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Article

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Journal of Applied Economics

Provided in Cooperation with:

University of CEMA, Buenos Aires

Suggested Citation: Mlangeni, Thobani; Buthelezi, Eugene Msizi (2024) : Monetary policy and inflation expectations: Impact and causal analysis of heterogeneous economic agents' expectations in South Africa, Journal of Applied Economics, ISSN 1667-6726, Taylor & Francis, Abingdon, Vol. 27, Iss. 1, pp. 1-28,
<https://doi.org/10.1080/15140326.2023.2289724>

This Version is available at:

<https://hdl.handle.net/10419/314249>

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To cite this article: Thobani Mlangeni & Eugene Msizi Buthelezi (2024) Monetary policy and inflation expectations: impact and causal analysis of heterogeneous economic agents' expectations in South Africa, *Journal of Applied Economics*, 27:1, 2289724, DOI: [10.1080/15140326.2023.2289724](https://doi.org/10.1080/15140326.2023.2289724)

To link to this article: <https://doi.org/10.1080/15140326.2023.2289724>



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Published online: 06 Dec 2023.



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RESEARCH ARTICLE



Monetary policy and inflation expectations: impact and causal analysis of heterogeneous economic agents' expectations in South Africa

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ABSTRACT

This study employs a Vector Error Correction (VEC) model to investigate the dynamic relationship between changes in monetary policy and inflation expectations within various sectors. The analysis encompasses data from the financial, business, and trade union sectors, spanning the first quarter of 2000 to the fourth quarter of 2022. Results indicate that trade unions exhibit sensitivity to previous changes in the repo rate. In the long term, monetary policy influences inflation expectations within the financial sector. In contrast, elevated repo rates in the business sector correlate with diminished expectations, subsequently impacting wage dynamics. Granger causality tests establish a significant link between repo rate shifts and inflation expectations in the business and trade union sectors. The study advances the understanding of diverse sector responses to monetary policy's impact on inflation expectations, and implement sector-specific policy adjustments that consider the unique dynamics of each sector, ensuring a more targeted and effective response.

ARTICLE HISTORY

Received 21 June 2023

Accepted 23 November 2023

KEYWORDS

Monetary policy; inflation expectations

1. Introduction

Inflation expectations play a crucial role in shaping economic behaviour and outcomes. They influence consumer spending, investment decisions, wage negotiations, and financial market dynamics. Understanding the formation and dynamics of inflation expectations is therefore of paramount importance for policymakers, as it affects their ability to achieve their monetary policy objectives (Carvalho et al., 2023; Cho & Oh, 2023; Coibion et al., 2020; Fracasso & Probo, 2017). Maintaining price stability is the key objective of the South African Reserve Bank (SARB) (SARB, 2023). Since adopting inflation targeting in South Africa in 2000, the SARB has aimed to achieve price stability by setting a target range for inflation. However, there have been concerns about the effectiveness of this regime in anchoring inflation expectations and guiding private-sector behaviour. In addition, the SARB needs to consider inflation expectations, which are the beliefs and perceptions of individuals, businesses, and investors about the future level of inflation.

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Empirical studies have shed light on several significant findings. First, Kabundi and Schaling (2013) found that Lagged inflation primarily influences inflation expectations in South Africa. This finding suggests a need for more anchoring of expectations by the SARB, and raises concerns about the effectiveness of the SARB's monetary policy in guiding and shaping inflation expectations. Second, Gabriel Caldas and Rodolfo Tomás Da Fonseca (2015) highlight the impact of central bank communications on the expectations of financial market experts. These findings underscore the critical role of the central bank's clear and effective communication strategies in shaping inflation expectations. The study emphasises the role of transparency and credibility in central bank communications, as they can significantly influence market participants' expectations.

Furthermore, Maule and Hubert (2016) explore the response of inflation expectations to monetary policy shocks. Their research provides insights into how changes in monetary policy affect inflation expectations in South Africa. Understanding these dynamics is crucial for policymakers as they seek to manage inflation and achieve their monetary policy objectives. While some studies have found clear evidence supporting the effectiveness of monetary policy in anchoring inflation expectations, other studies have presented more mixed or uncertain results. For example, Kabundi et al. (2015) and Beckers and Brassil (2022) report findings regarding the relationship between monetary policy and inflation expectations that need to be clarified. The findings indicate the need for further investigation and deeper analysis to understand this relationship comprehensively. Additionally, some studies have uncovered the negative impacts of contractionary monetary policy shocks on the term structure of inflation expectations. Coibion et al. (2020) and Mcneil (2023), among others, highlight how such shocks can distort and reshape inflation expectations, leading to unintended consequences for economic agents and financial markets. Buthelezi (2023a) examined the impact of money supply on inflation and economic growth in South Africa from 1990 to 2021 using Markov-switching dynamic regression. The study revealed a substantial multiplier effect on GDP and inflation. Another study by Buthelezi (2023b) focused on inflation's impact on unemployment using the Phillips curve, finding a 1% increase resulting in a 2.61% increase and 0.06% decrease in unemployment. However, Buthelezi (2023a) and Buthelezi (2023b), works highlight a gap in understanding economic agent inflation expectations, necessitating further exploration in the South African context..

Figure 1 shows the economic variables of inflation expectation and the repo rate. The economic variables considered are *infl_e_f* inflation expectations: financial analysts: one year ahead, *infl_e_b* inflation expectations: business representatives: one year ahead, *infl_e_trdun* inflation expectations: trade union representatives: one year ahead, and *rr* repo rate. It is noted that across all categories, the inflation expansion Figure 1 diagram (a to c) is in the high band of 6%. The problem identified is twofold-fold. Figure 1 diagram (a to c) shows that the repo rate in recent quarters has reflected a steep upward trend. However, this has yet to be followed by a fall in inflation expectations. Inflation expectations are also on an upward trend. This contradicts the notion that when there is an increase in the repo rate, inflation expectations should fall, as suggested by Rochon and Olawoye (2012).

It is against this background that this paper seeks to investigate the impact of the monetary rate (repo rate) on inflation expectations in South Africa for different economic agents, particularly in the financial, business and trade unions. Second, the problem identified in this paper is the discrepancy observed between the expected relationship between inflation

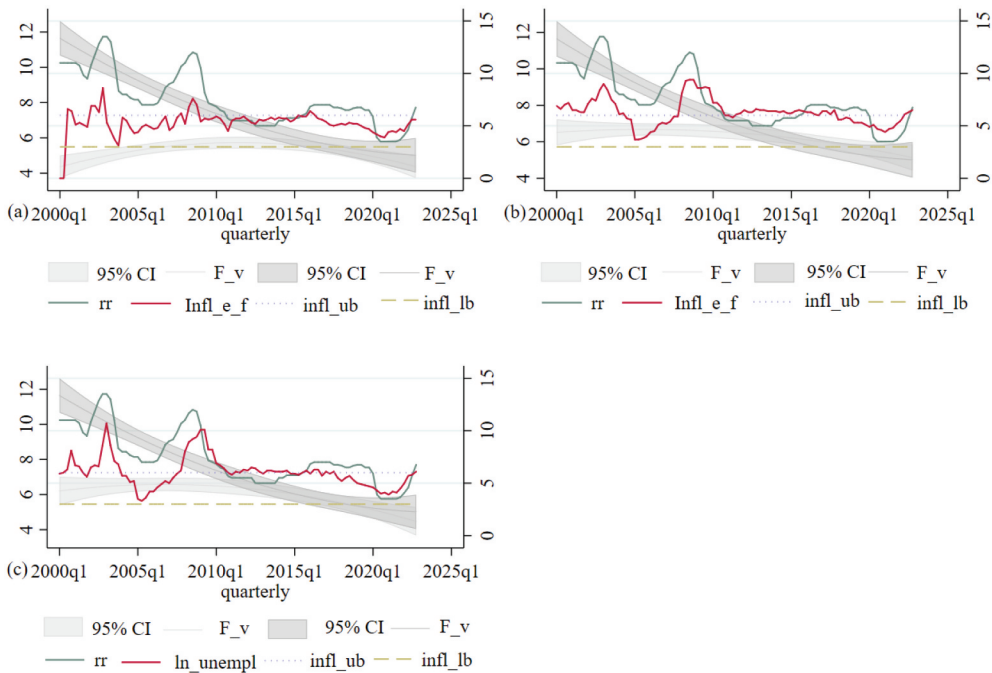


Figure 1. Economic variables of inflation expectation and the repo rate. Note the economic variables are $\ln_infl_e_f$, which is the inflation expectations for financial agents one year ahead; $\ln_infl_e_b$, which is the inflation expectations for business agents one year ahead, and $\ln_infl_e_trdun_rr$, which is the inflation expectations for trade union agents one year ahead. On the other hand, CI is a confidence interval, f_v is the filter value, $infl_ub$ is the inflation upper band, and $infl_lb$ is the inflation lower band. Composed by the authors, data sourced from (SARB, 2023).

expectations and the repo rate, as per conventional wisdom, and the empirical evidence in South Africa between the first quarter of 2000 and the second quarter of 2011. During this period, a counterintuitive trend emerged, indicating that as inflation expectations increased, the repo rate decreased, which is contrary to the prevailing understanding, which is the opposite. Therefore, this paper aims to investigate the causal relationship between inflation expectations and the repo rate. By unravelling the causal link between these variables, this paper seeks to provide insights into the underlying dynamics and mechanisms that drive the observed patterns, contributing to a better understanding of the relationship between inflation expectations and the repo rate in South Africa.

Although prior research has explored the link between inflation expectations and monetary policy, the emphasis has frequently been on broad indicators or isolated economic domains. This study undertakes a more comprehensive approach to address this limitation, aiming to bridge the gap by delving into a meticulous examination. This analysis considers the viewpoints of diverse economic stakeholders – from financial analysts and business delegates to trade union representatives. Significantly, a notable void exists for an in-depth exploration of the causal nexus encompassing the repo rate, inflation expectations, and the ramifications of monetary policy shocks. This study endeavours to address this unmet need, contributing a rigorous and nuanced analysis investigating these interconnected factors with heightened attention. The distinctive essence of this study lies in its multifaceted examination

of how varying economic agents shape their inflation expectations and react to changes in the repo rate. By scrutinising this dynamic from various angles, the study enriches the understanding of transmission mechanisms between monetary policy and inflation expectations. It provides insights into potential variations in the effectiveness of such policies across different sectors. In essence, the study's paramount contribution rests in addressing gaps, conducting an exhaustive exploration, and offering novel insights into the intricate relationship between the repo rate, inflation expectations, and monetary policy implications. This distinctive perspective equips policymakers with a deeper understanding of transmission channels, enabling the formulation of finely tuned strategies to anchor inflation expectations and achieve the crucial goal of sustainable price stability.

This paper holds sufficient understanding value for stakeholders, especially policymakers, in making more informed and effective decisions. Through nuanced policy formulation by comprehending how diverse economic agents shape their inflation expectations and react to repo rate changes, policymakers can tailor their strategies more precisely. This nuanced understanding enables the design of policies that align with the behaviours and expectations of specific sectors, enhancing the overall effectiveness of monetary policy. Improved transmission mechanisms and a deeper grasp of how inflation expectations respond to changes in the repo rate enhance the understanding of transmission mechanisms between monetary policy and economic outcomes. Policymakers can anticipate how various sectors will likely react to policy adjustments, facilitating better predicting potential outcomes. Recognising the heterogeneity of inflation expectations across economic agents leads to more accurate policymaking. Policies can be devised to address different sectors' unique needs and responses, promoting a balanced and targeted approach. Insights into how inflation expectations influence economic behaviour enable stakeholders to predict likely economic responses to policy changes. This aids in avoiding unintended consequences and fostering stability in the economy. Optimised policy implementation, understanding which economic agents are more sensitive to repo rate changes and whose inflation expectations play a more significant role in shaping behaviour, allows policymakers to allocate resources and attention more efficiently. This optimisation ensures that policies yield desired outcomes across various sectors.

Given the problem statement above, this paper has the following questions. What is the impact of the repo rate on the long- and short-run inflation expectations in South Africa? What is the causality effect between the repo rate and inflation expectations in South Africa? How do repo rate shocks affect inflation expectations in South Africa? Based on this question, the following hypotheses were formulated:

Hypothesis 1 Null: There is no impact of the repo rate on the long-run inflation expectations in South Africa.

Alt: There is an impact of the repo rate on long-run inflation expectations in South Africa.

Hypothesis 2 Null: There is no causality effect between the repo rate and inflation expectation in South Africa.

Alt: There is a causality effect between the repo rate and inflation expectation in South Africa.

Hypothesis 3 Null: Repo rate shocks do not affect inflation expectations in South Africa.

Alt: There is an effect of repo rate shocks on inflation expectations in South Africa.

This paper examines the relationship between repo rate changes and inflation expectations across different sectors using a vector error correction (VEC) model. The analysis is based on sector-specific data from the financial, business, and trade union sectors spanning from 2000 quarter 1 to 2022 quarter 4. In the long run, repo rate changes influence inflation expectations in the financial, business, and trade union sectors. Higher repo rates decrease inflation expectations across all three sectors, albeit with varying coefficients. This underscores the lasting impact of monetary policy decisions on inflation expectations in these sectors.

Furthermore, Granger causality tests reveal a statistically significant relationship between repo rate changes and inflation expectations in the business and trade union sectors. This highlights the influence of repo rate fluctuations on inflation expectations within these sectors. However, the tests do not indicate a statistically significant Granger causal relationship between repo rate changes and inflation expectations in the financial sector.

The paper provides evidence of the impact of repo rate changes on inflation expectations across different sectors. Policymakers can utilise this information to assess the effectiveness of repo rate adjustments in managing inflation. Understanding the sectoral dynamics of inflation expectations can help central banks make informed decisions regarding interest rates to achieve their inflation targets. The paper highlights the heterogeneity in the response of different sectors to repo rate changes. The financial sector experiences a relatively minor decrease in inflation expectations compared to the business and trade union sectors. This differentiation suggests that sector-specific policies may be warranted to address the varied effects of monetary policy actions. Market participants, such as investors and businesses, can benefit from understanding the relationship between repo rate changes and inflation expectations. Anticipating the impact of monetary policy on inflation expectations can assist investors in making informed decisions about asset allocation and risk management. Similarly, businesses can adjust their strategies, pricing decisions, and investment plans based on expected inflation, enhancing their ability to navigate economic conditions.

The rest of the paper highlights the following. First, [section 2](#) outlines the literature, including a discussion of the theoretical and empirical literature reviews. Second, [section 3](#) discusses the methodology. Third, [section 4](#) discusses descriptive statistics and empirical results. Finally, [section 5](#) outlines the conclusion of the paper.

2. Literature review

2.1. Theories

Rational expectations theory suggests that individuals form their inflation expectations based on all available information, including past inflation rates, current economic conditions, and expected future policy changes. Rational expectations theory implies that if the central bank raises the policy rate to combat inflation, individuals will adjust their expectations accordingly (Angeletos et al., 2021; Sargent, 2013). The rational expectations are represented in Equation (1).

$$\pi_{t+1}^e = E(\pi_t | I_t) \quad (1)$$

$E(\pi_t | I_t)$ represents the expectation of inflation π at time t based on the information set I_t , and π_{t+1}^e represents the expected inflation value at time $t + 1$. According to rational expectations theory, economic agents form their expectations π_{t+1}^e by using all the available information in I_t . This information may include historical data, economic models, policy announcements, and other relevant information (Angeletos et al., 2021; Sargent, 2013). Equation (1) implies that economic agents' expectations of inflation are unbiased and efficient, given the information they have. Any deviations between actual and expected inflation would be due to unforeseen shocks or changes in the economic environment (Angeletos et al., 2021; Sargent, 2013). In the context of this paper, this theory suggests that economic agents, such as financial analysts, business representatives, and trade union representatives, form their inflation expectations based on a comprehensive set of information, including past inflation rates, current economic conditions, and expected policy changes.

The monetary policy transmission mechanism indicates that raising the policy rate results in higher interest rates. Financial analysts understand that this can affect investments and borrowing expenses for businesses. This could lead to reduced economic activity and lower inflation due to weakened demand. Influenced by borrowing expenses, businesses might adjust expectations for costs and demand. Trade unions may also factor in higher interest rates' effect on consumer spending and economic conditions, impacting their inflation outlook (Yarovaya et al., 2022). Considering the perspectives of various economic agents, such as financial analysts, business representatives, and trade union members, rational expectations form expectations based on all available information (Angeletos et al., 2021; Sargent, 2013). When analysing causal relationships and implications of monetary policy shocks, the rational expectations theory aligns to conduct a rigorous analysis of the causal relationship between the repo rate, inflation expectations, and the implications of monetary policy shocks. This is key in the context of this paper.

2.2. Empirical studies

This literature review delves into extensive research examining the intricate relationship between policy rates and inflation expectations. We have organised our exploration into several distinct themes, each shedding light on different facets of this crucial economic interplay. The following themes are discussed in this review: (1) the capacity of policy rates to successfully anchor inflation expectations, (2) the negative relationship of policy rates on inflation expectations, (3) the shock of policy rates on inflation expectations, and (4) policy rates and inflation expectations across sectors. Pertinent investigations into the empirical underpinnings substantiating the capacity of policy rates to anchor inflation expectations successfully encompass contributions from a spectrum of researchers, including Gobbi et al. (2019), Coibion et al. (2020), Martin (2020), Younas and Siddiqui (2021) and Cho and Oh (2023), among others. Gobbi et al. (2019) examine how monetary policy affects inflation expectations using the New Keynesian DSGE model. They found rapid declines in inflation expectations, outpacing the policy rate during adverse shocks and reaching the zero lower bound without corrective measures.

Coibion et al. (2020) used New Zealand between 2013 and 2017 for their study, consisting of over 3000 households and firms. They note that the inflation expectations of households and firms affect their actions, but the underlying mechanisms remain unclear, especially for firms. The comparative analysis of Martin (2020) was used to investigate inflation expectations in Serbia. Inflation expectations across all sectors aligned with the inflation target set at 3%. However, households' inflation expectations are above the upper limit of the inflation target. The interaction between inflation, interest rates, and the stock market was explored by Younas and Siddiqui (2021) in Ghana using the VECM model on data from 2010 to 2016. Their study emphasised the influence of policy rates in shaping inflation expectations, thereby impacting economic dynamics. Cho and Oh (2023) examine the predictive abilities of various inflation expectations in Korea using a survey of 2 200 households and a simple model using the policy interest rate and an inflation expectation indicator. The regression result suggests that monetary policy is effective in controlling inflation.

Empirical studies elucidating the adverse impact of the policy rate on inflation expectations are found in the works of Shannon and Laurence (2018), Olsson (2020), Aßhoff et al. (2021), Bottone et al. (2022), Mcneil (2023), Bhattacharya (2023) and Arce-Alfaro and Blagov (2023). Shannon and Laurence (2018) examine the alignment of monetary policy rules with inflation expectations in the context of South Africa. They found that the more aggressive monetary policy is ineffective both at lower bounds and above it when the shock is significant and when the reactivity of inflation expectations is sufficiently high. A comprehensive investigation by Olsson (2020) was conducted into the impact of monetary policy announcements on inflation expectations from 2003 to 2015. Using the two-stage least squares regression model, the study unearthed a significant positive effect of announcing a policy rate increase on inflation expectations. The unconventional monetary policy and inflation expectations in the Euro area were investigated by Aßhoff et al. (2021) using the VAR model from 2009 to 2018. They reflect evidence that conventional monetary policy tools are ineffective, and inflation expectations become a crucial channel for monetary policy transmission. Bottone et al. (2022) used a survey of Italian firms from 2017 quarter 2 to 2020 quarter 1. A VAR model found that the policy resulted in a 0.247% increase in inflation expectations.

Mcneil (2023) investigated how inflation expectations in the United States responded to monetary policy shocks from 1982 to 2019. They estimated a structure mode note that a contractionary monetary policy shock twists the term structure of inflation expectations, raising short-run expectations while lowering long-run expectations. Using the VAR mode, Bhattacharya (2023) investigated whether monetary policy in India anchored inflation expectations from 2008 quarter 4 to 2014 quarter 4. It was found that inflation expectation was found to be unanchored by monetary policy. Arce-Alfaro and Blagov (2023) used data from 1982 to 2019 in a VAR model. It was found that monetary policy uncertainty reduces both inflation expectations and inflation. However, after the Great Recession, this link disappeared.

The short- and long-run dynamics of the policy rate on inflation expectations were undertaken by Fracasso and Probo (2017), Diegel and Nautz (2021), Lukianenko et al. (2022) and Armantier et al. (2022), among others. Fracasso and Probo (2017) examined Euro area inflation expectations from July 2008 to September 2015. Despite multiple structural changes during the global financial crisis, long-term inflation expectations

remained stable and well-anchored. Diegel and Nautz (2021) studied long-term inflation expectations and monetary policy shocks from August 2008 to November 2015. Using a VAR model, they found significant responsiveness of inflation expectations to these shocks, with an initial rise in the first six months and a subsequent decline. Lukianenko et al. (2022) found that moderate fluctuations last approximately five months, while high- and low-volatility regimes persist for only 4 and 1 months. They also highlight that during the research period's considerable inflation expectation fluctuations, the impact of the key policy rate on economic agents' price forecasts was most pronounced. Armantier et al. (2022) assessed the anchoring of inflation expectations using "strategic surveys" from 2019 to 2021. They note that the risk of unanchoring expectations was reasonably low in both short- and long-run inflation expectations.

The shock of the policy rate on inflation expectations was undertaken by Maule and Hubert (2016), Falck et al. (2021), Mester (2022), Beckers and Brassil (2022), and Carvalho et al. (2023), among others. Maule and Hubert (2016) found that private inflation expectations react negatively to contractionary monetary policy shocks but positively to optimistic central bank projections for inflation or output. This suggests more reliance on these projections for insights into future economic trends than on policy outlooks. The impact of unconventional monetary policy shocks on inflation expectations was studied by Falck et al. (2021) using a regime-switching New Keynesian model from 1970 to 2007. A 100-basis-point contractionary policy shock raised inflation and expectations by 0.7 percentage points during high disagreement periods but caused a significant 0.8 percentage-point decline in both measures. The Bayesian VAR was used by Mester (2022) to investigate inflation expectation updates in G-7 countries from 1989 to 2016. The study showed that changes in monetary policy paths, particularly interest rate adjustments, held sway over longer horizons, with monetary policy exerting contrasting effects on inflation expectations. Beckers and Brassil (2022) examined Australian inflation expectations using a New Keynesian DSGE model and a monthly survey from January 2004 to December 2019. The results showed that only a minority of union officials and consumers form rational inflation expectations, most influenced by recent inflation outcomes. Carvalho et al. (2023) studied anchored inflation expectations in the US using a new Keynesian model. Their model accurately predicted long-term inflation expectations and identified episodes of unanchored expectations.

The policy rate and inflation expectation in different sectors of trade unions, businesses and the financial sector were undertaken by Kabundi and Schaling (2013), Gabriel Caldas and Rodolfo Tomás Da Fonseca (2015), Kabundi et al. (2015), Bold and Harris (2018), and Coibion et al. (2020), among others. The inflation and inflation expectations investigation was undertaken by Kabundi and Schaling (2013) in South Africa. It was found that economic agents' expectations largely depend on lagged inflation. This suggests that the South African Reserve Bank (SARB) has not succeeded in anchoring the expectations of the private sector since adopting the inflation targeting (IT) regime in 2000. Gabriel Caldas and Rodolfo Tomás Da Fonseca's (2015) findings suggested that the expectations of financial market experts react according to the content of the information provided by the central bank. The announcements cause deterioration of expectations in times of instability and reduce inflation expectations when inflation is controlled. The

investigation of monetary policy and heterogeneous inflation expectations in South Africa was undertaken by Kabundi et al. (2015) from 2000 quarter 1 to the 2013 quarter. Using the EVC model, it was found that the SARB successfully anchored expectations. However, businesses were instinctive at a disaggregated level of finances, while repo resulted in a 0.35% inflation expectation for trade unions. Bold and Harris (2018) investigated monetary policy rules in South Africa with inflation expectations and unemployment using quarterly data from 1994, quarterly 1 to 2015, quarterly three and ordinary least squares (OLS). It was found that the SARB's policy rate decisions respond to expected inflation rather than current inflation, and its relationship to real economy fluctuations is evident in measures of labour market conditions rather than output gap variables. Coibion et al. (2020) outline that firms' expectations are systematically deficient, which can only be addressed by creating extensive, nationally representative surveys of firms. Second, neither households' nor firms' expectations respond much to monetary policy announcements in low-inflation environments.

The causality between the policy rate and inflation expectations was explored by Kirca and Canbay (2021), Matthews and Ong (2022) and Basse and Wegener (2022), among others. Kirca and Canbay (2021) note that Granger causality links consumer interest and exchange rate changes to housing inflation, not housing supply. Conditional frequency domain tests show a similar pattern, with interest rate changes influencing long- and mid-term housing inflation and exchange rate changes affecting mid- and short-term trends. Matthews and Ong (2022) investigated whether central banks must control inflation expectations with a credible target. Using a four-variable VAR, the results reveal that Granger causes inflation and inflation expectations. Basse and Wegener (2022) investigated the relationship between expected inflation and nominal interest rates in Nigeria from 1970 to 2021. In the closed economy context, expected inflation affects nominal rates via Fisher's hypothesis; no reverse causation exists. An approximately 22% disparity between long- and short-term rates is corrected yearly.

3. Methodology

The paper will use time series data from 2000 quarter 1 to 2022 quarter 4. This time was chosen because it was the start of inflation targeting in South Africa. Moreover, it will provide 88 data set episodes which is adequate for economic modelling, as 30 data set episodes are proposed in the literature (Gujarati, 2022). The economic variables used are reflected in Table 1.

The economic variable is used attractively because the $ln_infl_e_f_{t+1}$ financial agents' expectations of future inflation are essential because they influence financial market dynamics. Understanding how monetary policy affects financial agents' inflation expectations can illuminate the link between policy actions and economic outcomes. The $ln_infl_e_b_{t+1}$ business expectations about future inflation impacts pricing decisions, investment strategies, and overall business planning. The $ln_infl_e_trdunln_rr_{t+1}$ trade union inflation expectations are crucial because they can influence wage negotiations and labour market dynamics. Studying the relationship between monetary policy (repo rate) and trade union inflation expectations can help understand the impact of policy on wage

Table 1. Economic variables utilised.

| Variable | Description | Sourced |
|------------------------------------|--|-----------------|
| $\ln_infl_e_f_{t+1}$ | Inflation expectations for financial agents for one year ahead | SARB (2023) |
| $\ln_infl_e_b_{t+1}$ | Inflation expectations for business agents one year ahead | SARB (2023) |
| $\ln_infl_e_trdun\ln_rr_{t+1}$ | Inflation expectations for trade union agents for one year ahead | SARB (2023) |
| \ln_rr_t | Repo rate | |
| \ln_rir_t | Lag real interest rate. | Own computation |
| $\ln_gdp_gap_t$ | Gross domestic product gap, percent change, quarterly, seasonally adjusted annual rate | Own computation |
| \ln_unempl_t | Official unemployment rate | SARB (2023) |
| \ln_infl_t | inflation rate | |
| \ln_g_t | General government final consumption expenditure percentage of gross domestic product | SARB (2023) |

demands and, subsequently, inflation. The \ln_rr_t repo rate is a crucial instrument of monetary policy used to influence interest rates and, consequently, economic activity and inflation. Analysing the relationship between the repo rate and inflation expectations provides insights into the effectiveness of monetary policy transmission. The \ln_rir_t real interest rate influences borrowing costs, investment decisions, and consumer spending. The $\ln_gdp_gap_t$ GDP gap reflects the difference between actual and potential GDP, indicating the state of the economy. Economic conditions can affect inflation expectations, making the GDP gap a relevant control variable. The \ln_unempl_t unemployment affects wage dynamics and consumer spending patterns. The unemployment rate can influence inflation expectations, especially for trade union agents concerned with wage negotiations. The \ln_infl_t current inflation rates can impact future inflation expectations. If inflation is high, agents might adjust their expectations accordingly. Including the current inflation rate allows for a comprehensive analysis of how past and present inflation affects future expectations. The \ln_g_t government spending can influence aggregate demand and, consequently, inflation dynamics. This variable helps capture the fiscal side of economic dynamics that interacts with monetary policy. Other scholars who used similar variables are Kabundi et al. (2015), Shannon and Laurence (2018), and Younas and Siddiqui (2021), among others.

The paper uses vector error correction (VEC). The model provided an attractive fixture to the two-stage least squares (2SLS), ordinary least squares (OLS), and autoregressive distributed lag (ARDL). This is because used the 2SLS and OLS methods focus on short-term or long-term effects without fully capturing the dynamics across both horizons. On the other hand, the ARDL captures both short-term and long-term effects but might not provide the same level of interpretability as VECM. Both short-term dynamics and long-term equilibrium relationships address the endogeneity between monetary policy and inflation expectations (Younas & Siddiqui, 2021). One of the key limitation of the 2SLS, OLS, and ARDL is that these mode do not capture heterogeneous economic agents' expectations, and these methods might not easily accommodate multiple agents' expectations flexibly. In contrast, the VEC model accommodates heterogeneity in economic agents' expectations by considering various factors influencing their forecast formation. Furthermore, the VEC model incorporates an error correction term, which captures the adjustment process toward long-run

equilibrium (Alogoskoufis & Smith, 1991; Granger & Weiss, 1983; Strachan & Inder, 2004). Lastly, the VEC model enables dynamic analysis by capturing lagged effects and short-term adjustments. This is crucial for understanding the impact of monetary policy on inflation expectations in the short run and how expectations evolve in response to policy changes (Alogoskoufis & Smith, 1991; Granger & Weiss, 1983; Strachan & Inder, 2004). Other scholars that have used the model include Kabundi et al. (2015), Shannon and Laurence (2018), and Younas and Siddiqui (2021), among others.

The paper uses the Dickey-Fuller and Phillips-Perron tests for unit roots. These tests assess the stationarity properties of the variables included in the VEC model (Breitung & Franses, 1998; Dolado et al., 2002). Moreover, the paper uses the Perron (1989) test or the Perron – Zivot test to account for the possibility that the data-generating process might have changed at some point (Perron, 1989). Perron unit root test accounts for the structural breaks in the data. This test extends to traditional unit root tests like the Dickey-Fuller test. Perron (1989) further expanded the topic of structural breaks and unit root tests with a detailed methodology and practical guidance for conducting unit root tests with structural breaks.

The paper uses lag-order selection criteria, namely, the Akaike information criterion (AIC), Hannan-Quinn information criterion (HQIC), and Schwarz-Bayesian information criterion (SBIC). These criteria play a crucial role in determining the optimal lag order for the VEC model (Amaefula Chibuzo, 2023). In addition to the lag-order selection criteria and unit root tests, the paper employs Johansen cointegration tests. Johansen tests for the long-term equilibrium relationship between nonstationary variables (Bierens, 1997). The establishment of cointegration indicates that the VEC model is adequate for estimation. They used the Granger causality between inflation expectations of financial institutions, business organisations, trade unions, and the repo rate (Tjøstheim, 1981). After estimating the EVC model, there are post-estimations for autocorrelation in residuals, tests for normally distributed residuals, and stability conditions of estimates.

3.1. Model speciation VEC

The construction of the Vector Error Correction (VEC) model emanates from the unrestricted Vector Autoregressive (VAR) framework, encapsulated in Equation (2).

$$y_t = \beta_0 + \sum_{j=1}^p \beta_j X_{t-1} + e_t \quad (2)$$

where an $n \times 1$ vector of endogenous variables, is a d vector of exogenous variables X_{t-1} , β_1 is an $n \times 1$ vector of constants, p is the number of lags, β_j is an $n \times n$ matrix of estimable parameters, and e_t is an $n \times 1$ vector of independent and identically distributed error terms. Accordingly, the VEC model exhibits proficiency in accommodating cointegrated and diverse economic variables. Consequently, the VAR model undergoes transformation into the VEC model, as delineated in Equation (3).

$$\Delta y_t = \beta_0 + \sum_{j=1}^p \Gamma_j \Delta X_{t-1} + \sum_{j=1}^p \Pi_j X_{t-1} + \gamma_j ECT + e_t \quad (3)$$

where Δ is the difference operator, and the VECM specification contains information on both the short- and long-run adjustment to changes in X_t via the estimated parameters Γ and π , respectively Equation (1) from the theoretical framework is mirrored in Equations (4) and (5).

$$\pi_{t+1}^e = \{ln_infl_e_f_t ln_infl_e_b_t ln_infl_e_trdunln_rr_t \quad (4)$$

$$\pi_t = ln_infl_t \quad (5)$$

where π_{t+1}^e is expired inflation, and in the context of the paper, we use inflation expectations for financial agents one year ahead $ln_infl_e_b_{t+1}$ inflation expectations for business agents one year ahead and $ln_infl_e_trdunln_rr_{t+1}$ inflation expectations for trade union agents one year ahead. Subsequently, the model is expanded by introducing another pertinent economic variable, as outlined in Equations 6–8.

$$\Delta ln_infl_e_f_{t+1} = \beta_0 + \sum_{j=1}^p \Gamma_j \Delta \begin{Bmatrix} \beta_1 ln_rr_t \\ \beta_2 l_ln_rir_t \\ \beta_3 ln_gdp_gap_t \\ \beta_4 ln_unempl_t \\ \beta_5 ln_infl_t \\ \beta_{65} ln_g_t \end{Bmatrix} + \sum_{j=1}^p \Pi_j \begin{Bmatrix} \beta_1 ln_rr_t \\ \beta_2 l_ln_rir_t \\ \beta_3 ln_gdp_gap_t \\ \beta_4 ln_unempl_t \\ \beta_5 ln_infl_t \\ \beta_{65} ln_g_t \end{Bmatrix} + \gamma_j ECT + e_t \quad (6)$$

$$\Delta ln_infl_e_b_{t+1} = \beta_0 + \sum_{j=1}^p \Gamma_j \Delta \begin{Bmatrix} \beta_1 ln_rr_t \\ \beta_2 l_ln_rir_t \\ \beta_3 ln_gdp_gap_t \\ \beta_4 ln_unempl_t \\ \beta_5 ln_infl_t \\ \beta_{65} ln_g_t \end{Bmatrix} + \sum_{j=1}^p \Pi_j \begin{Bmatrix} \beta_1 ln_rr_t \\ \beta_2 l_ln_rir_t \\ \beta_3 ln_gdp_gap_t \\ \beta_4 ln_unempl_t \\ \beta_5 ln_infl_t \\ \beta_{65} ln_g_t \end{Bmatrix} + \gamma_j ECT + e_t \quad (7)$$

$$\Delta ln_infl_e_trdunln_rr_{t+1} = \beta_0 + \sum_{j=1}^p \Gamma_j \Delta \begin{Bmatrix} \beta_1 ln_rr_t \\ \beta_2 l_ln_rir_t \\ \beta_3 ln_gdp_gap_t \\ \beta_4 ln_unempl_t \\ \beta_5 ln_infl_t \\ \beta_{65} ln_g_t \end{Bmatrix} + \sum_{j=1}^p \Pi_j \begin{Bmatrix} \beta_1 ln_rr_t \\ \beta_2 l_ln_rir_t \\ \beta_3 ln_gdp_gap_t \\ \beta_4 ln_unempl_t \\ \beta_5 ln_infl_t \\ \beta_{65} ln_g_t \end{Bmatrix} + \gamma_j ECT + e_t \quad (8)$$

Where Equations 6–8 are the model estimation equations for $ln_infl_e_b_{t+1}$ inflation expectations for business agents one year ahead and $ln_infl_e_trdunln_rr_{t+1}$ inflation expectations for trade union agents one year ahead.

Table 2. Descriptive statistics.

| Variable | Obs | Mean | Std. Dev. | Min | Max | Skewness | Kurtosis | Shapiro–Wilk |
|-----------------------|-----|-------|-----------|--------|-------|----------|----------|--------------|
| <i>ln_infl_e.f</i> | 90 | 1.671 | 0.153 | 1.131 | 2.152 | 0.387 | 0.011 | 0.019 |
| <i>ln_infl_e.b</i> | 90 | 1.815 | 0.202 | 1.308 | 2.241 | 0.505 | 0.358 | 0.035 |
| <i>ln_nfl_e.trdun</i> | 90 | 1.772 | 0.234 | 1.194 | 2.37 | 0.589 | 0.268 | 0.015 |
| <i>ln_rr</i> | 92 | 1.948 | 0.342 | 1.253 | 2.603 | 0.913 | 0.364 | 0.081 |
| <i>l_ln_rir</i> | 91 | 1.588 | 0.463 | 0.394 | 2.46 | 0.072 | 0.975 | 0.203 |
| <i>ln_gdp_gap</i> | 91 | 0.024 | 0.293 | −0.478 | .808 | 0.026 | 0.524 | 0.016 |
| <i>ln_unempl</i> | 91 | 3.256 | 0.116 | 3.045 | 3.564 | 0.002 | 0.253 | 0.002 |
| <i>ln_infl</i> | 92 | 1.604 | 0.54 | −0.836 | 2.595 | 0.000 | 0.000 | 0.000 |
| <i>ln_g</i> | 91 | 2.893 | 0.082 | 2.741 | 3.153 | 0.873 | 0.295 | 0.000 |

The authors compiled the results.

4. Result

Table 2 shows the descriptive statistics of the economic variables used in this paper. *ln_infl_e.f*, *ln_infl_e.b* and *ln_infl_e.trdun* have mean values of 1.671%, 1.815% and 1.772%, respectively. These expectations are below the lower band on average. This suggests that financial institutions, business organisations, and trade unions anticipate moderate or low inflationary pressures in the near term. The lower average inflation expectations may contribute to price stability and provide flexibility for monetary policy decisions. The variables *ln_rr*, *l_ln_rir*, *ln_gdp_gap*, *ln_unempl*, *ln_infl* and *ln_g* are found to be 1.948, 1.588, 0.024, 3.256, 1.604, and 2.893, respectively. The economic variables considered in this paper all have positive skewness. Values of high kurtosis and greater than 0.975 indicate that their distributions are leptokurtic and fat-tailed. The high kurtosis values for *l_ln_rir* suggest that extremes occurred more frequently during the sampling period from 2000 quarter 1 to 2023 quarter 4.

The correlation matrix presented in Table 3 examines the relationships between various economic variables in the study. Specifically, it focuses on the correlations between the repo rate *ln_rr* and three different measures of inflation expectations: financial market inflation expectations *ln_infl_e.f*, business inflation expectations *ln_infl_e.b*, and trade uncertainty *ln_nfl_e.trdun*. The correlation coefficient between *ln_rr* and *ln_infl_e.f* is calculated to be 0.400. This value indicates a positive association between the repo rate and financial market inflation expectations. In other words, as the repo rate increases, there tends to be an increase in financial market participants' expectations of future inflation.

Similarly, the correlation coefficient between *ln_rr* and *ln_infl_e.b* is calculated to be 0.524. This value suggests a positive correlation between the repo rate and business inflation

Table 3. Matrix of correlations.

| Variables | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|-----------------------|--------|--------|--------|--------|--------|--------|--------|--------|-------|
| <i>ln_infl_e.f</i> | 1.000 | | | | | | | | |
| <i>ln_infl_e.b</i> | 0.520 | 1.000 | | | | | | | |
| <i>ln_nfl_e.trdun</i> | 0.521 | 0.965 | 1.000 | | | | | | |
| <i>ln_rr</i> | 0.400 | 0.524 | 0.578 | 1.000 | | | | | |
| <i>l_ln_rir</i> | −0.129 | −0.126 | −0.099 | 0.544 | 1.000 | | | | |
| <i>ln_gdp_gap</i> | −0.485 | −0.498 | −0.558 | −0.306 | −0.012 | 1.000 | | | |
| <i>ln_unempl</i> | −0.388 | −0.196 | −0.283 | −0.456 | −0.322 | 0.725 | 1.000 | | |
| <i>ln_infl</i> | 0.516 | 0.442 | 0.480 | 0.296 | −0.420 | −0.333 | −0.124 | 1.000 | |
| <i>ln_g</i> | −0.179 | −0.103 | −0.195 | −0.730 | −0.577 | 0.173 | 0.524 | −0.061 | 1.000 |

The authors compiled the results.

expectations. As the repo rate rises, businesses tend to anticipate higher inflation levels. Furthermore, the correlation coefficient between \ln_rr and $\ln_nfl_e_trdun$ is calculated to be 0.578. This implies a stronger positive correlation between the repo rate and trade uncertainty. In this context, trade uncertainty refers to the level of uncertainty or volatility experienced in trade-related activities. The positive correlation suggests that an increase in the repo rate is associated with higher trade uncertainty. Overall, these correlation findings indicate that changes in the repo rate can impact inflation expectations in both the financial and business sectors. A higher repo rate is associated with increased expectations of future inflation among financial market participants and businesses.

Table 4 shows the conventional unit root and structural break. The Dickey-Fuller and Phillips-Perron tests for unit roots. All economic variables considered in this paper are stationarity resolved with $d(1)$. Table 4 displays the dates of data breaks considered in this analysis. To address this issue, we applied the unit root test proposed by Perron (1989) to account for structural breaks. The results indicate that all the economic variables considered in this paper exhibit stationarity with $d(1)$ after addressing the structural breaks.

Conversely, the divergence in approach between the Dickey-Fuller and Phillips-Perron tests, coupled with integrating a dummy variable to represent the reflective structural break, has facilitated the resolution of the structural disruption issue. This is visually illustrated in Figure A1 where a specific period is identifiable within the data has significant break. Conversely, the divergence in approach between the Dickey-Fuller and Phillips-Perron tests, coupled with integrating a dummy variable to represent the reflective structural break, has facilitated the resolution of the structural disruption issue. This is visually illustrated in Figure A2, where a specific period is identifiable within the data where no significant break is observed.

Table 5 shows the lag-order selection criteria. In selecting the lag order for each variable, the paper utilises three commonly used information criteria: the Akaike information criterion (AIC), the Hannan-Quinn information criterion (HQIC), and the Schwarz-Bayesian information criterion (SBIC). For the estimation equation for $\ln_infl_e_f$, based on these criteria, the lag order of 3 is selected because it yields the lowest values for AIC, HQIC, and SBIC, indicating a better trade-off between model fit and complexity. With the estimation Equation of $\ln_infl_e_b$, the lag order of 4 is chosen

Table 4. Conventional unit root and structural break.

| Test Variable | Dickey-Fuller test for unit root | | Phillips-Perron test for unit root | | Structural break | | Perron test | |
|------------------------|----------------------------------|-------------------|------------------------------------|-------------------|------------------|---------|-------------|-------------------|
| | Test Stat | 5% Critical Value | Test Stat | 5% Critical Value | Break | P value | Test Stat | 5% Critical Value |
| $d.\ln_infl_e_f$ | Z(t) -4.453 | -2.900 | -4.453 | -2.900 | 2019q3 | 0.00 | -10.937 | -2.900 |
| $d.\ln_infl_e_b$ | Z(t) -4.969 | -2.900 | -4.969 | -2.900 | 2018q2 | 0.00 | -7.892 | -2.900 |
| $d.\ln_nfl_e_trdun$ | Z(t) -5.484 | -2.900 | -5.484 | -2.900 | 2018q4 | 0.00 | -8.483 | -2.900 |
| $d.\ln_rr$ | Z(t) -4.567 | -2.900 | -4.567 | -2.900 | 2009q4 | 0.00 | -4.609 | -2.900 |
| $d.\ln_rir$ | Z(t) -7.372 | -2.900 | -7.372 | -2.900 | 2008q2 | 0.00 | -9.118 | -2.900 |
| $d.\ln_gdp_gap$ | Z(t) -6.344 | -2.900 | -6.344 | -2.900 | 2008q4 | 0.00 | -25.463 | -2.900 |
| $d.\ln_unempl$ | Z(t) -8.984 | -2.900 | -8.984 | -2.900 | 2019q2 | 0.00 | -13.285 | -2.900 |
| $d.\ln_infl$ | Z(t) -5.899 | -2.900 | -5.899 | -2.900 | 2004q2 | 0.00 | -6.308 | -2.900 |
| $d.\ln_g$ | Z(t) -9.087 | -2.900 | -9.087 | -2.900 | 2010q1 | 0.00 | -13.625 | -2.900 |

Note that d is the difference in the first-order condition. The authors compiled the results.

Table 5. Lag-order selection criteria.

| lag | LL | LR | df | p | FPE | AIC | HQIC | SBIC |
|-----------------------|----------|----------|------|--------|----------|-----------|-----------|-----------|
| <i>ln_infl_e_f</i> | | | | | | | | |
| 0 | 202.514 | 0.000 | −4.5 | −4.466 | −4.347 | | | |
| 1 | 864.345 | 1323.700 | 49 | 0.000 | 0.000 | −18.799 | −18.156 | −17.201 |
| 2 | 1083.580 | 438.470 | 49 | 0.000 | 0.000 | −22.758 | −21.552 | −19.761 |
| 3 | 1235.160 | 303.17* | 49 | 0.000 | 3.1e-20* | −25.1433* | −23.3746* | −20.7483* |
| <i>ln_infl_e_b</i> | | | | | | | | |
| 0 | 197.313 | 0.000 | −4.5 | −4.450 | −4.329 | | | |
| 1 | 855.255 | 1315.900 | 49 | 0.000 | 0.000 | −19.030 | −18.378 | −17.409 |
| 2 | 1067.810 | 425.110 | 49 | 0.000 | 0.000 | −22.924 | −21.703 | −19.886 |
| 3 | 1226.840 | 318.060 | 49 | 0.000 | 0.000 | −25.544 | −23.752 | −21.0873* |
| 4 | 1330.320 | 206.960 | 49 | 0.000 | 6.4e-21* | −26.841 | −24.4795* | −20.967 |
| <i>ln_nfl_e_trdun</i> | | | | | | | | |
| 0 | 188.432 | 0.000 | −4.3 | −4.290 | −4.168 | | | |
| 1 | 832.202 | 1287.500 | 49 | 0.000 | 0.000 | −18.704 | −18.048 | −17.072 |
| 2 | 1037.770 | 411.130 | 49 | 0.000 | 0.000 | −22.476 | −21.247 | −19.416 |
| 3 | 1196.370 | 317.210 | 49 | 0.000 | 0.000 | −25.117 | −23.314 | −20.6294* |
| 4 | 1294.760 | 196.780 | 49 | 0.000 | 1.1e-20* | −26.308 | −23.9308* | −20.392 |

Compiled by the authors.

because it corresponds to the lowest values for AIC, HQIC, and SBIC, suggesting an optimal balance between model fit and complexity. Finally, the *ln_nfl_e_trdun* estimation of the lag order four is selected based on the lowest AIC, HQIC, and SBIC values, indicating the most suitable trade-off between model fit and complexity. Figure A3 reflects the stability of the ECV model estimation. Table 6 presents the results of the Johansen tests for cointegration for each variable: These tests determine the presence of long-term relationships among the variables. For the estimation of *ln_infl_e_f*, *ln_infl_e_b*, and *ln_nfl_e_trdun*, it is found that the maximum rank statistic decreases as the rank increases, suggesting evidence of cointegration at the critical value at the 5% p-value. Across all estimations, there is a maximum rank of 3, 4 and 3, respectively, indicating the presence of at least 3, 4 and 3 cointegrating vectors. These results suggest the existence of long-term relationships among the variables, indicating that they move together over time. These results provide evidence of the validity of estimating the VECM.

Table 6. Johansen tests for cointegration.

| Maximum rank | Params | LL | Eigenvalue | Trace statistic | Critical value 5% |
|-----------------------|--------|-----------|------------|-----------------|-------------------|
| <i>ln_infl_e_f</i> | | | | | |
| 0 | 105 | 1140.7723 | 0.0000 | 188.7824 | 124.24 |
| 1 | 118 | 1171.0061 | 0.50496 | 128.3148 | 94.15 |
| 2 | 129 | 1199.7746 | 0.48780 | 70.7779 | 68.52 |
| 3 | 138 | 1213.1351 | 0.26707 | 44.0569* | 47.21 |
| <i>ln_infl_e_b</i> | | | | | |
| 0 | 105 | 1150.7296 | 0.0000 | 208.2535 | 124.24 |
| 1 | 118 | 1192.4228 | 0.62077 | 124.8670 | 94.15 |
| 2 | 129 | 1214.9091 | 0.40722 | 79.8946 | 68.52 |
| 3 | 138 | 1229.7856 | 0.29246 | 50.1414 | 47.21 |
| 4 | 145 | 1241.4968 | 0.23841 | 26.7192* | 29.68 |
| <i>ln_nfl_e_trdun</i> | | | | | |
| 0 | 105 | 1127.9321 | 0.0000 | 213.9315 | 124.24 |
| 1 | 118 | 1173.1126 | 0.65031 | 123.5704 | 94.15 |
| 2 | 129 | 1196.2224 | 0.41576 | 77.3507 | 68.52 |
| 3 | 138 | 1211.3003 | 0.29577 | 47.1951* | 47.21 |

Compiled by the authors.

Table 7. Long-run estimations of VEC.

| Estimation | (1) | Estimation | (2) | Estimation | (3) |
|--------------------------|------------------------|------------------------------|---------------------------|--------------------------|---------------------------|
| Variable | <i>ln_infl_e_f</i> | Variable | <i>ln_infl_e_b</i> | Variable | <i>ln_infl_e_trdun</i> |
| <i>ln_rr</i> | -5.00709** (-8.38) | <i>ln_rr</i> | 3.217125 (0.309466) | <i>ln_rr</i> | 0.05391*** (5.556029) |
| <i>l_ln_rir</i> | 2.610707* (7.78) | <i>l_ln_rir</i> | -1.07985** (4.17848) | <i>l_ln_rir</i> | -2.49872 (0.330152) |
| <i>ln_gdp_gap</i> | 0.752205** (1.28) | <i>ln_gdp_gap</i> | 1.604874 (0.383199) | <i>ln_gdp_gap</i> | -2.0386 (0.705103) |
| <i>ln_unempl</i> | -1.60786** (-1.55) | <i>ln_unempl</i> | -1.49038* (8.70831) | <i>ln_unempl</i> | 7.034806*** (2.265198) |
| <i>ln_infl</i> | 4.024137*** (13.19) | <i>ln_infl</i> | -2.08427 (0.165142) | <i>ln_infl</i> | -2.36513 (0.285433) |
| <i>ln_g</i> | -2.6345 (-1.27) | <i>ln_g</i> | -4.12963*** (6.263472) | <i>ln_g</i> | -9.72697* (2.353076) |
| <i>dummy_ln_infl_e_b</i> | -0.68864* (-3.1) | <i>dummy_ln_infl_e_trdun</i> | 0.56658 (0.16943) | <i>dummy_ln_infl_e_b</i> | 0.679938 (0.304165) |
| <i>dummy_ln_gdp_gap</i> | -3.90001** (-6.33) | <i>dummy_ln_gdp_gap</i> | 2.770337 (0.309134) | <i>dummy_ln_gdp_gap</i> | -4.50543 (0.552148) |
| <i>dummy_ln_infl</i> | 2.19955* (5.89) | <i>dummy_ln_infl</i> | -1.30161** (5.22913) | <i>dummy_ln_infl</i> | -1.45619 (0.421555) |
| <i>dummy_ln_g</i> | 2.098428** (4.23) | <i>dummy_ln_g</i> | 0.292862 (0.218817) | <i>dummy_ln_g</i> | 4.91827 (0.408688) |
| <i>_cons</i> | 9.343239* (4.23) | <i>_cons</i> | 12.99339* (4.23) | <i>_cons</i> | 12.56705** (4.23) |
| <i>N</i> | 86 | <i>N</i> | 86 | <i>N</i> | 86 |

t statistics in parentheses and * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Please note that only significant results for the relevant variables are reported and compiled by the authors due to space constraints.

Table 7 shows the long-run estimations of VEC. In estimation 1, the *ln_infl_e_f* inflation expectation in the financial sector is reflected. The *ln_rr* natural logarithm of the repo rate is -5.00709 and statistically significant at the 1% p-value.

The result provides evidence that in the long run, a 1% increase in the repo rate decreases the *ln_infl_e_f* inflation expectation in the financial sector, which is approximately -5.00709%, all else being equal. These results are similar to those of Kabundi and Schaling (2013), Gabriel Caldas and Rodolfo Tomás Da Fonseca (2015), Kabundi et al. (2015) and Maule and Hubert (2016), among others, who found that monetary policy successfully anchors inflation expectations. In estimation 2, the *ln_infl_e_b* inflation expectation in the business sector is found to have a coefficient of 3.217125, which is statistically insignificant at the 1% p-value. The SARB is indeed the macroprudential measure of financial stability risks. Central banks might use macroprudential measures (regulations and policies to reduce systemic risks) alongside monetary policy.

In estimation 3, the *ln_infl_e_trdun* inflation expectation of trade unions is found to have a coefficient value of 0.05391, which is statistically significant at the 1% p-value. The result shows that a 1% increase in the *ln_rr* natural logarithm of the repo rate leads to an increase of 0.05391% in the *ln_infl_e_trdun* inflation expectation of trade unions, all else being equal. Lower inflation expectations in the business sector, driven by an increase in the repo rate, may influence wage-setting behaviour. Businesses may be more inclined to offer lower wage increases if they anticipate lower inflation in the future, which can affect workers' purchasing power and labour market dynamics. These results are similar to those of Kabundi et al. (2015), who found that repo rate increases result in a 0.35% inflation expectation for trade unions.

Table 8. Wald tests of Granger causality for *ln_infl_e.f.*

| Equation | Excluded | chi2 | df | Prob>Chi2 |
|--------------------|--------------------|--------|----|-----------|
| <i>ln_infl_e.f</i> | <i>ln_rr</i> | 3.124 | 1 | 0.077 |
| <i>ln_infl_e.f</i> | <i>l_in_rir</i> | 0.028 | 1 | 0.867 |
| <i>ln_infl_e.f</i> | <i>ln_gdp_gap</i> | 6.592 | 1 | 0.010 |
| <i>ln_infl_e.f</i> | <i>ln_unempl</i> | 0.120 | 1 | 0.729 |
| <i>ln_infl_e.f</i> | <i>ln_infl</i> | 1.257 | 1 | 0.262 |
| <i>ln_infl_e.f</i> | <i>ln_g</i> | 5.321 | 1 | 0.021 |
| <i>ln_infl_e.f</i> | ALL | 26.698 | 6 | 0.000 |
| <i>ln_rr</i> | <i>ln_infl_e.f</i> | 7.449 | 1 | 0.006 |
| <i>ln_rr</i> | <i>l_in_rir</i> | 2.142 | 1 | 0.143 |
| <i>ln_rr</i> | <i>ln_gdp_gap</i> | 1.481 | 1 | 0.224 |
| <i>ln_rr</i> | <i>ln_unempl</i> | 0.110 | 1 | 0.740 |
| <i>ln_rr</i> | <i>ln_infl</i> | 2.182 | 1 | 0.140 |
| <i>ln_rr</i> | <i>ln_g</i> | 18.176 | 1 | 0.000 |
| <i>ln_rr</i> | ALL | 37.988 | 6 | 0.000 |

Compiled by the authors.

Table 8 shows the Wald tests of Granger causality for *ln_infl_e.f.* The variable *ln_rr* has a chi-square statistic of 3.124 with 1 degree of freedom *df* and a probability *Prob > Chi2* of 0.077. The probability of 0.077 suggests that the variable *ln_rr* does not have a statistically significant Granger causal relationship with *ln_infl_e.f* at the conventional significance 5% p-value. This implies that interest rates may not significantly drive inflation expectations in the analysed model or period. On the other hand, *ln_infl_e.f* is found to have a chi-square statistic of 7.449 with 1 degree of freedom *df* and a probability *Prob > Chi2* of 0.006. The likelihood of 0.006 indicates a statistically substantial Granger causal association linking *ln_rr* and *ln_infl_e.f* at the conventional significance level of a 5% p-value.

Table 9 shows the Wald tests of Granger causality for *ln_infl_e.b* and *ln_infl_e.trdun*. The *ln_rr* has a chi-square statistic of 6.245 with 1 degree of freedom *df* and a probability *Prob > Chi2* of 0.012. The probability of 0.012 suggests a statistically significant Granger causal relationship between *ln_rr* and *ln_infl_e.b* at the conventional significance level. Therefore, the test indicates that *ln_rr* has a statistically significant impact on *ln_infl_e.b*, implying that changes in *ln_rr* can Granger-cause changes in *ln_infl_e.b*. The chi-square statistic for the relationship between *ln_rr* and *ln_infl_e.b* is 0.041 with 1 degree of freedom *df*, and the probability

Table 9. Wald tests of Granger causality for *ln_infl_e.b* and *ln_infl_e.trdun*.

| Equation | Excluded | chi2 | df | Prob>Chi2 | Equation | Excluded | chi2 | df | Prob>Chi2 |
|--------------------|--------------------|---------|----|-----------|------------------------|------------------------|--------|----|-----------|
| <i>ln_infl_e.b</i> | <i>ln_rr</i> | 6.245 | 1 | 0.012 | <i>ln_infl_e.trdun</i> | <i>ln_rr</i> | 3.676 | 1 | 0.055 |
| <i>ln_infl_e.b</i> | <i>l_in_rir</i> | 0.729 | 1 | 0.393 | <i>ln_infl_e.trdun</i> | <i>l_in_rir</i> | 6.017 | 1 | 0.014 |
| <i>ln_infl_e.b</i> | <i>ln_gdp_gap</i> | 1.418 | 1 | 0.234 | <i>ln_infl_e.trdun</i> | <i>ln_gdp_gap</i> | 3.580 | 1 | 0.058 |
| <i>ln_infl_e.b</i> | <i>ln_unempl</i> | 0.000 | 1 | 0.993 | <i>ln_infl_e.trdun</i> | <i>ln_unempl</i> | 1.415 | 1 | 0.234 |
| <i>ln_infl_e.b</i> | <i>ln_infl</i> | 50.060 | 1 | 0.000 | <i>ln_infl_e.trdun</i> | <i>ln_infl</i> | 3.830 | 1 | 0.050 |
| <i>ln_infl_e.b</i> | <i>ln_g</i> | 18.952 | 1 | 0.000 | <i>ln_infl_e.trdun</i> | <i>ln_g</i> | 3.295 | 1 | 0.069 |
| <i>ln_infl_e.b</i> | ALL | 128.500 | 6 | 0.000 | <i>ln_infl_e.trdun</i> | ALL | 44.317 | 6 | 0.000 |
| <i>ln_rr</i> | <i>ln_infl_e.b</i> | 0.041 | 1 | 0.840 | <i>ln_rr</i> | <i>ln_infl_e.trdun</i> | 0.561 | 1 | 0.454 |
| <i>ln_rr</i> | <i>l_in_rir</i> | 0.224 | 1 | 0.636 | <i>ln_rr</i> | <i>l_in_rir</i> | 0.038 | 1 | 0.846 |
| <i>ln_rr</i> | <i>ln_gdp_gap</i> | 1.291 | 1 | 0.256 | <i>ln_rr</i> | <i>ln_gdp_gap</i> | 0.310 | 1 | 0.578 |
| <i>ln_rr</i> | <i>ln_unempl</i> | 1.553 | 1 | 0.213 | <i>ln_rr</i> | <i>ln_unempl</i> | 0.155 | 1 | 0.693 |
| <i>ln_rr</i> | <i>ln_infl</i> | 2.201 | 1 | 0.138 | <i>ln_rr</i> | <i>ln_infl</i> | 1.859 | 1 | 0.173 |
| <i>ln_rr</i> | <i>ln_g</i> | 24.627 | 1 | 0.000 | <i>ln_rr</i> | <i>ln_g</i> | 8.305 | 1 | 0.004 |
| <i>ln_rr</i> | ALL | 56.241 | 6 | 0.000 | <i>ln_rr</i> | ALL | 18.349 | 6 | 0.005 |

Compiled by the authors.

$Prob > Chi2$ is 0.840. It is found that there is a 0.840 probability; as such, there is no statistically significant Granger causal relationship between ln_rr and $ln_infl_e_b$ at the conventional significance level. This suggests that changes in ln_rr do not significantly impact $ln_infl_e_b$.

Given this result, policy considerations need to be examined; hence, given the significant Granger causal relationship between ln_rr and $ln_infl_e_b$, policymakers should carefully monitor and consider the potential impact of changes in interest rates on inflation expectations within the banking sector. They should consider the dynamics of inflation expectations in their monetary policy decisions to ensure price stability and support the overall economic objectives.

The variable ln_rr has a chi-square statistic of 3.676 with 1 degree of freedom df , and the probability $Prob > Chi2$ is 0.055. The probability of 0.055 indicates a moderately significant result, suggesting a possible Granger causal relationship between ln_rr and $ln_infl_e_trdun$. However, it is essential to note that the significance level is not below the conventional threshold of 0.05, so the paper cannot conclude with certainty that there is a statistically significant Granger causal relationship between ln_rr and $ln_infl_e_trdun$. The chi-square statistic for the relationship between ln_rr and $ln_infl_e_trdun$ is 0.561 with 1 degree of freedom df , and the probability $Prob > Chi2$ is 0.454.

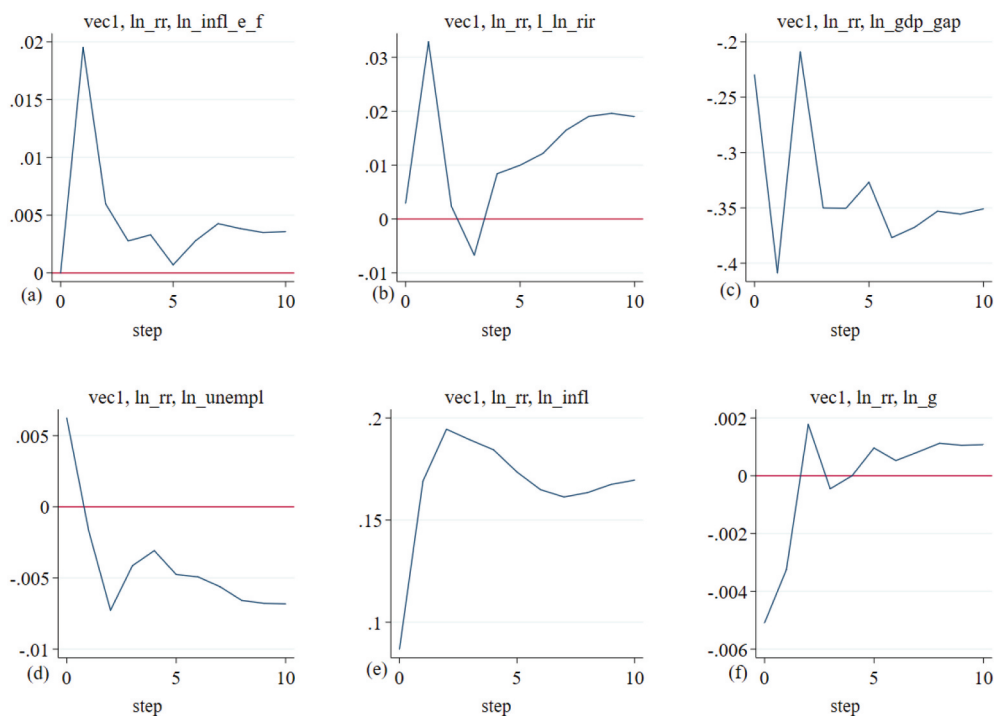


Figure 2. Shock of inflation expectations for financial agents for one year ahead on economic variables. Note that economic variables are $ln_infl_e_f$ which is the inflation expectations for financial agents for one year ahead, ln_rr is the repo rate, l_ln_rir is the lag real interest rate, ln_gdp_gap gross domestic product gap, percent change, quarterly, seasonally adjusted annual rate, ln_unempl is the official unemployment rate, ln_infl is the inflation rate and is the ln_g general government final consumption expenditure percentage of gross domestic product. Compiled by the authors.

With a probability of 0.454, there is no statistically significant Granger causal relationship between \ln_rr and $\ln_infl_e_trdun$ at the conventional significance level. This suggests that changes in \ln_rr do not significantly impact $\ln_infl_e_trdun$. Given that sector-specific analysis may be needed since the analysis does not find a significant relationship between \ln_rr and $\ln_infl_e_trdun$, it may be worthwhile to conduct further sector-specific analysis to identify the drivers of inflation expectations in the trade and industry sectors. This could involve exploring additional variables or factors influencing inflation expectations within that sector.

Figure 2 shows the shock of inflation expectations for financial agents one year ahead on economic variables. In Figure 2, diagram (a), it is found that \ln_rr results in a sharp increase in $\ln_infl_e_f$ from the first quarter, and after that, it drastically falls until quarter 3, where it returns to equilibrium and after the operator below equilibrium. Policymakers should communicate clearly and transparently about their monetary policy decisions and objectives. This helps anchor inflation expectations and ensure market participants understand the policy stance clearly. The first part of the shock is similar to that of Aßhoff et al. (2021), who note that there is a sharp increase in inflation expectations when there is an unconventional monetary policy shock on inflation expectations in the short term. Gobbi et al. (2019) advocated a monetary policy that anchored inflation expectations faster than the policy rate.

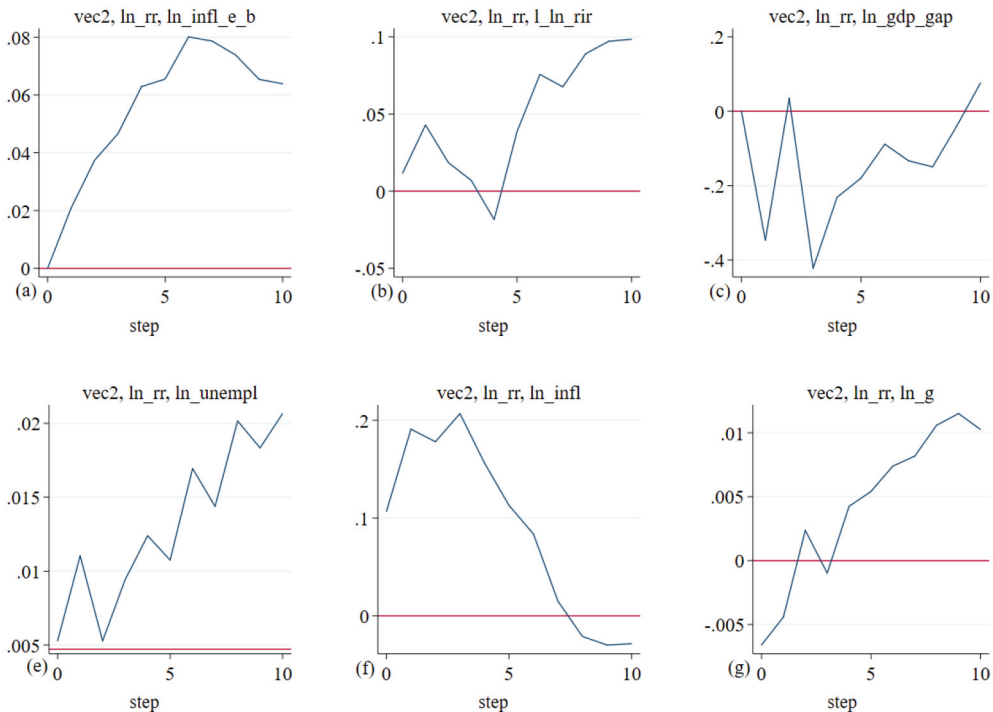


Figure 3. Shock of inflation expectations for business agents one year ahead on economic variables. Note that economic variables are $\ln_infl_e_b$, which is the inflation expectations for business agents one year ahead, \ln_rr is the repo rate, \ln_l_rir is the lag real interest rate, \ln_gdp_gap gross domestic product gap, percent change, quarterly, seasonally adjusted annual rate, \ln_unempl is the official unemployment rate, \ln_infl is the inflation rate. It is the \ln_g general government final consumption expenditure percentage of gross domestic product. Compiled by the authors.

Figure 3 shows the shock of inflation expectations for business agents one year ahead on economic variables. In Figure 3, diagram (a), it is found that l_ln_rir increases $ln_infl_e_f$, which increases at a decreasing rate. This reflects that it has a diminishing marginal returns effect on $ln_infl_e_f$. Given the diminishing marginal returns effect, the SARB may need to consider macroprudential measures as additional tools to manage inflation expectations and financial stability. These measures could include regulatory policies related to credit growth, asset prices, or other systemic risks that could impact inflation dynamics and expectations. The results are similar to those of Diegel and Nautz (2021), who found that expansionary monetary policy shocks have increased and re-anchored inflation expectations.

Figure 4 shows the shock of inflation expectations for trade union agents one year ahead on economic variables. In Figure 4, diagram (a), it is found that l_ln_rir results in an increase in $ln_infl_e_trdunln_rr$, which is slightly volatile but reflects a diminishing marginal returns effect on $ln_infl_e_trdunln_rr$. The volatility reflects the instability in the South African labour market, which is characterised by high unemployment. On the other hand, rapid changes and shifts in the labour market can lead to skill mismatches, where the skills possessed by workers may need to align with the evolving demands of the job market. These changes will result in economic agents having different inflation expectations when there is a change in monetary policy.

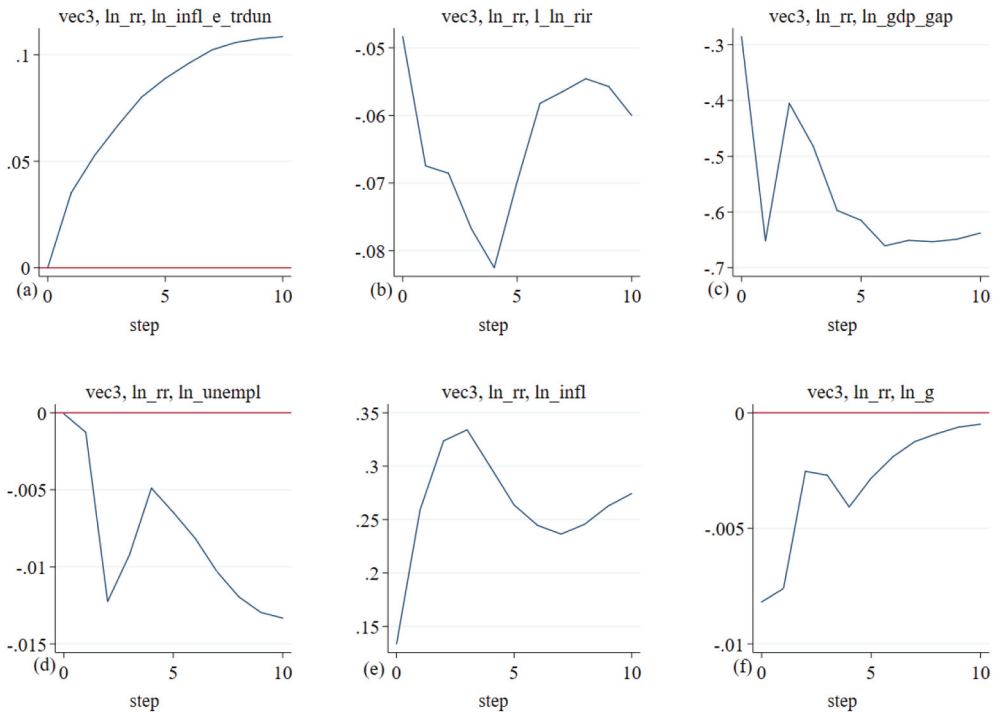


Figure 4. Shock of inflation expectations for trade union agents for one year ahead on economic variables. Note that economic variables are $ln_infl_e_trdunln_rr$, which is the inflation expectations for trade union agents for one year ahead, ln_rr is the repo rate, l_ln_rir is the lag real interest rate, ln_gdp_gap gross domestic product gap, percent change, quarterly, seasonally adjusted annual rate, ln_unempl is the official unemployment rate, ln_infl is the inflation rate and is the ln_g general government final consumption expenditure percentage of gross domestic product. Compiled by the authors.

Nevertheless, these results are empirically similar to those of Falck et al. (2021), who note that a contractionary monetary policy shock of 100 base points increases inflation and inflation expectations of up to 0.7 percentage points in times of high disagreement. In diagram (c), an increase in the repo rate means it becomes more expensive for individuals and businesses to borrow money. This can lead to reduced consumer spending, lower business investments, and decreased economic growth.

5. Conclusion

This paper delves into the intricate relationship between shifts in monetary policy and inflation expectations, exploring how this dynamic varies across different sectors. By employing a vector error correction (VEC) model and analysing a data set encompassing the periods from the first quarter of 2000 to the fourth quarter of 2022, the study investigates how monetary policy changes reverberate within the financial, business, and trade union sectors. In the longer term, monetary policy influences inflation expectations within the financial sector, and heightened repo rates in the business sphere correlate with diminished expectations, impacting the intricate landscape of wage negotiations. Granger causality tests further substantiate the links between repo rate shifts and corresponding inflation expectations shifts for the business and trade union sectors. By unpacking these sector-specific reactions to the impact of monetary policy on inflation expectations, this study expands our comprehension of the multifaceted nature of how different segments of the economy respond to these dynamics.

The paper reflected critical connections and practical implications, revealing significant short-run relationships between the repo rate and inflation expectations for various economic agents. The negative coefficients observed in the financial and business sectors suggest that increases in the repo rate lead to decreased inflation expectations. This aligns with the conventional view that higher repo rates are associated with tighter monetary conditions, influencing borrowing costs and overall economic outlook. The positive coefficient observed in trade unions' expectations is intriguing, implying that higher repo rates are linked to higher inflation expectations. This potentially reflects adaptive behaviour where historical relationships between repo rate changes and inflation are considered. These findings underscore the importance of clear and transparent communication by policymakers. Anchoring inflation expectations is crucial for ensuring stable economic conditions. The study suggests that market participants are responsive to policy rate changes, and central banks must communicate their intentions effectively to minimise uncertainty and shape expectations in desired directions.

It is essential to acknowledge the limitations of the study. The analysis relies on statistical relationships and associations, which might only capture some of the complexities of real-world economic dynamics. The study assumes specific behavioural patterns, such as rational and adaptive expectations, that might not fully explain agents' decisions. Additionally, the research might only capture some relevant variables that impact inflation expectations, leaving room for omitted variable bias. In the context of the South African economy, where inflation management is a priority, the study offers insights for policymakers. The findings suggest that repo rate changes can influence inflation

expectations, affecting economic behaviour. Policymakers should consider these relationships when making monetary policy decisions. Given the distinct responses across sectors, the study suggests that there might be better approaches than a one-size-fits-all approach to monetary policy. Tailoring communication and policy actions to specific sectors could enhance the effectiveness of policy transmission. The observed link between inflation expectations and repo rate changes also affects the broader macroeconomic environment. For instance, the impact on wage negotiations and the bargaining power of trade unions could affect the wage-price spiral. Policymakers should know these interconnections when framing monetary policy and conducting wage negotiations. Based on the findings, policy considerations suggest that policymakers should take a holistic approach to monetary policy. This includes adjusting the repo rate to manage inflation and communicating these actions transparently to shape expectations and market behaviour. Sector-specific analysis might provide more nuanced insights into inflation dynamics, allowing for more targeted policy decisions.

Additionally, policymakers should consider complementing monetary policy with macroprudential measures to address financial stability risks. Regulatory policies focused on credit growth, asset prices, and systemic risks could be vital in managing inflation expectations and ensuring overall economic stability. It is proposed that future studies may need to consider the time-varying effects of policy rates on inflation expectations. Moreover, it explores how market structure and the level of competition within sectors influence their responses to changes in monetary policy. Sectors with higher levels of competition might respond differently compared to more concentrated industries.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Data availability statement

Data will be supplied upon request.

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Annexures

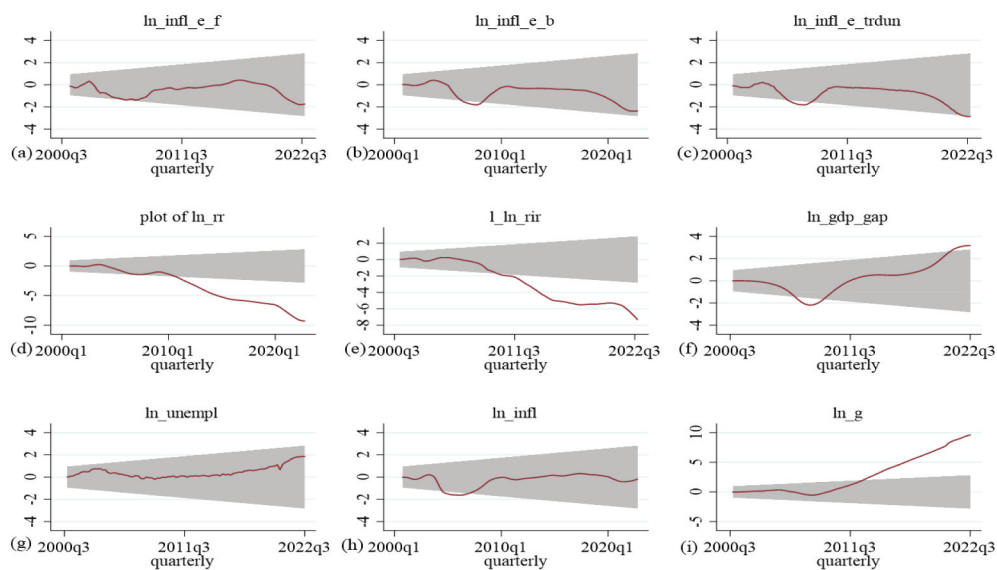


Figure A1. Period where a break in the data is considered. Note that this is with 95% confidence bands around the null. Where economic variables are $\ln_infl_e_trdun$, which is the inflation expectations for trade union agents one year ahead; \ln_rr is the repo rate; l_ln_rr is the lag real interest rate; \ln_gdp_gap is the gross domestic product gap, percent change, quarterly, seasonally adjusted annual rate; \ln_unempl is the official unemployment rate; \ln_infl is the inflation rate and is the \ln_g general government final consumption expenditure percentage of gross domestic product. Compiled by the authors.

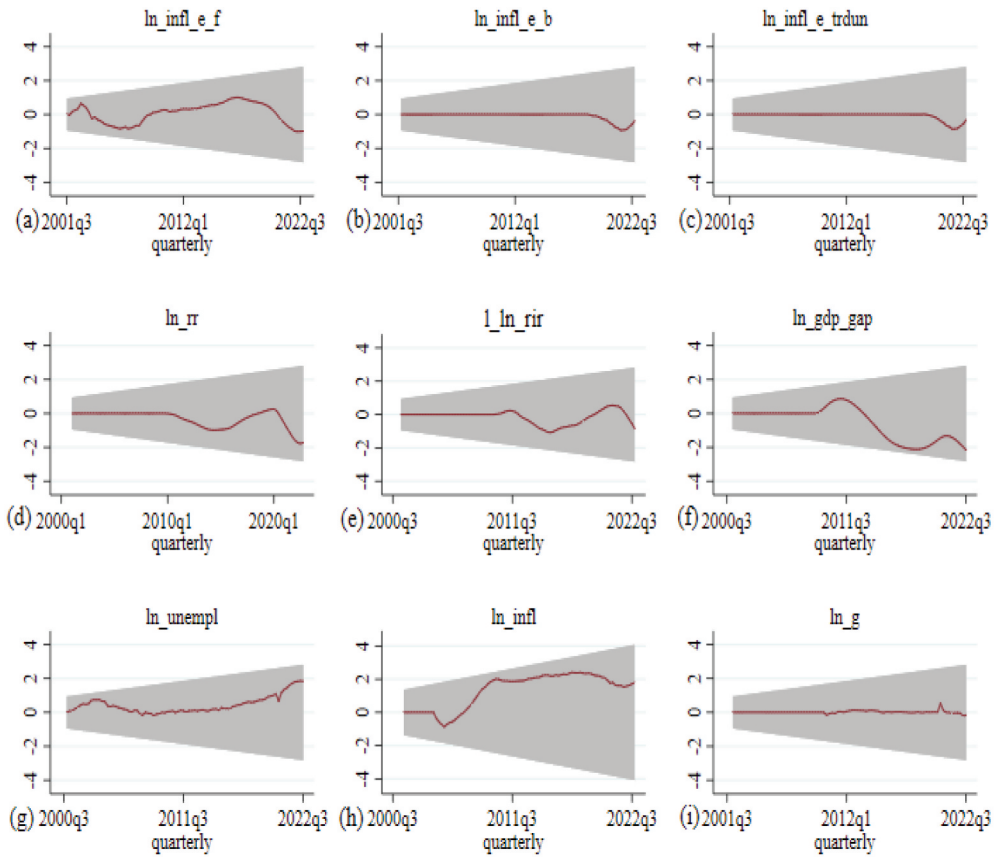


Figure A2. Period where there is no break in the data that is considered. Note that this is with 95% confidence bands around the null. Where economic variables are $\ln_infl_e_trdun$, which is the inflation expectations for trade union agents one year ahead; \ln_rr is the repo rate; l_ln_rir is the lag real interest rate; \ln_gdp_gap is the gross domestic product gap, percent change, quarterly, seasonally adjusted annual rate; \ln_unempl is the official unemployment rate; \ln_infl is the inflation rate and is the \ln_g general government final consumption expenditure percentage of gross domestic product. Compiled by the authors.

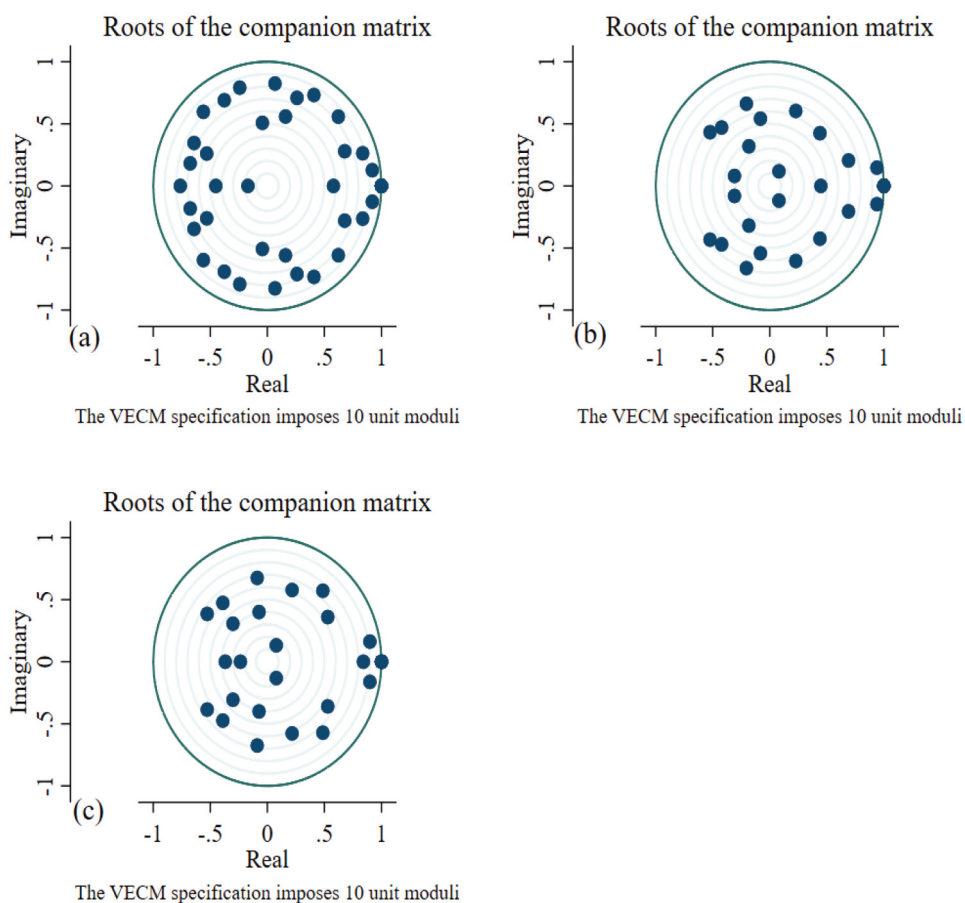


Figure A3. Stability of the ECV model estimation. Compiled by the authors.