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Monique Red and Pierre Siklos

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Head: Economic Research Department
South African Reserve Bank
P O Box 427
Pretoria 0001

Tel. +27 12 313 3911

Firm-level expectations and macroeconomic conditions: underpinnings and disagreement

Monique Reid* and Pierre Siklos†

Abstract

There is abundant evidence that financial analysts' inflation expectations differ in economically important ways from those of non-financial specialists. As a result, there is an increasing demand for firm-level data to more accurately capture the views of price setters. The unusually rich firm-level survey data from South Africa allow us to explore some of the ways in which the expectations of firms differ from those of other groups surveyed. We focus specifically on forecast disagreement, which can offer insights into the level of uncertainty reflected in the data and the degree to which expectations are anchored. We find that the divergence in inflation forecasts among respondents is partly explained by differences in how respondents believe the broader macroeconomy is evolving. The effect of aggregating the data in different ways is also considered. When we construct a new measure of macroeconomic disagreement that combines all the variables being forecast, we are able to see that forecasters responded sharply in early 2020 as the COVID-19 pandemic emerged.

JEL classification

E37, E31, E47, E32, E58

Keywords

Forecast disagreement; firm-level; labour; professional forecasts; Bureau of Economic Research; South African Reserve Bank

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* Lead economist, South African Reserve Bank (SARB) and Extraordinary Associate Professor, Stellenbosch University. Corresponding author: monique.reid@resbank.co.za.

† Wilfrid Laurier University and Research Fellow, Stellenbosch University. psiklos@wlu.ca.

1. Introduction[1]

Given the abundant evidence that financial analysts' inflation expectations differ in economically important ways (Binder 2015) from those of non-financial specialists, there has been an increasing demand for firm-level data (Bernanke 2007). This is part of a larger attempt to capture the views of price setters and understand how inflation expectations behave.[2] In an attempt to capture the views of the price setters in an economy, household expectations have recently received considerable attention. However, there is comparatively little evidence of the forecasting behaviour of firms, due at least in part to the small number of data sets available (see Coibion et al. (2020); Reid and Siklos (2022)). The unusually rich firm-level survey data from South Africa, collected at a quarterly frequency for over 20 years, allows us to explore some of the ways in which firms' expectations differ from those of other groups surveyed.

In this paper, we focus specifically on one characteristic of these expectations – disagreement – to gain insights into the level of uncertainty that survey respondents experience and how well anchored these inflation expectations are. There is a rich literature that empirically and theoretically examines the nature and behaviour of forecast disagreement. This literature provides substantial empirical evidence that forecasters disagree, but it has tended to focus on the surveys of professional forecasters. The literature is inconclusive about the nature of forecast disagreement and its origins, requiring further empirical evidence to narrow the differences of view.

The present study makes three contributions. Firstly, it employs an under-used data set from South Africa that is exceedingly rich. Our primary focus is to contribute to the body of knowledge about forecast disagreement among firms' expectations, but we also compare this to the forecast disagreement of financial analysts and trade unions

1 The authors are grateful to the Bureau of Economic Research (BER) for the data and to the SARB, where Pierre Siklos is an external research fellow. Comments from George Kershoff and Hugo Pienaar on an earlier draft are greatly appreciated. Additional results mentioned in the paper are relegated to an appendix available from either author.

2 The broader literature on inflation expectations is now vast, so we do not attempt a full review of it in this paper. Instead, we refer readers to Coibion et al. (2020) for an overview of the current state of the literature that focuses on firm-level data in particular. See Reid and Siklos (2021) for a review of academic contributions using the South African inflation expectations survey data.

(trade organisations).[3] Financial analysts provide a natural benchmark, because they have received the most attention in the literature. The comparison with trade union expectations is far less common but is interesting because of the relatively high level of unionisation in South Africa and periodic concerns about the effect of wage pressures on inflation. Unlike much of the extant data used in studies across several economies, we have at our disposal a relatively long time series, consisting of micro data at a quarterly frequency, covering a period of more than 20 years. The data span a sample when a single monetary policy regime, namely inflation targeting, was in place.

Secondly, besides the standard measures of forecast disagreement used in the literature, we also create a new indicator of macroeconomic forecast disagreement. We use a factor model to take advantage of the fact that the dataset includes forecasts of other macroeconomic variables. Using this factor model is a way of considering the impact of a different type of aggregation. The well-established view that consensus-style forecasts tend to be superior (i.e. the wisdom-of-the-crowd argument) is important, as central banks cannot tailor the stance of monetary policy to different groups in society. This indicator of macroeconomic disagreement provides evidence of the impact of the COVID-19 pandemic on expectations and reveals how forms of aggregation in inflation forecasts affect our interpretation of the data. Nevertheless, we empirically demonstrate that, even if this is the case, disaggregating expectations data can yield useful information that the monetary authority can use to fine tune how it communicates with different audiences[4] (e.g. see Portelance (2021) and references therein).

Our third contribution is an analysis of differences in disagreement across a number of factors – the respondent's industry, the respondent's occupation (e.g. economist

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[3] Our study complements an earlier study (Reid, Siklos and du Plessis 2021) that looks at household-level forecasts of inflation in South Africa since the introduction of inflation targeting there. The results discussed below also fit in the broader literature on forecast disagreement and its sources (e.g. see Siklos (2019)).

[4] For example, the SARB holds a press conference at the end of the monetary policy committee meeting. To enable the public to directly engage with the SARB, monetary policy forums are also held at various venues around the country when the *Monetary Policy Review* is released.

versus chief executive officer (CEO)) and the respondent's forecasts of other macroeconomic variables.

Our findings reveal that when forecasters disagree about future inflation it is because they also disagree about the future course of other key macrofinancial variables. This suggests that the divergence in their forecasts is at least partly because they disagree about how the broader macroeconomy is evolving. Inflation forecast disagreement is partially driven by past observation of the series being forecast, reflecting a level of persistence in inflation expectations. The level of aggregation in the data also plays a role in our interpretation of forecast disagreements. When we construct a new measure of macroeconomic disagreement that combines all the variables being forecast, we can see that forecasters responded sharply in early 2020 as the COVID-19 pandemic emerged. That said, our findings on the determinants of inflation forecast disagreement do not indicate whether this is due to a form of inattention, to differences in what the past portends for the future, to certain socio-economic characteristics of the forecasters that we are unable to quantify or to some type of bias in how disagreement about future inflation emerges. Nevertheless, the results show the value of analysing individual-level forecasts and the potential for these to provide insights into how a central bank might consider communicating differently with different audiences.

In this paper, while we do not explicitly aim to draw comparisons with other economies, we do situate our findings from South Africa (an emerging market economy) in relation to the wider literature on the subject, which has focused primarily on advanced economies. This South African experience holds insights of broader application, as the country was an inflation targeter over the entire period and experiences regular supply shocks. South Africa offers a test case for the resilience of inflation targeting under supply shocks at a time of significant international interest in the economic impact of COVID-19 and climate change.

The rest of the paper is organised as follows. In the next section, we provide a brief review of the literature before presenting the BER dataset in section 3. In section 4 we discuss the indicator we construct to measure disagreement. In section 5 we explain the empirical methodology adopted, discuss some stylised facts about the data and present our empirical findings. We also use more formal econometric analysis to

explore the sources of forecast disagreement. In section 6, we conclude by summarising our findings, noting potential limitations of our study and highlighting some policy implications.

2. Related literature

Siklos (2019) provides a recent overview of the literature on forecast disagreement. The literature explores concepts such as the extent to which disagreement can act as a proxy for uncertainty, and it tries to identify factors that are likely to increase (or decrease) disagreement. However, several important questions about what drives forecast disagreement remain unresolved. Multiple theories seek to explain why forecasters disagree, ranging from differences in implicit or explicit forecasting models to cognitive limitations (e.g. Dovern and Hartmann (2017)), and several indicators have been proposed to quantify forecast disagreement (e.g. Schultefrankenfeld (2020)).

The link between uncertainty and disagreement has attracted considerable interest, but there is mixed evidence for whether disagreement is a useful proxy for uncertainty. Bachmann, Elstner and Sims (2013) report that forecast errors are correlated with forecast dispersion and that uncertainty and disagreement may be treated as proxies for each other.[5] In contrast, Lahiri, Peng and Sheng (2015) posit that uncertainty is only one element of the concept of disagreement. In their survey of theory and evidence, Boero, Smith and Wallis (2015) point out that "disagreement is a useful proxy for uncertainty when it exhibits large fluctuations" (1044), which may explain why there is a weaker link between uncertainty and disagreement (e.g. see Glas (2020); Rich and Tracy (2021)).

Other difficulties to consider include whether to use point estimate forecasts or density forecasts (e.g. see Knüppel and Krüger (2019)), and the choice of forecast horizon (e.g. see Glas (2020)), where more uncertainty is likely at longer horizons. Clements and Galvão (2014) propose a distinction between ex ante and ex post measures of uncertainty (i.e. measures determined by models and probabilistic considerations

[5] Based on the German ifo Institute survey for the Business Climate Index, conducted by the Institute for Economic Research at the University of Munich.

versus those determined by realised data) and conclude that ex ante measures of uncertainty closely track ex post measures when the forecast horizon is short.

Even with limited consensus on the time series properties of forecast errors, it is widely accepted that they are riddled with biases and inconsistencies. Nevertheless, the existence of a common factor across forecasts or forecast errors is useful because it suggests that forecasters consider comparable sources of information when forming expectations, even if their conclusions are at odds. Jurado, Ludvigson and Ng (2015) investigate dispersion versus uncertainty concepts to empirically identify salient uncertainty 'events' for the United States (US). They find that uncertainty rises in recessions as well as when the forecast horizon lengthens. The authors interpret uncertainty as the common latent factor among individual measures of uncertainty.

These findings about how to measure disagreement and how well it proxies uncertainty are related to the question of how information generates disagreement, as signals (e.g. macroeconomic news) are digested differently by different forecasters. Disagreement can reflect differences in views, for example, about predictions about future recessions (e.g. see Bürgi and Sinclair (2021)) or expected future macroeconomic and financial conditions more generally, because signal-to-noise ratios can differ.

Glas and Hartmann (2016) rely on data from the Survey of Professional Forecasters (SPF) conducted by the European Central Bank to show that rising inflation uncertainty precedes a deterioration of forecasting performance. Bauer (2015) explores the role of news by using US Blue Chip and SPF forecasts to estimate their sensitivity to macroeconomic news. He concludes that targeting inflation contributes to a reduction in the volatility of inflation expectations, representing an effective anchoring device. Similarly, based on evidence from the eurozone, Badarinza and Buchmann (2009) find that better anchoring of expectations reduces forecast disagreement. Using household data, Kamada, Nakajima and Nishiguchi (2015) and Nishiguchi, Nakajima and Imabukko (2014) both report that central bank announcements in Japan (e.g. the introduction of quantitative and qualitative easing) can shift the distribution of expectations toward the announced objective. Strohsal, Melnick and Nautz (2016) and Strohsal and Winkelmann (2015) also consider the effect of macroeconomic news and conclude that inflation has been almost 'perfectly' anchored in the US since 2004.

Empirical results are subject to different views about how households, firms and professional forecasters form expectations. It is particularly important for policymakers to acknowledge these differences in their effort to understand how inflation expectations are formed in order to influence these expectations. Carroll (2003) argues that households acquire information more slowly than their professional counterparts, whereas Coibion and Gorodnichenko (2012) see no systematic differences in the processing of information across different groups. There is, however, substantial evidence that the forecasts of some professional forecasters represent an attractor for those of other professional forecasters. Clements (2015) demonstrates that forecast differences among US SPF forecasts become larger the longer the forecast horizon, although there is a form of herding of forecasts at short horizons.

The global increase in central bank transparency is well known (Dincer and Eichengreen 2014; Dincer, Eichengreen and Geraats 2019a, 2019b), but there are differing views about its connection with forecast disagreement. For example, Brito, Carrière-Swallow and Gruss (2018) find that disagreement falls with the adoption of inflation targeting, but only in developing economies. Given that inflation targeting and communication have long been thought to go hand in hand, it is less obvious whether the regime, or how it is presented to the public, is what drives changes in forecast disagreement (Seelajaroen, Budsaratragoon and Jitmaneeroj 2020). Forecast disagreement may rise with relatively higher transparency given that more information creates the opportunity for greater noise (Siklos 2013).[6]

Although in this paper we do not explicitly test whether forecast disagreement can proxy for uncertainty and whether central bank transparency reduces disagreement, the literature does provide motivation to explore ways to measure disagreement, identify some of the challenges in doing so and provide context for interpreting our own results. In the sections that follow, we introduce the BER data set, consider ways to

[6] Studies that conclude that a negative link exists between forecast disagreement in such regimes and transparency (e.g. Jitmaneeroj, Lamla and Wood (2019)) tend to distinguish them from other regimes using a 0.1 dummy. Given the heterogeneity of inflation-targeting regimes, it is debatable whether this is the appropriate specification.

measure forecast disagreement using this data and explore some of the sources of the disagreement.

3. The BER data set

Since 2000, when inflation targeting became the SARB's monetary policy strategy, the BER has surveyed trade unions, businesses and financial analysts on a quarterly basis on behalf of the SARB.[7] The dataset consists of individual-level forecasts at several horizons for a variety of critical macroeconomic and financial time series. Additional characteristics are collected about the survey respondents, such as the industry in which a firm operates. Each respondent is identified only by an ID number, as they are guaranteed anonymity,[8] but we are able to establish that few of the individuals surveyed are duplicated over time.[9]

The principal questions in the BER survey elicit forecasts of (headline) inflation. The precise wording for the inflation question is: "What do you expect average headline inflation rate to be during the year?" Respondents are then asked to fill in boxes for the current calendar year and the next two years. There is some 'priming', because respondents are provided with average annual inflation rates (actual inflation outturns) for the calendar year that precedes the survey, as well as the mean annual inflation rate over the past five years. Respondents are also asked, "What do you expect the average consumer price inflation (CPI) rate to be over the next five years?" to capture longer-term inflation expectations. A scanned copy of the survey is provided in the annexure.

A fixed event horizon is adopted in the survey. This means that a forecast for inflation covers a particular calendar year rather than a fixed horizon of one quarter or one year ahead. Fixed event data can be converted into a fixed horizon, but we retain the fixed

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7 Between 2000 and 2003 the quarterly surveys were conducted in February, May, August and October. The February and October surveys were subsequently shifted to March and November, while the timing of the remaining two surveys is unchanged.

8 The raw expectations data are available from the BER on written request.

9 More precisely, 7.45% of trade union respondents, 6.50% of businesses and 5.08% of financial analysts are duplicates over the complete sample.

event form and note that, with minor exceptions, either set of forecasts generates similar results (see Reid and Siklos (2021)).

The survey is notable in at least three respects. First, the BER also asks for forecasts for a wide range of key macrofinancial variables. Trade unions and firms provide forecasts for the GDP growth rate, the prime interest rate,[10] wage and salary growth, and the rand/US dollar exchange rate. In addition to the standard questions about inflation and economic growth, financial analysts are asked to forecast growth rates in the M3 money stock,[11] the yield on long-term government bonds and the capacity utilisation rate in the manufacturing sector (percentage utilisation of production capacity). Second, as described above, respondents are asked for inflation forecasts at three horizons and, since 2011Q2, a five-year horizon as well. Finally, the dataset is one of the longest consistent time series we are aware of (Coibion et al. 2020; Reid and Siklos 2022), covering almost 25 years.

Greater detail about the data for the full sample considered in this study (2000Q2–2020Q4) is available in the annexure, but we highlight a few relevant characteristics here. The number of respondents in the firm component of the survey is far greater than for the other two groups. The BER uses convenience sampling, so the fraction of firms surveyed is not formally linked to the relative size of each sector in the South African economy, although effort is made to ensure that a variety of sectors is adequately represented. The composition of the BER sample also appears to be fairly stable over time. Finally, the vast majority of the firm respondents are in senior decision-making positions within the firm, so their forecasts are likely to affect the firm's price-setting behaviour.

4. Measures of disagreement and econometric methodology

There is no universally agreed upon measure of inflation forecast disagreement. Commonly used indicators include a measure of forecast dispersion and the inter-quartile range of forecasts (e.g. Mankiw, Reis and Wolfers (2003); Capistrán and

10 That is, the interest rate charged by commercial banks for loans to their best customers.

11 M3 is a broad money supply measure that includes notes, coins, commercial bank deposits, time deposits, money market funds and other liquid financial assets.

Timmermann (2008)), both of which we adopt in the results below. The dispersion indicator has the virtue of retaining all the available information[12] (including the proverbial 'black swan'), but the results are potentially vulnerable to extreme forecasts. That said, sharp changes in forecast disagreement emerge at the same time regardless of the disagreement measure employed, and there are very few extreme forecasts as measured by the usual three or more standard deviations from the mean.

For the squared deviations measure of forecast disagreement (i.e. forecast dispersion),[13] let d_{th}^{j} represent disagreement about forecast *F* at time *t*, *h* periods ahead, for variable z (e.g. CPI inflation) and firm *j*. Intuitively, forecast disagreement is relative to some benchmark. Typically, the benchmark is the mean or consensus forecast $\bar{F}$ (e.g. see Glas (2020); Siklos (2019)). Hence, we write

$$d_{th}^{zj} = \frac{1}{N_j - 1} \sum_{i=1}^{N_j} (F_{ith}^{zj} - \bar{F}_{gth}^{zj})^2 \qquad (1)$$

where *F* is the forecasted variable (z), N_j is the number of forecasts, *i* identifies the forecast and $\bar{F}^{j}$ represents the mean forecast across a chosen group *g* (e.g. industries or the position of survey respondents) across firms *j*. The consensus forecast is typically used for $\bar{F}$, but other groups whose forecasts can provide an influential benchmark can be used (e.g. a central bank forecast or the forecasts of professionals).[14] Alternatively, if the inflation-targeting regime is credible, $\bar{F}$ would represent the announced numerical inflation target.

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12 Boxplots (not shown) for several measures of disaggregated expectations among all three groups that confirm: (1) mean and median estimates of expectations are very close to each other. The largest gap between the two measures are for the long-term expectations. However, as explained below, the sample for five-years-ahead inflation expectations is considerably shorter than for the other available horizons and is measured somewhat differently from the other inflation forecast series; (2) the inter-quartile ranges are extremely narrow in almost all cases examined, and a non-negligible portion of the distribution of expectations would be left out from the analysis, which could be seen as ad hoc.

13 The measure used here comes closest to the one used in Lahiri and Sheng (2008), while the applied transformation yields a version that is the normalised absolute deviation of forecasts implemented by Banternghansa and McCracken (2009).

14 Outside forecasts can be grouped in a variety of ways to generate forecast combinations. These include those prepared by central banks, survey-based forecasts conducted among households, a set of forecasts by public agencies (e.g. the Organisation of Economic Co-operation and

Most of the results in this paper assume, as is common in the extant literature, that $\bar{F}$ is the consensus forecasts across all groups (i.e. firms, labour and financial analysts). We tested robustness using the SARB's inflation target (4.5%), as well as by grouping[15] by industry and occupation of the respondent, but these did not change the conclusions. There were too few published data of the SARB's inflation and real GDP growth forecasts available (since 2015; see Reid and Siklos (2022)) to enable robustness testing using these.[16]

Once the forecast disagreement measures are obtained, we explore their determinants econometrically. We ask whether the forecast disagreement for macroeconomic variables for which the central bank provides an outlook (inflation and GDP growth) is linked to disagreement in other macroeconomic or financial variables that are believed to be related according to economic theory. We also condition disagreement on other information that might be available at the time forecasts are made – that is, lagged observed values of all the variables being forecast. The estimated specification is hence

$$\tilde{d}_{th}^{zj} = \boldsymbol{\alpha} + \boldsymbol{\Theta}_{\delta}\widetilde{\boldsymbol{D}}_{\boldsymbol{th}}^{\delta j} + \mathbf{B}\boldsymbol{\Gamma}_{t-1} + \eta_{\boldsymbol{t}} \qquad (2)$$

where disagreement was previously defined, **α** are fixed effects and **D** is a vector of variables that includes disagreement other than for inflation. In principle, of course, one can also ask whether disagreement in any of the variables is related to others with a lag, in which case equation (2) could be re-written as a vector autoregression (VAR). However, to conserve space, we limit our analysis to the relationship between

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Development, the International Monetary Fund, Consensus) and a group consisting of professional forecasts (e.g. Consensus, SPF).

15 This is motivated by the considerable evidence that favours simple forecast combinations over other forms of forecast aggregation or forecasts made by specific forecasters (e.g. see Timmermann (2006)).

16 We note that equation (1) can also be converted into an indicator that ranges between zero and 1 via normalisation. Since none of the conclusions are affected by this transformation, we only mention the effect of normalising forecast disagreement when providing additional insights into the results. A normalised version of (1) would be written $\tilde{d}_{th}^{zj} = \left|\sqrt{\frac{1}{N_j - 1}\sum_{i=1}^{N_j}(F_{ith}^{zj} - \tilde{F}_{gth}^{zj})^2}\right|$ where d_{th}^{j} is bounded between [0,1] using the transformation $(d - d_{min})/(d_{max} - d_{min})$.

disagreement in inflation and the other forecasts respondents are asked to make. **Γ** is a vector of observables (lagged values of the series being forecasted). As noted in the literature review, inattention, to name one explanation, may well lead forecasters to overlook outturns in the series being forecasted. Therefore z=[π], while $\boldsymbol{D^{\delta}} \neq z$ represents the vector of other forecasted variables. We provide details in the next section.

As discussed above, the series that respondents are asked to forecast are endogenous, in which case it can be appropriate to estimate a VAR. Expectations are usually modelled as being partially dependent on past inflation, but the response of expectations may also partially fuel future inflation.[17] A potential disadvantage of the VAR approach is that identification is needed to recover the structural coefficients. Strategies for doing so are often tailored to the question at hand, but given that there is no established theory about how disagreement between different macrofinancial variables are causally related, we exploit the information content about disagreement for the available time series.

A popular alternative to a VAR is estimating a factor model. A single series is created by linearly combining related series that are believed to be linked to inflation. The technique offers a parsimonious way of using considerable amounts of data (in this case across the different macroeconomic and financial variables being forecasted). We restrict attention to factor models for each available horizon (*h*) and socio-economic grouping (κ). We write the model to be estimated as follows:

$$\mathbf{X}_{\boldsymbol{th}}^{\boldsymbol{\kappa}} = \boldsymbol{\Lambda}\boldsymbol{\Omega}_{\boldsymbol{th}}^{\boldsymbol{\kappa}} + \boldsymbol{e}_{\boldsymbol{th}}^{\boldsymbol{\kappa}} \qquad (3)$$

where **X** is the vector of disagreement in all the variables that are forecasted, κ is the socio-economic groupings for which factor models are estimated, *h* is the forecast horizon, **Λ** is the factor loadings and **Ω** is the factors. Our results below show that this

[17] The clearest case is the adaptive expectations model, where expectations are determined by the past history of inflation and previous forecast errors. Similarly, when expectations are self-fulfilling, changes in expectations impact future inflation. As an illustration: the expectation of certain price rises in the future (e.g. goods or services) may prompt economic agents to raise their demand for them today. Other things being equal, this would generate more inflation.

approach yields new insights into how forecast disagreement evolves when forecasts of different but related macrofinancial variables are combined.

5. Stylised facts about the data and empirical results

5.1 Summary statistics and stylised facts

Table 1 and Figure 1 provide some stylised facts. Table 1 captures the mean inflation forecast (and standard deviation) for each of the three groups at the different forecast horizons. For all the horizons, the mean forecasts of the financial analysts were the lowest and those of the businesses were the highest. The standard deviation of the forecasts of all three groups decreases as the horizon lengthens, and this happens most rapidly for the financial analysts. It is, however, interesting to note that financial analysts perform the worst along this metric for the current year forecasts. To conserve space, we do not show the average forecasts of the other macroeconomic variables in the survey (e.g. GDP growth), but these are available in the annexure.[18] Financial analysts' forecasts of inflation are, on average, the lowest of the three groups, with businesses forecasting higher average inflation at all horizons.[19]

Table 1: Aggregate expectations for different macrofinancial variables from the BER survey: full sample 2000Q2–2020Q4

Forecast		Labour	Business	Financial analysts
Definition	**Label**	**Mean (SD) - %**	**Mean (SD) - %**	**Mean (SD) - %**
Current year inflation	CPI_T0	6.07 (1.52)	6.29 (1.56)	5.70 (1.81)
Year-ahead inflation	CPI_T1	6.16 (1.32)	6.39 (1.27)	5.46 (0.82)
Two-years-ahead inflation	CPI_T2	6.22 (1.23)	6.41 (1.09)	5.28 (0.44)
Five-years-ahead inflation	CPI5a	5.75 (0.64)	6.15 (0.48)	5.34 (0.35)

Source: BER and authors' calculations

Note: The figure in parentheses in each column is the standard deviation (SD).

Figure 1, divided into two parts, depicts the range of inflation forecasts across the different groups surveyed, focusing on the current and one-year-ahead expectations that dominate the literature. The top portion of Figure 1 plots the highest individual

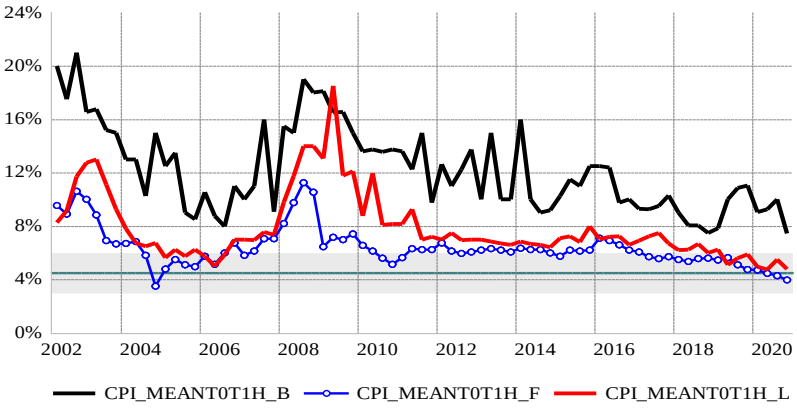
18 Obviously, the same individual need not generate the highest and/or lowest forecasts over time.

19 Tables providing comparisons between means and medians for groups across the full sample are shown in the annexure.

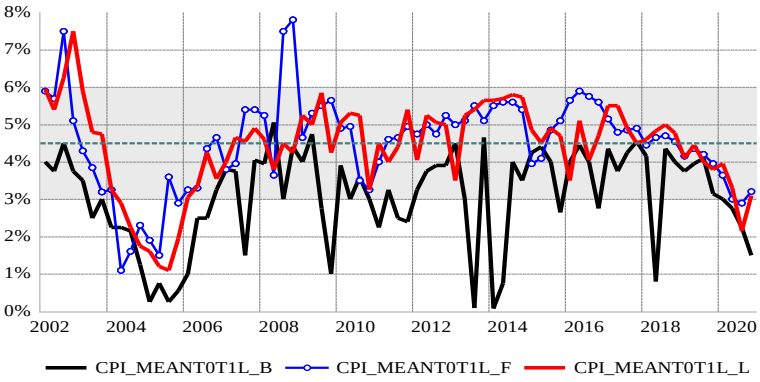
inflation forecasts, with the lower portion showing the lowest individual inflation forecast.

Figure 1: Highest and lowest inflation forecasts: trade unions, businesses and financial analysts, 2000Q2–2020Q4

(a) Highest



b) Lowest



Note: MEANT0T1 is the simple average of current and one-year-ahead inflation forecasts. B represents the business sector, F the financial analysts and L is for labour (trade unions). The shaded horizontal area is the SARB's inflation target of 3–6%.

The figures reveal considerable variation over time and across the three groups surveyed. Firm respondents who forecasted the lowest inflation rates are relatively more responsive to major economic events than the same respondents who predicted higher inflation. For example, we observe higher volatility in inflation expectations during 2013 and 2014 at the time of severe labour unrest in the mining industry. High volatility between the end of 2015 and 2018 was very likely influenced by local political turmoil caused by the sudden firing of the Minister of Finance in December 2015 ('Nenegate'), followed by events leading up to the resignation of the then state president, Jacob Zuma, in February 2018. Problems with electrical generation capacity

leading to load shedding (from about 2007 to the present day), as well as the mounting costs from a severe drought (peaking in 2017–2018), are also likely to have contributed. The impact of these events is less noticeable from the group of firms that expected relatively higher inflation. The sensitivity of different groups to the COVID-19 pandemic is, again, higher among the respondents who forecasted lower inflation than among those whose inflation expectations are highest.

5.2 Patterns in forecast disagreement

The SARB's mandate over the sample is an inflation target defined by a 3–6% range, and the SARB has explicitly targeted the mid-point at 4.5% since 2017. Figures 2 to 4 provide key details of the evolution of inflation forecast disagreement over time and across various levels of disaggregation of the data.[20] Unsurprisingly, the most visible impact on forecast disagreement at all forecast horizons is the period immediately after the Global Financial Crisis (GFC), in 2009 and 2010.[21] Respondents from the businesses display levels of disagreement that are only marginally lower than those of trade unions and far higher than financial analysts at the three shorter horizons. The pattern is similar at the five-year horizon, but forecast disagreement of labour is more volatile and slightly lower than that of firms. This slight change may simply be due to the smaller sample size of the labour group.

Generally, disagreement is far more volatile during the early years of the inflation-targeting regime, with notable increases in 2001/02 at the time of the exchange rate crisis, in 2004/05 when inflation was surprising observers at levels lower than any seen in about 35 years, and in 2009/10 as the effects of the GFC were being experienced in South Africa. Disagreement is both lower and more stable post-GFC, particularly after about 2012. The arrival of the COVID-19 pandemic has only a small impact on forecast disagreement, although a visible decline in disagreement emerges in the second quarter of 2020.

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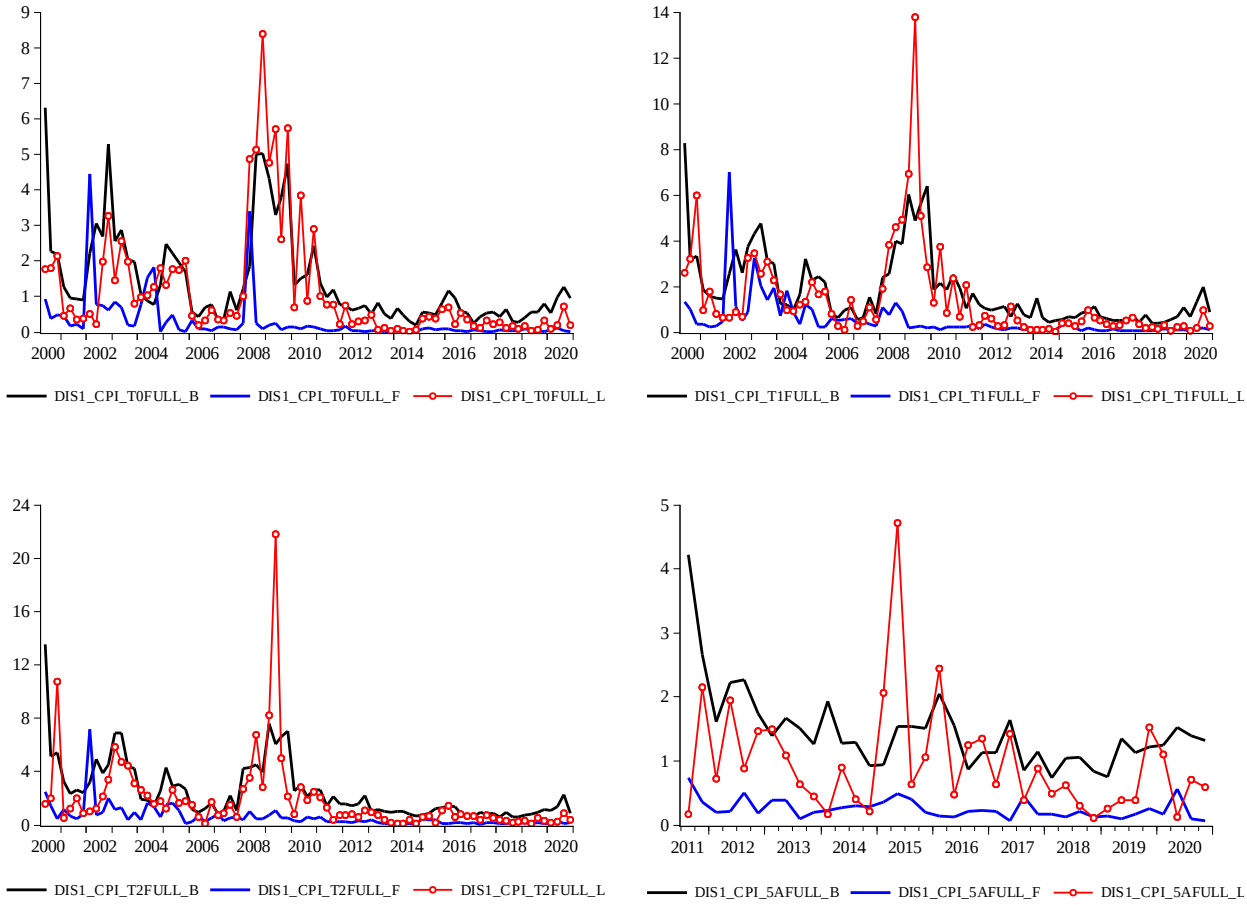
[20] Unless stated, the conclusions drawn from Figures 2 and 3 are the same even if the various measures of forecast disagreement are disaggregated.

[21] Unfortunately, long-run inflation expectations data begin after the GFC period, so we are unable to examine how longer horizon expectations may have been affected by the financial crisis.

Figure 2: Overall disagreement by major groups surveyed



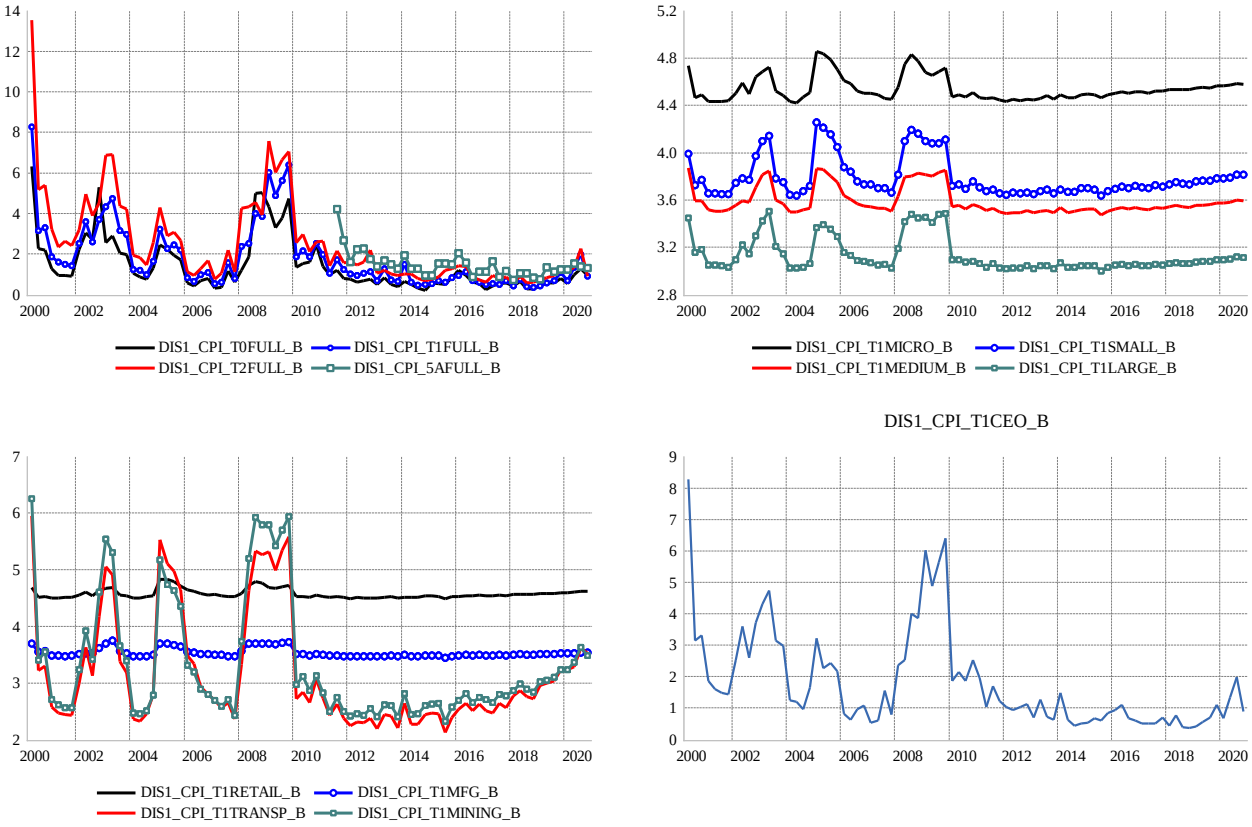
Note: Disagreement measured according to equation (1). See Table A3 for the benchmark used in the calculations.

In Figure 3 we consider examples of forecast disagreement for more disaggregated data. We plot the indicator of inflation forecast disagreement for the entire business sector and all horizons (figure at top left) against one-year-ahead forecast disagreement (i.e. for year T+1) according to firm size (figure at top right), selected industries (figure at bottom left) and CEOs of the businesses surveyed (figure at bottom right).

A common feature across horizons and various levels of disaggregation is that the period of the GFC no longer stands out as much as it did when the other three sectors are compared, as in Figure 2. The impact of the exchange rate crisis at the end of 2001

and into 2002, which was the subject of a commission of inquiry,[22] is visible in the inflation disagreement of 2002/03. Following this, in 2004/05 the South African rand strengthened significantly again. At the same time, the oil price increased sharply, so that, at least in early 2004, two key inflation drivers were moving in opposite directions. Disagreement among survey respondents about inflation forecasts could therefore quite reasonably be due to the movements in these two macroeconomic factors, which were both large and uncertain. Average headline CPI measured 1.4% in 2004, which was the lowest CPI reading in about 35 years.

Figure 3: Inflation forecast disagreement – business survey



Note: DIS1 is the disagreement metric used in Siklos (2013). T0, T1 and T2 refer to the forecast horizon (current year, one year ahead, two years ahead). FULL means that the mean of all respondents' forecasts is used. MICRO refers to businesses with fewer than 21 employees; SMALL, 21 to 50 employees; MEDIUM, 51 to 200 employees; LARGE, more than 200 employees. RETAIL is the wholesale and retail sector (SIC 61–64); MFG is manufacturing (SIC 30–39); TRANSP is transportation and communication (SIC 71–75); MINING is mining (SIC 13). CEO means that the respondent to the Business (B) survey is the CEO/manager/owner. The higher the estimate, the greater the forecast disagreement.

22 The South African rand weakened by 42% between 1 September and 31 December 2001 (Department of Justice and Constitutional Development 2002). The President of the Republic of South Africa appointed a commission of inquiry, which released a report on 1 August 2002.

Figure 3 also reveals a rising forecast disagreement after 2012 in the transportation and mining industries, although levels are lower than in the other industries shown. Disagreement is also much less volatile across all the industries after the worst of the GFC has passed. Levels of forecast disagreement are highest for the smallest firms and lowest for the largest firms. Finally, we note that levels of disagreement in mining and transportation catch up to those in the manufacturing sector by the end of the sample.

It is conceivable that firm respondents from different sectors may not contribute equally to the aggregate level of forecast disagreement. Recognising this, the US Federal Reserve publishes an index of common inflation expectations based on 21 indicators of inflation forecasts (Ahn and Fulton 2021). While the simplest way of aggregating is the simple arithmetic mean, we can consider several other measures of common inflation expectations. In the case of the BER survey, it is not unreasonable to think that the forecasts of other macrofinancial variables are related to each other (e.g. interest rates and inflation, exchange rates and inflation, and so on). Hence, we estimate, via principal components analysis,[23] a simple factor model that provides an alternative and, arguably, richer estimate of respondents' forward-looking views about the South African economy.[24] Next, we use the resulting estimates to generate a new measure of forecast disagreement using, as before, equation (3).

Figure 4 plots the resulting disagreement indicator, which summarises the views of the three groups surveyed. In contrast to the earlier calculations, inflation forecast disagreement combines forecast disagreement across the different variables and all three groups. The estimates are normalised and can be interpreted as an indicator of macrofinancial disagreement about the outlook for the South African economy. Two

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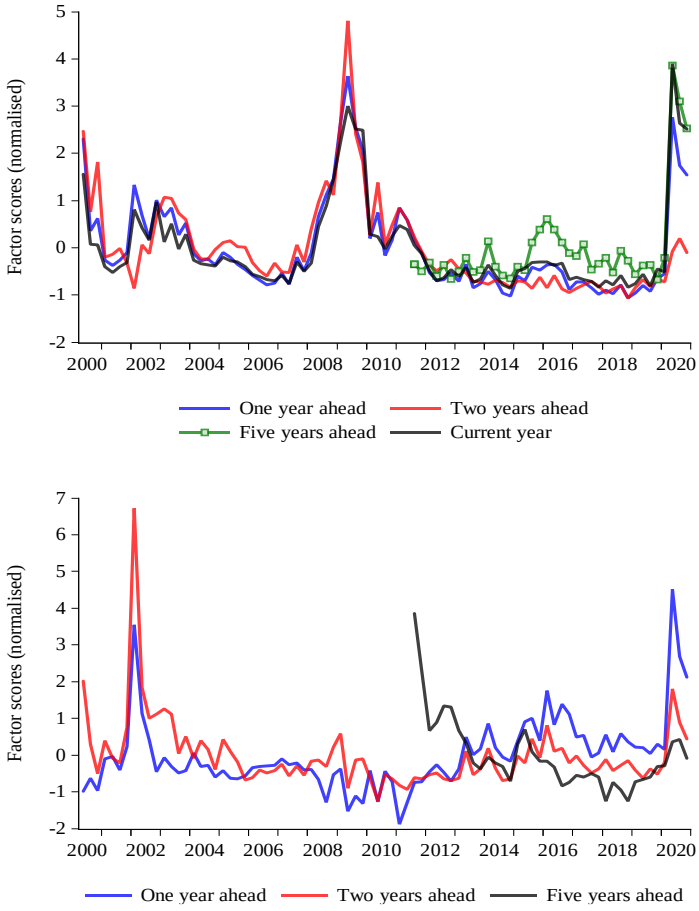
23 Principal components analysis is a widely used statistical method that generates a linear combination among several variables. Accordingly, it is a means to simplify the relationship that exists among time series. Several textbooks provide details (e.g. Joliffe (2002), but see also Joliffe and Cadima (2016)). When more than one linear combination satisfies a statistical relationship (e.g. maximum likelihood), it is common to clarify (and simplify) the relationship between the series still more. This requires a rotation to ensure the estimated factors remain uncorrelated; the varimax approach is a popular technique for this (see Kaiser (1958)).

24 The current-year factor model (T0) includes 15 variables; the one-year-ahead model (T1) includes 30 variables; and 18 variables are in the two- (T2) and five-year-ahead (5a) models. In the case of two factors, the scores are estimated following a rotation via the varimax method. More detailed estimates of the principal components are provided in the annexure.

results stand out in the figures. When data are aggregated across the sectors surveyed (top figure), the COVID-19 pandemic clearly results in a surge in overall forecast disagreement in early 2020. In contrast, macrofinancial disagreement does not rise at the two-year and five-year horizons, perhaps an indication that the impact of the pandemic is seen as temporary. The same interpretation holds when the factor model is estimated using only firm-level (i.e. business sector) data. Next, whereas the period of the GFC continues to stand out for the case where disagreement across the separate groups surveyed is combined, the same is not true when data are aggregated by firm size. Instead, it is the exchange-rate crisis in the early inflation-targeting period, the political turmoil in the mid-2010s and the COVID-19 pandemic that generate rises in macrofinancial disagreement.

Figure 4: Disagreement based on factor models



Note: The top figure is based on forecasts for all variables and survey groups. The bottom figure relies only on firm-level (business sector) data. Estimation is via principal components, with the number of factors set to 1 for the current year model and 2 for the remaining factor models.

5.3 Econometric evidence about the sources of disagreement

Figures 2 to 4 provide only unconditional insights into the sources of disagreement. Hence, we next turn to econometric evidence. Table 2 provides estimates of equation (2). Representative measures of inflation forecast disagreement for each of the three groups surveyed and of every available forecast horizon are included. The specifications also allow for the possibility that disagreement at shorter horizons is a potential determinant of longer-term forecast disagreement.

The table is divided into two parts. The first set of determinants of inflation forecast disagreement consists of disagreement in the set of other variables respondents are asked to forecast (real GDP growth, rand/USD exchange rate, prime interest rate, average salary and wage increase, long-term government bond yield, money supply growth and capacity utilisation rate). The second set of determinants is the levels of the variables observed in the previous quarter to capture the well-known persistence of macrofinancial time series (Jordà, Schularick and Taylor 2017).

With only two exceptions – current year inflation forecast disagreement between financial analysts and five-year-ahead disagreement among respondents from labour – inflation forecast disagreement is well explained by the combination of disagreement in all the variables forecasted and by lagged observed values of these same variables. Lagged disagreement about expected inflation is also significant, implying persistence in inflation forecast disagreement. Only firms at the shortest horizon show a significant and sizeable response to the rand, perhaps reflecting the fact that for some sectors, exchange rate movements can have a sizeable immediate impact on, for example, input costs, but that this impact is not expected to pass through to prices in general.[25] Increased disagreement about future interest rates contributes to more disagreement about inflation for firms at all horizons except the five-year horizon, probably reflecting a view that there is a connection between interest rates and inflation within the typical policy horizon.[26] Disagreement about the outlook for wage growth contributes positively to disagreement about future inflation at all horizons except the five-year

[25] The fact that the BER survey asks for forecasts of the level of the rand and not its rate of change may also play a role. Economic theory links inflation to currency appreciation or depreciation.

[26] The data do not permit us to disentangle the direction of causality between inflation and interest rates.

horizon for firms, reflecting the importance of wage growth as an input cost. This relationship is far less evident for labour and financial analysts, which may be more surprising.

Table 2: Sources of forecast disagreement

	Forecast disagreement by horizon (T0, T1, T2, 5a) and groups surveyed (business, financial analysts, labour)											
Determinants	CPIT0_B	CPIT0_F	CPIT0_L	CPIT1_B	CPIT1_F	CPIT1_L	CPIT2_B	CPIT2_F	CPIT2_L	CPI5a_B	CPI5a_F	CPI5a_L
CPIT2										.49(.34)	**.72(.32)**@	1.57(.98)
CPIT1							**1.44(.09)***	**.59(.08)***	**1.75(.10)***	.58(.42)	.28(.44)	.49(1.42)
CPIT0				**.57(.07)***	**.72(.13)***	**.38(.10)***	**-.40(.07)***	**.21(.10)**@	**-.48(.09)***	.01(.62)	**-1.31(.86)**@	-.24(1.33)
GDPT0	-.05(.03)	-.10(.15)	.08(.08)	**-.12(.07)** ¶	.16(.29)	-.05(.06)	.01(.05)	-.02(.17)	.07(.05)	**-.25(.13)** ¶	-.08(.21)	-.03(.13)
RANDT0	**.55(.24)**¶	.05(.17)	.03(.27)	-.04(.22)	-.45(.30)	.18(.35)	-.18(.15)	-.10(.18)	-.32(.29)	.37(.24)	.16(.11)	-.21(.54)
PRIMET0	**.72(.19)***	.34(.25)	**.17(.08)**@	**.78(.18)***	-.02(.36)	-.005(.11)	**-.47(.15)***	**-.52(.21)***	-.15(.13)	.16(.37)	-.15(.18)	.12(.44)
WAGEST0	**.23(.09)***	.09(.09)	.15(.09)	**.30(.18)** ¶	.45(.13) ¶	-.05(.15)	-.06(.11)	-.07(.08)	-.19(.13)	**.51(.19)***	-.09(.08)	.14(.41)
M3T0	-	-.03(.02)	-	-	.05(.02)@	-	-	-.07(.08)	-	-	-.03(.03)	-
R153T0	-	**.23(.14)** ¶	-	-	.32(.25)	-	-	-.02(.01)	-	-	-.11(.08)	-
CAPT0	-	-.001(.004)	-	-	.01(.03)	-	-	.02(.02)	-	-	-.01(.02)	-
GDPT1	-	-	-	.21(.14)	**-.83(.48)** ¶	.29(.18)	-.02(.10)	-.01(.29)	-.03(.15)	.38(.64)	.47(.33)	.25(.30)
RANDT1	-	-	-	.11(.12)	**.54(.25)** @	-.07(.16)	.005(.09)	.16(.16)	.15(.13)	.08(.07)	-.13(.09)	.04(.35)
PRIMET1	-	-	-	.02(.14)	.23(.27)	**.29(.11)***	**.40(.10)***	**.69(.16)***	-.03(.09)	.06(.18)	-.09(.15)	-.37(.37)
WAGEST1	-	-	-	.10(.18)	-.03(.13)	.11(.09)	.10(.13)	.02(.08)	**.18(.08)**@	-.05(.20)	**.14(.07)** ¶	.04(.38)
M3T1	-	-	-	-	-.01(.03)	-	-	.03(.02)	-	-	-.001(.03)	-
R153T1	-	-	-	-	-.24(.21)	-	-	-.04(.12)	-	-	.08(.08)	-
CAPT1	-	-	-	-	-.01(.04)	-	-	-.03(.02)	-	-	.02(.02)	-
RGDPG(-1)	-.05(.05)	-.01(.04)	-.01(.08)	**-.05(.03)** ¶	**-.08(.04)** ¶	.01(.07)	.02(.02)	.02(.03)	.05(.05)	**-.22(.11)** ¶	.04(.02)	.13(.12)
RAND (-1)	**-.09(.05)** ¶	-.04(.04)	**-.12(.07)**¶	**-.09(.03)***	-.06(.04)	.03(.06)	.03(.03)	-.001(.03)	.04(.05)	**-.23(.15)***	.01(.03)	.16(.16)
PRIME(-1)	**.12(.06)**@	**.15(.08)**@	**.19(.07)***	-.01(.05)	-.02(.08)	**.14(.07)**@	**.06(.03)** ¶	-.01(.05)	.03(.06)	.25(.17)	.03(.06)	-.39(.36)
CPI(-1)	**.07(.04)** ¶	**-.07(.04)** ¶	**.11(.06)** ¶	**.05(.02)**@	.02(.04)	-.0005(.05)	-.003(.02)	-.03(.02)	-.004(.04)	-.02(.09)	.003(.03)	-.12(.21)
RLT(-1)	-	-.03(.08)	-	-	.09(.09)	-	-	.03(.05)	-	-	-	-
M3G(-1)	-	.02(.02)	-	-	.02(.03)	-	-	-.01(.02)	-	-	-	-
CAP(-1)	-	.01(.02)	-	-	-.02(.02)	-	-	.01(.010	-	-	-	-
Constant	-.49(.82)	-1.68(1.63)	-.94(1.09)	**.88(.56)***	1.16(1.62)	**1.91(.97)**@	-.86(.40)	-.57(.97)	-.87(.83)	0.71(1.46)	-.37(.36)	2.28(2.96)
R^2-adj.	.68	.17	.48	.92	.61	.80	.97	.85	.93	.75	.55	.00
F-statistic	22.36(.00)	2.17(.02)	11.70(.00)	69.82(.00)	6.99(.00)	25.46(.00)	224.97(.00)	20.77(.00)	81.66(.00)	8.35(.00)	3.11(.01)	.88(.59)
Obs.	83	83	83	83	83	83	83	83	83	38	38	38

Note: Least squares estimation of equation (3). Also, see notes to Tables 1 and 2. RGDPG is the growth rate in real GDP; NER is the rand/USD exchange rate; PRIME is the observed prime rate; CPI(-1) is the inflation rate; M3G is the growth rate in M3; CAP is the capacity utilisation rate. Obs. is the number of observations before any transformation and lags. The full sample is 2000Q2–2020Q4; 2011Q3–2020Q4 for CPI5a. Forecast disagreement is given by equation (1), and the mean forecast across all three groups (i.e. business, labour, financial analysts) is represented as $\bar{F}$. Coefficient estimates in bold characters are respectively statistically significant at the 1% (*), 5% (@) and 10% (¶) levels of significance.

Another extension to the specifications presented in Table 2 was also considered (not shown). We added other variables from outside this survey that might affect forecast disagreement but are not among the series being forecast. We included the return on the Johannesburg Stock Exchange (lagged one quarter), credit growth, the US policy rate, the VIX and economic policy uncertainty (see Baker, Bloom and Davis (2016)). These additional series were not found to be statistically significant at the longer forecast horizons (two and five years), but share prices, credit growth and the US policy rate can partially explain inflation forecast disagreement at shorter horizons.[27]

The foregoing results suggest that when forecasters disagree about future inflation it is because they also disagree about the future course of other key macrofinancial variables. The relationship is strongest for shorter-term disagreement about inflation. Inflation forecast disagreement is also partially driven by how the series being forecast evolved in the past. We cannot tell whether this reflects a form of inattention, differences in what the past portends for the future, certain socio-economic characteristics of the forecasters we are unable to quantify or some type of bias in how disagreement about future inflation emerges. Nevertheless, we can conclude that not only do forecasters disagree about future inflation, as they have different expectations about other key variables, but also that the source of disagreement is sensitive to the level of aggregation in the data.

6. Conclusions

Despite low and stable inflation being a desirable goal of monetary policy, central bankers around the world have repeatedly stressed that we do not know enough about the dynamics of inflation and inflation expectations. Until fairly recently, models and professional forecasts were typically used to interpret the effectiveness of monetary policy. A growing literature underscores the value of understanding how households form expectations, but comparatively few data measure firms' expectations. As firms are, in a

[27] We also examined the possibility that a remaining structural break in equation (2) not captured by the available data was omitted. Using the Bai and Perron (2003) methodology, we found almost no structural breaks.

sense, both price takers and makers, it would appear critical for policy makers to better understand what firms think about the economic outlook.

This paper used rich micro-level firm data over a period of more than twenty years, during which inflation targeting has been in place in South Africa, to add to our understanding of firm-level inflation expectations. These data are complemented with similar data about the expectations of trade unions and financial analysts. We were especially interested in the extent to which forecasters disagree, and we attempted to explore the sources of their disagreement. The data set is rich in that it includes forecasts of inflation as well as forecasts for a set of other macrofinancial variables provided by the same individuals and offers forecasts of inflation for several time horizons, ranging from current to five years ahead.

Although there are common features in the behaviour of inflation expectations over time and across forecast horizons, disaggregating the data highlights important differences in how expectations behave across various groups. For example, the mining and manufacturing industrial sectors are far more sensitive to macroeconomic developments than other sectors, such as retail. Similarly, persistent differences in displayed forecast disagreement are sensitive to firm size and the occupation of the respondents (e.g. economists versus CEOs). Finally, it appears that forecasts of inflation alone are insufficient to understand how forecast disagreement evolves over time. Thus, aggregated and disaggregated forecast disagreement does not rise greatly at the onset of the COVID-19 pandemic, unless one examines an indicator we create (which we call macroeconomic forecast disagreement) that uses forecasts for all available variables jointly modelled via a factor model. The same is true for the impact of the GFC. Combining all forecasts and disaggregating the data shows that disagreement in some sectors or industries did not rise as sharply as in the data aggregated across sectors surveyed and for the entire data set combined.

The principal policy implication is that the SARB in particular, but central banks more generally, should consider disagreement in the outlook more broadly than just focusing

on inflation and GDP growth. Forecasts for other macrofinancial variables generate insights that an investigation of inflation forecast disagreement alone can miss. In addition, the heterogeneity of inflation expectations suggests that central bank communication should include elements that are targeted at particular audiences in addition to conveying information intended for the broader public.

In spite of our findings, there are limitations in our analysis and potential extensions. We have too few socio-economic variables to reliably determine what drives the formation of inflation expectations in the three groups for which we have survey data. Moreover, it would be interesting to compare these results with similar survey data available for South African households. Unfortunately, we only have a small selection of the available time series of household forecasts (Reid, Siklos and Du Plessis 2021). Another extension would be to identify the balance between concerns about the policy response to uncertainty versus the unintended consequences of an adverse change in the policy stance taken by the SARB over time. This would require a different econometric approach and the imposition of a priori restrictions. Finally, there is scope for a deeper analysis of the performance of various forecasts at different levels of disaggregation as well as the possibility of developing a better understanding of the role of rational inattention, noise or other behavioural limitations that respondents face when forecasting inflation and the other macrofinancial variables they are asked to forecast. We leave these extensions to future research.

Annexures

Survey questionnaire

	What do you expect the …	Average 2007-11	2011	T0 2012	T1 2013	T2 2014
CPI	average **headline inflation rate** (as measured by the percentage change in the CPI) to be during the year:	7,0	5,0			
GDP	average **economic growth rate** (as measured by the percentage change in the real GDP) to be during the year:	2,8	3,1			
Prime	**prime overdraft rate** to be at the end of:		9,00			
R153 *	yield on the **R207 ##** government **bond** to be at the end of:		7,90			
Rand	**rand / US dollar** exchange rate to be at the end of:		8,07			
M3 *	average **M3 money supply growth rate** to be during the year:	11,8	6,8			
Wages	average **salary and wage increase** to be during the year:	10,4	7,4			
Capacity *	average percentage **utilisation of production capacity** in the manufacturing sector to be during the year:	81,6	80,3			

* The long-term yield, money supply growth and capacity utilisation are only put to financial analysts.

The benchmark bond is changed periodically. Refer to the quarterly reports for information on the designated long-term bond.

Further detail about the BER survey

Part (a) of Table A1 presents the number of observations according to firm size. Notice that the number of firm respondents dwarfs those of financial analysts or labour. Almost half of the firms surveyed are micro or small firms and almost 60% of trade union respondents are from firms with 50 or fewer employees, but over half of the financial analysts are employed by large firms.

Part (b) of Table A1 provides the breakdown of the firm-level survey by two-digit standard industrial classification (SIC) codes. The BER uses convenience sampling, so the fraction of firms surveyed is not formally linked to the relative size of each sector in the South African economy, although effort is made to ensure that a variety of sectors is adequately represented in the sample. The last three columns show the relative importance of each sector surveyed as a percentage of South Africa's GDP. Data (not shown) reveal some

stability in the share of various industries sampled, although the importance of mining and manufacturing have shown some changes over time. Finally, part (c) shows a breakdown of the data according to the position of the respondents in firms surveyed. Only about 4% of firm-level responses did not provide the position of the respondent. It is clear that the vast majority of the firm respondents are in senior decision-making positions within the firm, so their forecasts are likely to impact the firm's price-setting behaviour.

Table A1: The BER survey: number of observations, 2000Q2–2020Q4

a. Firm size

Full-time employees	Alternate classification	Labour	*Labour*	Business	*Business*	Financial analysts	*Financial analysts*
< 21	Micro	620	*620*	8 005	*8 005*	184	*184*
21–50	Small	109	*109*	5 655	*5 655*	112	*112*
51–100	Medium	199	*250*	4 010	*7 810*	97	*310*
101–200		51		4 179		213	
201–300	Large	25	*254*	1 589	*6 897*	140	*794*
301–400		0		1 153		227	
401–500		86		939		57	
501–1 000		53		1 407		22	
> 1 000		90		1 433		348	
Undefined/No response		43		7		38	
Total		1 276		28 379		1 438	

Note: Sample is 2000Q2–2020Q4. The columns in *italics* represent the number of observations for the aggregations based on the column identified as “Alternate classification”.

b. Industry

Industry	Observations	% of total	% GDP 2002Q4	% GDP 2013Q4	%GDP 2019Q4
Agriculture	2 311	*8.1*	2.6	2.2	2.2
Mining	513	*1.8*	7.2	4.9	7.2
Manufacturing	10 589	*37.3*	17	15	12.2
Electricity & water	13	*0.46*	2.1	1.7	2.1
Construction	1 315	*4.6*	2.1	3	3.3
Transportation & communication	9 299	*32.8*	12.2	12.5	13.7
Wholesale & retail	476	*1.7*	8.6	9	8.6
Finance & real estate	2 667	*9.4*	18	21.4	20.8
Community & social services	1 184	*4.2*	19.5	19.2	20.9

Note: Twelve observations could not be classified. SIC codes are (in the same order as the first column of the table): 11, 13, 30–39, 42, 5, 61–64, 71–75, 82–88, 91–99. Data are from P0441, Gross Domestic Product, Stats SA, various years.

c. Title or responsibility of respondents

Title	Labour	Business	Financial analysts
CEO – *CEO*	0	17 767	29
Financial manager/Accountant – *Anal*	0	8 118	18
Senior sales/ Production manager – *Sales*	0	872	0
Economist – *Econ*	22	24	1 220
Investment analyst/Researcher – *Anal*	5	0	60
Fund manager – *Mgr*	0	0	71
Trade union rep. – *Union*	999	5	0
Employer organisation rep. – *Other*	246	1	0
Other	3	368	40
No response	1	1 224	0
Total	1 276	28 379	1 438

Note: See note to part (a) of this table. Under the "Other" category, respondents are asked to specify which industry their firms fall into, but these details are not available to us. The "Other" and "No response" categories are combined in the empirical work and labelled "Other". The short abbreviated variable name used in the rest of the paper appears in *italics*.

Source: BER

Table A2: Aggregate expectations for different macrofinancial variables from the BER survey: full sample 2000Q2–2020Q4

Forecast		Labour	Business	Financial analysts
Definition	**Label**	**Mean (SD) – %**	**Mean (SD) – %**	**Mean (SD) – %**
Current year inflation	CPI_T0	6.07 (1.52)	6.29 (1.56)	5.70 (1.81)
Year-ahead inflation	CPI_T1	6.16 (1.32)	6.39 (1.27)	5.46 (0.82)
Two-years ahead inflation	CPI_T2	6.22 (1.23)	6.41 (1.09)	5.28 (0.44)
Five-years ahead inflation	CPI5a	5.75 (0.64)	6.15 (0.48)	5.34 (0.35)
Current year economic growth	GDP_T0	2.40 (1.42)	2.14 (1.43)	2.17 (1.87)
Year-ahead economic growth	GDP_T1	2.89 (1.22)	2.49 (1.16)	2.86 (1.01)
Current year prime interest rate	PRIME_T0	11.28 (2.30)	11.31 (2.26)	11.10 (2.25)
Year-ahead prime interest rate	PRIME_T1	11.31 (2.04)	11.41 (1.99)	11.13 (1.79)
Current year rand/USD exchange rate	RAND_T0	9.89 (3.06)	9.90 (3.00)	9.79 (2.87)
Year-ahead rand/USD exchange rate	RAND_T1	10.08 (3.02)	10.27 (3.00)	10.12 (2.74)
Current year wage growth	WAGES_T0	7.62 (1.32)	7.54 (1.22)	7.52 (1.26)
Year-ahead wage growth	WAGES_T1	7.74 (1.18)	7.58 (1.06)	7.24 (0.88)
Current year capacity utilisation	CAP_T0	NA	NA	81.31 (2.66)
Year-ahead capacity utilisation	CAP_T1	NA	NA	82.13 (2.20)
Current year M3 growth	M3_T0	NA	NA	10.19 (4.60)
Year-ahead M3 growth	M3_T1	NA	NA	9.85 (2.81)
Current year long-term government bond yield	R_T0	NA	NA	8.88 (1.40)
Year-ahead long-term government bond yield	R_T1	NA	NA	8.98 (1.26)

Note: NA means not applicable, because survey respondents in the relevant groups were not asked to provide a forecast for the variables listed.

Source: BER and authors' calculations

Table A3: Selected comparisons between mean and median values for inflation expectations

		T0			T1			T2			5a		
		B	L	FA	B	L	FA	B	L	FA	B	L	FA
Full	Mean	6.26	6.06	5.64	6.38	6.17	5.44	6.41	6.20	5.27	6.09	5.70	5.30
	Median	6.17	5.89	5.52	6.32	6.05	5.44	6.40	6.06	5.35	6.29	5.89	5.41
Large	Mean	6.16	5.99	5.59	6.21	5.90	5.41	6.17	5.86	5.29	6.00	5.42	5.40
	Median	6.07	5.90	5.49	6.18	5.87	5.41	6.18	5.87	5.41	6.09	5.58	5.53
Small	Mean	6.33	6.46	5.78	6.48	6.33	5.80	6.52	6.18	5.57	6.18	5.85	5.24
	Median	6.18	6.28	5.53	6.42	6.35	5.68	6.43	6.10	5.50	6.33	6.00	5.29
ECON	Mean	6.62	6.22	5.62	6.80	5.46	5.39	6.88	5.24	5.22	6.40	NA	5.30
	Median	6.55	6.00	5.45	6.50	5.40	5.43	7.00	5.00	5.31	6.50	NA	5.42
MFG	Mean	6.23	NA	NA	6.30	NA	NA	6.30	NA	NA	6.11	NA	NA
	Median	6.11	NA	NA	6.26	NA	NA	6.33	NA	NA	6.24	NA	NA
ELEC	Mean	6.23	NA	NA	6.30	NA	NA	6.30	NA	NA	6.11	NA	NA
	Median	6.11	NA	NA	6.26	NA	NA	6.33	NA	NA	6.24	NA	NA

Note: All abbreviations are explained in the main body of the paper.

Table A4: Factor loadings for factor models estimated with all three groups jointly

a. Horizon T0

Factor method: principal factors	
Sample: 2000Q2–2020Q4	
Included observations: 83	
	Loadings
	F1
DIS1_CPI_T0FULL_B	0.63
DIS1_CPI_T0FULL_L	0.55
DIS1_CPI_T0FULL_F	0.14
DIS1_WAGES_T0FULL_B	0.71
DIS1_WAGES_T0FULL_L	0.46
DIS1_WAGES_T0FULL_F	0.67
DIS1_GDP_T0FULL_B	0.71
DIS1_GDP_T0FULL_L	0.80
DIS1_GDP_T0FULL_F	0.67
DIS1_PRIME_T0FULL_B	0.71
DIS1_PRIME_T0FULL_L	0.75
DIS1_PRIME_T0FULL_F	0.20
DIS1_RAND_T0FULL_B	0.41
DIS1_RAND_T0FULL_F	0.03
DIS1_RAND_T0FULL_L	0.47

b. Horizon T1

Rotation method: orthogonal varimax		
Rotated loadings: L * inv(T)'		
	F1	F2
DIS1_CPI_T1FULL_B	0.84	0.22
DIS1_CPI_T1FULL_L	0.84	-0.02
DIS1_CPI_T1FULL_F	0.16	0.56
DIS1_WAGES_T1FULL_B	0.79	-0.03
DIS1_WAGES_T1FULL_L	0.58	-0.13
DIS1_WAGES_T1FULL_F	0.46	0.23
DIS1_GDP_T1FULL_B	0.31	0.41
DIS1_GDP_T1FULL_L	0.67	-0.12
DIS1_GDP_T1FULL_F	0.27	0.45
DIS1_PRIME_T1FULL_B	0.71	0.34
DIS1_PRIME_T1FULL_L	0.88	0.04
DIS1_PRIME_T1FULL_F	0.26	0.52
DIS1_RAND_T1FULL_B	-0.07	0.86
DIS1_RAND_T1FULL_F	-0.23	0.42
DIS1_RAND_T1FULL_L	0.10	0.86

c. Horizon T2

Rotation method: orthogonal varimax		
Rotated loadings: L * inv(T)'		
	F1	F2
DIS1_CPI_T2FULL_B	0.81	0.33
DIS1_CPI_T2FULL_L	0.82	-0.03
DIS1_CPI_T2FULL_F	0.18	0.80
DIS1_WAGES_T1FULL_B	0.76	0.03
DIS1_WAGES_T1FULL_L	0.58	-0.10
DIS1_WAGES_T1FULL_F	0.43	0.29
DIS1_GDP_T1FULL_B	0.27	0.20
DIS1_GDP_T1FULL_L	0.67	-0.20
DIS1_GDP_T1FULL_F	0.24	0.22
DIS1_PRIME_T1FULL_B	0.71	0.44
DIS1_PRIME_T1FULL_L	0.88	0.02
DIS1_PRIME_T1FULL_F	0.22	0.64
DIS1_RAND_T1FULL_B	-0.09	0.75
DIS1_RAND_T1FULL_F	-0.22	0.34
DIS1_RAND_T1FULL_L	0.07	0.81
DIS1_CPI_T1FULL_B	0.84	0.32
DIS1_CPI_T1FULL_F	0.13	0.78
DIS1_CPI_T1FULL_L	0.90	-0.02

d. Horizon 5a

Rotation method: orthogonal varimax		
Rotated loadings: L * inv(T)'		
	F1	F2
DIS1_CPI_5AFULL_B	0.01	0.87
DIS1_CPI_5AFULL_L	-0.16	0.25
DIS1_CPI_5AFULL_F	-0.02	0.63
DIS1_WAGES_T1FULL_L	0.09	0.65
DIS1_WAGES_T1FULL_F	0.25	0.66
DIS1_GDP_T1FULL_B	0.94	0.10
DIS1_GDP_T1FULL_L	0.31	0.22
DIS1_GDP_T1FULL_F	0.93	0.12
DIS1_PRIME_T1FULL_B	0.78	0.23
DIS1_PRIME_T1FULL_L	0.82	0.13
DIS1_PRIME_T1FULL_F	0.28	-0.01
DIS1_RAND_T1FULL_B	0.71	-0.30
DIS1_RAND_T1FULL_F	0.12	-0.22
DIS1_RAND_T1FULL_L	0.70	-0.08
DIS1_CPI_T2FULL_B	0.27	0.74
DIS1_CPI_T2FULL_F	0.02	0.49
DIS1_CPI_T2FULL_L	0.05	0.28
DIS1_WAGES_T1FULL_B	0.05	0.86

Note: Most of the terms used here are defined in the body of the paper. DIS1 is forecast disagreement (equation (1)). FULL means the complete sample (2000**–**2020). The scores plotted in Figure 4 are the linear combination of the factor loadings multiplied by the series in question. A positive value raises the score, a negative value reduces the score.

Table A5: Sources of forecast disagreement

	Forecast disagreement											
Ind. vars: Fcst dis.	CPIT0_B	CPIT0_F	CPIT0_L	CPIT1_B	CPIT1_F	CPIT1_L	CPIT2_B	CPIT2_F	CPIT2_L	CPI5a_B	CPI5a_F	CPI5a_L
CPIT2										.49(.34)	**.72(.32)**@	1.57(.98)
CPIT1							**1.44(.09)***	**.59(.08)***	**1.75(.10)***	.58(.42)	.28(.44)	.49(1.42)
CPIT0				**.57(.07)***	**.72(.13)***	**.38(.10)***	**-.40(.07)***	**.21(.10)**@	**-.48(.09)***	.01(.62)	**-1.31(.86)**@	-.24(1.33)
GDPT0	-.05(.03)	-.10(.15)	.08(.08)	**-.12(.07)** ¶	.16(.29)	-.05(.06)	.01(.05)	-.02(.17)	.07(.05)	**-.25(.13)** ¶	-.08(.21)	-.03(.13)
RANDT0	**.55(.24)**¶	.05(.17)	.03(.27)	-.04(.22)	-.45(.30)	.18(.35)	-.18(.15)	-.10(.18)	-.32(.29)	.37(.24)	.16(.11)	-.21(.54)
PRIMET0	**.72(.19)***	.34(.25)	**.17(.08)**@	**.78(.18)***	-.02(.36)	-.005(.11)	**-.47(.15)***	**-.52(.21)***	-.15(.13)	.16(.37)	-.15(.18)	.12(.44)
WAGEST0	**.23(.09)***	.09(.09)	.15(.09)	**.30(.18)** ¶	.45(.13) ¶	-.05(.15)	-.06(.11)	-.07(.08)	-.19(.13)	**.51(.19)***	-.09(.08)	.14(.41)
M3T0	NA	-.03(.02)	NA	NA	.05(.02)@	NA	NA	-.07(.08)	NA	NA	-.03(.03)	NA
R153T0	NA	**.23(.14)** ¶	NA	NA	.32(.25)	NA	NA	-.02(.01)	NA	NA	-.11(.08)	NA
CAPT0	NA	-.001(.004)	NA	NA	.01(.03)	NA	NA	.02(.02)	NA	NA	-.01(.02)	NA
GDPT1	NA	NA	NA	.21(.14)	**-.83(.48)** ¶	.29(.18)	-.02(.10)	-.01(.29)	-.03(.15)	.38(.64)	.47(.33)	.25(.30)
RANDT1	NA	NA	NA	.11(.12)	**.54(.25)** @	-.07(.16)	.005(.09)	.16(.16)	.15(.13)	.08(.07)	-.13(.09)	.04(.35)
PRIMET1	NA	NA	NA	.02(.14)	.23(.27)	**.29(.11)***	**.40(.10)***	**.69(.16)***	-.03(.09)	.06(.18)	-.09(.15)	-.37(.37)
WAGEST1	NA	NA	NA	.10(.18)	-.03(.13)	.11(.09)	.10(.13)	.02(.08)	**.18(.08)**@	-.05(.20)	**.14(.07)** ¶	.04(.38)
M3T1	NA	NA	NA	NA	-.01(.03)	NA	NA	.03(.02)	NA	NA	-.001(.03)	NA
R153T1	NA	NA	NA	NA	-.24(.21)	NA	NA	-.04(.12)	NA	NA	.08(.08)	NA
CAPT1	NA	NA	NA	NA	-.01(.04)	NA	NA	-.03(.02)	NA	NA	.02(.02)	NA
RGDPG(-1)	-.05(.05)	-.01(.04)	-.01(.08)	**-.05(.03)** ¶	**-.08(.04)** ¶	.01(.07)	.02(.02)	.02(.03)	.05(.05)	**-.22(.11)** ¶	.04(.02)	.13(.12)
NER(-1)	**-.09(.05)** ¶	-.04(.04)	**-.12(.07)**¶	**-.09(.03)***	-.06(.04)	.03(.06)	.03(.03)	-.001(.03)	.04(.05)	**-.23(.15)***	.01(.03)	.16(.16)
PRIME(-1)	**.12(.06)**@	**.15(.08)**@	**.19(.07)***	-.01(.05)	-.02(.08)	**.14(.07)**@	**.06(.03)** ¶	-.01(.05)	.03(.06)	.25(.17)	.03(.06)	-.39(.36)
CPIPC(-1)	**.07(.04)** ¶	**-.07(.04)** ¶	**.11(.06)** ¶	**.05(.02)**@	.02(.04)	-.0005(.05)	-.003(.02)	-.03(.02)	-.004(.04)	-.02(.09)	.003(.03)	-.12(.21)
RLT(-1)	NA	-.03(.08)	NA	NA	.09(.09)	NA	NA	.03(.05)	NA	NA	NA	NA
M3G(-1)	NA	.02(.02)	NA	NA	.02(.03)	NA	NA	-.01(.02)	NA	NA	NA	NA
CAP(-1)	NA	.01(.02)	NA	NA	-.02(.02)	NA	NA	.01(.010	NA	NA	NA	NA
Constant	-.49(.82)	-1.68(1.63)	-.94(1.09)	**.88(.56)***	1.16(1.62)	**1.91(.97)**@	-.86(.40)	-.57(.97)	-.87(.83)	0.71(1.46)	-.37(.36)	2.28(2.96)
R^2-adj.	.68	.17	.48	.92	.61	.80	.97	.85	.93	.75	.55	.00
F-statistic	22.36(.00)	2.17(.02)	11.70(.00)	69.82(.00)	6.99(.00)	25.46(.00)	224.97(.00)	20.77(.00)	81.66(.00)	8.35(.00)	3.11(.01)	.88(.59)
Obs.	83	83	83	83	83	83	83	83	83	38	38	38

Note: Least squares estimates of equation (3). Also, see note to Tables 1 and 2. RGDPG is the annualised growth rate in real GDP; NER is the rand/USD exchange rate; PRIME is the observed prime rate; CPIPC is the annualised inflation rate; M3G is the annualised growth rate in CPI; CAP is the capacity utilisation rate. Obs. is the number of observations before any transformation and lags. The full sample is 2000Q2–2020Q4; in the case of CPI5a the sample is 2011Q3–2020Q4. Forecast disagreement is evaluated according to equation (1), with the overall mean forecast (i.e. business, labour, financial analysts) used for $\bar{F}$. Coefficient estimates in bold characters are statistically significant at the 1% (*), 5% (@), and 10% (¶) levels of significance.

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