflation: CY, YA, 2YA, 5YA*	Inflation: CY, YA, 2YA,5YA*
GDP: CY, YA	GDP: CY, YA
Interest Rate (prime): CY, YA	Interest Rate (prime): CY, YA
Wages: CY, YA	Wages: CY, YA
RAND/US\$ exchange rate: CY, YA	Rand/US\$ exchange rate: CY, YA
	Capacity Utilization: CY, YA
	M3 growth: CY, YA
	Long-term Gov Bond Yield: CY, YA

Source: Adapted from Reid and Siklos (2021)
 Notes: CY is current year; YA is year ahead; 5YA is five years ahead. All variables, except RAND/US\$ and capacity utilization are in per cent. * Since 2011Q2 only. All respondents receive information about the previous year's and average over the previous 5 years outturns.

For most of the sample, when the household survey question was asked as part of face-to face interviews, it was part of an omnibus survey. This meant that the BER, as one of a list of clients, paid the market research firm to include its inflation expectations question as part of a consolidated survey schedule. The trained interviewers then conduct face to face interviews, which consisted of the questions of the paying clients as well as a wide range of socio-economic characteristics of each respondent. The BER therefore received the aggregate inflation expectations data as well some analysis of how this varies across the socio-economic characteristics. The list of socio-economic variables varied a little over time, although most of the primary characteristics have remained constant. The list included age, gender, race, employment status, income, wealth (living standards measure), and the region of the country in which the household lives. Since the survey has been conducted telephonically, the list of socio-demographic variables collected has been reduced to age, gender, race and household income range.

Calendar year forecasts

For the three groups the BER surveys itself, the horizons used for the forecasts are calendar year forecasts (forecasts for inflation and other macroeconomic variables for a particular calendar year, irrespective of the quarter in the year in which the forecast is collected). For the household survey this was changed to forecasts of a fixed 1-year horizon (i.e. a forecast of inflation for the following 12-month period) in 2011. Part of the original reason for this feature was the fact that the original inflation target the SARB adopted also had this structure. Academics who use this data often use a reasonably ad hoc adjustment to create a fixed horizon. Reid, Siklos and Du Plessis (2021) do find evidence that this change in the horizon used in the household survey had no material effect on their empirical results.

Sampling

The household survey is conducted using stratified sampling in the case of face-to-face interviews. Sample weights are applied to the disaggregated data to adjust the data so that it is representative of the adult population in urban and metropolitan areas of South Africa¹¹. In the case of telephone call interviews (since 2019), quota sampling is used, and the results are not weighted to the population.

The other three socio-economic groups are surveyed directly by the BER. Little information is available publicly on the population (sample) universe of firms. Stats SA does publish the aggregate results of occasional sectoral censuses, but not the number of firms per size and sub-sector category. These three groups are relatively smaller and less heterogeneous than households, so it is easier to survey a larger proportion of the total populations. While the BER aims to ensure it samples a good cross section of respondents across each group in the economy, it does not claim to have a fully representative sample. In the case of the financial analysts and trade unions, the full populations are quite small and relatively homogenous, so the sample surveyed by the BER is less likely to not be representative of the full population. For these two groups, the BER uses comprehensive sampling (they approach every analyst and trade union they can find).

The population of the business sector is larger and consists of firms of varying size and from different sectors, which might experience a range of different price pressures. The sample size

¹¹ A discussion about the use of sample weights is available in Reid, Siklos and Du Plessis (2021) and new research is currently underway by Reid and Siklos that will provide more detail on the details of the sampling of the firms, trade unions and financial analysts over time.

collected by the BER for this population is quite large, ranging from 1 061 at inception in 2000 to 522 in 2020. The BER aims to ensure that firms from each sector are adequately represented in the sample, but whether this sample accurately reflects the changing composition of South Africa's economy is not easy to confirm¹² and the sampling is best described as convenience sampling. A natural place to look for a register of firms is SARS's tax data, but this information is confidential.

Quantitative survey questions

Some surveys internationally (especially of households) consist of qualitative questions, or a combination of qualitative and quantitative questions (see Table 2), whereas all the BER surveys involve quantitative questions. This distinction is more relevant for household surveys, where there is reason to believe that some fraction of the population does not understand inflation as well or are not really in a position to give an informative quantitative answer to a quantitative question¹³. Research (Reid, Siklos and Du Plessis (2021)) suggests that over the period 2006 – 2016 between 12%-20% of the sample of respondents in the household survey report that they either expect inflation to be 0% or that they 'don't know'¹⁴. Many respondents (especially in the lower income and education group) also provide round numbers, such as 0%, 5%, 10%, 20%, 30%, 50% and even 100%. It is hard to establish how many of these are "true" expectations vis-à-vis "wild" guesses. Ehlers and Du Plessis (2019) show that this digit preferencing is in fact present across the socio economic groups surveyed by the BER.

There is, however, evidence (Reid *et al.* (2020) and Pienaar (2018)) that portions of the population that are less economically active have less confidence about prices and even terms like inflation. In this case, it is likely that the quantitative questions carry more information for the economically active survey respondents than those that are unemployed, retired or students.

Wording of the survey question: 'inflation' or 'prices in general'

A related question is whether it is best to ask survey respondents to forecast 'inflation' or 'prices in general', where the motivation is that respondents might not understand the term inflation (Kershoff, 2002). There has been some research at the New York Fed (Bruine de Bruin *et al.*, 2010)

¹² Research (Reid and Siklos, 2021) has investigated the distribution of respondents by SIC code within the dataset. The results suggest that representations of some sectors within the economy have changed a little over the sample while others are quite stable, but the authors at this stage make no conclusions about whether this is appropriate.

¹³ The fraction that understands and could quantify (i.e. able to express a qualitative personal "experience" and view of the size of the change as a number) inflation, may have increased since the launch of the survey in 2000 due to the spread of more information about it.

¹⁴ Rossouw, Joubert and Padayachee (2012), and Rossouw, Padayachee and Bosch (2011) also question the extent to which the public understands inflation.

which suggests that using the phrase ‘prices in general’ may actually be interpreted more widely than the term ‘inflation’ and lead to greater disagreement amongst respondents. While this question has not been tested in published academic research for South Africa, an informal study by a BER employee (Pienaar, 2018)¹⁵ does provide preliminary evidence that the term ‘inflation’ is not notably less well understood than ‘prices in general’ in South Africa.

Priming in the Survey Question

Finally, there is a choice about whether to include a form of priming (where extra information is provided to the respondent which may affect the respondent’s response). In the case of the BER surveys, this involves the provision of the historical inflation number in the survey question. This was tested for the BER household survey (Reid *et al.*, 2020) and evidence was found it does bias the responses of a portion of the respondents in the household survey in a manner that is economically significant (a sizeable effect)¹⁶. It appears to mainly have an effect on that group that is less economically active (presumably, this group receives less information about inflation themselves and are therefore less confident/more likely to be influenced). For this reason, we believe any bias in the other three surveys is likely to be less notable.

Every economically active person in South Africa contributes to the actual inflation outcome, even if they do not know how to define inflation correctly or keep track of the latest official inflation figure. Making practical (sometimes pragmatic) decisions about how to measure their inflation expectations involves choices. The BER has made these with care and is transparent about them, which allows analysts and academics to use this data responsibly. In the following section, some analysis of the survey responses since 2000 will be presented.

4 Analysis of the BER inflation expectations data

The fact that the data from the household survey is often quite different to that of the other three surveys is supported by the international literature and not very surprising¹⁷. Household inflation expectations are generally higher and display greater levels of disagreement (Table 4). It is a much

¹⁵ This research is an unpublished Masters thesis (Pienaar, 2018), so it has not been peer reviewed, but it was externally examined by two South Africa academics.

¹⁶ The difference may be smaller or disappear if we were able to identify and remove guesses.

The provision of the historical information most likely reduces the size of the numbers given by those respondents that actually don’t know. As a result, disagreement (i.e. the interquartile range) becomes narrower and the magnitude of outliers smaller among respondents.

¹⁷ It must be noted that, while the aggregate data for the surveys are freely available on the BER website, access to disaggregated data is limited. Firstly, the anonymity of individuals and the institutions they may represent are guaranteed. Secondly, permission for access to the anonymous data must be requested from the South African Reserve Bank.

broader and more heterogeneous group of respondents and there is likely to be a wider variance in their knowledge about inflation generally. To identify and sample the group correctly requires specialist knowledge and even proficiency in different languages, requiring the assistance of market research specialists. The household data will therefore be analysed separately from the other three groups in this section.

Table 4 Comparing Inflation Expectations of Households, Firms and Financial Analysts

Dates	All Households	Fraction of forecasts 25% & 'don't know' or 0%	All Businesses	All Financial Analysts	All Trade Unions
Oct 2006	9.01% (15.63)	5% 20%	4.97% [3.5, 10] (0.88)	5.91% [4.8, 8] (0.88)	5.23% [3.1, 8] (1.25)
Dec 2008	11.80% (12.18)	4.7% 18.60%	10.33% [3.9, 18] (2.25)	7.06% [4.8, 9] 0.99	9.22 [5.5, 13] (2.29)
Oct 2014	8.28% (9.98)	3.2% 16.74%	6.11% [5, 8.4] (0.44)	5.37% [4.8, 5.7] (0.32)	5.94 [5.75, 6.3] (0.18)
Oct 2015	7.89% (40.50)	2% 14.21%	6.17 [0.5, 15] (0.91)	5.92% [5.6, 6.5] (0.28)	6.16 [4.9, 8] (0.72)
Oct 2016	7.45% (30.36)	4% 12.16%	5.96 [3.2, 10] (0.74)	5.50% [5.2, 5.9] (0.23)	5.72 [4.8, 6.7] (0.61)

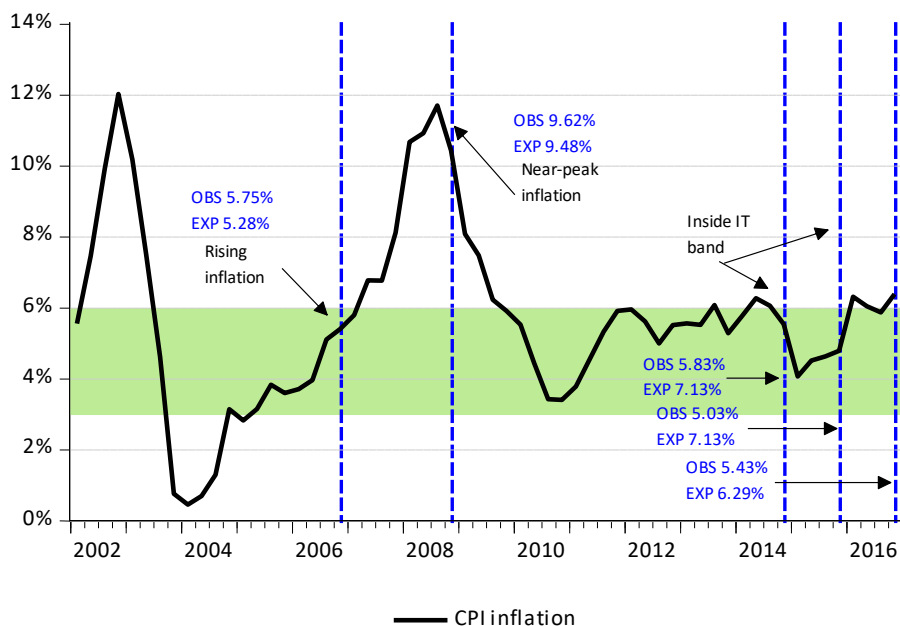
Source: Adapted from Reid and Siklos (2021)
 Note: Figures in square brackets show range of values (minimum and maximum, respectively). Standard deviations are provided in parenthesis. A higher standard deviation signifies a wider distribution of responses around the average and/or outliers (i.e. one or two particularly high and low responses). The dates are the months in which the household survey was conducted. The data from the other 3 surveys for the corresponding quarter may have been collected in a slightly different month.

4.1 Household Survey

The analysis of the household data focuses on only five quarters of data, because this disaggregated data had to be purchased from Nielsen directly at a cost for a particular research project (Reid, Siklos and Du Plessis (2021)) and the budget limited access. The five quarters were, however, chosen so that they covered a 10-year period with varying macroeconomic conditions (illustrated in Figure 1).

From Table 5A, we can see that across the 10-year period, the household survey data includes a large proportion (about 12%-20%) of respondents that claim they 'don't know' what inflation will be or who forecast 0% inflation. This number has decreased over the period, possibly due to increased transparency under the inflation targeting regime, a result that is comparable with that seen internationally. There is a small proportion of the sample that forecast inflation of greater than 25% and 35%, and these too are generally decreasing over the period. Figure 1 places these survey dates into context with respect to measured/published inflation over the period.

Figure 1 Headline Inflation in South Africa



Source: Reid, Siklos and Du Plessis (2021).

Note: The vertical dashed lines indicate the survey dates of the samples studied. The shaded area represents the SARB's inflation target. OBS means observed CPI inflation rate for the quarter when the survey is taken. EXP is the mean inflation expectation from Table 5B where responses of 35% and higher are excluded.

Table 5B also shows that relative to observed inflation for the period (column 2), the level of inflation forecasts of households are far higher than those from Consensus forecasts or SARB forecasts, but when we remove the outliers (those in the household sample that forecast inflation in excess of 35%), the forecasts generally drop notably.

Table 5C illustrates where households' inflation expectations lie relative to the SARB's inflation target (IT) mandate of keeping inflation within a 3 to 6% range. Over the 10-year period studied, inflation did rise above the target band between 2007-2009 and then briefly again in 2014 and 2016. There was also an informal acceptance (implied understanding) during the period that the SARB was willing to accept that inflation was often near the upper end of the target range. This is reflected in the fact that, across the period, sizeable proportions (8.5% - almost 40%) of respondents' inflation expectations for the year ahead lay above the SARB's target range¹⁸. There is, however, substantial variation in the number of respondents that expect inflation one year ahead will be inside the IT target band. Around half the sample expects inflation to be within the target range in the 2006, 2014 and 2016 surveys, but far fewer did so in 2008 (during the financial crisis) and 2015, largely due to a rise in food price inflation in 2014.

¹⁸ This informal target was even acknowledged ex post by the SARB in its April 2018 Monetary Policy Review.

Table 5 BER Household Inflation Expectations Survey: Stylized Facts

A. Samples

Survey date	Number of Observations (in the sample)	Population size (as per Nielsen Weights)	Fraction (%) & [Number] Who Answer "don't know" or 0%	Tail Forecasts‡		
				≤ 0%	≥ 25%	≥ 35%
Oct 2006	2 465	17 065 904	20.00%# [493: 42, 451]‡	0	124	102
Dec 2008	2 479	17 065 902	18.60% [461: 436, 25]	0	116	79
Oct 2014	2 628	23 752 000	16.74% [312: 252, 60]	0	84	65
Oct 2015	2 512	23 757 000	14.21% [330: 278, 52]	0	51	40
Oct 2016	2 532	24 585 247	12.16% [259: 259, 21]	0	101	76

Source: Reid, Siklos and Du Plessis (2021)

‡ Numbers in brackets are total number of inflation expectations in each category.

Per cent of total number of observations.

B. Means and Standard Deviations of Inflation Expectations (samples and population estimates)

Survey	Observed Inflation	Consensus	SARB	BER household inflation expectations	
				All observations (weighted)	Excludes ≥35% (weighted)
Oct 2006	5.75%	4.98% (0.32)	6.33% (0.67)	9.01% (15.63)	5.23% (3.81)
Dec 2008	9.62%	7.43% (0.67)	5.78% (0.63)	11.80% (12.18)	9.38% (4.39)
Oct 2014	5.83%	6.21% (0.12)	5.86% (0.27)	8.28% (9.98)	6.66% (3.39)
Oct 2015	5.03%	6.35% (0.18)	5.73% (0.57)	7.89% (40.50)	7.13% (3.32)
Oct 2016	5.43%	6.92% (0.73)	6.60% (0.00)	7.45% (30.36)	6.15% (3.70)

Source: Reid, Siklos and Du Plessis (2021)

Note: Sample estimates are obtained by multiplying the inflation expectations by the survey weights (i.e. the number of persons that each response represents)

After 2008, headline CPI; before 2008 CPIX (excludes mortgage costs). The data used for this table excludes inflation expectations reported as "don't know" or 0%. 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 (sample)

Survey	Headline CPI	$3 \leq \pi_{t+12}^e \leq 6$	$4 \leq \pi_{t+12}^e \leq 6$	$5 \leq \pi_{t+12}^e \leq 6$	$6 \leq \pi_{t+12}^e \leq 7$	$7 \leq \pi_{t+12}^e \leq 9$
OCT2006	5.75%	51.60 [1272]	40.49 [998]	25.60 [631]	14.00 [345]	7.91 [195]
DEC2008	9.62%	13.19 [327]	11.01 [273]	8.43 [209]	8.47 [210]	27.51 [682]
OCT2014	5.83%	44.03 [1157]	40.60 [1067]	36.53 [960]	39.84 [1047]	23.67 [692]
OCT2015	5.03%	28.50 [716]	24.80 [623]	20.02 [503]	32.25 [810]	41.52 [1043]
OCT2016	5.43%	53.16 [1346]	46.56 [1179]	39.26 [994]	29.03 [735]	18.96 [480]

Source: Reid, Siklos and Du Plessis (2021)

Note: Column 2: Headline inflation is for the 4 quarters prior to the survey (eg. 2005Q4 to 2006Q3 for the October 2006 survey)

Columns 3 – 7: Per cent of complete sample [Number of observations]. Data excludes outliers defined as expectations of inflation 35% and higher.

There is substantial heterogeneity amongst the household respondents, which potentially holds much information. Reid and Siklos (2021b) summarise some of the research which uses this dataset to explore the nature and implications of this heterogeneity.

4.2 Financial Analysts, Business Sector and Trade Union Surveys

The three surveys conducted by the BER are often quoted only as a single average of the three aggregate numbers, which is a pity as this practice hides considerable information that should not all receive equal weighting.

The survey of financial analysts is informative and can be compared to other measures of the inflation expectations of South African analysts (also called professional forecasters), either from other surveys or from asset prices. Generally, research has suggested that the expectations of analysts are relatively more rational and better anchored than those of the other socio-economic groups surveyed by the BER (see Reid and Siklos, 2021b for a summary of the South Africa literature).

Once the numbers are considered separately, the inflation expectations of trade unions naturally attract attention due to the sizeable impact of organised labour in South Africa. While we believe that the trade union survey should continue to be conducted by the BER, we feel less confident about drawing strong conclusions from statistical analysis of this dataset. The sample size is small for robust statistical analysis, ranging from 8-17 for the survey dates comparable with those of the household data in tables 5A-D.

It is also interesting to note that the correlation between the inflation expectations of the trade unions and the business sector is surprisingly high (see Table 6). A possible reason for this is that it is the pursuit of redistribution, rather than inflation forecasts that is driving the wage demand of trade unions. Trade unions affect wage demands in some sectors of the South African economy more than others, in which case the business sector survey better captures wage pressures across the economy broadly. Furthermore, the views of the general secretaries and other representatives of the trade unions at the head office (who are quizzed) differ from those of shop stewards and other representatives directly involved in wage negotiations (who are not surveyed). The latter often communicates higher wage demands as part of a negotiating strategy. For these reasons, we in fact believe it is preferable to use the business sector survey to empirically address questions about price pressures (even if these relate to wage pressures).

Table 6 Select unconditional correlations

Labour\ Business	CPI_t0	CPI_t1	CPI_t2	CPI_5a
Full sample: 2000Q2-2020Q4 – Aggregated (2011Q3-2020Q4 for CPI_5a)				
CPI_t0	0.96(.00)			
CPI_t1		0.96(.00)		
CPI_t2			0.35(.00)	
CPI_5a				0.89(.00)
Micro firms (less than 21 employees)				
CPI_t0	0.97(.00)			
CPI_t1		0.93(.00)		
CPI_t2			0.72(.00)	
CPI_5a				0.79(.00)
Large firms (over 1001 employees)				
CPI_t0	0.91(.00)			
CPI_t1		0.86(.00)		
CPI_t2			0.28(.50)	
CPI_5a				0.78(.00)
CEO (businesses) vs Union representative (Labour)				
CPI_t0	0.97(.00)			
CPI_t1		0.92(.00)		
CPI_t2			0.79(.11)	
CPI_5a				0.85(.00)

Note: Estimate of simple correlation with p-value in parenthesis.

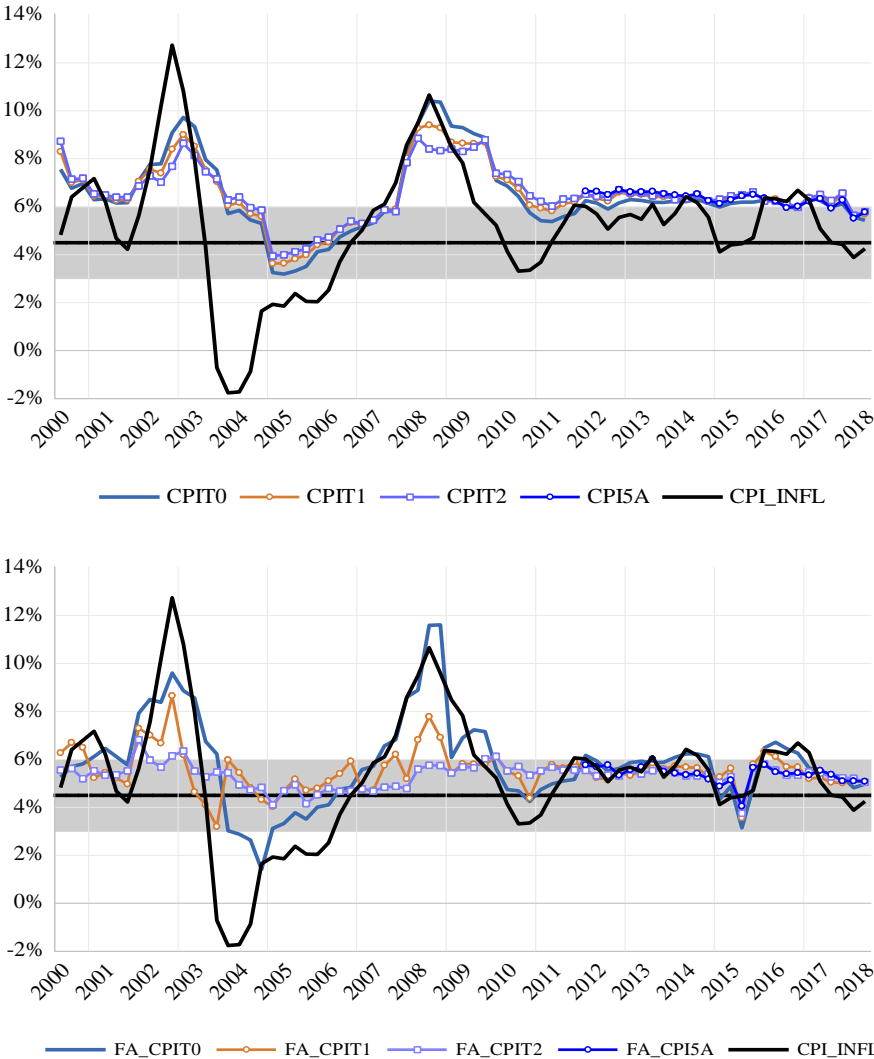
Finally, the sample size used for the BER's Business Sector survey is large and the dataset is rich. At this stage, a minimum of 23 countries conduct some kind of survey on the expectations of firms, but they differ across a number of dimensions. These include that many cover relatively short sample periods, often the available data are sampled only occasionally or are available at irregular intervals, and very few surveys ask respondents to forecast other macroeconomic variables besides inflation. This limits our ability to test economic theories about how inflation expectations are formed. The BER's survey for South Africa is both one of the longest time series available and very possibly the most comprehensive of any of the firm level surveys internationally.

To see how the inflation expectations of the business sector and financial analysts compare, we begin by looking at Figure 2, which plots observed headline inflation in South Africa since the beginning of the inflation targeting era against inflation expectations of firms (top portion) or financial analysts (bottom portion) on a calendar year basis for the current, next year, two and five years ahead horizons.

In comparing the expectations of the firms with those of the financial analysts, we notice that until about 2009 inflation and the inflation expectations of both firms and analysts, at all horizons, fluctuate considerably. In the case of firms, during this sub-period, their expectations are outside of the target band more than they are within it, whereas the longer horizon expectations of firms

are better anchored, albeit mostly at the top end of the band. After 2009, the expectations of both groups generally settle at the top end of the band. After 2018 (i.e. beyond the period covered in the chart) the expectations of both groups moved towards the midpoint of the target, in large part due to the decline in price pressures as a result of the deteriorating economy, but also in response to communication by the SARB indicating its intention to bring inflation to this level.

Figure 2 Inflation, Inflation Expectations and the SARB's Inflation Target



Note: CPI is the Consumer Price Index, T0, T1, T2, 5A refer to current calendar year, next calendar year, 2 calendar years in the future, and five years into the future expectations of businesses. FA refers to the expectations of financial analysts. The shaded area is the SARB's inflation target; the dashed line is the midpoint of the inflation target (4.5%).

It is also worth noting that there is less variation in inflation expectations than in observed inflation, which may be evidence that they are well anchored and monetary policy has been successful. Alternatively, it could be evidence that individuals are inattentive, in which case observed economic

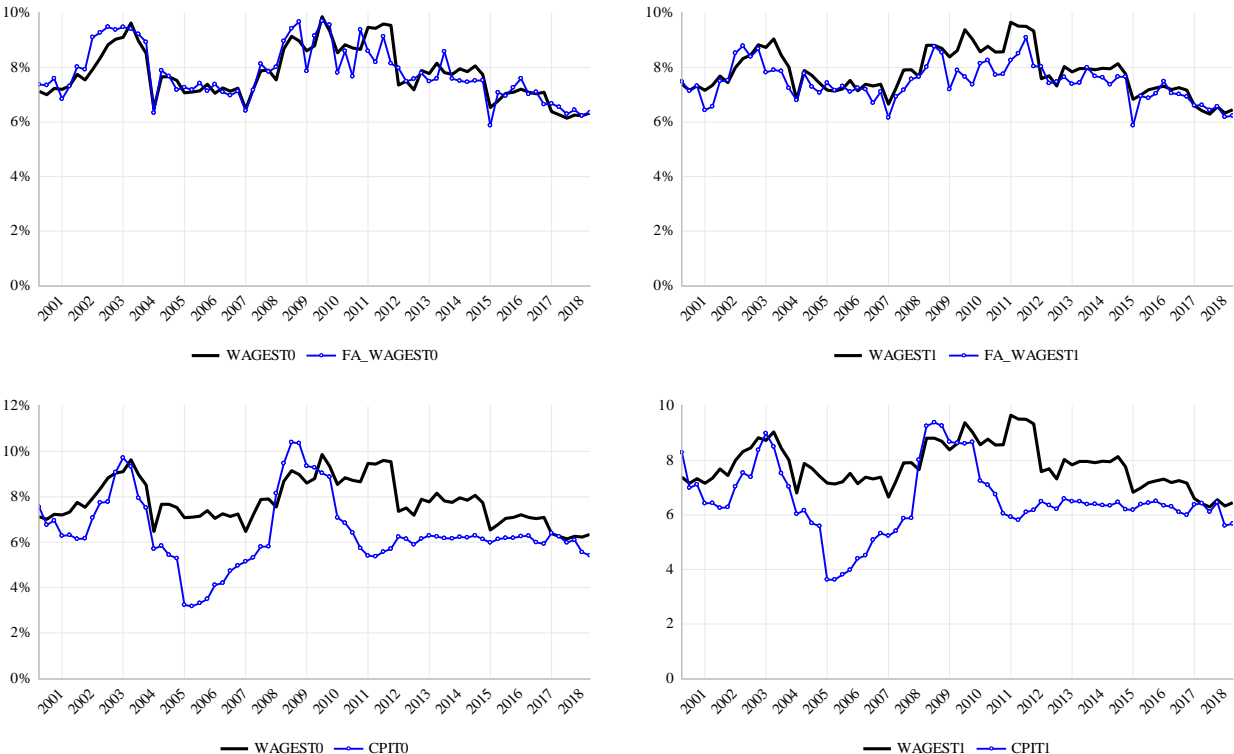
fundamentals should not be related to forecast errors (more details on this evidence in the second part of this research note).

The inclusion of the other macroeconomic variables also allows researchers to study how the inflation expectations of the respondents are influenced by (related to) their expectation of other macroeconomic factors such as wage growth (see Figure 3) and the rand/USD nominal exchange rate.

In Figure 3, the wage growth expectations of businesses and financial analysts are plotted against one another in the top half of the figure. These appear comparable except around the time of the Global Financial Crisis. In the bottom half of figure 3, businesses wage growth expectations are plotted against current and one year ahead inflation expectations, providing an indication of the evolution of the growth in real wages.

Similarly, questions can be asked about exchange rate pass through and other sources of price pressure, using the other macroeconomic variables. Furthermore, the macroeconomic variables can be used to test various economic theories about how inflation expectations are formed.

Figure 3 Wage growth expectations



Note: T0 and T1 refer to current calendar year and one calendar year ahead. WAGES are wage growth expectations of businesses. FA are the same expectations of financial analysts. CPIT0 and CPIT1 are from Figure 1.

4. Summary Discussion

In summary, expectations matter, but they are unobservable. Choices need to be made about how to measure them and each holds implications for the quality of the data and the appropriate way to interpret and apply the data. In this research note, some of the most important of these choices are discussed and the BER's inflation expectations survey datasets are described along these dimensions. Finally, some simple data analysis is presented to visualise some of the characteristics of the different socio-economic groups.

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