News and Firms' Expectations

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Preliminary version

Abstract.

This paper explores the impact of news on firms' expectations of macroeconomic conditions. Using data from a U.S. survey on firms' inflation expectations, Candia et al. (2022) document substantial disagreement among firms regarding future aggregate conditions, despite their access to similar aggregate statistics. In a related study, Andrade et al. (2020) analyze survey data from French manufacturing firms and find that industry-specific conditions significantly shape firms' aggregate expectations. However, many small and medium-sized firms may lack access to privileged industry information and instead rely on standard news sources for insights into industry conditions. Consequently, publicly available industry news likely plays a crucial role in shaping these firms' perceptions of aggregate economic conditions. Using Natural Language Processing model to analyze the text of news reports from major South African newspapers and South African firm-level expectation data, I find that both industry and aggregate news play a significant role in shaping firms' expectations, particularly for inflation and economic growth. These findings challenge the assumption of full-information rational expectations in macroeconomic models and align with the "island" model literature. Interestingly, industry news has a stronger effect than aggregate news for variables influenced by both types of news. Additionally, while industry news impacts the expectations of small and medium-sized firms, it has no significant effect on large firms.

Keywords: Expectations, Surveys, Firms, News Media

JEL Codes: E3, E4, E5, E6

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1 Introduction

Expectations play an important role in economic theories as they have substantial impacts on agents' current decisions, and thus ultimately affect current prices and the state of the economy. In fact, the primary distinction between economics and other sciences is the forward-looking nature of decisions made by agents. For instance, firms need to forecast the prices of their costs and their competitors' prices to decide how much to produce and how much they should invest in new machines. In consumption theory, households' consumption decisions today not only depend on their current income but also their expectations of future income. Hence, expectations underpin most macroeconomic models.

Nevertheless, the way in which agents form their beliefs is not well understood. Research shows that agents typically face information frictions when forming expectations. They are barriers or inefficiencies in the flow of information in markets that can affect decision-making and outcomes. These frictions can arise due to various factors, such as incomplete information, lack of transparency, or difficulties in accessing or processing information. This leads to uncertainty about future outcomes, which in turn affects people's expectations, market efficiency, and welfare.

There is a growing literature assessing the impacts of informational frictions on aggregate dynamics. Using a U.S. survey of firms' inflation expectations, Candia et al. (2022) report large disagreement among firms about future aggregate conditions even though they observe similar aggregate statistics. Andrade et al. (2020) use a survey of French manufacturing firms and explain that this puzzle is due to firms relying on the information they receive about their industries to form beliefs about the broader economic conditions although their industry signals have no aggregate effects. Big firms could have the resources to access the exact industry information. However, many small and medium firms could hardly have access to privileged industry information. Instead, I hypothesize that they rely on standard news sources to learn about industry conditions. Therefore, firms' public industry news would have a substantial role in shaping their view of aggregate economic conditions.

In this paper, I explore the role of industry news in shaping firms' expectations of macroeconomic conditions. Specifically, I investigate whether greater coverage of industry and aggregate news influences firms' expectations of macroeconomic variables and enhances their forecast accu-

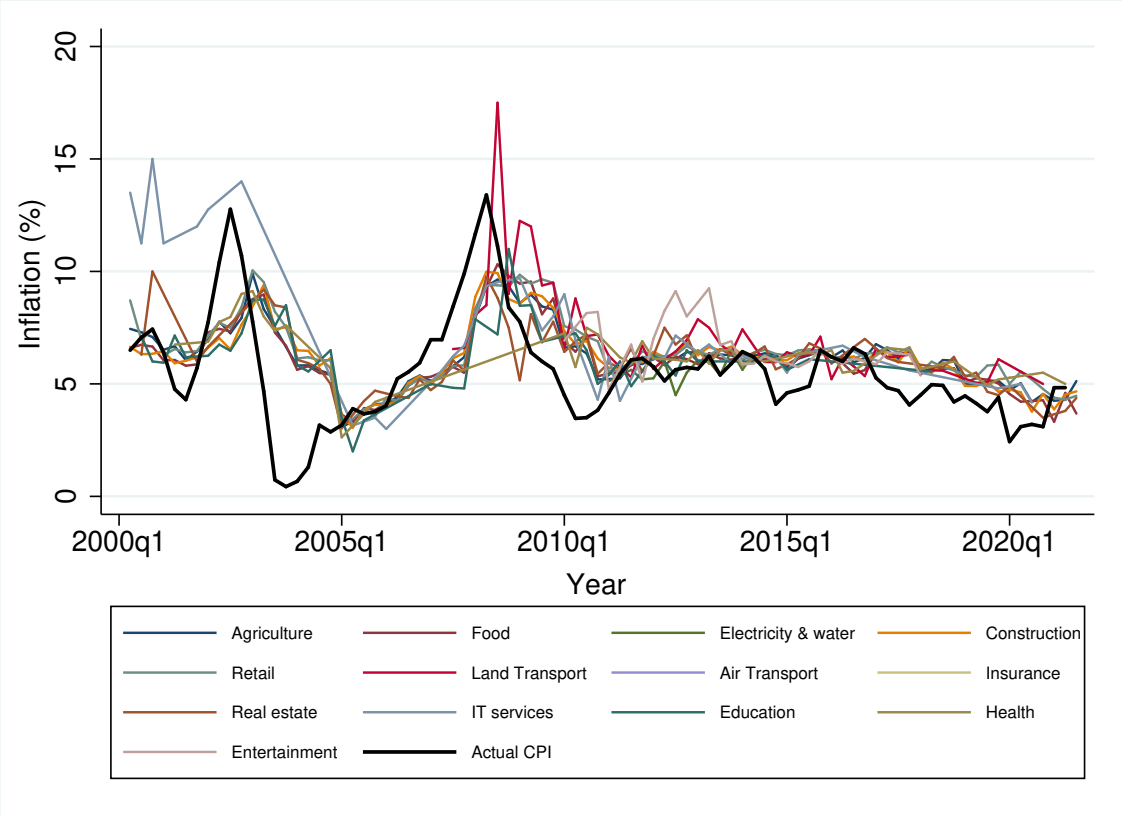
racy, as well as whether the content of such news—whether it mentions an increase, decrease, or no change in a macroeconomic variable—affects firms' forecast errors.

To study these questions, I leverage news data from Factiva alongside quarterly firm-level survey data on expectations from South Africa, administered by the Bureau for Economic Research/South African Reserve Bank.[1] I use South Africa data because: (i) This data provides detailed information on firms' sectors, enabling us to map the frequency of industry news with specific firms; (ii) The data offers extensive coverage in terms of both size and sector; (iii) The survey not only inquires about inflation expectations but also encompasses other aggregate economic variables such as economic growth, interest rates, exchange rates, and wages. This comprehensive scope facilitates a thorough understanding of the relationship between industry news and firms' expectations regarding the aggregate economic condition; and (iv) Despite the survey being conducted quarterly, the month when firms respond to the survey varies throughout the year. For instance, in some years, firms may respond in April for the second quarter, while in other years, responses may occur in May or June. This variation in response timing throughout the year is leveraged in the analyses in Section 4.

The paper presents three key findings. First, there is a strong correlation between firms' expectations for different aggregate economic variables: firms that expect higher inflation at any future horizon tend to predict rising interest rates, increasing wages, lower economic growth, and a depreciation of the Rand against the U.S. dollar. Second, the frequency of both industry and aggregate news plays an important role in shaping firms' expectations, particularly for small and medium-sized firms. Increased exposure to industry news improves firms' forecast accuracy for inflation and economic growth. This result challenge the assumption of full-information rational expectation employed widely in macroeconomic models. Following this assumption, we should not observe any effects of industry news on firms' expectation and forecast errors. This finding supports the literature of "island" models in macroeconomics, that is firms only have access to a subset of prices in the economy with which they conduct transactions, using these prices to shape their beliefs about aggregate economy. Moreover, industry news has a stronger effect than aggregate news for variables influenced by both types of news. (3) The content of news reports

[1]I thank George Kershoff, Bureau for Economic Research (Stellenbosch University), and the South African Reserve Bank (SARB) for providing me with the South Africa expectation data. The views expressed in this paper are those of the author and do not reflect those of the South African Reserve Bank.

Figure 1: Heterogeneity in Firms' Inflation Expectations across sectors in South Africa



Notes: The figure plots firms' inflation expectation of different sectors in South Africa. Data is from South Africa firm-level expectation data from SARB/BER.

significantly influences firms' forecast accuracy, with news mentioning increases or decreases in economic variables reducing forecast errors. Industry news reporting no change does not improve forecast accuracy, while aggregate news, regardless of direction, has a positive impact on forecast accuracy. The effects of news coverage also vary by firm size, with small and medium-sized firms benefiting the most from news exposure.

This work contributes to the literature examining the formation of expectations among economic agents. Coibion et al. (2020) highlight a significant discrepancy among firms regarding future aggregate conditions, despite observing similar aggregate statistics. Numerous papers in the literature offer explanations for this disparity. In particular, this study aligns with a well-established strand of "island" models in macroeconomics, (Lucas, 1972; Lorenzoni, 2009; Angeletos and La'O, 2013; Nimark, 2014; Coibion and Gorodnichenko, 2012; Andrade and Le Bihan, 2013;

Yang, 2022; Afrouzi, 2023, for example,). Building on this foundation, Andrade et al. (2020) employ a survey of French manufacturing firms, revealing the significant role played by the firm's industry conditions in shaping their aggregate expectations. This paper extends this line of work by examining how industry news interacts with firms' expectation formation since it is not possible for all firms to have access to the privilege industry information. This finding that industry news exhibits correlations with firms' expectations aligns with the research by Andrade et al. (2020), who utilize a survey of French manufacturing firms and observe that industry conditions significantly influence the formation of firms' aggregate expectations. It also aligns with previous research indicating that prices tend to react more swiftly to industry-level shocks compared to aggregate shocks (Boivin et al., 2009; Maćkowiak and Wiederholt, 2009; Andrade and Le Bihan, 2013).

This paper is also related to the literature exploring the role of news media or textual data in macroeconomics. For instance, Alexopoulos (2011) develop new measures based on books published in the technology field, employing them to identify the impact of technology shocks on economic activity. They find a positive correlation between these shocks and changes in R&D expenditure and scientific knowledge. Baker et al. (2016) formulate a novel index of economic policy uncertainty derived from the frequency of newspaper coverage. Ahir et al. (2022) construct the World Uncertainty Index (WUI) utilizing quarterly Economist Intelligence Unit country reports, revealing that shifts in the WUI anticipate substantial declines in output. This effect is more pronounced and enduring in countries with lower institutional quality and in sectors facing greater financial constraints. Some papers closely aligned with this work include Boehm and Kroner (2023), who present evidence for a causal relationship between the US economy and the global financial cycle using macroeconomic news releases; Carroll (2003), demonstrating how household expectations are shaped by news reports reflecting the views of professional forecasters; and Chahrour et al. (2021), who formalize the role of news media in a multi-sector economy, illustrating that media can act as an independent source of business cycle fluctuations. This paper delves into the connection between firm expectations and news media.

Finally, this work complements a growing body of literature investigating firms' and households' expectations in South Africa using survey data from SARB/BER. Several papers discuss the choices made in sampling and designing these expectation surveys, including studies by Kershoff (2000), Kershoff (2002), Kershoff and Smit (2002), and Reid and Siklos (2021). Other papers fo-

cus on utilizing the data to study expectation formation and its impact on monetary policy. For example, Ehlers and Steinbach (2007) examine the characteristics of expectation formation across various economic groups in the South African economy and find that there is no strongly indication of whether South African economic agents rely exclusively on rational or adaptive strategies in formulating their inflation expectations. Kabundi and Schaling (2013) investigate the relationship between inflation and inflation expectations in South Africa's private sector, revealing that economic agents' expectations are largely influenced by past inflation rates. Kabundi et al. (2015) analyze the relationship between inflation and inflation expectations among analysts, businesses, and trade unions in South Africa during the inflation targeting regime. They find that expectations among price setters (businesses and unions) are closely aligned and tend to exceed the upper limit of the official target band, whereas analysts' expectations typically fall within the target range. Pierdzioch et al. (2018) employ relative operating characteristic curves to assess the directional accuracy of forecasts and consistently finds evidence that forecasts contain information regarding the subsequent direction of inflation rate changes. Reid et al. (2020) examine South African newspaper articles to identify how inflation is presented in the media and the role of the media in central bank's communication.

The rest of the paper is organized as follows. Section 2 describes South Africa firm-level expectation data and South Africa news data scraped from Factiva. Section 3 describes text analysis of news articles. Section 4 documents the main findings of the paper showing the relation between industry and aggregate news with firms' expectation. Section 5 concludes.

2 Data

This section describes three main data sets used in the analysis. To examine the relationship between news and firms' expectations, I first utilize South African firm-level expectations data conducted by the Bureau for Economic Research on behalf of the South African Reserve Bank (SARB). This data set allows us to track firms' expectations of aggregate economic variables on a quarterly basis. Additionally, I gather data on South African newspapers from Factiva and use Natural Language Processing models to analyze the sentiment of news reports to obtain the frequency of news mentioning each subject, i.e. each aggregate economic variable, like inflation

rate, economic growth rate, exchange rate, wages, and so on. Finally, I incorporate South Africa's economic data from various sources as controls and to compute firms' forecast errors.

2.1 South Africa Firm-Level Expectations Data

The South African firm-level expectations data consist of quarterly panel data from 2000 to 2021, capturing firms' expectations about South Africa's aggregate economic variables. Detailed information on the survey methodology can be found in Appendix A.1.

The sample includes firms of various sizes and sectors. Although the data provides extensive coverage in terms of size and sector, it is uncertain whether it fully represents the entire economy. The coverage of the survey data is summarized in Table 1 by firm size and in Table 2 by firm sector.

Table 1: The coverage of South Africa firm-level expectations data by firm's size

Firm size		**Number of obs**	**Unique firm ID**
Micro:	(<21 employees)	8125	647
Small:	(21-50 employees)	5727	467
Medium:	(50-100 employees: agriculture sector) (50-200 employees: all other sectors)	7934	626
Large:	(>101 employees: agriculture sector) (>200 employees: all other sectors)	6992	528
Total		**28778**	**2277**

Notes: The table summarizes South Africa firm-level expectations data by firm's size from 2000 to 2021.

Table 2: The coverage of South Africa firm-level expectations data by firm's sector

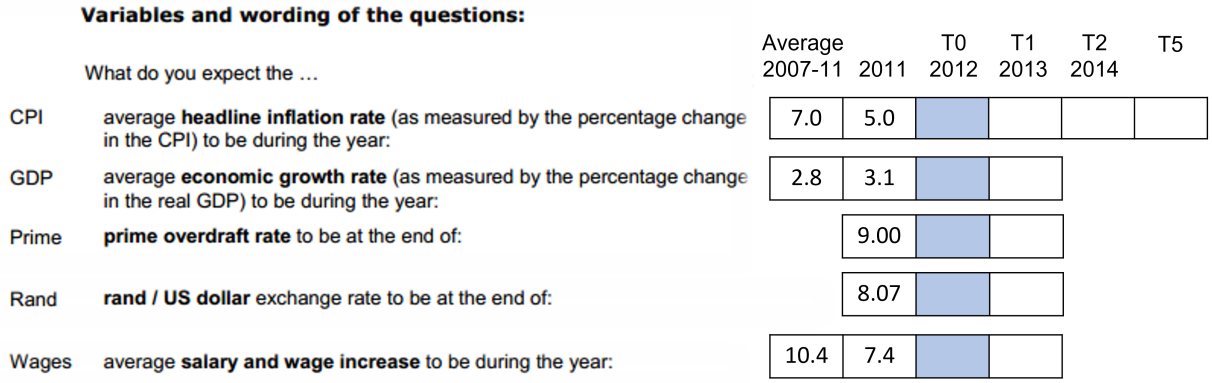
Sector	**Number of obs**	**Unique firm ID**
1. Agriculture, hunting, forestry, fishing	2873	200
2. Manufacturing	10691	790
3. Electricity, gas, water supply	13	1
4. Construction	1340	103
5. Wholesale and retail	9388	692
6. Transportation, storage, communication	481	45
7. Financial intermediate, insurance, real estate	2721	252
8. Community, social, personal services	1283	194

Notes: The table summarizes South Africa firm-level expectations data by firm's sector from 2000 to 2021.

The survey asks firms for the following variables: (i) the average headline inflation rate, (ii) the average economic growth rate, (iii) the prime overdraft rate (interest rate), (iv) the Rand/US

dollar exchange rate, and (v) the average salary and wage increase. The forecast horizons include: (i) T0 - expectations for the current calendar year, i.e. if the survey was conducted in 2014, what firms expect for 2014, (ii) T1 - expectations for the next calendar year, i.e., 2015 in this example, (iii) T2 - expectations for the calendar year two years ahead, i.e., 2016 in this example, and (iv) T5 - expectations for the calendar year five years ahead, i.e., 2019 in this example. The forecast horizons T0 and T1 are available for all variables. However, only inflation expectations are available for the forecast horizons T2 and T5. The survey also provides respondents with data from the previous calendar year and the average over the previous five years for all variables.

Figure 2: Variables and wording of the survey questions



Notes: The figure displays the variables and wording of South Africa firm-level survey questions. The information source is the dataset manual.

Since the survey horizon is based on the calendar year, the forecast horizon is shorter in the fourth quarter compared to the first quarter. Therefore, to ensure consistent expectation horizons, we need to create measures of 12-month-forward expectations and 24-month-forward expectations (for the inflation variable) for each firm i in sector j. I employ the weighted average method outlined in Table 3. Similarly, I generate the measure of expectations for the next 24 months by calculating the weighted expectations for years $t+1$ and $t+2$. I do not create weighted expectations measures for the current year and five years ahead, as it is not feasible to do so. I denote CPI_t0, GDP_t0, Interest rate_t0, Exchange rate_t0, and Wage_t0 as the firm's expectations for inflation, GDP growth, prime rates, the Rand/US dollar exchange rate, and wages for the current year, respectively. Similarly, CPI_t1, GDP_t1, Interest rate_t1, Exchange rate_t1, and Wage_t1 represent

the firm's 12-month ahead weighted expectations for inflation, GDP growth, prime rates, the Rand/US dollar exchange rate, and wages. Finally, CPI_t2 denotes the firm's 24-month ahead weighted expectation for inflation, and CPI_t5 denotes the firm's expectation for inflation five years ahead.

Table 3: Creating measure of 12-month ahead expectations

Variable X	Expectation Year t	Expectation Year t+1	$F_{ijt}X_{t+1}$
Quarter 1 - year t	a_1	b_1	$3/4a_1 + 1/4b_1$
Quarter 2 - year t	a_2	b_2	$1/2a_2 + 1/2b_2$
Quarter 3 - year t	a_3	b_3	$1/4a_3 + 3/4b_3$
Quarter 4 - year t	a_4	b_4	$0.a_4 + 1.b_4$

Notes: The table illustrates the method to create the measure o 12-month ahead expectations.

The reasons for utilizing South African data are: (i) South Africa provides detailed information on firms' sectors, enabling us to map the frequency of industry news with specific firms; (ii) Although we cannot ascertain whether the data is nationally representative, it offers extensive coverage in terms of both size and sector; (iii) The survey not only contains information about inflation expectations, but also other aggregate economic variables such as economic growth, interest rates, exchange rates, and wages. This comprehensive scope facilitates a thorough understanding of the relationship between news and firms' expectations regarding the aggregate economic condition; and (iv) Despite the survey being conducted quarterly, the month when firms respond to the survey varies throughout the year. For example, in some years, firms may respond in April for the second quarter, while in other years, responses may occur in May or June. This variation in response timing throughout the year is leveraged in the analyzes in Section 4.

2.2 South African Newspapers Data

I scrape South African news articles from Dow Jones Factiva from 2000 quarter 1 to 2021 quarter 3, focusing on economic and business news. I focus on the 20 largest national newspapers by circulation. Specifically, I include the following newspapers: The Star, Cape Times, The Mercury, Pretoria News, Cape Argus, Daily News, Business Day, The Herald, Sunday Tribune, The Sunday Times, Sowetan, Daily Dispatch, Mail & Guardian Online, Sunday Independent, The Times, Post,

The Financial Mail, Financial Mail, The Independent on Saturday, Daily Sun, Cape Business News, and Cape Business Online News. Additionally, I collect news articles from major newspapers in South Africa's top trading partner countries that mention South Africa's economic conditions, including The Financial Times, The New York Times, The Wall Street Journal, and USA Today. Further details on Factiva and the news articles data are provided in Appendix A.2.

I categorize articles by subject using Dow Jones Intelligent Identifiers (DJID). Factiva assigns these tags to articles based on their subject matter. For example, the tag "inflation" is applied to all articles discussing inflation topics. These subjects correspond to variables in the expectations survey data, as outlined in Table 4. Across the selected newspapers, there are 37,068 articles covering these subjects from the first quarter of 2000 to the third quarter of 2021. Specifically, there are 13,569 articles on inflation, 12,079 articles on economic growth, 8,131 articles on interest rates, 22,087 articles on exchange rates, and 4,217 articles on wages.[2] Since it is unclear which newspapers firms pay attention to, I aggregate article frequencies across all newspapers by month.

Table 4: Mapping of Variables in Expectation Data and News Subjects in Factiva.

Variable in Expectation Data	**Subjects in Factiva**
Inflation rate	- "Inflation" - "Inflation or "Money supply"
Economic growth rate	- "Economic growth"
Prime overdraft rate	- "Interest rate"
Rand/US dollar	- "Trade/External Payments"
Salary and wage increase	- "Employment cost/productivity" - "Employment cost/productivity" or "Employment/Unemployment"

Notes: The table shows the mapping between the variable in the survey and the subject of news reports in Factiva.

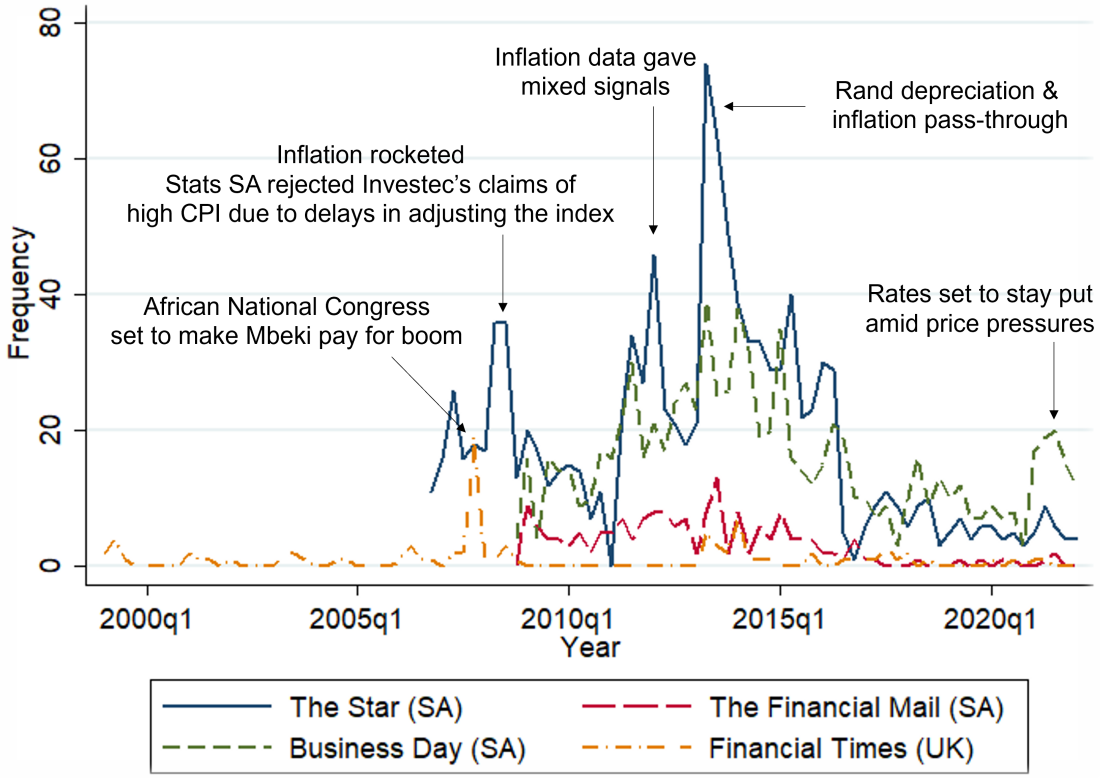
To examine how industry-specific news influences firms' macroeconomic expectations relative to news about the aggregate economy, I distinguish between industry news and aggregate news using DJID sector tags. Factiva assigns a sector tag to an article if it mentions a specific sector. Articles tagged with a sector are classified as industry news for that sector, while aggregate news covers the broader economy. However, Factiva's sector classifications do not align precisely with South Africa's Standard Industrial Classification (SIC). To address this, I develop a Factiva–South Africa SIC Sector Concordance, outlined in Table 9 in Appendix B. This concordance facilitates the

[2]Note that the total number of articles across subjects does not necessarily equal the overall article count, as some articles discuss multiple subjects.

integration of Factiva news data with firm expectation data and South African economic data.

Because firms respond to the survey in different months throughout the year, and our goal is to examine the relationship between industry news reports and firms' expectations, I aggregate the monthly frequency of industry news from the month before the previous survey wave up to the month preceding the current wave. For example, if a firm was surveyed in May for the second quarter and then in September for the third quarter, the news frequency is calculated as the sum of the monthly frequencies for that sector from May to August. Consequently, firms within the same sector but surveyed in different months within a quarter may be exposed to different amounts of news articles.

Figure 3: Example of Aggregate News on Inflation

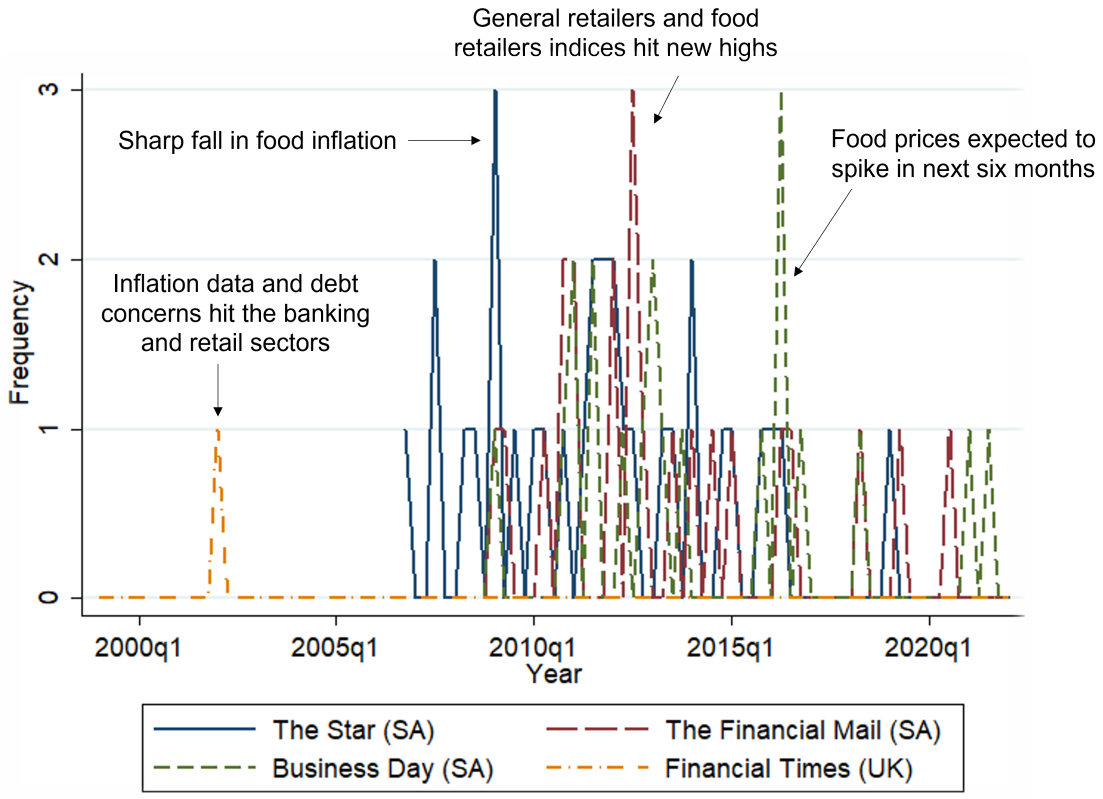


Notes: The figure plots the frequency of news reports about inflation in South Africa from some top South African newspapers. Data is collected by the author from Factiva.

Figure 3 plots the time series of news frequency referencing inflation at the aggregate level across multiple newspapers, whereas Figure 4 graphs news frequency mentioning inflation within a specific industry (the retail trade sector). The intensity of news coverage fluctuates significantly

over time at both the aggregate and sector levels, with noticeable spikes often aligning with major events. However, these spikes at the aggregate level do not always coincide with those at the sector level.

Figure 4: Example of Industry News on Inflation



Notes: The figure plots the frequency of news reports about inflation in the retail trade sector in South Africa from some top South African newspapers. Data is collected by the author from Factiva.

2.3 South Africa's Economic Data

In addition to the two primary datasets outlined above, we also require South Africa's economic data encompassing inflation, GDP growth, interest rates/prime rates, exchange rates, and wages. This necessity arises for several reasons: (i) The survey furnishes respondents with information regarding outcomes from the previous year and the average over the preceding five years. To mitigate the influence of priming, it's imperative to control for these variables in the regressions, and (ii) We aim to compute firms' forecast errors as dependent variables, necessitating the inclusion of actual realizations of aggregate economic variables.

Specifically, inflation and economic growth data are sourced from Statistics SA, while data for interest rates (prime overdraft rate) and the Rand/US dollar exchange rate are obtained from the South African Reserve Bank (SARB). Additionally, data regarding salary and wage changes are extracted from the Quarterly Employment Statistics of Statistics SA.

3 Text Analysis of News Articles

To understand how news content influences firms' expectations of macroeconomic conditions, examining the frequency of articles alone may not fully capture the essence of the content. For example, an article discussing rising inflation will likely impact a firm's inflation expectations differently than an article mentioning the potential for decreasing inflation. Therefore, I supplement the analysis of news frequency with text analysis to capture the nuances of the content. Specifically, I assess whether news articles indicate an increase, decrease, or no change in key economic variables, including the inflation rate, economic growth rate, exchange rate, interest rates, and wages. To classify news articles based on these signals, I employ a natural language processing (NLP) model called XLNet from Yang et al. (2020). This section provides an overview of the XLNet model and its application in analyzing and classifying news articles based on their economic content.

3.1 Natural Language Processing Models for Text Analysis

Natural Language Processing (NLP) models have been widely applied in tasks such as sentiment analysis, text classification, machine translation, and question answering. NLP has evolved significantly, from simple statistical models to complex deep learning architectures.

The early approach relied on counting words from particular sentiment lists or word clustering. However, this approach often miss to capture the relationships between words within a sentence. For example, the phrases "inflation is rising, but employment is not improving" and "employment is rising, but inflation does not" would yield identical measurements despite conveying different meanings. The next development is n-grams, which model the probability of word sequences based on fixed-length word windows, but they struggled with long-range dependencies. For the following sentence, "economic growth slowed, but is likely to expand at a rapid pace," a bigram would count "growth slowed" but would miss that the point of the sentence is that economic

growth is expected to increase. This limitation led to the adoption of hidden Markov models (HMMs) and conditional random fields (CRFs), which introduced probabilistic sequence modeling. However, these models still lacked deep contextual understanding. The rise of recurrent neural networks (RNNs) improved sequential processing, allowing the model to retain past information, but standard RNNs suffered from vanishing gradients when dealing with long-term dependencies. To address this, long short-term memory (LSTM) networks were introduced, incorporating gating mechanisms to better capture long-range dependencies.

Later, transformers, introduced in Vaswani et al. (2023), revolutionized NLP by using self-attention mechanisms instead of recurrence, enabling parallelization and better handling of context. This led to models like BERT (Bidirectional Encoder Representations from Transformers), which captured deeper contextual meaning through bidirectional training. However, BERT relied on masked language modeling, limiting its ability to predict relationships between words dynamically.

To overcome the problem in BERT, XLNet was developed by Yang et al. (2020), combining BERT's bidirectionality with autoregressive modeling, leading to improved performance in various NLP tasks. To understand how XLNet is better than BERT, we consider the phrase "rising inflation due to a weakened exchange rate". Suppose both BERT and XLNet select the two words [rising, inflation] as the prediction targets and maximize *log(rising, inflation | due, to, a, weakened, exchange, rate)*. BERT would analyze this sentence by filling in missing words based on surrounding context. For instance, if the word "rising" were masked, BERT would rely on bidirectional context to predict a likely replacement. In this case, BERT reduces to the following objective function:

$$\begin{aligned} J_{BERT} = & \, log(\text{rising}|\text{due, to, a, weakened, exchange, rate}) \\ & + log(\text{inflation}|\text{due, to, a, weakened, exchange, rate}) \end{aligned}$$

While this approach captures deep contextual meaning, it does not explicitly model the natural word order dependencies, which may lead to limitations in understanding cause-effect relationships. In contrast, XLNet, with its permutation-based autoregressive modeling, would train on multiple word order permutations of [due, to, a, weakened, exchange, rate, rising, inflation]. It

might consider sequences like "Due to a weakened exchange rate, inflation is rising." or "A weakened exchange rate is causing inflation to rise." This allows XLNet to capture both bidirectional context and word-order dependencies, making it more effective at understanding the causal link between "weakened exchange rate" and "rising inflation." In this case, XLNet's objective function is:

$$\begin{aligned} J_{XLNet} &= log(\text{rising}|\text{due, to, a, weakened, exchange, rate}) \\ &\quad + log(\text{inflation}|\text{rising, due, to, a, weakened, exchange, rate}) \end{aligned}$$

We can notice that XLNet is able to capture the dependency between the pair (rising, inflation), which is omitted by BERT. This simple example shows that XLNet learns more dependency pairs given the same target.

Overall, while BERT provides strong contextual understanding, XLNet is better suited for capturing sequential relationships and causality. In this paper, I leverage XLNet for text analysis of news articles, to classify whether articles signal an increase, decrease, or stability (no change) in macroeconomic variables.

3.2 Application to Text Analysis of News Articles

To analyze how news content shapes firms' expectations of macroeconomic conditions, relying solely on article frequency may not fully capture the substance of the content. For instance, an article highlighting rising inflation is likely to influence firms' inflation expectations differently than one suggesting a potential decline in inflation. To address this limitation, I complement the frequency-based analysis with text analysis, identifying whether news articles signal an increase, decrease, or no change in key economic variables including the inflation rate, economic growth rate, exchange rate, interest rates, and wages.

I conduct text analysis on the full text of English-language articles, as South African newspapers are published in English. Additionally, NLP research in English is more advanced, with a wide range of high-quality pre-trained models available, which enhances the accuracy of text analysis.

NLP models operate in two key stages. First, in the pre-training stage, the model learns language representations from a vast amount of unlabeled text through unsupervised learning.

The pre-trained models used in this study are discussed in Section 3.1, with XLNet selected as the primary model. Second, in the fine-tuning stage, the pre-trained model is adapted using a smaller, labeled dataset to perform a specific task, such as text analysis in an economic context. This stage involves supervised learning, allowing the model to refine its understanding for more accurate predictions.

The algorithm consists of several key steps. (1) *Data preparation:* This step involves constructing the training dataset. I begin by randomly selecting 1,000 articles for each subject. I then manually read each article and assign one of three labels for each subject: 0 - no change, indicating that the article suggests no change in the subject (i.e., variable) of interest; 1 - increase, signifying that the article conveys an expectation of the variable increasing; and 2 - decrease, meaning the article suggests a potential decline in the variable. The remaining data is split into validation (80%) and testing sets (20%). Finally, the dataset undergoes preprocessing, which includes removing stopwords, converting text to lowercase, and tokenizing text into subwords. (2) *Model Selection and Initialization:* The next step is choosing a pre-trained model for text analysis. I use the XLNet model, load its pre-trained weights, and initialize it for further training. (3) *Fine-Tuning:* In this step, the pre-trained model is fine-tuned using the training dataset by updating its weights. The model learns to predict the appropriate label for each input text. I employ the Adam optimizer and determine the optimal learning rate using the learning rate finder function. (4) *Validation:* After each training epoch, the model's performance is evaluated on a separate validation dataset to check for overfitting. This dataset is also used to fine-tune hyperparameters, such as the number of epochs, batch size, and learning rate. (5) *Testing:* Once training and optimization are complete, the model is tested on a separate testing dataset to assess its performance on new, unseen data.

The results are two datasets: one comprising aggregate news articles that mention the variables of interest at the aggregate level (i.e., inflation, economic growth, interest rates, exchange rates, and wages) and another containing industry-specific news articles mentioning these variables for particular industries. Each article is labeled as 0, 1, or 2 for each subject. For the aggregate news articles, accuracy scores range from 89.36% to 96.53% across different subjects. Specifically, the model achieves an accuracy of 90.59% for inflation-related articles, 89.36% for economic growth, 91.09% for interest rates, 90.35% for exchange rates, and 96.53% for wages. For the industry news articles, accuracy scores vary between 71.15% and 90.91% depending on the subject. The accuracy

for inflation-related articles is 89.06%, for economic growth 86.63%, for interest rates 82.5%, for exchange rates 90.91%, and for wages 71.15%.

4 Results

This section presents findings on three key research questions: (1) how firms' expectations for one variable are related to their expectations for other variables, (2) how the frequency of aggregate and industry news correlates with firms' expectations of aggregate economic variables, and (3) how the frequency of aggregate and industry news indicating an increase, decrease, or no change in economic variables of interest is associated with firms' expectations of aggregate economic variables.

4.1 Relationship Between Firms' Expectations of Aggregate Economic Variables

Since aggregate economic variables are interconnected, firms' expectations about one variable are likely influenced by their expectations of others. This section examines these relationships by analyzing how firms' expectations for key economic indicators—including inflation rate, economic growth rate, interest rate, exchange rate, and wages—interact with each other. Specifically, I study whether expectations about one variable can help predict expectations about another and explore the underlying patterns in firms' perceptions of macroeconomic dynamics. I employ the following specification:

$$F_{ijt}X_{t+h} = \alpha_t + \beta_i + \beta F_{ijt}X'_{t+h'} + \gamma Controls + \varepsilon_{ijt} \tag{4.1}$$

In this equation, $F_{ijt}X_{t+h}$ represents the weighted expectation of firm i in sector j for the aggregate variable X at a future horizon h (12 months, 24 months, or five years ahead), as described in Section 2.1. Similarly, $F_{ijt}X'_{t+h'}$ denotes the weighted expectation of firm i in sector j for a different aggregate variable X' at the horizon h' (12 months, 24 months, or five years ahead). Time fixed effects (α_t) and firm fixed effects (β_i) are included to account for time and firm-specific factors. Additionally, I include *Controls* for the aggregate-level variables of the previous year and the average over the previous five years since the survey provides the information to firms. Following

Andrade et al. (2020) who find that industry condition has impact on firm's aggregate economic expectations, I also control for current sectoral economic conditions. Standard errors are clustered by sector.

Table 5 presents the findings on the relationships between firms' expectations for different aggregate economic variables. The first three rows, which examine the connection between inflation expectations across various time horizons and other economic variables, suggest that firms anticipating higher inflation in the near term are also likely to expect elevated inflation in the longer term, and vice versa. Moreover, firms that foresee higher inflation at any future horizon tend to predict rising interest rates, increasing wages, and a depreciation of the Rand against the U.S. dollar (i.e., a higher exchange rate). However, when firms expect higher inflation over the next one or two years, they are more likely to anticipate a decline in economic growth.

The fourth row of Table 5 indicates that when firms anticipate stronger economic growth, they tend to expect lower inflation, interest rates, and exchange rates. This pattern aligns with the view that a robust economy helps contain inflation, leading the central bank to adopt lower interest rates and strengthening the Rand. However, firms also expect wages to rise, reflecting their belief that economic growth drives higher labor demand and a tighter labor market.

Similarly, the relationship between interest rate expectations and other variables exhibits a clear pattern, as shown in the fifth row of Table 5. When firms expect interest rates to rise, they also anticipate higher inflation, a weaker Rand (higher exchange rate), and rising wages. However, they associate higher interest rates with lower economic growth. A similar pattern emerges in exchange rate expectations, as shown in the sixth row of Table 5. Firms anticipating a depreciation of the Rand (i.e., an increase in the exchange rate) also expect higher inflation, rising interest rates, and wage growth. However, they associate it with a slower economic growth.

Lastly, when firms expect wages to increase, they also predict higher inflation, interest rates, exchange rates, and economic growth. This suggests that firms may link rising wages to overall macroeconomic expansion and inflationary pressures.

For a robustness check, I extend the analysis by controlling for information on other variables, not just variable X'. That includes the previous year's values and five-year averages of all other variables at the aggregate level, and these variables at the industry level at the current period . Table 10 reports the results, which confirm the same patterns observed in the main analysis.

Table 5: Relationship Between Firms' Expectations of Aggregate Economic Variables

Dependent variable		CPI_t1	CPI_t2	CPI_t5	GDP_t1	Interest rate_t1	Exchange rate_t1	Wage_t1
Independent variable								
CPI_t1	β		0.961***	0.586***	-0.054***	0.233***	0.083***	0.171***
			(0.018)	(0.048)	(0.007)	(0.012)	(0.006)	(0.022)
	N		22057	7640	22389	22448	22444	8666
	R^2		0.900	0.565	0.626	0.849	0.938	0.683
CPI_t2	β	0.790***		0.613***	-0.055***	0.259***	0.089***	0.149***
		(0.007)		(0.034)	(0.0103)	(0.009)	(0.008)	(0.017)
	N	22057		7513	21811	21871	21878	8482
	R^2	0.917		0.600	0.356	0.854	0.938	0.685
CPI_t5	β	0.265***	0.355***		0.020	0.075***	0.074***	0.125***
		(0.032)	(0.034)		(0.022)	(0.012)	(0.009)	(0.028)
	N	7640	7513		7607	7599	7598	6278
	R^2	0.650	0.669		0.446	0.648	0.941	0.702
GDP_t1	β	-0.078***	-0.064***	0.008		-0.063***	-0.081***	0.041*
		(0.010)	(0.010)	(0.016)		(0.011)	(0.009)	(0.021)
	N	22389	21811	7607		24217	24211	8619
	R^2	0.658	0.590	0.490		0.832	0.934	0.658
Interest rate_t1	β	0.284***	0.383***	0.162***	-0.049***		0.106***	0.106***
		(0.014)	(0.013)	(0.028)	(0.009)		(0.008)	(0.022)
	N	22448	21871	7599	24217		24369	8668
	R^2	0.679	0.627	0.494	0.622		0.935	0.671
Exchange rate_t1	β	0.196***	0.257***	0.123***	-0.129***	0.218***		0.032*
		(0.016)	(0.028)	(0.019)	(0.011)	(0.018)		(0.016)
	N	22444	21878	7598	24211	24369		8674
	R^2	0.667	0.600	0.504	0.621	0.837		0.649
Wage_t1	β	0.074***	0.078***	0.106***	0.028*	0.037***	0.011*	
		(0.010)	(0.009)	(0.025)	(0.015)	(0.007)	(0.005)	
	N	8666	8482	6278	8619	8668	8674	
	R^2	0.562	0.567	0.524	0.513	0.604	0.952	

Notes: The table presents the estimates of the specification (4.1). Standard errors clustered by sector in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Variables with _t1 mean firms' expectation one year ahead. Variables with _t2 mean firms' expectation two years ahead. Variables with _t5 mean firms' expectation five year ahead. CPI means firms' inflation expectation. GDP denotes firms' expectation for economic growth.

4.2 News and Firms' Expectations

This section examines the relationship between the frequency of aggregate and industry news and firms' expectations of aggregate economic variables. Under the assumption of full-information rational expectations, industry news should not impact firms' expectations of aggregate economic conditions. To evaluate this, we investigate whether increased exposure to industry and aggregate news improves firms' forecast accuracy using the following specification:

$$\left|X_{t+h} - F_{ijt}X_{t+h}\right| = \alpha_t + \beta_i + \gamma_1 NEW_{Xijt} + \gamma_2 NEW_{Xit} + \gamma Controls + \varepsilon_{ijt} \tag{4.2}$$

where X_{t+h} represents the actual realization of the variable of interest at horizon h. $F_{ijt}X_{t+h}$ represents the weighted expectation of firm i in sector j for the aggregate variable X at a horizon h (i.e., the current year, 12 months ahead, 24 months ahead, or 5 years ahead), calculated as explained in section 2.1. $\left|X_{t+h} - F_{ijt}X_{t+h}\right|$ denotes the forecast errors made by firm i for variable X in the period t. NEW_{Xijt} denotes the industry news representing the frequency of news reports on subject X of sector j, calculated as described in section 2.2. NEW_{Xit} denotes aggregate news representing the frequency of news reports on subject X.[3] Due to the presence of many observations with a news frequency of 0, I apply the inverse hyperbolic transformation to the news frequency instead of taking its logarithm. α_t represents time fixed effects, while β_i denotes firm fixed effects. Additionally, since the survey provides data for the variables of the previous year and the average over the previous five years, I also include controls for this information in the regression. Following Andrade et al. (2020) who find that industry condition has impact on firm's aggregate economic expectations, I control for current sectoral economic condition. Standard errors are clustered by sector.

The parameters of interest are γ_1 and γ_2, which represent whether an increase in industry news and aggregate news, respectively, improves firms' forecast accuracy. Specifically, γ_1 can be interpreted as the change in firms' forecast errors for the aggregate variable X resulting from a 1% increase in the frequency of industry news, holding other variables constant. Similarly, γ_2 indicates

[3]Note that while the number of news articles available in a given month is the same for all firms, we aggregate the monthly frequency data into quarterly data to align with the survey frequency. However, since firms were surveyed in different months, the actual number of news articles each firm may have been exposed to varies. This quarterly news frequency is not calculated based on the standard calendar quarters but rather from the month following a firm's last survey until the month of its next survey.

the change in firms' forecast errors for X due to a 1% increase in the frequency of aggregate news, holding other variables constant.

The results are presented in Table 6. Panel A of Table 6 shows the results for the entire sample of firms, while Panels B-E break down the effects by firm size. Panel A suggests that increased frequency of industry news does improve firms' forecast accuracy for inflation across different horizons: the current year, 12 months ahead, 24 months ahead, and 5 years ahead. Similarly, greater frequency of industry news also lowers forecast errors for economic growth in the current year and 12 months ahead. Additionally, it helps improve firms' forecast accuracy for interest rates in the current year and wages 12 months ahead. However, there are no significant effects of industry news on forecast errors for the exchange rate at any horizon, for interest rates 12 months ahead, or for current-year wage changes. These findings suggest that firms do not fully behave rationally, instead using industry-specific information to shape their expectations about key aggregate economic variables such as inflation and economic growth. Furthermore, Panel A reveals that a higher frequency of aggregate news improves firms' forecast accuracy for inflation, economic growth, interest rates, exchange rates, and wages. This suggests that firms do use news media to update their information and learn about the aggregate economy. Interestingly, industry news has a stronger effect than aggregate news for variables influenced by both types of news.

Interestingly, Panels B-E of Table 6 demonstrate that the effects of increased industry and aggregate news frequency differ by firm size. Specifically, greater industry and aggregate news tend to improve forecast accuracy for small and medium-sized firms, particularly for inflation and economic growth. However, there is no significant impact of increased news frequency on forecast errors for large firms. While we do observe some effects of higher news frequency on forecast errors for micro firms, these impacts are not as strong as for small and medium-sized firms. These results suggest that news is a more important source of information for small and medium-sized firms.

Table 6: Firms' Forecast Errors and News

	CPI_t0	CPI_t1	CPI_t2	CPI_t5	GDP_t0	GDP_t1	Interest rate_t0	Interest rate_t1	Exchange rate_t0	Exchange rate_t1	Wage_t0	Wage_t1
Panel A - All firms												
Industry News	-.04084***	-.06037***	-.05168**	-.07778***	-.02483**	-.01150**	-.02459*	.03925	-.00185	.00915	.04010	-.10114**
	(.01829)	(.02362)	(.02398)	(.01878)	(.0113)	(.00510)	(.01328)	(.03117)	(.00446)	(.01233)	(.04638)	(.04623)
Agg. News	-.00921***	-.00836***	-.00714***	-.00853***	-.00355***	-.00287**	-.00619**	-.00527**	-.00474***	-.00379	-.0625**	-.0351**
	(.00149)	(.00103)	(.00231)	(.00210)	(.00050)	(.00137)	(.00284)	(.00251)	(.00072)	(.0040)	(.0289)	(.0125)
N	26,841	24,148	23,056	5,672	26,740	24,036	26,880	24,133	26,912	24,170	16,414	24,201
R^2	0.6312	0.7318	0.6788	0.5762	0.6883	0.8102	0.6315	0.5558	0.7465	0.7743	0.6443	0.8573
Panel B - Micro firms												
Industry News	-.02087*	-.03571*	-.02931**	-.00336	.00347	-.06864***	.01107	.06129	.00413	-.00845	.12080	.08583
	(.01097)	(.01807)	(.01964)	(.09029)	(.01970)	(.01860)	(.01591)	(.04912)	(.01530)	(.03163)	(.08657)	(.11916)
Agg. News	-.00768**	-.00536**	-.00362	-.00558*	-.00236*	.00194	.00170	-.00436**	-.00171*	.00332	-.05150	.03981
	(.00334)	(.00248)	(.00845)	(.00276)	(.00122)	(.00210)	(.00196)	(.00214)	(.00084)	(.00285)	(.04342)	(.02722)
N	7,521	6,403	5,982	1,626	7,485	6,369	7,518	6,390	7,551	6,419	4,948	6,419
R^2	0.6317	0.7409	0.6669	0.5407	0.7215	0.8146	0.6320	0.5915	0.6973	0.7231	0.6189	0.8224
Panel C - Small firms												
Industry News	-.07671***	-.05577***	-.05077*	.09772***	-.03142**	-.01372**	-.07645***	-.04728***	.00208	.00466	.10992	-.16725**
	(.02437)	(.01284)	(.02476)	(.01603)	(.01228)	(.00568)	(.01908)	(.01335)	(.01540)	(.02410)	(.09594)	(.07207)
Agg. News	-.01214***	-.00906***	-.00686**	-.00724***	-.00315***	-.00273**	-.00694***	-.00553***	-.00435***	-.00411	-.05822**	-.03320**
	(.00221)	(.00115)	(.00304)	(.00277)	(.00110)	(.00135)	(.00217)	(.00211)	(.00103)	(.00394)	(.00250)	(.01611)
N	5,310	4,792	4,519	1,323	5,292	4,777	5,337	4,813	5,341	4,812	3,575	4,833
R^2	0.6341	0.7258	0.6735	0.6178	0.7022	0.8061	0.6278	0.5535	0.7216	0.7502	0.6337	0.8497
Panel D - Medium firms												
Industry News	-.05735**	-.06726***	-.04123***	-.09837***	-.01647**	-.03991***	-.00602	-.02379	-.01235	.00566	-.13053	.08959
	(.01594)	(.01463)	(.01971)	(.02440)	(.00712)	(.01037)	(.03356)	(.04036)	(.01059)	(.00517)	(.09380)	(.08585)
Agg. News	-.00836***	-.00736***	-.00912***	-.00898***	-.00389***	-.00291***	-.00630***	-.00501**	-.00495***	-.00216*	-.06611*	-.04263**
	(.00301)	(.00215)	(.00269)	(.00275)	(.00126)	(.00112)	(.00276)	(.00230)	(.00111)	(.00103)	(.03250)	(.02081)
N	7,418	6,786	6,563	1,435	7,394	6,747	7,435	6,768	7,430	6,773	4,172	6,782
R^2	0.6480	0.7395	0.6909	0.5877	0.6869	0.8117	0.6354	0.5513	0.7724	0.7967	0.6655	0.8716
Panel E - Large firms												
Industry News	.00505	-.02721	-.05561	-.02725	.03748	.02001	.01424	.02299	.00427	.00281	.08978	-.01993
	(.02074)	(.02898)	(.03791)	(.02533)	(.03048)	(.05774)	(.03006)	(.04690)	(.01131)	(.01993)	(.08847)	(.08877)
Agg. News	-.00321*	.00415	-.00581	-.00126	.00255	-.00236*	-.00589*	-.00326	-.00613	.00277	-.04331	-.05614
	(.00162)	(.00563)	(.00572)	(.00277)	(.00314)	(.00170)	(.00294)	(.00281)	(.00595)	(.00288)	(.03504)	(.04882)
N	6,592	6,167	5,992	1,288	6,569	6,143	6,590	6,162	6,590	6,166	3,719	6,167
R^2	0.6403	0.7529	0.7202	0.5803	0.6644	0.8275	0.6681	0.5717	0.8126	0.8327	0.7146	0.8934

Notes: The table presents the estimates of the specification (4.2). Standard errors clustered by sector in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Variables with _$t0$ mean firms' forecast errors for the current year. Variables with _$t1$ mean firms' forecast errors one year ahead. Variables with _$t2$ mean firms' forecast errors two years ahead. Variables with _$t5$ mean firms' forecast errors five year ahead. CPI means firms' forecast errors for inflation expectation. GDP denotes firms' forecast errors for economic growth.

4.3 News Content and Firms' Expectations

In Section 4.2, we examine the relationship between the frequency of aggregate and industry news and firms' expectations of aggregate economic variables. However, news frequency alone is too broad a measure, as the content of the articles can lead firms to update their expectations in different directions. For example, more news about rising inflation would likely to make firms raise their inflation expectations, while more news about decreasing inflation would more likely to make firms lower their inflation expectations. It is also possible that within the same period, news may mention or predict changes in inflation in different directions or magnitudes. Therefore, to better understand how news content influences firms' expectations of macroeconomic conditions, focusing solely on the frequency of articles may not fully capture the impact of the content. To address this, I complement the analysis of news frequency with text analysis to capture the nuances of the news content.

I first classify news articles based on whether they indicate an increase, decrease, or no change in key economic variables, including the inflation rate, economic growth rate, exchange rate, interest rates, and wages, as outlined in Section 3.1. Next, I measure the frequency of industry and aggregate news within each category—increase, decrease, or no change—in these key economic variables. These frequency series are then used in the following specification to analyze the relationship between news frequency by sentiment and firms' forecast errors.

$$\begin{aligned}\left|X_{t+h} - F_{ijt}X_{t+h}\right| = {} & \gamma_1^{increase} NEW_{Xijt}^{increase} + \gamma_1^{decrease} NEW_{Xijt}^{decrease} + \gamma_1^{no\_change} NEW_{Xijt}^{no\_change} \\ & + \gamma_2^{increase} NEW_{Xit}^{increase} + \gamma_2^{decrease} NEW_{Xit}^{decrease} + \gamma_2^{no\_change} NEW_{Xit}^{no\_change} \\ & + \gamma Controls + \alpha_t + \beta_i + \varepsilon_{ijt}\end{aligned} \tag{4.3}$$

where $NEW_{Xijt}^{increase}$ represents the frequency of news reports indicating an increase in the variable X for sector j that firm i might be exposed to, while $NEW_{Xit}^{increase}$ denotes the frequency of news reports indicating an increase in the variable X that firm i might encounter. Similarly, $NEW_{Xijt}^{decrease}$ and $NEW_{Xit}^{decrease}$ denote the frequency of industry and aggregate news reports mentioning a decrease in the variable X, respectively. Additionally, $NEW_{Xijt}^{no\_change}$ and $NEW_{Xit}^{no\_change}$ denote the frequency of industry and aggregate news reports indicating no changes in the variable X,

respectively. All other variables and controls remain the same as specified in equation 4.2. I also apply the inverse hyperbolic transformation to the news frequency.

We are interested in the parameters $\gamma_1^{increase}$, $\gamma_1^{decrease}$ and $\gamma_1^{no\_change}$, which represent the changes in a firm's forecast errors for variable X resulting from a 1% increase in the frequency of industry news mentioning an increase, decrease, or no change, respectively, while holding other variables constant. Similarly, $\gamma_2^{increase}$, $\gamma_2^{decrease}$ and $\gamma_2^{no\_change}$ represent the changes in a firm's forecast errors for variable X due to a 1% increase in the frequency of aggregate news mentioning an increase, decrease, or no change, respectively, while holding other variables constant.

Table 7 presents the results for the sample of all firms. It shows that a higher frequency of industry news mentioning an increase or decrease in inflation and economic growth helps reduce firms' forecast errors for these aggregate economic variables. However, a greater frequency of news reporting no change in these variables does not improve firms' forecast accuracy. Additionally, we do not observe a significant impact of industry news on firms' forecast accuracy for other variables such as the exchange rate, interest rates, or wages, with the exception of wages 12 months ahead. In contrast, a higher frequency of aggregate news indicating the direction of changes (increase or decrease) significantly improves firms' forecast accuracy for all variables.

Table 8 examines the effects of industry and aggregate news by firm size, as the impact of news may differ across firms depending on their access to information. Once again, we find that the effects of greater industry and aggregate news frequency vary by firm size. Greater aggregate news, including articles mentioning no changes in variables, improves the forecast accuracy of small and medium-sized firms. Increased industry news also improves the forecast accuracy of small and medium-sized firms for inflation and economic growth. While there is some impact of industry and aggregate news on micro firms, it is not as strong as for small and medium-sized firms. Notably, we do not observe any impact of articles mentioning no changes in variables on micro firms' forecast accuracy. Finally, similar to the findings in Section 4.2, large firms' forecast accuracy does not seem to be influenced by news coverage.

Table 7: Firms' Forecast Errors and News's Content

	CPI_t0	CPI_t1	CPI_t2	CPI_t5	GDP_t0	GDP_t1	Interest rate_t0	Interest rate_t1	Exchange rate_t0	Exchange rate_t1	Wage_t0	Wage_t1
Industry News												
Increase	-.03731**	-.04775***	-.03772***	-.03756***	-.03429**	-.03661**	-.06957*	-.07091*	-.00161	.00102	-.05022	-.05198**
	(.01714)	(.01383)	(.01515)	(.01196)	(.01655)	(.01633)	(.03663)	(.03601)	(.00235)	(.00214)	(.04540)	(.02503)
Decrease	-.04532	.04088**	-.04303***	-.03324**	-.01640**	-.01252*	-.02764	-.02980	-.00260	-.00225	-.05112*	-.07633***
	(.02557)	(.01716)	(.01528)	(.01515)	(.00811)	(.00643)	(.02802)	(.02681)	(.00171)	(.00189)	(.02604)	(.02556)
No change	.01337	-.01532	-.01595*	-.01416	.00787	-.00921*	-.03556	-.03875	.00232	.00216	.04010	-.05233**
	(.00935)	(.01014)	(.00813)	(.00809)	(.00516)	(.00475)	(.03626)	(.03178)	(.00335)	(.00341)	(.03113)	(.02577)
Aggregate News												
Increase	-.00747***	-.00606***	-.00772***	-.00726***	-.00927***	-.00871***	-.00707***	-.00682***	-.00489***	-.00411***	-.06121***	-.04224***
	(.00196)	(.00152)	(.00192)	(.00189)	(.00206)	(.00246)	(.00087)	(.00087)	(.00070)	(.00108)	(.02105)	(.01113)
Decrease	-.01061***	-.01350***	-.01074***	-.01151***	-.00880***	-.00913***	-.00678***	-.00614***	-.00467***	-.00468***	-.06277***	-.03569***
	(.00337)	(.00338)	(.00333)	(.00354)	(.00189)	(.00244)	(.00071)	(.00074)	(.00106)	(.00105)	(.01735)	(.01033)
No change	-.00535	.00763	-.00696*	.00735	-.00516	.00633*	-.00651***	-.00632***	-.00317**	-.00357	-.05160**	-.03367*
	(.00478)	(.00512)	(.00351)	(.00496)	(.00354)	(.00322)	(.00095)	(.00098)	(.00143)	(.00198)	(.02501)	(.01708)
N	26,841	24,148	23,056	5,672	26,740	24,036	26,880	24,133	26,912	24,170	16,414	24,201
R^2	0.647	0.646	0.687	0.688	0.585	0.578	0.632	0.643	0.579	0.578	0.612	0.611

Notes: The table presents the estimates of the specification (4.3). Standard errors clustered by sector in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Variables with _t0 mean firms' forecast errors for the current year. Variables with _t1 mean firms' forecast errors one year ahead. Variables with _t2 mean firms' forecast errors two years ahead. Variables with _t5 mean firms' forecast errors five year ahead. CPI means firms' forecast errors for inflation expectation. GDP denotes firms' forecast errors for economic growth.

Table 8: Firms' Forecast Errors and News's Content by Firm Size

	CPI_t0	CPI_t1	CPI_t2	CPI_t5	GDP_t0	GDP_t1	Interest rate_t0	Interest rate_t1	Exchange rate_t0	Exchange rate_t1	Wage_t0	Wage_t1
Panel A - Micro firms												
Industry News												
Increase	-.02261*	-.03351*	-.03353**	-.03306*	.02779	-.03552*	-.06678	-.06911	-.00154	.00202	-.04814	-.04889
	(.01271)	(.01703)	(.01437)	(.01635)	(.01933)	(.01783)	(.04123)	(.04316)	(.00208)	(.00243)	(.04232)	(.02767)
Decrease	.01620	-.03879	-.04154*	-.02998*	-.01115*	-.01252*	-.02565	-.02658	-.00233	-.00211	.05051	-.07910
	(.02447)	(.02716)	(.02152)	(.01501)	(.00589)	(.00638)	(.02113)	(.02130)	(.00185)	(.00202)	(.02712)	(.04505)
No change	.01537	-.01645	-.01377	-.01224	-.00322	.00426*	-.03725	-.03567	-.00202	-.00208	.04255	.06012
	(.01235)	(.01117)	(.01113)	(.00833)	(.00478)	(.00221)	(.03688)	(.03132)	(.00288)	(.00335)	(.03224)	(.03228)
Aggregate News												
Increase	-.00821*	-.00665*	-.006378**	-.00669*	-.00878	-.00832*	-.00735**	-.00602**	-.00475*	-.00423**	-.05887	-.04870
	(.00418)	(.00334)	(.00312)	(.00341)	(.00506)	(.00422)	(.00361)	(.00288)	(.00241)	(.00205)	(.02955)	(.03011)
Decrease	-.01270*	-.01532**	-.01033**	-.00933*	-.00793	-.00882*	-.00633**	-.00610**	-.00489*	-.00453**	-.05311	-.04026
	(.00648)	(.00708)	(.00514)	(.00462)	(.00489)	(.00439)	(.00305)	(.00294)	(.00244)	(.00216)	(.02902)	(.02832)
No change	-.00422	-.00536*	-.00577	-.00535	-.00317	-.00532	-.00583*	-.00533	.00333	-.00376	.05676	.03957
	(.00356)	(.00270)	(.00403)	(.00447)	(.00344)	(.00373)	(.00265)	(.00312)	(.00217)	(.00238)	(.03012)	(.02133)
N	7,521	6,403	5,982	1,626	7,485	6,369	7,518	6,390	7,551	6,419	4,948	6,419
R^2	0.6317	0.7409	0.6669	0.5407	0.7215	0.8146	0.6320	0.5915	0.6973	0.7231	0.6189	0.8224
Panel B - Small firms												
Industry News												
Increase	-.01960**	-.05011***	-.04115***	-.04128***	-.03228**	-.04017**	-.07042**	-.07111**	.001777	-.00180	-.05312	-.04128**
	(.00837)	(.01454)	(.01605)	(.01216)	(.01456)	(.01913)	(.03461)	(.03522)	(.00216)	(.00201)	(.04003)	(.02004)
Decrease	-.04776**	-.04338**	-.04216***	-.03598***	-.01896**	-.01556**	-.02518	.02877	-.00286	-.00217	-.04977	-.06995**
	(.02357)	(.02016)	(.01505)	(.01322)	(.00824)	(.00789)	(.02622)	(.02133)	(.00211)	(.00173)	(.03055)	(.03417)
No change	-.01017	-.01673	-.01545**	-.01767*	-.00668*	-.00943	.01338	-.03244	-.00206	-.00225	.05098	-.04855
	(.00865)	(.01222)	(.00733)	(.00861)	(.00340)	(.00577)	(.02326)	(.03015)	(.00295)	(.00281)	(.03424)	(.03121)
Aggregate News												
Increase	-.00785***	-.00631***	-.00806***	-.00788***	-.01022**	-.00911***	-.00788***	-.00632***	-.00477***	-.00394*	-.05832**	-.04535***
	(.00195)	(.00177	(.00210)	(.00192)	(.00606)	(.00271)	(.00122)	(.00102)	(.00103)	(.00195)	(.02890)	(.01008)
Decrease	-.00978***	-.01373***	-.01224***	-.01236***	-.00932***	-.00933***	-.00702***	-.00628***	-.00453**	-.00457*	-.05773***	-.04011***
	(.00322)	(.00355)	(.00309)	(.00344)	(.00335)	(.00276)	(.00091)	(.00093)	(.00216)	(.00231)	(.01616)	(.01116)
No change	-.00588	-.00551***	-.00533*	-.00742**	.00493	.00758**	-.00674***	-.00654***	.00347	-.00366	-.04935	-.03555
	(.00499)	(.00112)	(.00269)	(.00363)	(.00337)	(.00370)	(.00103)	(.00092)	(.00213)	(.00202)	(.02703)	(.02113)
N	5,310	4,792	4,519	1,323	5,292	4,777	5,337	4,813	5,341	4,812	3,575	4,833
R^2	0.6341	0.7258	0.6735	0.6178	0.7022	0.8061	0.6278	0.5535	0.7216	0.7502	0.6337	0.8497

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Notes: The table presents the estimates of the specification (4.3). Standard errors clustered by sector in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Variables with _t0 mean firms' forecast errors for the current year. Variables with _t1 mean firms' forecast errors one year ahead. Variables with _t2 mean firms' forecast errors two years ahead. Variables with _t5 mean firms' forecast errors five year ahead. CPI means firms' forecast errors for inflation expectation. GDP denotes firms' forecast errors for economic growth.

Continued

	CPI_t0	CPI_t1	CPI_t2	CPI_t5	GDP_t0	GDP_t1	Interest rate_t0	Interest rate_t1	Exchange rate_t0	Exchange rate_t1	Wage_t0	Wage_t1
Panel C - Medium firms												
Industry News												
Increase	-.03802**	-.04008**	-.03668***	-.03819***	-.03667*	-.03719**	-.01585	-.03091	-.00166	-.00122	-.05105	-.05134
	(.01819)	(.01883)	(.00755)	(.01008)	(.01815)	(.01853)	(.03711)	(.03552)	(.00201)	(.00205)	(.03552)	(.03433)
Decrease	-.04322**	.04218**	-.04143***	-.03526***	-.01876**	-.01288**	-.00764	-.00980	-.00267	-.00214	.05016	-.05340
	(.02107)	(.01856)	(.01008)	(.00882)	(.00873)	(.00605)	(.02182)	(.02282)	(.00182)	(.00192)	(.03364)	(.03521)
No change	-.01455	-.01791	-.01812**	-.01773	-.00766	-.00831*	-.01053	-.01225	-.00203	.00208	-.03943	.04797
	(.00899)	(.01225)	(.00897)	(.00859)	(.00525)	(.00406)	(.02778)	(.02987)	(.00311)	(.00313)	(.03003)	(.02916)
Aggregate News												
Increase	-.00738***	-.00703***	-.00671***	-.00754***	-.01003***	-.00882***	-.00633***	-.00652***	-.00402**	-.00410**	-.06009*	-.04535*
	(.00182)	(.00147)	(.00133)	(.00136)	(.00255)	(.00216)	(.00092)	(.00102)	(.00176)	(.00158)	(.02943)	(.02292)
Decrease	-.01002**	-.01065***	-.01115***	-.01317***	-.00893***	-.00898***	-.00614***	-.00646***	-.00438**	-.00424**	-.06122**	-.03376
	(.00475)	(.00266)	(.00326)	(.00342)	(.00176)	(.00203)	(.00092)	(.00097)	(.00132)	(.00165)	(.02715)	(.02410)
No change	-.00494	-.00809	-.00708**	-.00691	.00513	-.00617*	-.00605***	-.00602***	-.00356	.00320	-.04809	-.03511
	(.00432)	(.00517)	(.00309)	(.00408)	(.00384)	(.00302)	(.00085)	(.00111)	(.00193)	(.00202)	(.02521)	(.02102)
N	7,418	6,786	6,563	1,435	7,394	6,747	7,435	6,768	7,430	6,773	4,172	6,782
R^2	0.6510	0.7422	0.6783	0.5744	0.6933	0.8016	0.6344	0.5622	0.7211	0.7748	0.6355	0.8355
Panel D - Large firms												
Industry News												
Increase	-.02831	-.04122	-.03556	-.03809	-.03323	-.03154	-.06322	-.06981	-.00190	-.00142	-.04933	-.05030
	(.01832)	(.02693)	(.02515)	(.02118)	(.01919)	(.01871)	(.03743)	(.03756)	(.00335)	(.00209)	(.04209)	(.03673)
Decrease	-.04263	-.03891	-.04122	-.03556	-.01778	-.01108	-.02614	-.02709	-.00235	-.00211	.05003	-.06765
	(.02557)	(.02116)	(.02289)	(.02109)	(.01022)	(.00828)	(.02786)	(.02615)	(.00188)	(.00173)	(.02724)	(.04338)
No change	.01337	-.01633	.01434	-.01514	-.00834	.00875	.03661	.03445	.00313	.00257	.04301	-.05166
	(.00935)	(.01118)	(.01055)	(.01090)	(.00618)	(.00555)	(.03105)	(.03008)	(.00306)	(.00313)	(.03327)	(.02927)
Aggregate News												
Increase	-.00477*	-.00587	-.00766	-.00723	-.00896	-.00868	-.00698	-.00677	-.00502	-.00478	-.06008	-.04012
	(.00153)	(.00412)	(.00501)	(.00489)	(.00500)	(.00516)	(.00414)	(.00397)	(.00273)	(.00281)	(.03223)	(.03134)
Decrease	-.00780	-.00983	-.01240	-.00964	-.00832	-.00892	-.00633	-.00621	-.00487	-.00432	-.06310	-.05376
	(.00437)	(.01238)	(.07223)	(.00897)	(.00496)	(.00511)	(.00471)	(.00394)	(.00296)	(.00235)	(.03304)	(.03334)
No change	.00633	-.00821	-.00717	-.00775	.00603	.00615	-.00612	-.00616	-.00351	-.00371	-.05236	-.03211
	(.00415)	(.00554)	(.00422)	(.00498)	(.00418)	(.00421)	(.00395)	(.00384)	(.00234)	(.00211)	(.02902)	(.02809)
N	6,592	6,167	5,992	1,288	6,569	6,143	6,590	6,162	6,590	6,166	3,719	6,167
R^2	0.6441	0.7355	0.7117	0.5930	0.6733	0.8121	0.6478	0.5711	0.7823	0.7904	0.6908	0.8325

Notes: The table presents the estimates of the specification (4.3). Standard errors clustered by sector in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Variables with _t0 mean firms' forecast errors for the current year. Variables with _t1 mean firms' forecast errors one year ahead. Variables with _t2 mean firms' forecast errors two years ahead. Variables with _t5 mean firms' forecast errors five year ahead. CPI means firms' forecast errors for inflation expectation. GDP denotes firms' forecast errors for economic growth.

5 Conclusion

In this paper, I examine the relationship between the frequency of industry and aggregate news and firms' expectations of key macroeconomic variables, as well as the influence of news content on the accuracy of firms' forecasts. First, the findings suggest that the frequency of both industry and aggregate news plays a significant role in shaping firms' expectations, particularly for smaller firms. This challenges the assumption of full-information rational expectations, as industry news does influence firms' expectations of aggregate economic variables. Specifically, we find that increased exposure to news reporting changes in variables such as inflation and economic growth helps reduce forecast errors, particularly for small and medium-sized firms. Second, the impact of news on firms' expectations varies by firm size, with small and medium-sized firms being more likely to update their expectations when exposed to a higher frequency of news.

Overall, this study highlights the importance of news as an information source for firms, particularly for smaller ones, and emphasizes the need to consider both the frequency and content of news in understanding how firms update their expectations. This has implications for policymakers and researchers interested in understanding how firms form their expectations and how news media influence economic behavior and decision-making. Future research could explore the broader implications of news exposure on firm-level outcomes and the role of information dissemination in shaping economic dynamics.

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A Data Appendix

A.1 South Africa Firm-Level Expectations Data

The primary dataset is South Africa firm-level expectations data. In 1999, the South African Reserve Bank (SARB) commissioned the Bureau of Economic Research (BER) to conduct inflation expectations surveys. The design of the BER's survey drew inspiration from 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.

The BER conducts surveys of four societal groups. The surveys of financial analysts, the business sector, and the trade unions are administered by the BER itself, while a respected market research company (Nielsen for most of the period since the survey's inception) is commissioned to administer the survey of households. All four surveys have been conducted quarterly since 2000. The dataset used in the analyses of this paper pertains to the survey of the business sector (firms).

The survey encompass forecasts of multiple horizons, various macroeconomic variables, and certain socio-economic characteristics of respondents. Expectations are collected for the current calendar year, the next calendar year, the calendar year two years ahead, and five years ahead. Respondents are also asked to forecast a range of other macroeconomic variables including inflation, GDP growth, interest rates/prime rates, exchange rates, and wages.

The survey provides respondents with information about the previous year's outcomes and the average over the previous five years. This priming effect, tested in the BER household survey by Reid et al. (2020), has been found to bias the responses of a portion of the respondents in a manner that is economically significant. It appears to predominantly affect the less economically active group, presumably due to their lesser exposure to inflation-related information, making them less confident or more susceptible to influence. To limit the effects of priming, I control for the previous year's variables and the average over the previous five years in the regressions.

Regarding the wording of the survey question, there is a debate whether to use 'inflation' or 'prices in general'. Research by Bruine de Bruin et al. (2010) suggests that using the phrase 'prices in general' might lead to greater disagreement among respondents compared to 'inflation'. However, recent research by Pienaar (2018) for South Africa found no clear evidence that the term 'inflation' is notably less well understood than 'prices in general'. It is reasonable to assume that the population might understand the term 'inflation' more accurately two decades after the adoption of inflation targeting.

The population of the business sector is extensive and comprises firms of varying sizes and sectors. The sample size collected by the BER for this population is quite large, ranging from 1,061 in 2000 to 522 in 2020. The BER aims to ensure adequate representation of firms from each sector in the sample, although confirming whether this sample accurately reflects the changing composition of South Africa's economy is challenging. The sampling method is best described as convenience sampling. Reid and Siklos (2021) investigated the distribution of respondents by SIC code within the dataset and showed that representations of some sectors within the economy have changed

slightly over the sample period, while others remain stable. However, no conclusions have been drawn regarding whether the data is nationally representative.

A.2 South African Newspapers Data

I gather data on the frequency of industry news mentioned in newspapers according to specific subjects (inflation, GDP growth, interest rates/prime rates, exchange rates, and wages) using Dow Jones Factiva for the period spanning from 2000 to 2021. I concentrate on the top 20 national newspapers in South Africa by circulation, as well as prominent newspapers from South Africa's major trading partners, such as the Financial Times (United Kingdom), the Wall Street Journal (United States), and the New York Times (United States). Specifically, I gather data from the following South African newspapers: The Star, Cape Times, The Mercury, Pretoria News, Cape Argus, Daily News, Business Day, The Herald, Sunday Tribune, The Sunday Times, Sowetan, Daily Dispatch, Mail & Guardian Online, Sunday Independent, The Times, Post, The Financial Mail, Financial Mail, The Independent on Saturday, Daily Sun, Cape Business News, and Cape Business Online News.

The criteria for selecting these newspapers are as follows: (i) they are the top national newspapers in South Africa by circulation, (ii) they cover significant economic and business news, and (iii) Factiva provides consistent coverage of these newspapers throughout the entire period from 2000 to 2021. The frequency data are collected from both the print and online editions of each newspaper. Factiva allows users to exclude identical articles from search results, enabling us to avoid duplicate articles across different editions of the same newspaper or duplicates resulting from minor changes in the articles, such as typos.

One advantage of Factiva is its development and maintenance of a list of Dow Jones Intelligent Identifiers (DJID) Codes for sectors, countries, and subjects. These descriptive terms are attached to each article as metadata. Users can search using these codes instead of keywords, facilitating consistent searching and obtaining frequency data across different newspapers, regardless of their editions.

Factiva boasts more than 1,150 DJID codes covering a wide range of sectors. These codes are organized into five levels in the industry coding hierarchy, allowing users to search at broad or detailed levels. For example, agriculture is the broadest level, encompassing farming, which can be further disaggregated into more refined sectors such as coffee growing or horticulture. Horticulture, in turn, includes subsectors like vegetable growing or fruit growing, which can be further refined into even more detailed categories, such as citrus groves and non-citrus fruit/tree nut farming. I utilize the second broadest aggregation level of sectors as defined by Factiva (for example, farming) and establish a concordance with South Africa SIC sectors as reported in Table 9 to merge with other datasets. .

B Empirical Appendix

Table 9: Factiva - South Africa SIC Sector Concordance

No	SIC Code	SIC description	Factiva sector
1	11	Agriculture, hunting and related services	Farming
2	13	Fishing, operation of fish hatcheries and fish farms	Fishing
3	12	Forestry, logging and related services	Forestry/Logging
4	11	Agriculture, hunting and related services	Seeds
5	11	Agriculture, hunting and related services	Support Activities for Agriculture
6	38	Manufacture of transport equipment	Autonomous Driving Technologies
7	38	Manufacture of transport equipment	Connected Vehicle Technologies
8	38	Manufacture of transport equipment	Motor Vehicle Parts
9	38	Manufacture of transport equipment	Motor Vehicles
10	33	Manufacture of coke, refined petroleum products and nuclear fuel; manufacture of chemicals and chemical products; manufacture of rubber and plastic products	Chemicals
11	21	Mining of coal and lignite	Mining/Quarrying
12	32	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials; manufacture of paper and paper products; publishing, printing and reproduction of recorded media	Paper/Pulp
13	35	Manufacture of basic metals, fabricated metal products, machinery and equipment and of office, accounting and computing machinery	Primary Metals
14	32	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials; manufacture of paper and paper products; publishing, printing and reproduction of recorded media	Wood Products
15	88	Other business activities	Accounting/Consulting
16	91	Public administration and defence activities	Administrative/Support Services
17	88	Other business activities	Advertising/Marketing/Public Relations
18	99	Other service activities	Agents/Managers for Public Figures
19	99	Other service activities	Commercial Cleaning Services
20	86	Computer and related activities	Computer Services
21	83	Activities auxiliary to financial intermediation	Debt Recovery/Collection Services

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Table 9 – *Factiva - South Africa SIC Sector Concordance (Cont.)*

No	SIC sector	SIC description	Factiva sector
22	83	Activities auxiliary to financial intermediation	Diversified Holding Companies
23	92	Education	Educational Services
24	94	Other community, social and personal service activities	Environment/Waste Management
25	74	Supporting and auxiliary transport activities; activities of travel agencies	Highway Operation
26	88	Other business activities	Investigation Services
27	88	Other business activities	Legal Services
28	99	Other service activities	Moving/Relocation Services
29	99	Other service activities	Parking Lots/Garages
30	99	Other service activities	Photographic Processing
31	39	Manufacture of furniture; manufacturing n.e.c.; recycling	Product Repair Services
32	95	Activities of membership organisations n.e.c.	Professional Bodies
33	88	Other business activities	Recruitment Services
34	85	Renting of machinery and equipment, without operator, and of personal and household goods	Rental/Leasing Services
35	87	Research and development	Scientific Research Services
36	88	Other business activities	Security Systems Services
37	88	Other business activities	Security/Prison Services
38	88	Other business activities	Services to Facilities/Buildings
39	83	Activities auxiliary to financial intermediation	Shell Company
40	94	Other community, social and personal service activities	Specialized Consumer Services
41	86	Computer and related activities	Technical Services
42	30	Manufacture of food products, beverages and tobacco products	Baby Products
43	31	Manufacture of textiles, clothing and leather goods	Clothing/Textiles
44	32	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials; manufacture of paper and paper products; publishing, printing and reproduction of recorded media	Converted Paper Products
45	37	Manufacture of radio, television and communication equipment and apparatus and of medical, precision and optical instruments, watches and clocks	Durable Household Products

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Table 9 – *Factiva - South Africa SIC Sector Concordance (Cont.)*

No	SIC sector	SIC description	Factiva sector
46	30	Manufacture of food products, beverages and tobacco products	Food/Beverages
47	39	Manufacture of furniture; manufacturing n.e.c.; recycling	Furniture
48	35	Manufacture of basic metals, fabricated metal products, machinery and equipment and of office, accounting and computing machinery	Home Improvement Products
49	31	Manufacture of textiles, clothing and leather goods	Leather/Fur Goods
50	31	Manufacture of textiles, clothing and leather goods	Leisure/Travel Goods
51	39	Manufacture of furniture; manufacturing n.e.c.; recycling	Luxury Goods
52	30	Manufacture of food products, beverages and tobacco products	Marijuana Products
53	33	Manufacture of coke, refined petroleum products and nuclear fuel; manufacture of chemicals and chemical products; manufacture of rubber and plastic products	Nondurable Household Products
54	35	Manufacture of basic metals, fabricated metal products, machinery and equipment and of office, accounting and computing machinery	Office Equipment/Supplies
55	37	Manufacture of radio, television and communication equipment and apparatus and of medical, precision and optical instruments, watches and clocks	Optical Instruments
56	33	Manufacture of coke, refined petroleum products and nuclear fuel; manufacture of chemicals and chemical products; manufacture of rubber and plastic products	Personal Care Products / Appliances
57	30	Manufacture of food products, beverages and tobacco products	Tobacco Products
58	37	Manufacture of radio, television and communication equipment and apparatus and of medical, precision and optical instruments, watches and clocks	Watches/Clocks/Parts
59	33	Manufacture of coke, refined petroleum products and nuclear fuel; manufacture of chemicals and chemical products; manufacture of rubber and plastic products	Alternative Fuels
60	36	Manufacture of electrical machinery and apparatus n.e.c.	Electric Power Generation
61	33	Manufacture of coke, refined petroleum products and nuclear fuel; manufacture of chemicals and chemical products; manufacture of rubber and plastic products	Fossil Fuels
62	33	Manufacture of coke, refined petroleum products and nuclear fuel; manufacture of chemicals and chemical products; manufacture of rubber and plastic products	Natural Gas Processing
63	33	Manufacture of coke, refined petroleum products and nuclear fuel; manufacture of chemicals and chemical products; manufacture of rubber and plastic products	Nuclear Fuel

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Table 9 – *Factiva - South Africa SIC Sector Concordance (Cont.)*

No	SIC sector	SIC description	Factiva sector
64	81	Financial intermediation, except insurance and pension funding	Banking/Credit
65	81	Financial intermediation, except insurance and pension funding	Financial Technology
66	82	Insurance and pension funding, except compulsory social security	Insurance
67	81	Financial intermediation, except insurance and pension funding	Investing/Securities
68	83	Activities auxiliary to financial intermediation	Rating Agencies
69	83	Activities auxiliary to financial intermediation	Risk Management Services
70	93	Health and social work	Biotechnology
71	93	Health and social work	Healthcare Provision
72	93	Health and social work	Healthcare Support Services
73	93	Health and social work	Medical Equipment/Supplies
74	93	Health and social work	Pharmaceuticals
75	34	Manufacture of other non-metallic mineral products	Abrasive Products
76	38	Manufacture of transport equipment	Aerospace/Defense
77	63	Sale, maintenance and repair of motor vehicles and motor cycles; retail trade in automotive fuel	Downstream Operations
78	38	Manufacture of transport equipment	Drones
79	34	Manufacture of other non-metallic mineral products	Glass/Glass Products
80	34	Manufacture of other non-metallic mineral products	Industrial Ceramics
81	36	Manufacture of electrical machinery and apparatus n.e.c.	Industrial Electronics
82	36	Manufacture of electrical machinery and apparatus n.e.c.	Machinery
83	35	Manufacture of basic metals, fabricated metal products, machinery and equipment and of office, accounting and computing machinery	Metal Products
84	37	Manufacture of radio, television and communication equipment and apparatus and of medical, precision and optical instruments, watches and clocks	Optical Instruments
85	32	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials; manufacture of paper and paper products; publishing, printing and reproduction of recorded media	Packaging

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Table 9 – *Factiva - South Africa SIC Sector Concordance (Cont.)*

No	SIC sector	SIC description	Factiva sector
86	33	Manufacture of coke, refined petroleum products and nuclear fuel; manufacture of chemicals and chemical products; manufacture of rubber and plastic products	Plastics Products
87	38	Manufacture of transport equipment	Railroad Rolling Stock
88	33	Manufacture of coke, refined petroleum products and nuclear fuel; manufacture of chemicals and chemical products; manufacture of rubber and plastic products	Rubber Products
89	38	Manufacture of transport equipment	Shipbuilding
90	36	Manufacture of electrical machinery and apparatus n.e.c.	Wires/Cables
91	96	Recreational, cultural and sporting activities	Digital Libraries/Archives
92	96	Recreational, cultural and sporting activities	Entertainment Venues
93	96	Recreational, cultural and sporting activities	Film/Video Exhibition
94	96	Recreational, cultural and sporting activities	Gambling Industries
95	64	Hotels and restaurants	Lodgings/Restaurants/Bars
96	96	Recreational, cultural and sporting activities	Performing Arts/Sports Promotion
97	96	Recreational, cultural and sporting activities	Sporting Facilities/Venues
98	96	Recreational, cultural and sporting activities	Sports/Physical Recreation Instruction
99	96	Recreational, cultural and sporting activities	Tourism
100	96	Recreational, cultural and sporting activities	Audiovisual Production
101	96	Recreational, cultural and sporting activities	Broadcasting
102	96	Recreational, cultural and sporting activities	Freelance Journalism
103	96	Recreational, cultural and sporting activities	Media Content Distribution
104	32	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials; manufacture of paper and paper products; publishing, printing and reproduction of recorded media	Printing/Publishing
105	96	Recreational, cultural and sporting activities	Social Media Platforms/Tools
106	32	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials; manufacture of paper and paper products; publishing, printing and reproduction of recorded media	Sound/Music Recording/Publishing
107	88	Other business activities	Architects

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Table 9 – *Factiva - South Africa SIC Sector Concordance (Cont.)*

No	SIC sector	SIC description	Factiva sector
108	34	Manufacture of other non-metallic mineral products	Building Materials/Products
109	50	Construction	Construction
110	84	Real estate activities	Real Estate
111	62	Retail trade, except of motor vehicles and motor cycles; repair of personal household goods	Retail
112	61	Wholesale and commission trade, except of motor vehicles and motor cycles	Wholesalers
113	32	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials; manufacture of paper and paper products; publishing, printing and reproduction of recorded media	3D/4D Printing
114	11	Agriculture, hunting and related services	Agriculture Technology
115	86	Computer and related activities	Artificial Intelligence Technologies
116	38	Manufacture of transport equipment	Autonomous Driving Technologies
117	37	Manufacture of radio, television and communication equipment and apparatus and of medical, precision and optical instruments, watches and clocks	Biometrics Technology
118	83	Activities auxiliary to financial intermediation	Blockchain Technology
119	86	Computer and related activities	Computers/Consumer Electronics
120	92	Education	E-learning/Educational Technology
121	81	Financial intermediation, except insurance and pension funding	Financial Technology
122	37	Manufacture of radio, television and communication equipment and apparatus and of medical, precision and optical instruments, watches and clocks	Healthcare Information Technologies
123	36	Manufacture of electrical machinery and apparatus n.e.c.	Industrial Electronics
124	86	Computer and related activities	Online Service Providers
125	96	Recreational, cultural and sporting activities	Sports Technologies
126	75	Post and telecommunications	Telecommunications Equipment
127	86	Computer and related activities	Virtual Reality Technologies
128	75	Post and telecommunications	Integrated Communications Providers
129	75	Post and telecommunications	Satellite Telecommunications Services
130	75	Post and telecommunications	Wired Telecommunications Services

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Table 9 – *Factiva - South Africa SIC Sector Concordance (Cont.)*

No	SIC sector	SIC description	Factiva sector
131	75	Post and telecommunications	Wireless Telecommunications Services
132	73	Air transport	Air Transport
133	75	Post and telecommunications	Freight Transport/Logistics
134	71	Land transport; transport via pipelines	Land Transport
135	73	Air transport	Space Transport
136	72	Water transport	Water Transport/Shipping
137	41	Electricity, gas, steam and hot water supply	Electricity/Gas Utilities
138	41	Electricity, gas, steam and hot water supply	Multiutilities
139	42	Collection, purification and distribution of water	Water Utilities

Table 10: Relationship Between Firms' Expectations of Aggregate Economic Variables (including other variables in the control

		CPI_t1	CPI_t2	CPI_t5	GDP_t1	Interest rate_t1	Exchange rate_t1	Wage_t1
CPI_t1	β		0.926***	0.579***	-0.143***	0.122***	0.0814***	0.161***
			(0.0193)	(0.0532)	(0.0246)	(0.0135)	(0.0119)	(0.0220)
	N		8575	6317	8657	8685	8685	8666
	R		0.872	0.594	0.537	0.621	0.952	0.691
CPI_t2	β	0.758***		0.591***	-0.113***	0.107***	0.0990***	0.143***
		(0.0157)		(0.0382)	(0.0217)	(0.0133)	(0.0144)	(0.0163)
	N	8575		6216	8471	8494	8500	8482
	R	0.870		0.625	0.535	0.621	0.952	0.693
CPI_t5	β	0.262***	0.350***		-0.0225	0.0590***	0.0696***	0.128***
		(0.0364)	(0.0385)		(0.0162)	(0.0125)	(0.0110)	(0.0296)
	N	6317	6216		6285	6282	6293	6278
	R	0.675	0.686		0.546	0.643	0.940	0.709
GDP_t1	β	-0.0818***	-0.0228	-0.0845***		0.0334***	-0.0617***	0.0754***
		(0.0169)	(0.0172)	(0.0143)		(0.00858)	(0.0105)	(0.0213)
	N	8471	6285	8657		8633	8636	8619
	R	0.568	0.518	0.567		0.615	0.952	0.692
Interest rate_t1	β	0.158***	0.120***	0.147***	0.0685***		0.0995***	0.0963***
		(0.0158)	(0.0276)	(0.0204)	(0.0216)		(0.0187)	(0.0204)
	N	8494	6282	8685	8633		8687	8668
	R	0.574	0.525	0.573	0.525		0.952	0.692
Exchange rate_t1	β	0.139***	0.113***	0.0944***	-0.119***	0.0939***		0.0421**
		(0.0228)	(0.0223)	(0.0169)	(0.0223)	(0.0232)		(0.0156)
	N	8500	6293	8685	8636	8687		8674
	R	0.566	0.528	0.560	0.526	0.620		0.691
Wage_t1	β	0.0752***	0.110***	0.0691***	0.0556***	0.0346***	0.0155***	
		(0.00849)	(0.0259)	(0.00949)	(0.0175)	(0.00699)	(0.00537)	
	N	8482	6278	8666	8619	8668	8674	
	R	0.574	0.528	0.574	0.530	0.617	0.953	

Notes: The table presents the estimates of the specification (4.1). Standard errors clustered by sector in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Variables with _t1 mean firms' expectation one year ahead. Variables with _t2 mean firms' expectation two years ahead. Variables with _t5 mean firms' expectation five year ahead. CPI means firms' inflation expectation. GDP denotes firms' expectation for economic growth.