Inflation Expectations and Input Costs in the Construction Industry in New Zealand

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Abstract

This dissertation examines the formation of inflation expectations among households particularly the influence of input costs changes in construction in the context of New Zealand. Unlike the previous research, which focused on firms' inflation expectation, this research investigates households' responses to input cost fluctuations and consider how these adjustments reflect broader inflationary expectations. The findings document those changes in sector-specific costs and expectations, particularly within construction, comove and serves as forward-looking indicator of inflation. This effect is especially pronounced in times of economic shocks, supporting the theory of "rational inattention" where households selectively respond to prominent price changes and disregard minor fluctuations in stable time periods. While this research is constrained by a short-term and aggregate data which obscured long term trends and demographic variations, the high correlation in expectations and costs of input offer important implications for monetary policy. Targeted approaches in sectors which have high impact on expectations can aid in anchoring inflation expectations during the period of economic shocks/instability. These insights highlight the critical role of sector-specific costs which plays a vital role in shaping household inflation expectations, suggesting that monetary policy can benefit from a dual focus on macroeconomic conditions and sectoral dynamics.

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Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgments), nor used artificial intelligence tools or generative artificial intelligence tools (unless it is clearly stated, and referenced along with the purpose of use), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or any other institutions of higher learning.

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Chapter 1. Introduction

Inflation expectations have long been a central focus for both policymakers and economists, as they play a crucial role in determining the trajectory of actual inflation and influencing broader economic outcomes (Mankiw & Reis, 2002; Mishkin & Schmidt-Hebbel, 2007). Central banks, particularly those targeting inflation, like the Federal Reserve, Reserve Bank of New Zealand, or European Central Bank monitor inflation expectations to guide their policy responses maintain price stability (Bernanke et al., 1997). Because inflation expectations influence wage-setting, price setting behaviour and interest rates, they are a critical component for achieving stable, long-term economic growth (Blanchard & Leigh, 2013). Well-anchored inflation expectations contribute to economic stability, allowing central banks to achieve their dual mandate of price stability and maximum employment (Blanchard, 2009). Conversely, if inflation expectations become unanchored, they can lead to volatile inflation outcomes, complicating monetary policymakers' tasks (Blinder, 1999; Orphanides & Williams, 2004). Therefore, understanding how households, businesses, and financial markets form their inflation expectations has become a significant focus in recent years (Coibion, Gorodnichenko, & Kamdar, 2018; Mankiw & Reis, 2002). However, the process of forming inflation expectations is far from uniform (Carvalho & Nechio, 2014). Households, firms, and other economic agents form expectations based on their unique information sets, subjective experiences, and broader economic conditions (Carroll, 2003; Coibion & Gorodnichenko, 2015). Particularly, inflation expectations reflect how individuals and firms perceive future price levels and adjust their behaviour accordingly. However, the existing literature on survey-based measure of inflation expectations reveals significant challenges regarding how well the public forms these expectations, especially in low-inflation environments (Coibion, Gorodnichenko, & Kumar, 2018; Weber et al., 2023).

“There are errors in this book. I do not know where they are. If I did, they would not be there”

Alan Greenspan, The Age of Turbulence

Households often respond more to price changes in items they are frequently exposed to, these purchasing patterns shape up households' expectations (Cavallo et al., 2017; D’Acunto, Malmendier, Ospina, et al., 2021). For households, inflation expectations are influenced by variety of demographic factors, such as income and education levels, leading to persistent biases relative to actual inflation rates (Bryan & Venkatu, 2001; Thomas Jr, 1999). Literature has shown that these expectations often display considerable dispersion among different demographic groups (Bordalo et al., 2020; Hommes, 2011; Mankiw et al., 2003). Furthermore, the cognitive abilities of households in responding to survey questions can affect their inflation expectations, leading to inaccuracies (Armantier et al., 2013; Bruine de Bruin et al., 2010; D'Acunto, Malmendier, & Weber, 2021). Similar challenges are observed among firms when forming inflation expectations. Business decision-makers also face informational and processing barriers that complicate their ability to form accurate expectations (Candia et al., 2024; Coibion, Gorodnichenko, & Kamdar, 2018; Kumar et al., 2015; Zbaracki et al., 2004). Firms also struggle with the same difficulties in the formation of expectations as households do, suggesting systematic problems in how inflation expectations are understood across sectors (Coibion, Gorodnichenko, & Kamdar, 2018).

Recent global economic events, such as the COVID-19 pandemic, have reignited debates on the formation of inflation expectations and the broader role of supply shocks, labour markets and sector-specific costs in shaping these views (Guerrieri et al., 2022; Kumar et al., 2015; Meyer et al., 2022). While much research has focused on firms' inflation expectations and their response to changes in input prices (Candia et al., 2024; Coibion, Gorodnichenko, & Kamdar, 2018; Meyer & Sheng, 2024), little has been done to explore how these dynamics apply to households, which is the central focus of this dissertation.

Our research based on the seminal work of Meyer & Sheng 2024, who analysed firms' idiosyncratic unit labour cost expectations and uncertainty closely follow measure of inflation expectations, exploring how such expectations shape firm's inflation forecasts. And during period of high economic uncertainty, firms' inflation expectations become more dispersed, while their research was instrumental in understanding firms' inflationary outlooks, our dissertation extends this framework to investigate how households form inflation expectations, particularly in response to rising unit labour costs and input prices in construction industry. The framework also considers the concept of rational inattention, as developed by (Mankiw & Reis, 2002), to understand how households allocate their limited attention to inflation signals amidst various economic shocks and price fluctuations (Bordalo et al., 2020; Carroll, 2003; Coibion & Gorodnichenko, 2015; Sims, 2003).

The relationship between input prices and inflation expectations is particularly significant in sectors such as construction, where costs are highly visible to households and have a direct impact on their financial outlook. In my research, I examine how input prices in the construction industry, specifically labour and material costs, influence households' inflation expectations. The construction industry, given its noticeable role in housing and infrastructure development, acts as a key signal for households to re-evaluate their future price expectations (Blanchflower & Oswald, 2005; Carroll, 2003; Gürkaynak et al., 2006; Rudd, 2022). Rising construction costs, particularly during the Covid-19 pandemic, presented a unique opportunity to examine how economic shocks amplify inflationary concerns (Carroll, 2003; Wiederholt & Vellekoop, 2017). The pandemic presented an unprecedented economic challenge, and inflation expectations during this period were heavily influenced by sharp rises in construction costs, labour shortage and material supply disruptions (Ball et al., 2005; Clarida et al., 1999; Gopinath et al., 2011; Sims, 2003; Wiederholt & Vellekoop, 2017). Economic shocks amplify inflation expectations (Guerrieri et al., 2022). In this context, households viewed the CCI as a forward-looking indicator of future inflation, adjusting their expectations accordingly.

To validate our findings that inflation expectations are heavily influenced by input costs, we employed data from the time-period that is not affected by economic shocks, to contrast with the post-Covid period. By focusing on a more stable economic environment, we aimed to verify whether the observed relationship between inflation expectations and input costs holds in period without significant disruptions. Our findings suggest that inflation expectations co-move with unit labour costs (Meyer & Sheng, 2024) of construction, manufacturing, and trade sectors. However, lower explanatory power aligns with the theory of rational inattention, where households pay less attention to minor fluctuations in prices during the period of economic stability (Coibion & Gorodnichenko, 2015; D'Acunto, Malmendier, Ospina, et al., 2021; Mankiw & Reis, 2002).

To affirm the robustness of our findings, we employed other measures of input costs like Producer Price Index (PPI), CPI (input costs) and CPI for new housing for the same time-period as CCI. PPI is labour and material cost from production side, CPI for input cost shows changes in the cost of labour and material which firms face in the cost of construction, lastly CPI for new housing is more consumer-facing measure, it reflects the labour and input cost involved in construction of new home. We find a strong correlation between inflation expectations and these different measures of input costs; this supports the idea that the households adjust their expectations based on signals from broader economic conditions. The high correlation suggests that households treat input costs as forward-looking indicator of future inflation.

However, it is worth noting that exact mechanism through which households integrate these price signals into their inflation expectations remains unclear, as they are not directly interacting with these input costs in their daily lives. This opens-up an important question about how information flows and economic narrative shape household expectations, particularly during the period of economic turbulence or significant price changes like housing and construction. Understanding these channels is crucial as it can help policymakers better anticipate and manage household expectations in response to inflationary pressure.

A key contribution of this research is its sectoral analysis that highlights the varying impact of inflationary pressure across different industries. The construction and manufacturing sectors are shown to have strong influence on household inflation expectations due to their direct impact on household budgets, especially in relation to housing and durable goods (Ball et al., 2005; Blanchflower & Oswald, 2005). By contrast, sectors like trade also exhibit a correlation however with smaller coefficient, due to more diffuse nature of trade related costs and their indirect impact on household spendings (Gopinath et al., 2011).

One of the major limitations of this study is the short-term nature of the dataset, which covers time-period from 2015 to 2024. While this time-period includes the Covid-19 pandemic and its associated economic shocks, it may not fully capture the long-term inflationary trends and changes that occur over long-period. Inflation expectations tend to fluctuate over the economic cycle, with different dynamics during periods of expansion, contraction, or external shocks (Coibion, Gorodnichenko, Kumar, et al., 2021). Therefore, the findings of this research reflect temporary economic conditions rather than more permanent structural trends. A longer dataset would provide a more comprehensive understanding of how inflation expectations evolve over time, particularly in response to long-term economic changes.

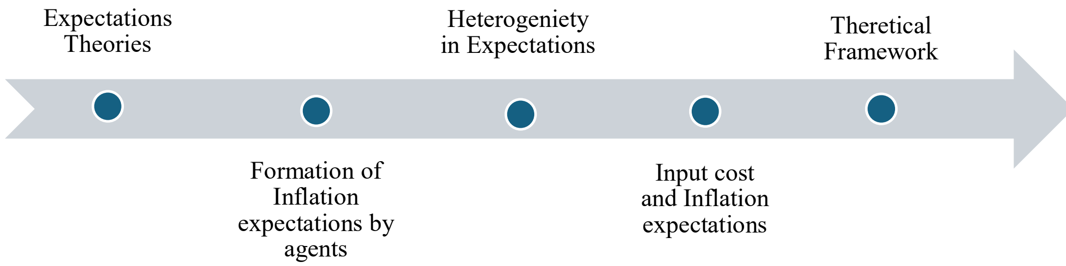
Additionally, the focus on specific sectors, particularly construction and manufacturing and trade limit the generalization of the findings. Inflation expectations are shaped by wide range of economic activities excluding key sectors such as energy, healthcare and transportation may lead to an incomplete picture. For instance, energy prices which are highly volatile play a critical role in shaping household inflation expectations (Blanchard & Simon, 2001). Future research could expand the sectoral analysis to include these areas providing more holistic view of the factors influencing inflation expectations.

Another limitation of our research is the reliance on aggregate data, which obscure important variations in inflation expectations across different household group. A wide literature documented that inflation expectations vary significantly based on income, education level, age, and geographical location (D'Acunto, Malmendier, & Weber, 2021; Weber et al., 2022). Aggregated data oversimplifies the phenomenon of how different households react to inflationary pressure by overlooking the variations in it. Future studies could benefit from disaggregating the data to examine these demographic differences, which can provide a more nuanced understanding of inflation expectation formation.

Our research contributes to the growing body of literature on inflation expectations by providing new insights into the role of input costs in shaping household inflation expectations. Our results highlight the importance of sector-specific inflationary pressure and suggests that policymakers should consider targeted interventions in sectors where price changes are highly visible to households, particularly in the construction sector during the periods of economic turbulence. These findings have important implications for both policymakers and economists, suggesting that inflation expectations are not only shaped by macroeconomic conditions but also by sector-specific factors that directly affect household spending.

The rest of the dissertation proceeds as follows. In chapter 2 provides a comprehensive literature review outlining the inflation expectations, expectations theories (Full Information Rational Information and Rational Inattention), Formation of inflation expectation by agents, Input prices and Inflation expectations, and theoretical framework. Chapter 3 focuses on empirical analysis in inflation expectations detailing data sources, descriptive summary, distribution, and regression analysis. The results chapter 4 presents discussion about the findings, implications and limitations for policy and theory. Finally, the conclusion chapter 5 summarizes the key findings, discusses the limitations of the research, and proposes directions for future work.

Chapter 2. Literature Review



2.1 Inflation Expectations

Expectations are crucial to economics decision-making, particularly in macroeconomic modelling. Pesaran (1987) defines expectations as “attitudes, dispositions or psychological states of mind” which are related to uncertain future events. The uncertainty inherent in economic forecasting necessitates the formation of expectations by agents, which are critical for making informed decisions. Expectations significantly influence the economy’s trajectory, thereby shaping future expectations (Evans & Honkapohja, 2001). Classical economists typically treated expectations as exogenously determined, assuming that future variables were known with some degree of certainty. However, Keynes (1936) challenged this view, arguing that firms’ behaviour depends heavily on forward-looking expectations.

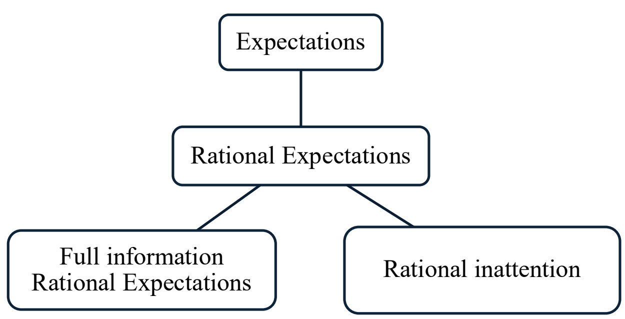


Figure 1 Expectations

When businesses collectively expect a downturn, they reduce investment and hiring which further leads to the anticipated downturn. This process highlights the importance of expectations in economic fluctuations and the potential role of government intervention in stabilizing the economy (Tobin, 1958). Although central banks aim to influence expectations, there is no consensus in the empirical literature on how expectations are formed or influenced (Bachmann et al., 2015; Bernanke, 2007; Coibion & Gorodnichenko, 2015). Individuals form expectations (adaptive expectations based on lagged experience) of future variables like inflation by extrapolating from past values, adjusting gradually as latest information becomes available (Blanchard & Sheen, 2013; Friedman, 1995). Early models of expectations included adaptive expectations, where agents base their expectations on past experiences (Christiano, 1987), and rational expectations, where expectations are “model consistent.” The latter evolved into what is now known as full Information Rational Expectations (FIRE), which has become a cornerstone of modern macroeconomic modelling (Sargent & Wallace, 1975).

2.1.1 Full Information Rational Expectations vs. Rational Inattention

The hypothesis of rational expectations (Muth, 1961) is theory consistent, marked a significant departure from the Keynesian approach. Muth argued that economies do not waste information, and economic agents use all available information efficiently and form expectations that are, on average, correct. Muth’s proposal was not met with great excitement; the experience of stagflation in the 1970s prompted many economists to realize that a comprehensive revision of macroeconomics model was necessary. Robert Lucas and Thomas Sargent led to the development and the evolution of rational expectations. In 1972, Lucas introduced an ‘islands model,’ demonstrating that policymakers could not systematically manipulate the Phillips curve relationship to influence the real economy. In 1976, Lucas introduced what is known as the ‘Lucas Critique,’ arguing that using Keynesian models with parameters based on past data is an inadequate method of assessing the effects of change in government policy. Economic models used for policy analysis can become unreliable if they do not account for changes in how expectations are formed in response to policy changes (Lucas Jr, 1976). Lucas and Sargent suggested that Keynesian models fail to account for the fact that economic agents adjust their behaviour in response to policy changes, making such evaluations unreliable. In favour of equilibrium models, (Lucas & Sargent, 1978) strongly advocated for abandoning Keynesian economics models featuring agents with rational expectations. They argued that these models, where agents adjust to policy changes in a way that optimize their own interests, would not be vulnerable to the Lucas critique.

One of the earliest and most enduring applications of rational expectations is in the context of the Phillips curve, which describes the relationship between nominal and real quantities in the economy (Fischer, 1977; Lucas Jr, 1972; Sargent, 1971). The original Phillips curve, as described by Phillips (1958) and later extended by Samuelson & Solow (1960), suggested a trade-off between inflation and unemployment. However, this relationship was challenged by economists like (Friedman, 1968) & (Phelps, 1967), who introduced the natural rate hypothesis, arguing that the Phillips curve is vertical in the long-run and that monetary policy could not permanently lower unemployment without increasing inflation expectations.

The integration of rational expectations into the Phillips Curve framework led to the development of the new Keynesian Phillips Curve (NKPC), which became the dominant model for analysing inflation dynamics (Clarida et al., 1999; Roberts, 1995; Woodford & Walsh, 2005). The NKPC is based on microeconomic foundations that models how firms optimize their pricing strategies while facing certain frictions, the most common of which is the staggered pricing (Calvo, 1983), which assumes that firms face a constant probability of being able to change their prices in any given period. This framework not only addresses the shortcomings of earlier models but also makes the NKPC immune to the Lucas critique. The rational expectations assumption, which suggests that individuals form their expectations about the future on all available information and in accordance with economic models, has become integral to macroeconomic theory. This framework underlies several influential models including the efficient market hypothesis (Fama, 1970), the permanent income hypothesis (Friedman, 1957) and theories of housing investment and price appreciation (Case & Shiller, 2003)**.** Moreover, policymakers frequently incorporate rational expectations into their economic models. It is documented that the Federal reserve board utilizes this assumption in its FRB/US model (Brayton et al., 1997). While the International Monetary Fund employs similar assumptions in its Global Integrated monetary and Fiscal Model (Kumhof et al., 2010). Additionally, models at the Bank of Canada also reflect this approach (Murchison & Rennison, 2006).

Rational Inattention (RI) challenges the assumption of the FIRE model by acknowledging the cognitive limitations and costs associated with acquiring and processing information (Sims, 2003). Individuals allocate their limited attention selectively, focusing more on information they deem crucial and less on what they perceive as less relevant (Maćkowiak & Wiederholt, 2009; Sims, 2003). Individuals do not fully process all available information, leading to incomplete or biased expectations (Maćkowiak & Wiederholt, 2009; Woodford, 2002). For instance, Sims (2010) argues that agents facing information costs will optimally choose to ignore some aspects of the economy, leading to less than fully informed decisions. Individuals only partly incorporate information on topics such as inflation, because acquiring that information is costly relative to potential gains from using that information (Cavallo et al., 2017). Due to this selective attention, aggregate outcomes may differ from those predicted by models assuming perfect information.

In the FIRE framework, agents are assumed to have complete and accurate information about the economic environment and model structure. Consequently, they can make forecasts that on average align with the actual outcomes. FIRE implies that systematic errors in expectations are unlikely, as agents continuously update their beliefs based on latest information (Sargent & Wallace, 1975). One key implications of the FIRE hypothesis is the ineffectiveness of systematic monetary and fiscal policy in influencing real economic variables, a concept known as the policy ineffectiveness proposition as anticipated changes in monetary policy will not affect output or unemployment as rational agents will adjust their behaviour in anticipation of these changes, leaving only unexpected policy shifts to have real effects (Lucas Jr, 1976).

2.1.2 Empirical Evidence and Critiques

Despite its theoretical appeal, the assumption of FIRE has been extensively tested empirically, particularly in the context of inflation expectations. Early scepticism towards the use of survey data to measure expectations has diminished over time, leading to a growing body of literature that tests FIRE using survey-based data. Studies consistently find that survey-based expectations deviate from the predictions of FIRE. Suggesting that agents may not fully informed or rational in their expectations formation process. For instance, Jonung & Laidler (1988) found that although household inflation perceptions were unbiased, the errors made by households were serially correlated, indicating a deviation from rational expectations. Roberts (1998) observed that inflation expectations from the Livingston Survey and the Michigan Survey of consumers displayed and ‘intermediate” level of rationality, neither fully rational nor purely autoregressive. It is further demonstrated that while some surveys met certain criteria for rationality, they failed others, indicating that expectations might not always be formed in a fully rational manner (Mankiw et al., 2003).

Another strand of literature has explored the role of individual perceptions and experiences in shaping expectations. Jonung (1981) and subsequent studies found significant differences in households’ perceptions of recent inflation, which in turn influenced their expectations of future inflation. These findings are particularly striking because they contradict the assumption of fully informed agents that underpins FIRE. The Studies by (Coibion & Gorodnichenko, 2015; Georganas et al., 2014) further supported the idea that individuals’ consumption experiences, such as the frequency of purchasing certain goods, can bias their inflation perceptions and expectations. Moreover, inflation expectations are influenced by demographic factors. Women tend to have higher inflation expectations than men, (Bryan & Venkatu, 2001), even after controlling for various socio-economic factors. Similarly, it is documented by Souleles (2004) that in Michigan survey of consumer, demographics are correlated with inflation forecast errors. The assumption of fully informed rational agents is also challenged by empirical evidence that individuals with lower financial literacy tend to have higher inflation expectations (Bruine de Bruin et al., 2010).

The recent literature has well documented this phenomenon that accuracy and dispersion of inflation can vary over time and across different conditions. Carvalho & Nechio (2014) found that households' inflation forecast is more consistent with a Taylor rule during economic downturn, while (Coibion & Gorodnichenko, 2015; Mankiw et al., 2003) observed that deviation from FIRE declined during recession, and higher inflation levels and greater variability are associated with increased dispersion in inflation expectations. The FIRE and RI framework offer contrasting perspective on how expectations are formed and updated, the FIRE model assumes that agents have perfect information and make unbiased forecasts, leading to immediate and complete adjustment in response to policy changes. In contrast, RI recognizes that agents have limited cognitive resources and face costs in acquiring and processing information, resulting in potentially biased and less timely adjustment.

A key distinction in both theories is the role of information processing, the FIRE model suggests that all available information is used efficiently by agents, while RI acknowledges that agents optimally choose to ignore some information due to the costs associated with processing it (Gabaix, 2014). These differences lead to different forecasts about economic shocks and the effectiveness of policy interventions. For example, under the FIRE hypothesis, anticipated policy is quickly incorporated into agents' expectations, minimizing their real effects. However, under Rational Inattention, the same policy could have significant and prolonged impacts due to delayed and uneven responses from agents across the economy (Reis, 2006). This phenomenon has important implications for policymakers, who must consider the potential for varied responses among economic agents when designing and communicating policies.

While FIRE has provided a robust framework for understanding expectations formation in macroeconomic models, empirical evidence suggests that its assumptions are too restrictive, the literature persistently finds deviations from FIRE model in survey-based expectations, which are influenced by demographic factors, individual perceptions, and varying economic conditions. Accordingly, there is a growing recognition that economy requires models that go beyond FIRE, incorporating more realistic assumptions about how agents form their expectations, while departures from rational expectations are significant in the short term, these deviations tend to diminish over time (Croushore, 2010), suggesting that expectations may converge towards FIRE eventually. However, fully understanding the complexities of expectation formation requires a more nuanced approach, integrating insights from behavioural economics and other fields to capture the diverse ways in which agents form their expectations.

In inflation forecasting (Coibion & Gorodnichenko, 2015) provide the extensive evidence challenging the full-information expectation hypothesis. They demonstrate that forecast error is predictable using forecast revisions, contradicting the full-information assumption. This predictability aligns with models incorporating sticky or noisy information, The authors find that information rigidities vary cross countries, macroeconomics variable, and time periods. Remarkably, the degree of information rigidity increased during the Great Moderation and tends to decrease during recessions. These findings extend beyond professional forecasters to consumers and financial markets. The observed information rigidities are economically significant and explain various macroeconomic and financial puzzles. This study provides convincing evidence for widespread departures from full-information rational expectations, with important implications for macroeconomic modelling and policy design.

Another work by Coibion, Gorodnichenko, & Kamdar (2018) provided empirical evidence that challenge the assumptions of full information and rational expectations. They argue that the empirical data consistently show that agents' expectations whether from professional forecasters, firms, or households deviate significantly from those predicted by FIRE models. They argue that inflation expectations often exhibit systematic biases and are influenced by factors not accounted for in FIRE-based models, such as information frictions and cognitive limitations. The research suggests that expectations are formed in an environment of imperfect information, where agents face constraints in acquiring and processing data leading to heterogeneity in expectations, where different agents hold different beliefs about future economic conditions.

Moreover, they emphasize the need for Central banks to recognise the diversity of expectations within the economy while formulating monetary policy. Traditional model based on FIRE may overestimate public's ability to anticipate and respond to policy changes, leading to ineffective outcomes.

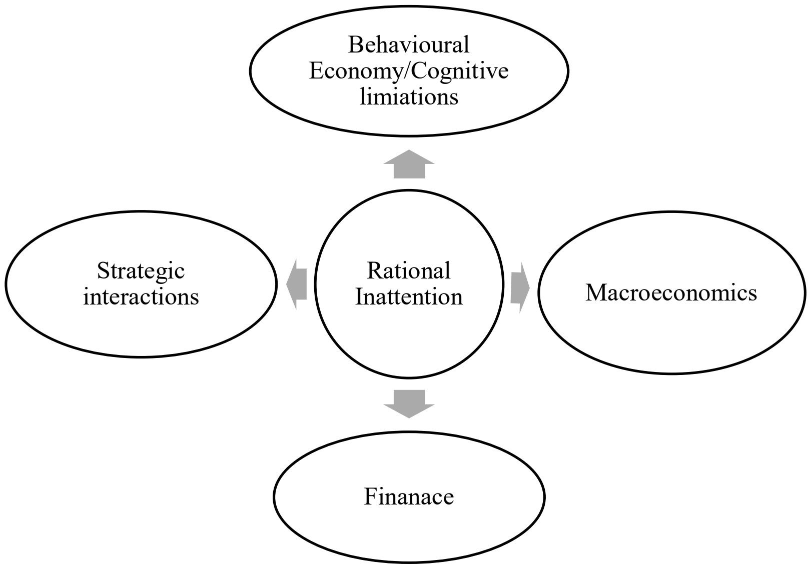


Figure 2 Implications

The way people manage abundant information have broader implications as discussed below.

RI suggests that central bank communication may not be fully absorbed by all economic agents, leading to heterogeneity in expectations and slower adjustments in the economy. The communication of monetary policy is not fully realized (Coibion & Gorodnichenko, 2015), as there is no uniform response from all agents to policy signals (Mankiw et al., 2003; REIS, 2002). Additionally, RI can explain the observed persistence in inflation and output, as agents may not instantly revise their expectations in response to new available information.

In 1998, Sims introduced the concept of RI, primarily due to his interest in macroeconomics. He explored a typical dynamic stochastic general equilibrium model, incorporating various forms of slow changes in both nominal and real variables. Sims established that the model required several sources of gradual adjustment to replicate the inertia observed in macroeconomic data accurately, He hypothesized that this inertia could be attributed to rational inattention. This assumption laid the foundation for a new research direction, with much of the successive work focusing on how firm set prices, a critical issue in macroeconomics. Sims emphasis on both microeconomic price data and aggregate price level to shocks (Galí, 2015; Maćkowiak & Wiederholt, 2009). It is documented by Matějka (2016) that price distributions are distinct, with prices often fluctuating between a regular and a sales price, and that pricing strategies tend to remain simple and update infrequently (Klenow & Malin, 2010; Stevens, 2020).

Price-setters observe nominal aggregate demand (Benigno & Woodford, 2003), but their perceptions are influenced by individual random factors, which were interpreted as being due to limited attention. Woodford demonstrated that nominal demand could have deep and long-lasting real effects. According to him, although macroeconomic data is readily available, most of the agents have minimal incentives to monitor it closely. Therefore, prices adjust gradually to nominal shocks, such as rate of interest or money supply changes, allowing these shocks to have real impacts.

Price-setting behaviour under RI, specifically considering the separate nature of paying attention to aggregate versus idiosyncratic conditions is examined by Gorodnichenko(2008) and Maćkowiak & Wiederholt (2009). To account for the significant average price changes observed in micro-level data, their model required unique volatility to be much greater than aggregate volatility. Consequently, firms allocated most of their attention to idiosyncratic conditions, causing prices to react swiftly to these to idiosyncratic conditions but slowly to aggregate shocks. This model successfully explains the empirical findings that prices at the micro level change frequently and, while the aggregate prices gradually respond to shocks.

Firms optimally select prices from a limited set, even when shocks are continuously distributed (Matějka, 2016). He studied price setting under RI without approximating the profit function. This led to a discrete price adjustment process without any physical cost and prices naturally swing between a regular price and a sales price. This adjustment process is confirmed by (Stevens, 2020) that firms adopt simple pricing strategies, which are updated infrequently and consist of a limited set of prices. The author developed a model where reviewing a pricing policy incurs a fixed cost, and price choices within this policy are made under rational inattention. Recent studies on price setting under RI include works by (Afrouzi & Yang, 2021; Giacomini et al., 2020; Hassan, 2016; Pasten & Schoenle, 2016), according to them RI could explain the flattening of the Phillips curve in recent decades.

Several researchers have suggested that rational inattention could also shed light on consumption data. The permanent income model with quadratic utility explains that agents observe permanent income with independent and identically distributed noise (Luo, 2008). Luo demonstrated that this signal is optimal under rational inattention because permanent income is the sole state variable.

Other macroeconomic questions pertain to the sources and propagation of business cycle shocks and the role of policy in this process. Mackowiak and Wiederhold revisited (Sims, 1998) original conjecture, proposing that the inertia observed in aggregate data could be understood as resulting from rational inattention (Maćkowiak & Wiederholt, 2015). Their model closely resembles a New Keynesian model but excludes traditional source of slow adjustment, such as Calvo pricing, habit formation in consumption, and Calvo wage setting. This model explains that firms and households rely solely on rational inattention.

Real Business Cycle models incorporate rational inattention, (Maćkowiak et al., 2020) focussed on the two limitations of the baseline RBC model: these limitations heighten the persistence in employment, investment, and output growth and forms co-movement following new shocks. Insights into policy implications have also emerged (Paciello & Wiederholt, 2014). Some shocks warrant attention, while others do not, and policy can influence incentives to pay attention. In a standard business cycle model, quick price responses to productivity shocks are beneficial, whereas rapid responses to markup shocks are not. The central bank can influence firms' incentives to pay attention to specific shocks through its interest policy.

Survey data on expectations can be used to test RI, and it succeeds in these tests where the FIRE model does not. It is documented by (Coibion & Gorodnichenko, 2015; Coibion et al., 2012) that expectations systematically deviate from full information rational expectations in the data. The average forecast across agents for various macroeconomic variables underreacts to economic shocks, and the ex-post average forecast error is predictable based on the ex-ante average forecast revisions. Rational inattention accounts for the systematic deviations from full information rational expectations observed in the data.

The theory of Rational Inattention has been applied to key questions in financial theory, such as why most investors concentrate wealth in domestic assets, the general lack of divergence, the cause of limited information flows, and the potential channels of contagion. In the context of globalized financial market, where investors are bombarded with information relevant to portfolio decision, RI posits that investors cannot follow all necessary data for optimal range of choices. As a result, they develop strategies that systematically ignore certain information, leading to new insights into portfolio and asset price behaviour.

Investors often allocate wealth between a diversified reserve and a concentrated set of assets (Van Nieuwerburgh & Veldkamp, 2010) which is understandable through RI lens. They show that while investors may want to learn about multiple assets to maintain diversified portfolio, they tend to focus on the assets with the highest sharp ratio, concentrating their learning and trading in that asset while diversifying the rest. Other studies, (Mondria & Wu, 2010; Van Nieuwerburgh & Veldkamp, 2009) explain the persistence of “home bias” in portfolios, where investors specialize in home assets due to small informational advantage, even though information is publicly available. RI also explains excessive co-movement in asset prices relative to the covariance of their fundamentals. For instance, (Mondria & Wu, 2010) show that investors who track a combination of asset payoffs rather than individual payoffs contribute to magnified co-movement. Peng & Xiong (2006) find that investors processing more market- or sector-wide information over firm-specific data engage in “category learning” which further drives this phenomenon.

In the realm of financial contagion, Mondria & Quintana-Domeque (2013) propose that increased volatility in one market can cause investors to divert attention from another, leading to rising uncertainty and price drops in the latter. This model of attention reallocation offers insights into financial contagion mechanisms. During recessions, when aggregate risk increases, skilled managers focus more on macroeconomic information and adjust their portfolio accordingly (Kacperczyk et al., 2016). The data supports these predictions, showing that skilled managers outperform unskilled ones more during recessions.

RI has been incorporated into finance to understand optimal security design. Unlike previous models, which assumed rigid forms of information acquisition by outside investors, the RI approach allows for flexible information processing, leading to broader conclusions about the conditions under which debt or equity financing is optimal (Yang, 2020; Yang & Zeng, 2019).Other studies focus on relationship between fully informed sellers and rationally inattentive buyers. With many sellers in the market, the prices are in equilibrium (Matějka & McKay, 2012), while Matějka (2015) explores a monopolistic retailer’s pricing strategy when facing rationally inattentive consumers. It is investigated by Martin (2017) that how firms set prices when customers are inattentive to product quality information.

Rational Inattention (RI) is also a behavioural model that incorporates the idea that while agents’ behaviour may appear error-prone, the nature of these mistakes is a deliberate choice. This model acknowledges that people cannot avoid errors but can decide what to focus on and what types of mistakes to minimize, driven by their preferences and the stochastic nature of the environment. Humans are inherently inattentive, and psychology and behavioural; economics have demonstrated that cognitive limitations significantly impact economic outcomes (DellaVigna, 2009; Handel & Schwartzstein, 2018; Kahneman, 2003)

Sims introduced in his seminal work, 'Implications of Rational Inattention' 2003, He explores how economic agents make decisions when they are constrained by limited cognitive resources. The RI framework posits that individuals and firms optimally choose what information to pay attention to, given the costs associated with acquiring and processing that information. This departure from the assumption of fully informed rational agents allows for a more realistic depiction of behaviour under uncertainty and limited information. The RI framework builds on the idea that individuals face cost when processing information, "akin to the concept of 'bounded rationality' introduced by Herber Simon." Sims formalizes this by modelling the decisions-making process as one where agents allocate their limited attention in an optimal way, balancing the benefits of acquiring additional information against the cognitive costs of processing it. This leads to decision-making that is not fully informed but is the best that can be achieved given the constraints.

One of the key contributions of Sim's work is the application of RI to macroeconomic models. In traditional models, agents are often to have perfect to near-perfect information about economic variables such as prices, interest rates, and output. However, Sims argues that agents cannot process all available information due to cognitive limitations. This leads to 'sticky' or delayed responses to changes in economic conditions, which can explain several observed macroeconomic phenomena.

RI leads to choices that may seem imperfect to an external observer, a point of great interest in behavioural economics. This has important policy implications because RI illustrates how behavioural imperfections shift with changes in decision making environment. While RI does not model the practical details of decision-making, it does explain the available choices within certain cognitive limits, merging psychological insights with the optimizing framework of economics.

2.2 Formation of Inflation Expectations

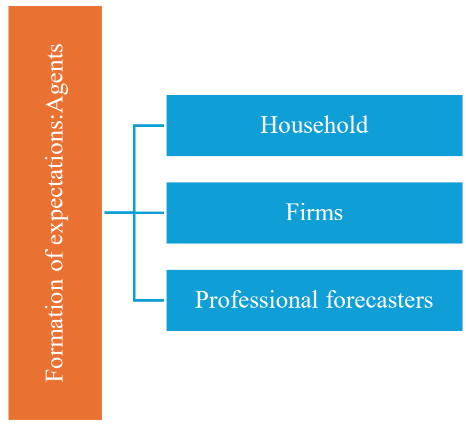


Figure 3 Formation of inflation expectations by agents

2.2.1 Household Expectations

The formation of inflation expectations among households is a crucial aspect of macroeconomic analysis, as it influences consumption, saving, wage-setting behaviour, and overall economic stability. Understanding how households form these expectations can aid central banks in designing effective monetary policies. Households, in aggregate, are important drivers of economic activity and play a key role in the transmission mechanism through which inflation expectations impacts future realized inflation (Bernanke, 2007). To understand the formation of household inflation expectations, some studies have measured the role of inflation statistics, exploiting media coverage of statistics (Badarinza & Buchmann, 2009; Dräger & Lamla, 2013; Lamla & Lein, 2014), the publications of official statistics (Carrillo & Shahe Emran, 2012), and information experiment (Armantier & Treich, 2016; Roos & Schmidt, 2012).

The adaptive expectations hypothesis suggests that households form expectations based on past inflation rates. This theory suggests that people adjust their expectations gradually as they observe actual inflation diverging from their previous forecasts. (Christiano, 1987) discussed this theory in the context of hyperinflation, showing how expectations can lag actual inflation rates. Similarly, Nerlove extended the adaptive expectations framework, demonstrating its applicability in agricultural economics (Nerlove, 1958). Although adaptive expectations provide a straightforward way to model expectation formation, they often fail to capture rapid changes in actual inflation, leading to systematic forecast error.

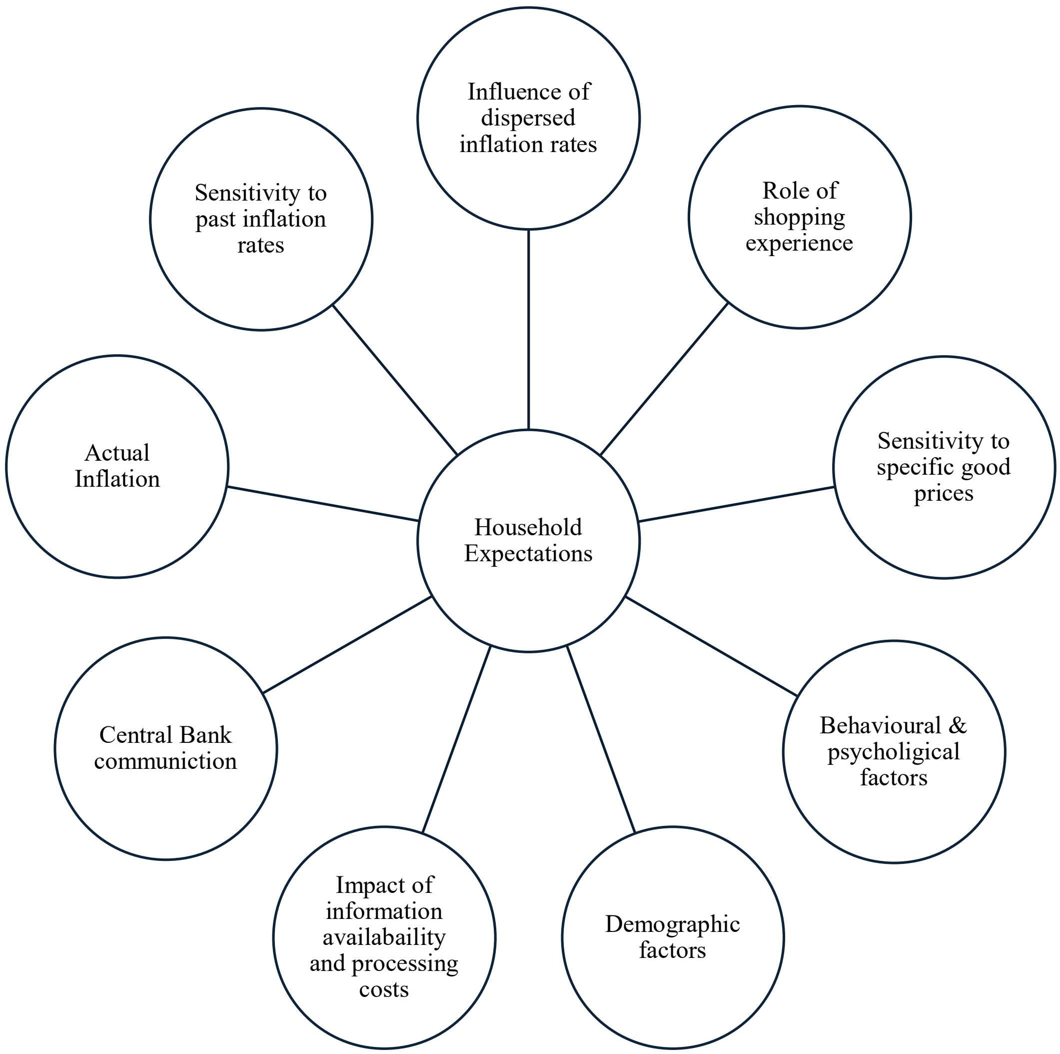


Figure 4 Influencers for household expectations

Shopping experiences significantly influence how households perceive and form expectations about inflation. Inflation rates and prices can vary significantly across households (Coibion & Gorodnichenko, 2015) leading individuals to extrapolate their subjective experiences to the broader economy (Kaplan & Schulhofer-Wohl, 2017). Women who often handle grocery shopping tend to have higher inflation expectations than men (Bryan & Venkatu, 2001; D'Acunto et al., 2019), this is because they are more frequently exposed to price changes, particularly for frequently purchased goods. Moreover, recent shopping experience also has a significant impact in influencing inflation expectations (Cavallo et al., 2017). Once exposure to price changes is has been accounted for, the difference in inflation expectations between genders diminishes, suggesting that shopping experiences are a critical factor in shaping expectations.

Individuals use information from their own price memories (Bates & Gabor, 1986; Bruine de Bruin et al., 2011) and tend to give more weight to prices of goods they have recently purchased, leading to an excess sensitivity to certain price changes (Malmendier & Nagel, 2016). Shopping experience also serves as a major source of information for firms when forming inflation expectations (Kumar et al., 2015). Groups experiencing more dispersed inflation rates tend to disagree more about inflation expectations (Johannsen, 2014) which suggests that subjective experiences with varying inflation rates lead to differences in how households perceive inflation, contributing to divergence in expectations across different demographic and socio-economic groups. A growing body of literature recognizes the heterogeneity in inflation expectations among different households due to differences in information processing, cognitive abilities, and economic experiences (Coibion & Gorodnichenko, 2012).

Households do not treat all consumer prices equally when forming inflation expectations. It is documented that U.S. consumers are particularly sensitive to gasoline prices, even beyond what would be expected based on their share of household expenditures (Coibion & Gorodnichenko, 2015; Harris et al., 2009; Wong, 2015). This excess sensitivity implies that households may disproportionately focus on easily observable and frequently fluctuating prices, such as gasoline, when forming expectations about broader inflation trends. Forming inflation expectations also entails the cost of collecting and processing information. As economic agents, households tend to rely on prices that are easy to observe and understand as proxies of overall inflation. For example, Carroll (2003) suggests that households often form expectations based on news and information they encounter passively, without actively seeking out detailed economic data.

This reliance on accessible information sources can lead to biased or incomplete inflation expectations, particularly if the information is not representative of the broader economy. (Akerlof & Yellen, 1985) proposed "near rational" model, arguing that even a small deviation from rationality can create a significant forecast error. Consumer expectations are systematically biased and not fully rational (Souleles, 2004). Souleles has received substantial support from various economists. Mankiw & Reis (2002) introduced the concept of stick information, suggesting that households do not continuously update their information due to costs or cognitive limitations. Instead, they update their expectations intermittently, leading to a gradual adjustment process. The concept of “sticky information” which suggests that consumers update their expectations slowly, leading to persistent forecast errors(Carroll, 2003; Coibion et al., 2012). Consumers rely on outdated information, resulting in systematic errors influenced by past inflation regimes (Coibion et al., 2012). The role of psychological factors in expectations formation explored by Shiller & Beltratti (1992), showing that consumer expectations can be biased, particularly during economic cycles. Sims also discussed the role of limited information-processing capacity in the formation of expectations, emphasizing the concept of ‘rational inattention’ (Sims, 2003). These theories explain why households might not immediately adjust their expectations in response to latest information, resulting in delayed responses to monetary policy.

Behavioural factors including loss aversion and the availability heuristic, also play a vital role in shaping households inflation expectations. Households overemphasize price increases for goods that are frequently purchased or have a significant psychological impact, leading to an overestimation of inflation (Brachinger, 2008; Bruine de Bruin et al., 2010). This can result in expectations that are more volatile and responsive to short-term price movement rather than long term trends. Inflation expectations can be influenced by psychological factors and social dynamics, such as herd behaviour and narrative economics (Shiller, 1997). Psychological biases, such as overconfidence and anchoring, can lead households to systematically overestimate or underestimate future inflation (Duca & VanHoose Jr, 2000).

The impact of demographic factors on inflation expectations like age, education and income levels significantly influence expectations (Bryan & Venkatu, 2001). Their study showed that older individuals and those with lower education levels tend to have higher inflation expectations. This demographic segmentation highlights the need for targeted communication strategies by central banks to effectively manage expectations. Survey of household by the University of Michigan and the Federal Reserve Bank of New York provide valuable insights into the actual inflation expectations to households. These survey reveals a significant dispersion in expectations, often influenced by recent inflation trends and personal experience. Household expectations are more influenced by current inflation than by long-term trends, indication a short-term bias in expectations (Blanchflower & MacCoille, 2009).

2.2.2 Formation of Inflation Expectations: Firms

The formation of inflation expectations among firms is a critical area of study in macroeconomics, as it significantly influences pricing strategies, wage negotiation, investment decisions and overall economic performance (Afrouzi & Yang, 2021). Firms' expectations about future inflation can impact their behaviour in ways that affect both microeconomic and macroeconomic outcomes (Candia et al., 2024). Several models attribute a vital role to firms' expectations, often captured by an expectation-augmented Phillips Curve (Fuhrer, 1995; Gordon, 1997), which predicts the relationship between inflation and the real economy (Bernstein et al., 2022; D'Acunto, Hoang, et al., 2021; Hazell et al., 2022), contingent on firms' inflation expectations (Candia et al., 2024). The expectations-augmented Phillips Curve, formalized by Phelps (1968) is a cornerstone in understanding the role of inflation expectations. Phelps introduces the notion that inflation is note solely a function of past inflation and unemployment but also depends on expectations of future inflation. This extension of Philps curve incorporates the role of expectations in linking inflation with economic activity, providing a framework for analysing how firms' expectations impact inflation dynamics (Coibion & Gorodnichenko, 2015; Mankiw & Reis, 2002).

The New Keynesian Phillips Curve (NKPC) builds on the expectations-augmented Phillips curve by incorporating the concept of sticky prices (Benigno & Woodford, 2003; Galı & Gertler, 1999). The NKPC posits that firms set prices based on both current and expected future economic conditions. Benigno & Woodford (2003) emphasize that this model highlights the importance of inflation expectations in monetary policy, as it reflects the interplay between nominal rigidities and real economic variables. Galı & Gertler (1999) extend this theory by integrating it into a broader macroeconomic model that accounts for the persistence of inflation and the role of monetary policy in stabilizing the economy. Their work underscores how firms' expectations about future inflation influence price-setting behaviour and, consequently, inflation dynamics.

Rational expectations theory suggests that firms use all available information to forecast inflation accurately. This concept, developed by Lucas Jr, (1972) and Muth (1961) assumes that firms form expectations based on an understanding of economics models and policies. However, empirical evidence often shows deviations from this theory due to information frictions. Mankiw & Reis (2002) proposed a model of sticky information, where firms update their information intermittently due to their cognitive constraints. This sticky information model offers an alternative to the sticky prices framework by emphasizing how firms' inflation expectations adjust gradually due to information rigidities. According to this model, firms do not continuously update their expectations but rather adjust them inconsistently as they receive latest information. This gradual adjustment process affects the inflation dynamics and the responsiveness of firms to economic shocks.

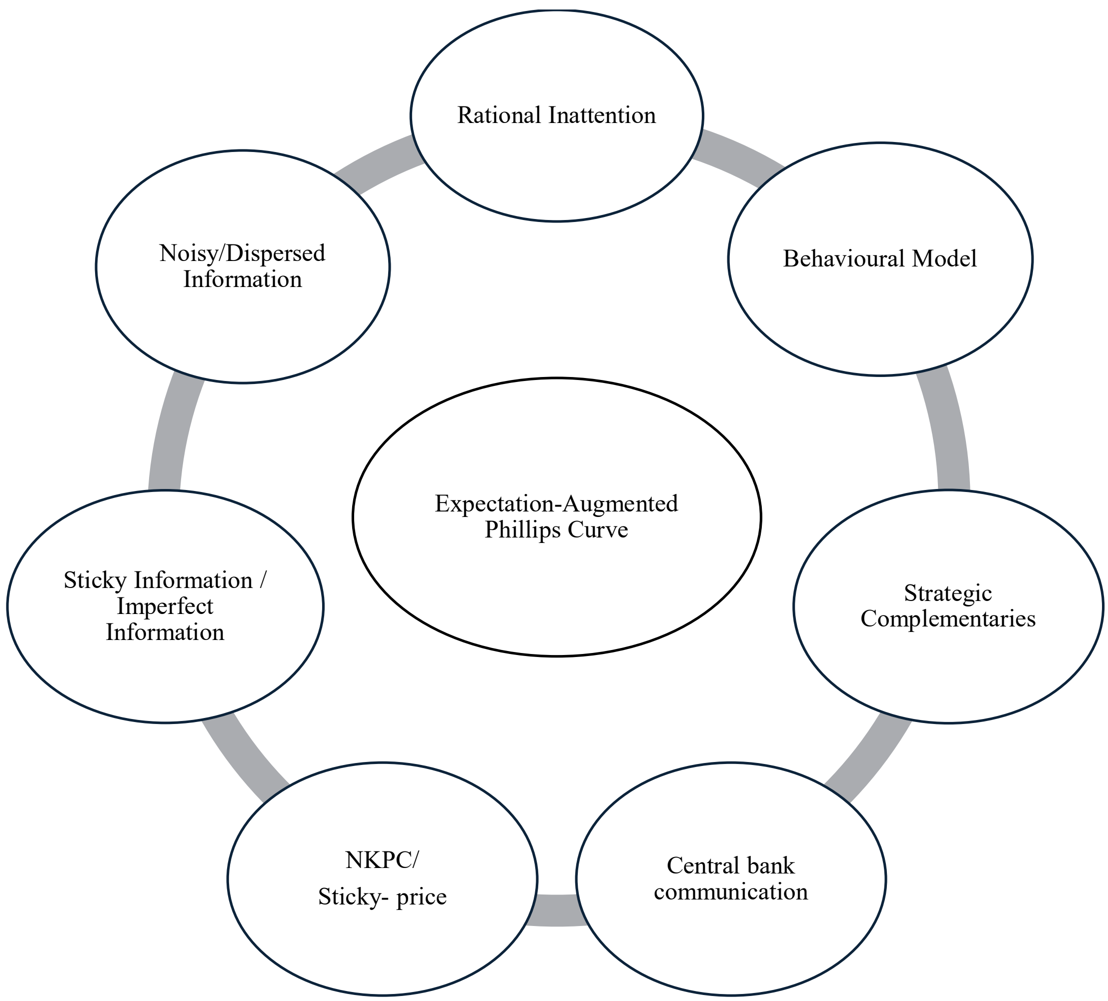


Figure 5 Framework for Firm's Expectations

Reis further develops this concept by introducing rational inattention, where firms allocate limited attention to economic variables, leading to delayed adjustment in their expectations and price-setting behaviour (Reis, 2006). This model provides insights into how firms' information processing constraints can influence macroeconomic outcomes. (Sims, 2003) introduced the concept of rational inattention, when firms may not fully process all available information because of the costs associated with doing so. Rational inattention, as discussed by (Afrouzi & Yang, 2021; Reis, 2006), explores how firms allocate limited attention to economic variables. In these models, firms face costs associated with acquiring and processing information, leading to imperfect adjustments in their expectations. (Afrouzi & Yang, 2021) extend this framework by examining its implications for the Phillips curve and inflation dynamics. They argue that rational inattention affects the sensitivity of firm's price-setting behaviour to changes in economic conditions and monetary policy.

The impact of dispersed information on inflation dynamics is explored by (NIMARK, 2014). In this model, firms have access to heterogeneous information, leading to variations in inflation expectations across firms. He highlighted how information dispersion can contribute to aggregate inflation dynamics and affect the effectiveness of monetary policy. Inattention to recent inflation and monetary policy objectives appears to be characteristic of advanced economies with the history of low and stable inflation, Inflation expectations among U.S. firms are characterized by notable instability and dispersion, reflecting a situation where these expectations are anything but anchored (Candia et al., 2024; Kumar et al., 2015) investigate whether the inflation expectations of firm managers in New Zealand are well-anchored. Their findings reveal that these expectations display minimal anchoring according to any definition considered: New Zealand firms' inflation expectations are higher, more dispersed, and more volatile than those of professional forecasters, both in the short run and the long run. Additionally, managers frequently revise their forecasts, show a high correlation between short-run and long-run inflation expectations, and exhibit significant uncertainty about future inflation.

Nevertheless, inattention to inflation and monetary policy does not necessarily mean that inflation expectations are irrelevant to firms' decisions. (Coibion, Gorodnichenko, & Kamdar, 2018; Coibion et al., 2020) provide evidence from New Zealand and Italy, respectively, showing that giving firms randomized information about inflation can significantly influence their inflation expectations and subsequently affect their investment and employment decisions. These studies offer direct causal evidence that even firms that are, inattentive can respond to changes in their inflation expectations.

The most recent studies (Candia et al., 2024) explored this phenomenon of inattention, and their advancement in measuring firms' inflation expectations have been marked by the introduction of the Survey of Firms' Inflation Expectations (SoFIE) in the U.S. This survey provides a quantitative and representative measure of firms' inflation expectations over time, revealing that these expectations often deviate from those of households and professional forecasters. In an analogous manner to household expectations, firms' inflation outlooks are found to be unanchored. The data from SoFIE is particularly valuable for central bank decision-making, offering real-time insights that can inform monetary policy, as evidenced by firms' high inflation expectations in late 2022. Furthermore, the survey contributes to a growing body of research on the expectations formation process within firms, highlighting its importance for forward-looking decisions such as pricing, employment, and capital investment. (Woodford, 2002) introduces noisy information models, where firms face uncertainty about the true state of the economy due to noisy signals. This model emphasizes how noise in information can affect firm's expectations and their response to monetary policy. He provides a framework for understanding how information imperfection impact inflation and economic stability.

A strand of literature explores that how micro-level data is utilized to examine that how firms adjust prices in response to expected inflation (Gagnon et al., 2013; Nakamura & Steinsson, 2013). These studies found that price adjustments are infrequent and often driven by external shocks rather than continuous monitoring to inflation trends. This finding supports the notion of sticky prices and highlights the role of external factors in shaping firms' expectations and behaviour. Prospect theory provides a framework for understanding how firms might overreact to certain types of information or ignore others (Kahneman & Tversky, 2013). Firms place disproportionate weight on recent inflation trends and anchor their expectations to a particular inflation rate (Akerlof & Shiller, 2010) which leads to systematic error in expectations affecting prices and investment decisions. Behavioural models also incorporate insights from behavioural economics into the analysis of firm expectations. Integration of bounded rationality into the New Keynesian framework suggest that firm's expectations and price setting behaviour are influenced by cognitive biases and limited rationality (Gabaix, 2020). This approach provides a more nuanced understanding of how firms form expectations and how these expectations impact macroeconomic dynamics.

Central bank communication plays a pivotal role in shaping firms' inflation expectations (Bernanke et al., 1997; Coibion et al., 2020). Clear, consistent, and timely messaging from central bank can help anchor firms' expectations while reducing uncertainty and aligning firms' inflation forecast more closely with the central bank's targets (Blinder, 1999; Ehrmann & Fratzscher, 2007; Hubert & Labondance, 2021; King, 2005). However, the effectiveness of such communication depends on the credibility and clarity of the central bank's message (Cukierman, 2009; Geraats, 2002). Another strand of literature emphasizes the critical role of well-anchored expectations in effective monetary policy (Bernanke et al., 1997; Jonas

& Mishkin, 2004; Woodford, 2002). They argue that stable expectations help maintain price stability and reduce the volatility of actual inflation during uncertain economics periods (Crowe & Meade, 2008). It is important to understand that central bank communication strategies also differ across countries, affecting how clearly and effectively inflation-related information is conveyed to firm (Andrade & Le Bihan, 2013; Woodford, 2005).

Empirical studies often rely on survey data to assess firms' inflation expectations. The vast literature used survey data to show that firms often form expectations based on current inflation rates and current trends (Blinder, 1991) rather than fully incorporating all available information. These findings align with the sticky information model (Mankiw & Reis, 2002). Most recent literature has shown that firms' inflation expectations are biased, dispersed and lack of uniformity (Candia et al., 2024; Coibion, Gorodnichenko, & Kamdar, 2018). These studies highlight that firms, like households, do not have homogeneous expectations due to differences in access to information and cognitive limitations. A core difficulty is the lace of high-quality survey with data on firms' expectations (Bernanke, 2007). The data are even scarer for times of important changes in the monetary policy regime or the macroeconomic environment.

Firms' expectations are influenced by number of factors such as size, industry and geographical location (Bachmann et al., 2015) which leads to heterogeneity in expectations. For instance, smaller firms and those more in volatile industries tend to have higher and more variability in inflation expectations (Cieslak & Vissing-Jorgensen, 2017; Coibion, Gorodnichenko, & Kamdar, 2018) which lead to differing responses to economic policies, complicating the central bank's task of managing inflation. Firm's inflation expectations are influenced by their price-setting behaviour (Ball & Romer, 1990; Gopinath et al., 2011; Nakamura & Steinsson, 2013; Sims, 1998) discussed the concept of strategic complementary, where firms consider not only their own costs but also the expected prices of competitors. If firms expect their competitors to raise prices due to anticipated inflation, they follow suite, reinforcing the inflationary trend. This interaction can create a coordination problem, as firms' expectations and actions become interdependent. Firms, pay less attention to macroeconomic information, including inflation, compared to households or professional forecasters (Meyer & Sheng, 2024). According to them this inattentiveness forming less accurate inflation expectations, these findings contrast with the traditional view that firms, as active market participants, are highly responsive to macroeconomic indicators. They argue that this lack of attention might be stem from prioritizing microeconomic factors, such as their own input costs and demand conditions, over broader inflation trends when making price decisions.

The macroeconomic implications of firms' inflation expectations are substantial. Firms' expectations affect aggregate supply and demand, influencing the overall price level and economic output (Blanchard & Kiyotaki, 1987), when firms expect higher future inflation they raise prices pre-emptively, contributing to actual inflation. This feedback loop underscores the importance of accurately understanding and managing firms' expectations to achieve macroeconomic stability.

2.2.3 Formation of Inflation Expectations: Professional Forecasters and Central Bankers

The formation of inflation expectations among professional forecasters and central bankers is a pivotal area of study in macroeconomics, as these groups play a significant role in shaping economic policies and influencing market perceptions (Blinder et al., 2008; Coibion et al., 2012; Mankiw et al., 2003; Orphanides & Williams, 2005). Professional forecasters include economists from financial institutions, academia, and research organizations, while central bankers are key policymakers responsible for setting and communicating monetary policy. Understanding how these groups form inflation expectations provides insights into the mechanism through which economic information is processed and the implications for policy effectiveness (Federal Reserve Bank).

Professional forecasters- economists working for private institutions, think tanks, and academia rely on various tools and data sources. They form their expectations based on historical data (Coibion & Gorodnichenko, 2015). Professional forecasters also use real time economic indicators such as GDP growth, unemployment rates and central bank communication to adjust their predictions (Faust & Wright, 2013). These forecasters employ models like the NKPC to integrate inflation expectations into their macroeconomic analysis. Forecasters also exhibit rational inattention and do not continuously adjust their forecast in response to every new piece of information (Andrade & Le Bihan, 2013) instead they update expectations on when substantial new data becomes available.

Surveys have been a crucial tool for capturing inflation expectations among professional forecasters providing insights into their views and expectation formation proccess (Andrade & Le Bihan, 2013; Coibion, Gorodnichenko, & Kamdar, 2018; Giordani & Söderlind, 2003; Mankiw et al., 2003). The Survey of Professional Forecasters (SPF), initiated by the Federal

Reserve Bank of Philadelphia, has been extensively used in academic research to track inflation expectations. Professional forecasters' expectations often reflect a consensus (Bryan & Venkatu, 2001) but can diverge based on the frequency and type of information incorporated. Their research emphasized that open-ended survey formats tend to yield more reliable predictions compared to multiple-choice surveys (Armantier & Treich, 2016; Manski, 2004; Weber et al., 2022).

Professional forecasters and central bankers are assumed to use models to act rationally in processing information (Blinder et al., 2008). However, empirical studies have shown that this ideal does not always hold and deviation from rational expectations are common, as information asymmetric and bounded rationality come into play (Coibion et al., 2012; REIS, 2002; Sims, 2003). While rational expectations theory assumes continuous updating of information, sticky information models suggest that forecasters update their inflation expectations infrequently due to the costs associated with obtaining and processing new information REIS, 2002). Rational inattention model explain the behaviour of central bankers and professional forecasters during time of macroeconomic shocks and policy changes, where the cost of processing information quickly outweighs the perceived benefits. Professional forecasters often exhibit sticky information behaviour, as they revise their inflation expectations slowly in response to policy changes (Coibion & Gorodnichenko, 2015).

Central banks use forward guidance to manage expectations by signaling their future policy intentions (Gürkaynak et al., 2005), the effectiveness depends on the credibility and clarity of the message (Ehrmann & Fratzscher, 2007) which can reduce uncertainity and help align professional forecasters' inflation expectations with policy goals. However, central bank communication is not always perfectly interpreted by professional forecasters (Andrade & Ferroni, 2021) which leads to divergent interpretations among professional forecasters, increasing the dispersion of expectations. Anchoring inflation expectations is essential to prevent unmoored expectations that can lead to inflation volatility. (Levin et al., 2004) finds that successful inflation targeting regimes result in lower inflation forecast errors among professional forecasters. The effectiveness of the inflation targeting in anchoring expectations varies across countries, depending on the credibility and transparency of the central bank (Gürkaynak et al., 2010).

Beyond sticky information models,learning models have been developed to explain how central bankers and professional forecasters adapt their inflation expectation over time. In these models, agents form expectations based on past forecast errors and gradually adjust their models as they receive new information. Agents use adaptive learning to revise their inflation expectations, incorporating new information based on observed forecast error (Branch & Evans, 2006). Learning mechanism improve the predictive power of inflation expectations by allowing agents to continually adjust their beliefs as economic conditions evolve (Milani, 2007). This framework also explains how persistent deviation from rational expecttaions occur, as agents rely on past errors and how professional forescasters and policymakers respond to shift in economic conditions (Evans et al., 2001).

Professional forcasters and central bankers find it challenging to form expectations (Andrade & Ferroni, 2021), global trade and interconnectedness have changed the dynamics of expectations making it more difficult for professional forecasters and central bankers to predict inflation accurately (Ihrig et al., 2010). Recent Literature also highlighted the difficulties central banks face in managing inflation expectations when using unconventional tools (Nakamura & Steinsson, 2018). These tools have less predictable effects than traditional interest rate policies, leading to greater variation in expectations about future inflation.

2.2.4 Heterogeneity in Inflation Expectations

Heterogeneity in inflation expectations refers to the variations in how different economic agents- households, firms and professional forecasters anticipate future inflation. The concept of heterogeneity in inflation expectations has garnered significant in recent years, it is documented that not all agents form expectations in the same way.

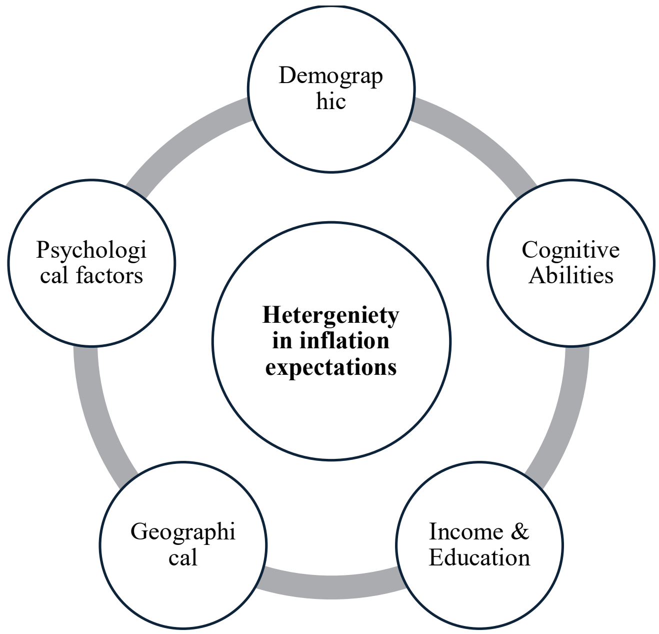


Figure 6 Heterogeneity in inflation expectations

The demographic composition of an economy significantly impacts how inflation expectations are formed. It is well-documented through literature that age, income, education level and gender are key determinants of these expectations (Blanchflower & MacCoille, 2009; Bruine de Bruin et al., 2010; Candia et al., 2024; Carvalho & Nechio, 2014; D'Acunto, Malmendier, & Weber, 2021; Weber et al., 2022). Older individuals who have lived through periods of high inflation tend to expect higher future inflation rates compared to younger individuals (Bryan & Venkatu, 2001). The phenomenon "experience effect" suggests that past experiences with inflation can anchor future expectations leading to systematic differences across age groups (Ehrmann & Tzamourani, 2012; Malmendier & Nagel, 2011, 2016).

An individual's Income and education levels also plays a key role in shaping inflation expectations (Armantier et al., 2015; Bryan & Venkatu, 2001; Souleles, 2004). Individuals with higher income and education levels are found to have more accurate expectations (Armantier et al., 2015; D'Acunto et al., 2023) due to better access to information and stronger understanding of economic principles (Kumar et al., 2015). In contrast, people with lower income and education levels rely more on subjective experiences and local price changes which can lead to greater variability and potential inaccuracies in their expectations (Weber et al., 2022).

Another important aspect of heterogeneity in inflation expectations is geographical, as regional economic conditions such as variations in housing market, job opportunities and local price levels can lead to different inflation expectations across regions (Armantier et al., 2016; Binder, 2017; Cavallo et al., 2017; D'Acunto, Malmendier, & Weber, 2021). It is documented by (Coibion et al., 2012) that inflation expectations vary significantly across different regions within the same country, driven by local economic circumstances and differing exposure to economic shocks. The geographical variation in inflation expectations from the firms' perspective is further explored by (Coibion & Gorodnichenko, 2015). According to them inflation expectations differ by region and industry, indicating that local economic conditions and industry specific factors contribute to regional disparities in expectations. Regional factors and local economic conditions affect price dynamics and inflation expectations, emphasizing the influence of local variations (Brachinger, 2008; Maćkowiak & Wiederholt, 2009). (Mankiw & Reis, 2002) discussed the role of sticky information which suggests that regional differences in information availability and updating lead to heterogeneous inflation expectations that complement the findings of (Kaplan et al., 2020) who investigated how micro-level data reveals how local economic conditions, and regional factors impact inflation expectations and price setting.

Cognitive biases and psychological factors are central to understanding heterogeneity in inflation expectations (Carroll, 2003). Behavioural models those are developed by (Kahneman & Tversky, 2013; Kahneman, 1979) suggest that individuals are influenced by heuristics and biases when forming expectations. For example, the anchoring bias leads individuals to rely too heavily on recent inflation rates (Tversky & Kahneman, 1974). This reliance can skew expectations if recent rates have been high or low (Rabin, 2013). (Barberis et al., 2001) extended this by showing how investors' expectations are influenced by contemporary trends highlighting the similar biases impact professional forecasters as well. (Gabaix, 2014) explores the broader implications of cognitive biases on economic decisions, including inflation expectations, providing a framework for understanding how such biases persist across diverse groups. The impact of psychological factors on inflation expectations is also discussed by (Blinder et al., 2008) who explored how biases affect expectations and emphasized the challenges these biases pose for central banks. This study shows that biases like over-optimism or pessimism about the economy can lead to persistent overestimation or underestimation of inflation by certain groups (Bachmann et al., 2013; D'Acunto, Hoang, et al., 2021; Mankiw & Reis, 2002). From recent economic experiences, it is documented that cognitive biases affect firms' inflation expectations leading to systematic deviations in forecast (Coibion & Gorodnichenko, 2015). This argument is also discussed by (D'Acunto et al., 2019), examining how psychological factors influence consumer expectations and spending behaviour.

The size of firms also contributes to heterogeneity in inflation expectations. Firm level inflation expectations differ between SMEs and large firms due to information constraints and firm-specific experiences (Coibion, Gorodnichenko, & Kumar, 2018). It is documented by (Brunnermeier & Sannikov, 2014; Mankiw et al., 2003) that inflation forecasts by professional forecasters are heavily dispersed and has significant variability. Addressing these biases through clear and targeted communication is crucial for managing expectations and ensuring that monetary policy has its intended effect (Kumar et al., 2015).

2.3 Input Prices and Inflation Expectations

Input costs are crucial in the construction industry as they directly affect costs of building projects, including both residential and commercial properties as they are a major source of cost overruns. These costs are a major determinant of the final prices of construction outputs, such as housing, which in turn influence broader economic variables, like consumer price inflation and household inflation expectations. High construction costs can limit the ability to build affordable housing, exacerbating the housing crisis.

The relationship between input prices and inflation expectations can be understood through the lens of cost-push inflation. According to classical economic theory, when the cost of production inputs rises, firms often pass these costs on to consumers in the form of higher prices, leading to an overall increase in the price level (Phelps, 1968). Theories on inflation expectations hinge on how agents react to observed changes in prices. According to Mankiw & Reis (2002) agents do not continuously update their information on prices but rather adjust their expectations when they perceive a significant deviation in price movement.

A significant body of literature investigates the relationship between prices and household inflation expectations. Households tend to anchor their inflation expectations based on the prices of frequently purchased items such as food, fuel, and rent (Kumar et al., 2015). Input prices are closely related to consumer prices as firms pass on higher input costs to consumers (Gopinath & Itskhoki, 2010). This is particularly true for construction material costs which has a direct bearing on housing prices as a key component of household consumption basket, higher prices in essential sectors drives inflation expectations upward, as they are reflected in the price of final goods and services consumed by households (Andrade & Le Bihan, 2013; D'Acunto et al., 2023). Significant increases in housing prices can lead to higher inflation expectations, particularly among those who own property or are seeking to buy (Bachmann et al., 2015; Case et al., 2005; Iacoviello & Neri, 2010).

The role of personal experiences, such as rent increases, also plays an important role in shaping inflation expectations (Cavallo et al., 2017), so the people who experience rising housing costs are more likely to expect higher overall inflation even if other prices remain stable. (Armona et al., 2019) also documented that individual facing rising housing costs, particularly in tight markets, tend to revise their inflation expectations upwards. Regional variation in housing costs also influences inflation expectations with areas experiencing rapid housing cost increases seeing residents with higher inflation expectations (Armona et al., 2019). Studies shows that in time of volatile or unpredictable price changes, particularly in essential commodities like oil and food, inflation expectations become more dispersed and uncertain which in turn causes them to overestimate future inflation (Coibion, Gorodnichenko, & Kamdar, 2018; Gürkaynak et al., 2010). Furthermore, (Bloom et al., 2018) points out that uncertainty regarding future price movements can make firms and households more reactive to immediate price changes, influencing their short-term inflation expectations. In this scenario, inflation expectations become more volatile in the periods of price instability, such as those caused by supply chain disruption or geopolitical events that affects prices. This research primarily captures the impact of consumer goods prices and lacks in-depth exploration of how input costs particularly construction sector affects inflation expectations.

Several studies discuss how firms pass increased input costs onto consumer prices, which indirectly affect expectations, (Blanchard & Galí, 2007) explain how input cost changes affect price-setting behaviour which can influence inflation expectations. (Ramey, 1991) provides evidence of cost pass through from material to final goods, suggesting a mechanism through which material costs could impact consumer inflation expectations. Although input prices are indirectly mentioned in relation to pass-through effects, the specific role of input costs in shaping inflation expectations remains underexplored. For instance, the Construction Cost Index is a vital indicator of material cost fluctuation in the construction industry, yet there is limited evidence in the literature connecting material cost changes to household inflation expectations in a direct and measurable way. The research gap lies in understanding how these input costs affect broader inflationary dynamics and how households and firms form inflation expectations when material prices rise.

2.3.1 Research Motivation

The costs associated with owning a home, such as mortgage interest payments or changes in property values, are not included in the Consumer Price Index (CPI) in New Zealand. The CPI is designed to capture a representative basket of goods and services that reflect consumer spending habits and rent prices are used to approximate housing-related costs. This exclusion is primarily to avoid the volatility associated with house prices, which could disproportionately influence the CPI if included.

In New Zealand, housing is often treated as an investment asset rather than a consumption good (Piazzesi et al., 2007), which creates a fundamental distinction in how inflation is measured. Since inflation is traditionally seen as the increase in the cost of living, focusing on the price consumers pay goods and services, the inclusion of housing could distort this measure. Housing is typically treated as part of wealth or investment portfolio and its price fluctuations may not reflect day to day consumption trends (Poterba et al., 1991). The costs associated with owning a home, such as mortgage interest payments or changes in property values are not included in the Consumer Price Index (Silk & Governor, 2022). The CPI is designed to capture a representative basket of goods and services that reflect consumer spending habits (Blanchard, 2021; Mankiw & Taylor, 2020), where rent prices are used to approximate housing-related costs.

Housing prices tend to be highly volatile due to several factors such as interest rate, government policies and speculative demand (Case & Shiller, 2003; Mankiw & Weil, 1989). Including housing in inflation measures could lead to erratic inflation figures, making it harder for policymakers and consumers to form stable inflation expectations. The Bundesbank suggests that the CPI of basket of goods may overstate inflation by about 2 percentage points, while the Federal Reserve acknowledge a potential bias of up to 1.8 percentage points. Meanwhile the Boskin Report provides a more conservative upper estimates of this bias, setting it at 2.7 percentage points (Bakker et al., 1994; Boskin, 1996).

Existing research suggests that households form their inflation expectations based on various sectoral prices changes, particularly in energy and food prices (Coibion & Gorodnichenko, 2015; D’Acunto et al., 2021). Empirical evidence shows that households tend to overweight price changes in frequently purchased goods, such as fuel and groceries, when forming their expectations about overall inflation (Candia et al., 2021). However, despite the significant role construction sector plays in the economy, particularly in influencing the cost of living through housing-related expenditure, little attention been given to how fluctuation in construction input cost affect inflation expectations. Prior studies have focused on demand-side factors and sectoral-shocks in industries such as retail, food, and energy but have overlooked the impact of supply-side cost-pressures in the construction industry (Coibion et al., 2018; Cavallo et al., 2017). This gap in the literature provides an opportunity to examine whether changes in material and labour costs in construction influence households’ inflation expectations, extending the existing understanding of price perception dynamics.

In New Zealand, housing-related costs, such as construction costs are tracked through separate indices like the Construction Cost Index (CCI). This approach allows for a clearer understanding of inflation in consumer goods and services without the distortion that housing market volatility could introduce. Central banks including the Reserve Bank of New Zealand focus on consumer price inflation when setting monetary policy. By examining the impact of construction input prices, which they are not directly exposed to, on households' inflation expectations, policymakers can better assess how fluctuations in housing costs influence consumer perceptions of inflation.

For these reasons, my research is driven by the need to explore the specific impact of input costs in the construction industry on inflation expectations, rather than housing prices. This represents a significant gap in the literature, as there is limited evidence connecting input costs in construction to the formation of inflation expectations.

By leveraging CCI data, this study will extend the literature on inflation expectation formation by exploring whether increases in material and labour costs in a critical sector like construction have a measurable impact on household inflation expectations. This research will provide insights into how inflation expectations are shaped by supply-side factors, accompanying the extensive body of work on demand-side price dynamics. This new perspective could provide policymakers with additional tools for understanding and managing inflation expectations in the face of rising input costs, particularly in periods of supply chain disruptions and global commodity price volatility.

2.4 Theoretical Framework

Our theoretical framework of formation of inflation expectations based on (Mankiw & Reis, 2002) rational inattention & (Meyer & Sheng, 2024) where firms pay more attention to idiosyncratic condition than aggregate inflation. This phenomenon supported by that firms' unit cost expectations are more closely related to their own pricing decisions than aggregate inflation expectations. Findings by Meyer & Sheng show that firms do not continuously revise their inflation expectations which aligns with rational inattention theory. However, firms revise expectations during economic shocks which reflects selective attention where firms respond more aggressively to uncertainty and volatility but remain less attentive in normal times. Their findings also show that firms in construction, manufacturing, mining, and finance inflation expectations become more dispersed during shocks, leading them to anticipate higher inflation as a precautionary response. Our model is based on the framework where household expectations are influenced by aggregate unit labour cost while using Construction Cost Index and inflation expectations data as dependent variables, we will use this approach to find the impact of aggregated unit labour cost on household expectations.

Based on Mankiw & Reis (2002), agents do not continuously update their information due to cost associated with acquiring and processing information. Price do not adjust immediately to latest information because agents update their information infrequently and adjust their inflation expectations periodically. Changes in the CCI serve as signals of potential future price changes but these signals may not be immediately processed due to the cost of acquiring information. In our model, CCI represents construction-related input prices. According to the base model, agents will adjust their expectations when these prices move significantly to capture their attention. When CCI rises sharply, households may notice the change despite rational inattention and revise their inflation expectations upward. Conversely, moderate changes in CCI might go unnoticed, leading to sticky inflation expectations.

The model we have incorporated is the NKPC where household adjust their expectations after visible changes in independent variable, here, CCI.

$$\pi_t^E = \alpha + \beta . CCI_t + \varepsilon_t$$

where,

π_t^E is the dependent variable and represents inflation that household expect on the available information at time *t*, α is constant term which represents the base level of expectations when CCI is zero. β is the coefficient of CCI at time *t*, which represents sensitivity of expected inflation to change in CCI_t. CCI_t Construction Cost Index at time *t* is independent variable, represents the fluctuation in material and labour cost in the construction industry, which may impact on household inflation expectations.

Chapter 3. Empirical Analysis

To provide evidence on the formation of households' expectations from input costs, we combine data from three sources. To observe the choice set facing households, we analysed 10 years (2015-2024) of quarterly data CCI and CPI for Input costs from CoreLogic, Inflation expectations data from the RBNZ site, Manufacturing, Construction and Trade data from Fred and PPI, CPI for new housing from Stas New Zealand. In this section, we explain the nature of these datasets and provide some institutional background.

3.1 Data Sources

3.1.1 RBNZ

For empirical analysis, we have utilized inflation expectations data from the Reserve Bank of New Zealand (RBNZ). As the central bank of New Zealand, the RBNZ is a highly authoritative source of economic data, and its crucial responsibility is to maintain price stability and manage inflation by implementing monetary policy which underscores the importance and reliability of its data collection process. It employs rigorous methodologies for collecting and analysing inflation expectations data. Surveys are designed to capture a broader and representative sample of economic agents, and the data collection methods adhere to high standards of statistical reliability. Moreover, RBNZ regularly updates and publishes its inflation expectations data, providing transparency regarding data collection methodologies and any changes in survey procedures. This consistency helps to maintain the credibility of the data over time. One of its key functions is to monitor and manage inflation expectations, which play a critical role in influencing actual inflation outcomes.

The RBNZ collects inflation expectations data through several methods. Survey of Expectations is conducted quarterly and gather inflation expectations from the range of economic agents including professional forecasters, firms, and households. The Quarterly Survey of Business opinion includes questions on inflation expectations among other economic indicators. The Expectations Survey specifically targets the expectations of businesses and professional forecasters regarding future inflation rates.

We have used the data collected from the Survey of Expectations specifically of household data which covers the time-period from 1995 to 2024. The dataset provides a comprehensive view of inflation expectations over various time horizons, including 1-year, 2-year, and 5-year ahead forecasts. Each time horizon offers distinct insights into how economic agents perceive future inflation and their confidence in monetary policy.

3.1.2 CoreLogic

We also employed data on input costs from the CoreLogic. The Construction Cost Index (CCI) shows aggregate costs across a range of inputs used in the construction industry. The dataset covers the period from 2015 to 2024, The CCI serves as a proxy for the understanding of how inflation expectations in material and labour costs may shape inflation expectations in the construction sector, thus updating the wider economic analysis in this study. The Construction Cost Index (CCI), provided by CoreLogic, offers a comprehensive measure of construction-related costs. CoreLogic collects data on input costs from a wide range of suppliers, contractors, and industry sources. This includes pricing information on critical inputs such as timber, concrete, and steel, as well as labour wages in the construction sector. The CCI is updated on a regular basis, ensuring that it reflects current market conditions. By focusing on the regional construction market, the CCI provides a precise measure of input costs, which are crucial for understanding their role in shaping inflation expectations within the construction industry. The choice of period from 2015-2024 is constrained by the data availability, however this period time-period is marked by high uncertainty and fluctuation in input costs leading to soaring prices of ultimate product, housing.

3.1.3 FRED

For our dissertation, to compute the relationship of inflation expectations with other sectors, we collected data from the Federal Reserve Economic data (FRED) database and sourced New Zealand unit labour costs for the construction, manufacturing, and trade sectors for the period 1995 to 2011. While my primary research question focuses on the period from 2015-2024, I incorporate historical data (1995-2011) from other industries to strengthen the robustness of my findings. The choice of this period is constrained by data availability, as FRED no longer collect sectoral unit labour cost data beyond 2011. However, analysing historical pattern allows for a broader understanding of sector price dynamics and their influence on inflation expectations. The Reserve Bank of St. Louis manages FRED which is a highly credible and widely used source that provide access to reliable economic indicators across various domains. Its data is drawn from various trusted national and international agencies, which ensure accuracy and rigor through regular updates and transparent methodologies.

3.1.4 Stats NZ

We collected data on the Producer Price Index (PPI) & Consumer Price Index (CPI) for new housing in the construction sector from Stats NZ, which is a highly credible and robust source. Stats NZ is the official government agency for data collection, ensuring rigorous standards for accuracy and consistency. The data spans from 2015 to 2024, capturing a decade of quarterly trend. For the PPI, Stats NZ gathers data directly from construction industry firms, capturing prices at various stages of production, that reflect changes in input costs like raw materials and labour. The PPI measures price fluctuations from the perspective of producers, providing insights into cost pressures that passed on to consumers. The CPI for new housing is based on data from property transactions, building permits and surveys that captures costs associated with residential construction from the consumer's perspective. The CPI for new housing includes factors such as labour, materials and additional fee incurred in residential construction reflection end consumer prices.

Table 1 Descriptive statistics of expected inflation 1 year ahead, construction cost index, manufacturing, construction, and trade.

Quarterly	**Time period**	**Mean**	**Standard deviation**	**Min**	**Max**
Expectations 1 year Ahead	2015-2024	3.91	1.687	2.1	7.5
CCI (Input Costs)	2015-2024	133.5278	17.47	109.1	162.2
Manufacturing (Unit Labour Costs)	1995-2011	2.75e+09	3.96e+08	2.14e+09	3.45+09
Construction (Unit Labour Costs)	1995-2011	1.71e+09	3.02e+08	1.18e+09	2.25+09
Trade	1995-2011	0.3038	0.99	-2.155052	2.224952

(Unit Labour Costs)					

Source: RBNZ, CoreLogic & FRED

Notes: Expectations 1-year ahead data cover the time-period from Q1 1995 to Q3 2024. CCI data covers the time-period from Q1 2015 to Q3 2024, while manufacturing, construction and trade input costs data covers time-period Q 1995 to Q 2011. CCI is percentage change of unit labour cost of new housing, however, the manufacturing, Construction and Trade Unit labour costs are in the absolute values.

3.2 Descriptive Statistics

Table 1 shows the descriptive statistics of the data which include mean inflation expectations, Construction Cost Index, Manufacturing, Construction, and trade unit labour costs. The average inflation expectations one year ahead from 2015 to 2024 are 3.91% with a standard deviation of 1.69%, ranging from 2.1% 7.5%. Over the same period, Construction Cost Index (CCI) averaged 133.53, with a standard deviation of 17.47, value ranging between 109.1 and 162.2. For the Period (1995-2011), the average input prices for the manufacturing industry were 2.75 billion, with a standard deviation of 396 million. The minimum and maximum values were 2.14 billion and 3.45 billion respectively: Construction input prices during this time averaged 1.71 billion. With a standard deviation of 302 million, ranging from 1.18 billion to 2.25 billion. In the trade industry, input prices average 0.3038 with a standard deviation of 0.99, ranging between -2.16 and 2.22.

3.3 Distributions

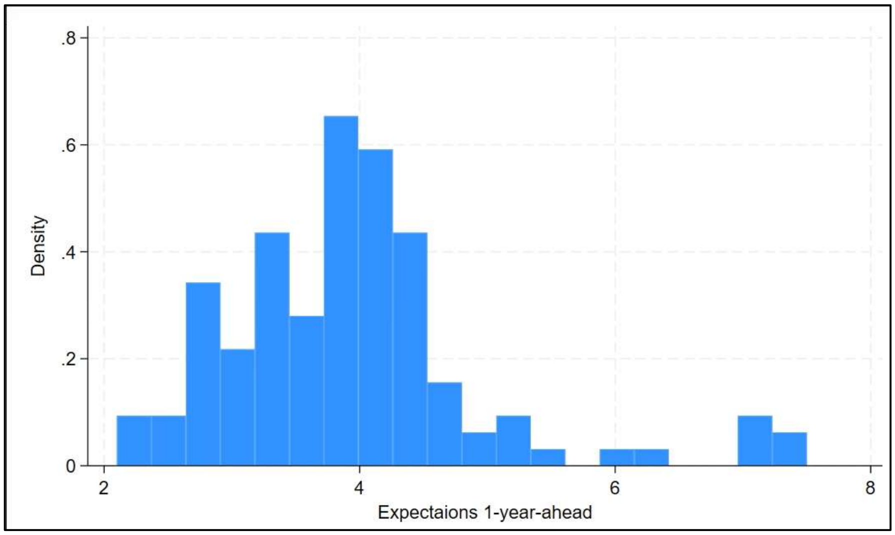


Figure 7 Dispersion in mean expectations over the years (1995-2024)

Source: Reserve Bank of New Zealand (RBNZ)

Notes: This histogram explains the dispersion of inflation expectations from the period 1995 to 2024.

Figure 7 shows the distribution of 1-year-ahead inflation expectation, illustrating how these expectations are influenced by economics shocks, Covid-19 Pandemic. The distribution is right skewed, with most values concentrated between 2% and 3 % indicating that a substantial portion of households expect inflation to remain low due to deflationary pressure after financial crises shock of 2008. From 1995 to 2008, inflation expectation concentrated around 3%, the clustering under normal economic conditions have tendency towards central inflation targets, consistent with findings from (Woodford & Walsh, 2005). However; the onset of the Covid-19 pandemic led to significant economic disruptions, reflected in the broader dispersion of inflation expectation reached up to 8%, this reflects the pattern identified by (Carroll, 2003) when households adjust their expectations upwards during the inflationary shocks.

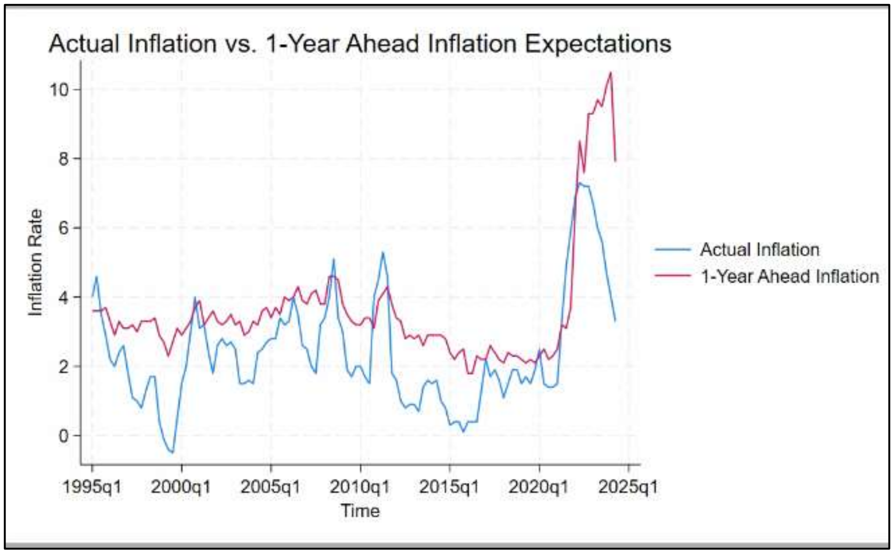


Figure 8 Actual inflation vs 1-Year Ahead Inflation Expectations (1995-2024)

Source: RBNZ

Notes: Actual inflation is measure by the RBNZ through the Consumer Price Index (CPI), while inflation expectations of households are gathered through surveys. These surveys, conducted quarterly, measure household inflation expectations.

Figure 8 compares actual inflation with 1-year-ahead expectations from 1995 to 2025. From 1995 to 2010, actual inflation shows significant volatility, while inflation expectations remain more stable and often lag actual inflation. In the 2010s, the two series become more closely aligned, indicating better forecasting accuracy during this period. In 2020, there is a sharp divergence as actual inflation spikes dramatically due to the pandemic and economic disruptions, peaking around 10 % by 2022. Inflation expectations rise more slowly, eventually catching up but never reaching the same peak as actual inflation. By 2023, both actual inflation and expectations begin to decline, with inflation cooling faster than the public's expectations, projected to fall below 5% by 2025. This trend indicates that agents always expect higher inflation than the actual one (Baker et al., 2016; Blanchard & Simon, 2001; Carroll, 2003; Meyer et al., 2022; REIS, 2002).

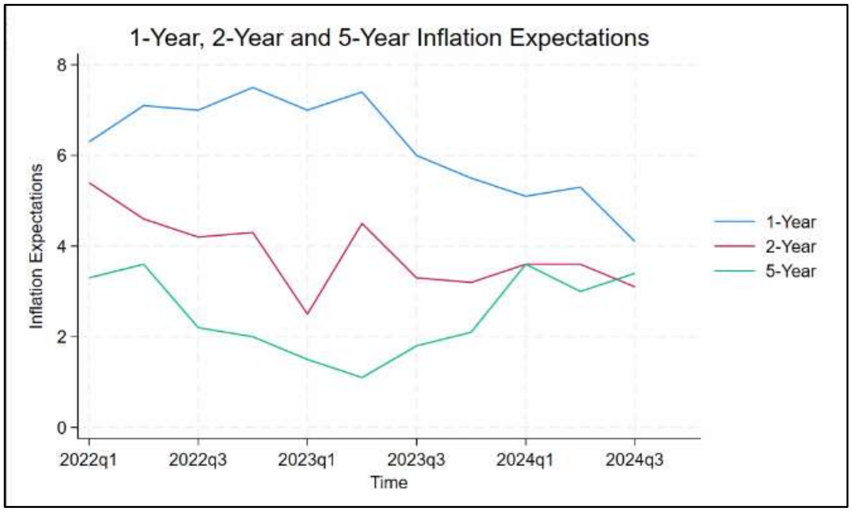


Figure 9 Inflation expectations in short run and long run horizons (2022-2024)

Source: RBNZ

Notes: 1-year, 2-year and 5-year inflation expectations

Figure 9 illustrates the trend of inflation expectations over 1-year, 2-year, and 5-year from 2022 to 2024. Short term expectations (1-year and 2-year are higher and more volatile, reflecting concerns about inflationary pressure in the short term. In contrast, long term expectations (5-year) show gradual decline, indicating that forecasters expect inflation to stabilize over time. Household's short run expectations are heavily influenced by new coverage and recent inflation rates, and they tend to adjust their short-run expectations more frequently based on perceived inflation (Carroll, 2003)

3.4 Regression Analysis

We run the following regression model for each independent variable.

$$\pi_t^E = \alpha + \beta . CCI_t + \varepsilon_t$$

Table 2 Baseline regression of inflation expectations

	(1) Expectations	**(2) Actual**
β	0.081	0.122
Standard error	0.009	0.009
P-value	0.000***	0.000***
R-squared	0.71	0.82
α	-6.604	-13.62
Observations	36	36

Source: RBNZ & CoreLogic

Notes: These regression results cover the period from Q3 2015 to Q2 2024. Time series correlation between quarterly inflation expectation and Construction Cost Index & Actual inflation and Construction Cost Index.

Table 2, regression 1, shows the correlation results of inflation expectations and the construction cost index (CCI) regression 2 shows the correlation between actual inflation and CCI. From the perspective of individual households, inflation expectations in the New Keynesian framework are based on construction cost index. Inflation expectations are highly correlated with CCI and co-move with pricing decisions. The positive and significant coefficient 0.081 ($P < 0.001$) indicates that as construction costs increase, household inflation expectations also rise. This relationship shows that households are sensitive to input costs in construction sectors, relative to housing, which is significant expenditure for most households. Households incorporate observable price increases, including those in housing, into their inflation expectations (Coibion, Gorodnichenko, & Weber, 2021). Actual inflation also highly correlated with CCI, positive and significant coefficient 0.122 ($p<0.001$). These findings are reinforced by (Afrouzi et al., 2024; Ball & Mankiw, 1995) who emphasized the sectoral shocks in high-cost industries play a significant role in driving inflationary pressure across the economy.

Our results show that household inflation expectations are positively correlated with construction costs align with (Carroll, 2003) who highlights that inflation expectations are extremely sensitive to price signals from goods closely tied to household expenditure. Construction costs are a particularly salient part of household spending, and the rise in the CCI during the post-COVID period could serve as a clear signal for households to adjust their expectations upwards. Inflation expectations are also influenced by supply-side shocks, such as rising prices in construction, which tend to be highly visible to consumers (Clarida et al., 1999; Gürkaynak et al., 2006). In this case, households are likely to treat CCI as a forward-looking indicator, adjusting their inflation expectations accordingly. The positive relationship is also consistent with (Coibion, Gorodnichenko, & Kamdar, 2018), who suggest that inflation environment enhance household attention to specific input prices, leading to a more active adjustment of expectations.

Table 3 Time series correlation between quarterly inflation expectation and pre-COVID and post-COVID sample.

	(1) Pre-Covid	**(2) Post-Covid**
Dum	-0.018	0.016
Standard error	0.003	0.003
P-value	0.000***	0.000***
R-squared	0.42	0.51
α	4.99	2.73

Notes: These regression results cover the period from Q3 2015 to Q2 2024. Pre-Covid sample covers time-period Q3 2015 to Q1 2020 and post-Covid sample covers time-period Q2 2020 to Q2 2024.

Table 3 shows that in the pre-COVID time-period, the Dum coefficient -0.018 (P <0.001) is statistically significant result; however, the relations do not show a positive correlation between Inflation expectations and CCI. During periods of low inflation, households pay less attention to price stability (D'Acunto et al., 2019). Pre-COVID results align with rational inattention theory (Carroll, 2003; Mankiw et al., 2003; Meyer & Sheng, 2024; Meyer et al., 2022). In the post-COVID time-period, the Dum coefficient is significant and positive at 0.016 ($P < 0.001$), co-moving with rising prices, which reflects that once inflationary pressure became more widespread and significant across consumer markets, households' inflation expectations became much more closely aligned with the Construction Cost Index (CCI). This stronger correlation explains that during periods of rising inflation, households become more aware and responsive and pay closer attention to price signals, particularly in the key sector, construction. This mirrors finding by (Coibion, Gorodnichenko, & Kamdar, 2018) who noted a disconnect between firms cost expectations and aggregate inflation expectations during periods of low inflation, reinforcing the idea that people are less attentive to inflation in more stable times.

The negative correlation between CCI and inflation expectations prior to the pandemic is particularly intriguing. It resonates with (Mankiw et al., 2003; Sims, 2003) rational inattention theory, which suggests that households, during periods of price stability, are less likely to adjust their expectations based on small fluctuations in input costs. (Malmendier & Nagel, 2016) add to this, arguing that households are more likely to ignore inflation signals when they perceive the economy to be stable, explaining the weak connection between CCI and inflation expectations in low-inflation periods.

Table 4 shows the correlation between inflation expectations and unit labour costs of manufacturing, construction, and trade sectors. Manufacturing (1995-2011) sector has significant and positive coefficient 1.38 ($P<0.001$). This indicates that households' inflation expectations and manufacturing price move in tandem, reinforcing the notion that consumers closely monitor manufacturing costs as a key indicator of future inflation. The stronger correlation suggests that fluctuation in manufacturing prices is directly reflected in households' perceptions of inflation, aligning with the findings that inflation expectations are heavily influenced by input costs from the manufacturing sector. This finding is consistent with the critical role of manufacturing prices in shaping household inflation expectations (Meyer et al., 2022).

Similarly, the coefficient of 0.867 ($P<0.001$) from the construction sector shows a positive correlation. This relation further supports the idea that households' inflation expectations are significantly influenced by construction costs. Given that housing and infrastructure are major components of household expenditure, changes in construction costs can directly influence households' assessments of future inflation. The findings from this sector align with the earlier analysis of the construction costs (CCI) directly influence households' assessment of future inflation which demonstrated that rising construction costs lead to heightened inflation expectations among households. This reinforces the concept that households use input costs in the construction industry as a crucial signal when forming their inflation outlook (Carroll, 2003).

Table 4 Regressions with other input costs.

	(1) Construction	**(2) Manufacturing**	**(3) Trade**
β	0.867	1.37	0.18
Standard error	0.25	0.29	0.045
P-value	0.001***	0.000***	0.000***
R-squared	0.15	0.25	0.20
α	-14.34	-25.71	4.011
Observations	66	66	66
Time-Period	Q1 1995- Q2 2011	Q1 1995- Q2 2011	Q1 1995- Q2 2011

Source: RBNZ & FRED

Notes: The sample data starts from March 1995 to June 2011. Regression (1) is the correlation between inflation expectations and Construction (Unit labour costs), Regression (2) shows the correlation inflation expectations between Manufacturing (Unit labour costs) and Regression (3) shows the correlation between inflation expectations and Trade (Unit labour costs)

The trade sector also reflects a positive correlation, though the trade coefficient 0.18 ($P<0.001$) is lower than other coefficients for construction and manufacturing. While this suggests a less pronounced influence compared to manufacturing and construction, it still indicates that households consider trade-related costs in their inflation expectations. Trade prices, which affect the availability and pricing of goods, play a role in shaping consumer perception of inflation, albeit to a lesser extent than the other sectors. This finding supports the belief that a comprehensive view of input costs across various sectors contributes to households' overall inflation expectations.

The positive correlation between unit labour costs and inflation expectations, especially in the manufacturing and construction sectors, is consistent with the literature on cost-push inflation. (Ball et al., 2005) emphasize that rising labour costs, especially in key sectors, contribute directly to inflationary pressure, which in turn influence household inflation expectations. When labour costs increase, firms often pass these costs on to consumers, heightening household awareness of rising prices and prompting upward revisions in their inflation expectations.

In relation to the wage-price spiral, our findings suggest that households interpret rising labour costs as a sign of future inflation (Blanchflower & Oswald, 2005). The strong correlation in the construction sector highlights the sector's role in household spendings, particularly in housing a key cost area for many households. Rudd (2022) also supports this finding that sectors with significant cost pressures, such as construction, play a crucial role in shaping consumer expectations of inflation due to the immediate and visible impact on household budgets.

Moreover, Kiley (2007) argues that households use information about wages and labour costs to form their inflation expectations, particularly when wages are seen as a proxy for broader inflationary trends. The link established between labour costs and expectations in the manufacturing sector support this, suggesting that households track labour market dynamics to anticipate future price movements.

Table 5 explains the correlation between the producer price index (PPI) and Consumer Price Index (CPI), which measure the aggregated prices of construction industry from producer and consumer perspective. The strong positive relationship between PPI with coefficient 0.010 ($P<0.001$) with higher explanatory value of R-squared (0.80) rationalizes that rising production costs in the construction industry are a key driver of inflation expectations. As producers face higher input costs, they pass these costs onto consumers through higher prices for construction-related goods and services, influencing households to expect higher inflation in the future. The CPI (input costs) coefficient of 0.14 ($P<0.001$) and reflects the consumer's perspective on rising input costs in the construction industry. The significant and positive correlation with higher explanatory power of r-squared (0.73) indicates that households are sensitive to increases in prices of construction- related goods, which directly influences their inflation expectations. The CPI for new housing with coefficient 0.0068 (P<0.001) and R-squared value of (0.80) reflects while rising costs do affect inflation expectations, the impact is low due to small coefficient of CPI (new housing). Expectations co-move with CPI but the impact is smaller compared to general input costs. This is because housing price changes, though significant for households, are perceived as part on broader economic factors influencing inflation, rather than as direct, immediate cost pressure.

Table 5 Robustness

	(1) PPI	(2) CPI (Input cost)	(3) CPI (New housing)
β	0.01	0.14	0.0068
Standard error	0.001	0.73	0.007
P-value	0.000***	0.000***	0.000***
R-squared	0.803	0.73	0.80
α	-8.5	-12.23	-4.06
Observations	37	36	39
Time-Period	Q1 1995- Q2 2011	Q1 1995- Q2 2011	Q1 1995- Q2 2011

Source: Stats NZ, CoreLogic

Notes: Regression (1) is the correlation between Inflation Expectations and PPI, Regression (2) is the correlation between Inflation Expectations and CPI (Input Cost) and Regression (3) is the correlation between Inflation Expectations and CPI (Purchasing of New House).

Our findings on the relationship between PPI and household inflation expectations reveal that households interpret rising producer prices as early signals of future inflation, which is consistent with (Blanchard & Simon, 2001), who argue that producer prices act as leading indicators of consumer prices. The strong correlation between PPI and the construction industry and household inflation expectations aligns with this theory, suggesting that households view rising input costs in construction as a precursor to overall price increases in the broader economy. These findings are reinforced by (Bernanke et al., 1997),who highlight that producer prices are often passed on to consumers during inflationary periods. This pass-through effect, particularly in sectors where cost increase is more directly felt by consumers, such as construction, supports the observed connection between PPI and household expectations in our analysis.

Our analysis of CPI input costs in the construction sector reveals a significant positive correlation with household inflation expectations, confirming that households are highly responsive to changes in the prices of goods and services related to construction. Rising prices of input goods are closely tied to inflation expectations, particularly in sectors that form a substantial part of household spending (Hamilton, 1996). The construction sector, with its major contribution to household expenses, acts as a direct channel through which households perceive inflation. As construction costs rise, households anticipate broader inflationary pressures.

The lower coefficient for CPI on new housing prices reflects findings from (Case & Shiller, 1988), who argue that housing prices, while significant to households spending, are influenced by a broader range of macroeconomic factors, such as interest rates and credit availability. These factors moderate the direct relationship between housing prices and inflation expectations. The weaker relationship is considered as rather than viewing rising housing costs solely as the result of inflation, households may consider these broader economic influences. The weaker correlation suggests that instead of observing rising housing costs purely because of inflation, households perceive them as being influenced by broader economic factors.

Chapter 4. Results

4.1 Discussion

Our analysis of inflation expectations in response to the Covid-19 pandemic aligns with (Wiederholt & Vellekoop, 2017), who document the heightened sensitivity of households to inflation during periods of economic uncertainty. The broader dispersion of inflation expectations during the pandemic that our observation which is consistent with (Carroll, 2003), who shows that households react to economic shocks by revising their expectations upward, reflecting greater uncertainty about future inflation.(Guerrieri et al., 2022) also argue that economic shocks like the Covid-19 pandemic can amplify inflation expectations due to increased volatility in supply chains and input costs, which are quickly noticed by consumers. The sharp rise in inflation expectations during the pandemic reflects the broader economic disruption, consistent with the findings of (Coibion et al., 2020), who emphasize that external shocks lead households to adjust their inflation expectations more aggressively than during normal periods.

Our findings in the short-term horizon, expectations are influenced by recent inflation trends and media coverage, leading to greater volatility, aligning with (Mankiw et al., 2003). Households are more reactive to immediate price pressures, explaining the higher short-term correlation between expectations and CCI, manufacturing, construction, and trade. Coibion, Gorodnichenko, & Kamdar (2018) argue that long-term expectations tend to be more stable, reflecting households' belief that inflation will revert to target over time.

Our sectoral analysis of inflation expectations and input costs is consistent with (Boivin et al., 2009), who highlighted the varying impact of inflationary pressure across different sectors. The high correlation between inflation expectations and construction, manufacturing sectors reflects the direct impact of these costs on households' budget, especially in housing and durable goods. By contrast, the lower coefficient of trade shows correlation in the trade sector aligns with (Gopinath et al., 2011) that trade-related costs are less salient to households, possibly because they are more diffuse and less tied to major expenditure like housing and labour costs.

4.2 Implications

The positive correlation between construction costs and household inflation expectations suggests that sector-specific inflationary pressures have a broad influence on household behaviour. Policymakers could implement more targeted inflation control measures in sectors like construction, where price changes are highly visible to households and play a key role in shaping inflation expectations. Household inflation expectations are heavily influenced by visible price signals from key sectors (Gürkaynak et al., 2006), such as construction. Government interventions that address input cost increases in sectors like construction could help manage broader inflation expectations more effectively. Sector-specific policies like subsidies for raw-materials or incentives for technological advancement that improve productivity could manage inflationary pressures. This aligns with the findings of (Ball et al., 2005), who emphasize that managing input cost inflation, particularly in labour-intensive sectors, can mitigate inflationary pressures on the broader economy. Reducing input costs in these sectors could, in turn, help stabilize inflation expectations.

Given the strong influence of inflation expectations on actual inflation outcomes, central banks should focus on clear communication strategies that address the factors driving household inflation expectations. Our finding, which show that input costs (CCI) and producer price index (PPI) are linked to inflation expectations, align with (Blinder, 1999) who emphasize the need for central banks to clearly communicate their strategies to stabilize expectations and stress the importance of transparency in addressing inflation drivers to prevent anchoring (Coibion & Gorodnichenko, 2015). Central bank communication plays a critical role in anchoring inflation expectations during volatile periods (Woodford, 2006). The Covid- 19 pandemic highlighted the vulnerability of supply chains, which contributed to increased construction costs and, subsequently, inflation expectations. For policy makers, supply-side intervention is important in stabilizing prices and preventing inflationary shocks (Guerrieri et al., 2022). Our research shows that rising input costs during supply-side disruptions, such as those seen in the construction industry, are linked to household inflation expectations. Policymakers should focus on supply chain resilience measures to reduce the likelihood of future supply-side shocks that could lead to inflationary expectations.

Our findings show a strong correlation between unit labour costs, particularly in manufacturing and construction, and inflation expectations, which is consistent with the concept of wage-price spiral. Policymakers should be aware of the potential for rising labour costs to contribute to inflationary expectations. (Blanchflower & Oswald, 2005) highlighted the importance of preventing wage-price spirals, where rising wages lead to soaring prices, which in turn lead to further wage increases. Wage moderation policies, such as productivity-linked wage agreement or fiscal policies that support real wage growth without driving inflation, could help mitigate the inflationary impact of rising labour costs. Policymakers should recognize that households are less likely to adjust their inflation expectations when the economy is stable, and inflation is low due to rational inattention (Mankiw & Reis, 2002). In such periods, policy communication should focus on anchoring inflation expectations and ensuring that households do not overreact to short-term price fluctuations. Central banks can help in managing household inflation expectations by consistent and transparent communication.

Overall, our research contributes to a growing body of literature that highlights the importance of inflation expectations in shaping actual inflation outcomes.

4.3 Limitations

While our research offers valuable insights into the relationship between household inflation expectations and sector-specific input costs, several limitations must be acknowledged, particularly due to the short-run nature of the data. These limitations may affect the generalizability and robustness of the findings.

One of the primary limitations of our analysis is the short-run nature of the data. Our dataset covers a brief period (2015-2024), and as a result, it may not fully capture long-term inflationary trends. Inflation expectations are influenced by both short-term shocks and long-term economic changes, and a longer dataset could provide a more comprehensive view of how inflation expectations evolve over time. According to (Coibion, Gorodnichenko, Kumar, et al., 2021), inflation expectations tend to fluctuate over the economic cycle, with significant differences during periods of economic expansion, contraction, or external shocks. The sharp increase in construction costs during the pandemic may be partly attributed to supply disruptions and labour shortages, which may not persist eventually (Guerrieri et al., 2022). Our findings may just reflect temporary economic conditions rather than structural trends. Our short-term data, therefore, hinder the ability to observe how these cyclical factors develop eventually.

This research focuses on the construction, manufacturing, and trade sectors, but this narrow sectoral focus limits the generalizability of the findings. Inflation expectations are shaped by a broad range of economic activities and excluding key sectors such as energy, healthcare, the services sector, and transportation may result in an incomplete picture. For instance, energy prices, which can experience significant volatility, play a crucial role in shaping both households' budget and inflation expectations (Blanchard & Simon, 2001). By focusing primarily on construction, manufacturing and trade, our analysis missed critical drivers of inflation expectations that are prevalent in other sectors. Including a wider range of sectors in future research could lead to a more holistic understanding of the factors that influence household inflation expectations.

A key limitation of the research is the reliance on aggregate data, which obscure important variations in inflation expectations across different household groups. Inflation expectations vary significantly depending on household characteristics such as income, education level, age, and geographical location (D'Acunto et al., 2015). Aggregate data do not capture these variations and might lead to oversimplification of how different households react to inflationary pressures.

Chapter 5. Conclusion

This research builds upon the foundational work of (Meyer et al., 2022) “unit labour cost expectations and uncertainty from a firm perspective,” which primarily focuses on firms, our research extends the lens to household. Our research demonstrates the similar dynamics in the context of household inflation expectations. The results suggest that inflation expectations are not formed in insolation but are heavily influenced by the broader economic environment, specifically the price signals that households receive from key sectors of the economy.

One of the central findings of this study is the households’ expectations comove with construction costs, as measured by the Construction Cost Index (CCI), and household inflation expectations, particularly during periods of economic disruption, such as the post-Covid era. This aligns with the broad literature, particularly (Carroll, 2003), who posits that inflation expectations are extremely sensitive to price signals in goods and services that closely tied to household expenditures. Construction costs represent a significant part of household spending, especially in the housing sector, and therefore serve as a salient indicator for households when adjusting their inflation expectations. The post-pandemic period provides a unique context in which supply-side shocks, labour shortage, and disruptions in the construction industry have led to noticeable price increases. These prices changes are particularly visible to consumers, which helps explain the positive relationship between CCI and inflation expectations. Households, observing the sharp rise in construction costs, perceive this as a forward-looking indicator of broader inflationary pressures, adjusting their expectations accordingly. This is consistent with findings by (Coibion, Gorodnichenko, & Kamdar, 2018), who argue that during periods of heightened inflation, households tend to become more attentive to specific input prices, such as those in construction, leading to more active adjustment in their inflation expectations.

However, an intriguing aspect of the findings is the negative association between CCI and inflation expectations during the pre-pandemic period. This result aligns with the rational inattention theory, proposed by (Mankiw et al., 2003; Sims, 2003), which suggests that households, during times of price stability, are less likely to pay close attention to small fluctuations in input costs. During these periods, inflation expectations remain anchored, and household are less inclined to adjust their views based on sector-specific price signals. This behaviour reflects a broader economic sentiment of stability, where households perceive little need to react to minor changes in construction costs.

The role of unit labour costs, particularly in manufacturing, construction, and trade sectors, is another critical element of this analysis. The positive correlation between rising unit labour costs and inflation expectations supports the literature on cost-push inflation, where increases in costs drive up production costs, which are then passed on to customers. This dynamic emphasized by (Ball et al., 2005) highlights how households interpret raising labour costs as an indicator of future inflation in the sectors like construction, where labour costs constitute a sizeable portion of overall expenses. The connection between wage growth and inflation expectations in particularly strong. This study also underscores the potential for a wage-price spiral in certain sectors, especially construction. As labour costs rise, firms pass these costs onto consumers in the form of higher prices, prompting households to revise their inflation expectations upwards. This feedback loop, (Blanchflower & Oswald, 2005), can further contribute to inflationary pressures, with households responding to the perception of higher future prices by adjusting their expectations. The construction sectors' role in household budgets, particularly in relation to housing costs, makes it a key area where these dynamics play out most visibly.

In addition to unit labour costs, our research finds a strong correlation between the Producer Price Index (PPI) and household inflation expectations. Rising producer prices, particularly in the construction sector, act as leading indicator for consumer prices, as households perceive increase in input costs as precursors to overall price inflation. This is consistent with the findings of (Blanchard & Simon, 2001), who emphasize the pass-through effect from producer prices to consumer prices, particularly during period inf inflationary pressure. The construction sector, given its impact on household spending, serve as a primary channel through which these price signals are transmitted to households. Furthermore, the study highlights the role of the Consumer Price Index (CPI) in shaping household inflation expectations, particularly in relation to input costs in the construction sector. The strong positive correlation between CPI and inflation expectations reflects households' responsiveness to changes in the prices of goods and services that directly affect their budgets, Construction costs, which form a substantial part of household expenditure, act a clear signal of inflation pressures, prompting households to adjust their expectations accordingly.

Our results also provide valuable insights into the impact of shocks, such as the Covid-19 pandemic here, on household inflation expectations. During the pandemic, inflation expectations became more dispersed, reflecting higher economic uncertainty and the increased visibility due to supply-side disruption, particularly in the construction industry. These findings align with (Carroll, 2003; Guerrieri et al., 2022) that households respond to economic shocks by revising their inflation expectations upwardly, reflecting greater uncertainty about future price movements. The strong correlation between inflation expectations and input costs in construction and manufacturing sector highlights the direct impact of these costs on household's budget, particularly in relation to housing and durable goods. On the other side, the small coefficient of trade sector suggests that households are less focused on diffuse costs that are not directly tied to their major expenditure. This finding aligns with (Gopinath et al., 2011) that trade related costs are less visible to households compared to costs in sectors like construction and manufacturing.

The implications of this research are clear. Policymakers need to recognize the importance of sector-specific input costs, particularly in construction and manufacturing, in shaping household inflation expectations. Targeted interventions, such as subsidies for raw materials or incentive for technological advancement in construction, could help alleviate inflationary pressure. Additionally, central bank communication plays a crucial role in managing inflation expectations. Clear, transparent communication that addresses the factors driving inflation, such as input costs and labour market by dynamics, can help anchor household expectations and prevent overreactions to short-term price changes. Despite the valuable insights provided by this research, several limitations must be acknowledged. The short-run nature of the dataset just 36 observations limit the ability to capture long-term inflationary trends. Inflation expectations evolve over time and are influenced by both short-term shocks and long-term structural changes in the economy. A longer dataset would provide a more comprehensive view of how inflation expectations respond to various economic cycles, including periods of expansion and contraction.

Moreover, the narrow focus on the construction, manufacturing and trade sectors limits the generalizability of the findings, while these sectors are critical to understanding inflation dynamics, other key areas, such as energy, healthcare, and transportation, also play a significant role in shaping household inflation expectations. Further research should consider incorporating a broader range of sectors to provide a more holistic understanding of the factors influencing inflation expectations. In conclusion this research contributes to the growing body of literature on inflation expectations by highlighting the importance of sector-specific input costs in shaping household view on future inflation.

Chapter 6. References

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Appendix

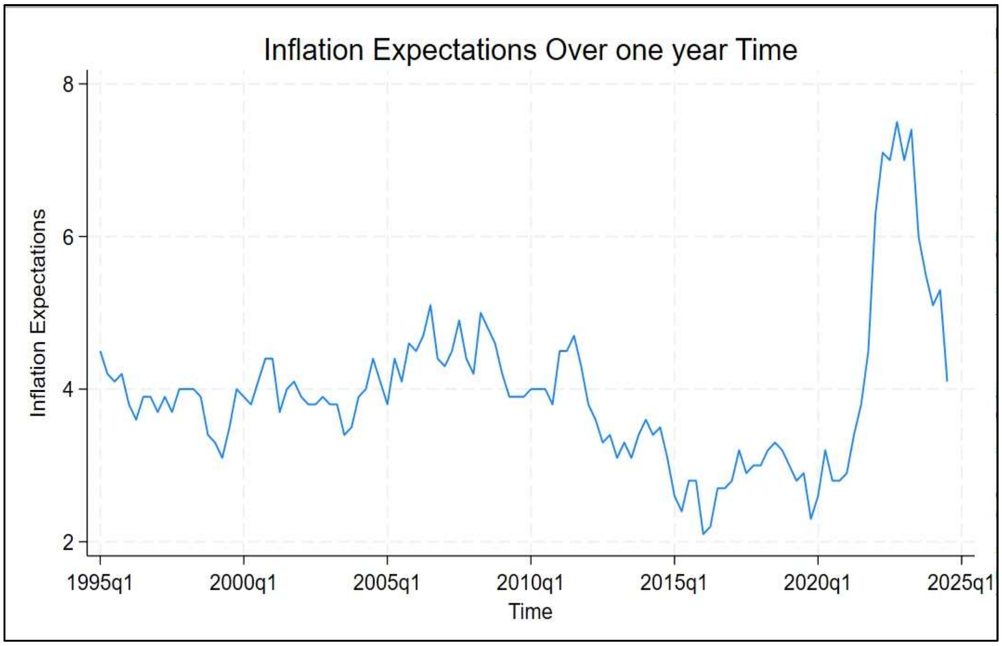

Figure A. Inflation expectation 1-year-ahead (1995-2024)

Source: RBNZ

Notes: The graph of inflation expectations from 1995 to 2024.

Figure A line graph of inflation expectations from the time period 1995 to 2024, households inflation expectations are stable with little fluctuation from 3% to 5% from 1995 to 2008, there is noticeable drop in inflation expectations falling from 5 % to 3% due to financial crises by the early 2010, which reflects the aftermath financial crises when inflation expectations likely dropped due to the global economic slowdown and deflationary pressure (Trehan & Zorrilla, 2012).Between 2010 to 2020, inflation expectations remail relatively low but slow, fluctuating around 3 to 4%. This indicates that households did not expect significant inflation during the low inflation time (Carroll, 2003). There is a sharp decline in expectations to cool off after the sharp rise in the early 2022.