Title
How Do Firms Form Their Expectations? New Survey Evidence

Journal
American Economic Review, 108(9)

ISSN
0002-8282

Authors
Coibion, Olivier
Gorodnichenko, Yuriy
Kumar, Saten

Publication Date
2018-09-01

DOI
10.1257/aer.20151299

Peer reviewed

HOW DO FIRMS FORM THEIR EXPECTATIONS?

NEW SURVEY EVIDENCE

Olivier Coibion
UT Austin
and NBER

Yuriy Gorodnichenko
UC Berkeley
and NBER

Saten Kumar
Auckland University of
Technology

First Draft: May 21st, 2014
This Draft: June 9th, 2017

Abstract: We implement a new survey of firms' macroeconomic beliefs in New Zealand and document a number of novel stylized facts from this survey. Despite nearly twenty-five years under an inflation targeting regime, there is widespread dispersion in firms' beliefs about both past and future macroeconomic conditions, especially inflation, with average beliefs about recent and past inflation being much higher than those of professional forecasters. Much of the dispersion in beliefs can be explained by firms' incentives to collect and process information. Using experimental methods, we find that firms update their beliefs in a Bayesian manner when presented with new information about the economy and that changes in their beliefs affect their decisions ex-post. But few firms seem to think that inflation is most important to their business decisions and therefore they tend to devote few resources to collecting and processing information about inflation.

JEL: E2, E3
Keywords: expectations, survey, rational inattention

We are grateful to Graham Howard and Katrina Young for sharing data from the survey of households in New Zealand and seminar participants at UCLA, Bank of Canada, Bank of France, Cleveland Fed, Princeton, ECB, NBU, KSE, FRB, Booth, Bundesbank, Berkeley, Goethe U., AEA conference, CESifo conference, SED conference, WEA conference, and SEA conference for comments. We are also grateful to our discussants: Brent Meyer (November 2014 Southern Economics Conference), Fernanda Nechio (July 2014 Western Economics Conference) and Justin Wolfers (January 2015 AEA Conference). We thank Doreen Chandra, Intaaz Joseph, Pengfei Jia, Aditya Raj, Anand Kumar, Peter Whitehead, Andrew Gould, Tom Markus, Jerry Koong, Todd Bloomfield, Kamakshi Singh, Adev Raj, Wein Chaddah and Matt Hunt for outstanding research assistance. Kumar thanks the AUT Business School for financial support. Gorodnichenko thanks the NSF and Sloan Foundation for financial support.

1 Introduction

Central banks like the U.S. Federal Reserve or the European Central Bank target inflation and employment rates, both of which depend on firm-level decisions. Because of their dynamic nature, the employment and pricing choices made by firms depend directly upon their expectations of future economic conditions. Measuring and understanding these expectations is therefore fundamental to the effective use of monetary policy. And yet, information on firms' beliefs is scant.[1] Economists have access to detailed surveys of consumers' expectations, along with those of professional forecasters, financial market participants, and even FOMC members. But comparable quantitative surveys of firms' beliefs are inexplicably lacking. As Bernanke (2007) observed, "Information on the price expectations of businesses who are, after all, the price setters in the first instance ... is particularly scarce."

In this paper, we take a first step toward filling this gap by reporting results from a new large quantitative survey of firms in New Zealand. This survey provides detailed information about general managers' economic beliefs, including not just their expectations of future macroeconomic conditions but also their beliefs over recent economic dynamics. This allows us to characterize how closely firms pay attention to recent macroeconomic developments and whether inattention to recent economic conditions is reflected in firms' expectations of the future, as posited by models of information rigidities (e.g. Mankiw and Reis 2002, Sims 2003, Woodford 2002). We also study the determinants of firms' macroeconomic forecasts and backcasts, using a rich set of quantitative firm-level controls from the survey.

This survey of firms is unique in several ways. First is its quantitative nature. While some surveys of firms' expectations exist (e.g. Conference Board, Ifo), they tend to be primarily qualitative (e.g. "do you expect prices to rise, fall or stay the same in the next twelve months?"), thus making it difficult to extract quantitative measures of expectations (Bachmann and Elstner 2013). In contrast, we extract *quantitative* answers from firms about their beliefs in the same manner as existing surveys of households' or professional forecasters' expectations. In addition, we ask firms to provide probability distributions for their forecasts so that we can examine not only distributions of point forecasts across respondents but also construct firm-level measures of uncertainty about the future path of macroeconomic variables.

Second, the survey covers a wide range of firms. The few quantitative surveys which include some firms (e.g. Livingston survey) consider only very large firms. Because these firms typically employ macroeconomists on staff who are likely to be the respondents of any such survey, the reported forecasts mimic those of professional forecasters. But it is unclear whether these reported forecasts are in any way characteristic of other agents in the firm or are utilized in actual economic decisions made by the firm. In contrast, our survey includes both small and medium-sized firms, with respondents being the general managers of each firm.

Third, we ask firms not only about their expectations of future economic outcomes but also their beliefs about recent economic conditions. Given that macroeconomic data is readily available to firms, this allows us to study how attentive firms are to macroeconomic developments as well as what factors determine how much attention firms devote to tracking macroeconomic conditions. Such potential factors include differences by industry, age, size, number of competitors, access to international markets, or expected duration until subsequent pricing decisions, among many others that we collect in the survey.

[1] We refer to the beliefs of decision-makers within firms as "firms' beliefs" as short-hand, with obvious abuse of terminology.

Fourth, there are multiple waves to the survey. We conducted three follow-up surveys of firms from the first wave, yielding a panel dimension to the survey which contrasts with repeated cross-sections in typical surveys of economic agents and allows us to study the evolution of firms' beliefs about past, current and future economic conditions. We also use follow-up surveys to verify the accuracy of firms' responses. In addition to these four waves, we conducted another two waves using a combination of new firms as well as some firms from the original panel. The combined surveys cover the period 2013Q4 until 2016Q4.

After verifying the high quality of these data, we document a number of new stylized facts about the macroeconomic beliefs held by those agents in charge of running firms. First, managers' average forecasts of inflation have been systematically higher than actual inflation over this period, just like households', and display much more cross-sectional disagreement than among professional forecasters, despite the fact that New Zealand was the first country to implement formal inflation targeting in 1989 and has experienced relatively low inflation since then. While there is similar heterogeneity in the managers' forecasts of other economic variables (such as unemployment or GDP growth), managers' forecasts of aggregate inflation are unique in their asymmetry. This feature is not due to the specific formulation of the questions: results are similar regardless of whether we ask managers about overall prices or CPI inflation or whether we ask for point forecasts or distributions. The asymmetry is absent, however, when we ask managers about prices in their industry, suggesting that aggregate inflation is unique in terms of agents' knowledge and understanding.

Second, we find that there is just as much dispersion in managers' perceptions of recent conditions as there is in their forecasts of future conditions. Furthermore, the two are strongly correlated: managers who believe that inflation has been high in the last year are much more likely to expect inflation to be high in the future. This suggests that inattention to recent conditions is a primary source of differences in expectations. Firms which are "informed" about recent inflation rates not only tend to report inflation forecasts much closer to ex-post true values than do "uninformed" firms, they also tend to do so with more confidence. But being "informed" is not time-invariant: firms classified as "informed" in the first wave of the survey display a similar distribution of inflation forecasts by the fourth wave as do firms originally classified as "uninformed."

Third, given the richness of firm, industry and manager-specific information in the survey, we can study the sources of variation in inattention across firms. Focusing on errors made by managers about recent inflation, we find that the characteristics of the manager account for very little of the variation in beliefs about recent inflation. Instead, we find robust evidence that firms' inattentiveness to recent macroeconomic information is systematically related to their incentives to process or track such information: firms which face more competitors and firms which expect to change their prices sooner are more likely to be better informed than firms with fewer competitors or those which do not expect to change their prices in the near future. In the same spirit, firms with steeper average profit functions (for which information is more valuable) also tend to have better information. These patterns are consistent with rational inattention explanations of agents' expectations formation process, as in Sims (2003), Reis (2006), Mackowiak and Wiederholt (2009) and Afrouzi (2016). In addition, because the persistence of inattention, measured with backcast errors of different variables, can be mapped into underlying levels of information rigidity, our results speak to the economic significance of these frictions. We find very high levels of persistence in backcast errors, implying high levels of information rigidity of the same order as those found by Coibion and Gorodnichenko (2012) for the U.S.

Fourth, we use novel experiments in which managers are provided with new information to assess how their beliefs respond to new information, both on impact and over longer periods, as well as whether these changes in their beliefs affect their actions. The first experiment, done in the fourth wave of the survey, provided random subsets of firms with additional information about recent macroeconomic variables, forecasts of professional forecasters, the value of the central bank's inflation target, or the average forecast of other firms in the survey. Firms were asked to quantify their forecasts and the uncertainty around their forecasts prior to this information being revealed, then were asked for new forecasts after the additional information was provided to them. Consistent with models of Bayesian learning, firms immediately and systematically adjusted their forecasts in response to this new information and did so in the expected direction. The responses to information about inflation were generally stronger than those for information about GDP growth or unemployment and were particularly large in response to information about the central bank's inflation target. Also consistent with Bayesian learning is the fact that those firms with higher levels of a priori uncertainty revised their forecasts by more than did firms that were more confident in their forecasts. This novel experimental evidence supports the notion that firms update their beliefs as in noisy information models and suggests that firms' inflation forecasts are particularly sensitive to new information.

In the second experiment, implemented in the fifth and sixth waves of the survey, a subset of firms were provided with information about the central bank's inflation target. Relative to a control group, the firms that were initially poorly informed about the RBNZ's inflation target immediately reduced both their short-run and long-run inflation forecasts but did not materially change their views about other macroeconomic variables. When surveyed again six months later, their short-run forecasts of inflation were indistinguishable from those of the control group, but their long-run forecasts remained slightly lower. This implies that even credible information that significantly affects agents' expectations on impact has only transitory effects on their views of the economy. Despite this short-lived effect on expectations, the firms which received the information and lowered their inflation expectations significantly reduced their employment and investment relative to what they were planning before the information was provided and relative to the control group. Their prices and wages, in contrast, were on average unchanged relative to their initial plans. This implies that policies which successfully affect managers' inflation expectations are likely to have real effects, but doing so requires communication strategies that break through the veil of inattention that pervades managers' views about aggregate inflation.

To address this point, we explore how firms seek out and process macroeconomic information. Rational inattention models suggest that agents should devote more resources to tracking variables which affect their profits or utility more. The survey asked firms to rank macroeconomic variables in terms of their importance for their business decisions. Consistent with rational inattention models, firms make systematically smaller errors about recent values of the variables that are important to their business decisions and report less uncertainty about them. There is also a strong correlation between the variables that firms identify as being important to business decisions and those which they track. Strikingly, well under half of firms report that they track inflation (whereas 80% report tracking GDP) and the average inflation backcast errors of these firms are five times larger on average than those made by firms which track inflation. One likely reason why some firms' inflation forecast errors are so large may therefore be that these firms do not view aggregate inflation as being as important to their business as other macroeconomic variables and devote relatively fewer resources to tracking inflation's evolution. Another prediction of models with endogenous acquisition of information is that

strategic complementarities should induce firms to focus relatively more on public signals. We find a strong positive correlation between the degree of strategic complementarity in price setting of firms and their preference for receiving public over private signals, which is in agreement with predictions of Hellwig and Veldkamp (2009). Higher strategic complementarity is also positively associated with firms preferring to wait for other firms to change their prices first when facing uncertainty, consistent with Gorodnichenko (2008). Hence, the predictions of models with endogenous acquisition of information also receive support in the survey data. However, at odds with standard models, managers report a striking asymmetry in how they would respond to positive versus negative news about the economy on TV: over 70% of firms would seek out more information if the economic news were negative, while less than 30% would do so if the news were positive. This cyclicality is consistent with empirical evidence in Coibion and Gorodnichenko (2015b) and points toward important state-dependence in the acquisition and processing of information by firms, as in Gorodnichenko (2008) or Alvarez et al. (2011).

Our results build on a growing literature studying the properties of agents' expectations. Theoretical work has long found that departures from full-information rational expectations can have profound consequences for economic dynamics and optimal policy (e.g. Lucas 1972). More recent work has studied the empirical properties of agents' expectations and how these relate to different models of the expectations formation process. Mankiw, Reis and Wolfers (2003), for example, document that the dispersion in U.S. households' inflation forecasts is much larger than that of professional forecasters. Carroll (2003) studies the transmission of macroeconomic information from professional forecasters to households. Coibion and Gorodnichenko (2012) estimate the rates at which different agents' forecast errors respond to structural shocks while Coibion and Gorodnichenko (2015b) test for predictability of forecast errors from past forecast revisions as implied by models of imperfect information. Andrade and LeBihan (2013) assess the ability of imperfect information models to match key facts of the expectations of professional forecasters. Carvalho and Nechio (2014) find that many households report expectations that are inconsistent with monetary policy actions. This line of research has documented pervasive and systematic deviations from full-information rational expectations, with much of the empirical evidence being consistent with models of inattentiveness.

We differ from this previous work in that we implement and study the results of a new survey of firms' macroeconomic expectations, whereas previous research has relied primarily on forecasts of households (such as from the Michigan Survey of Consumers), professional forecasters (Survey of Professional Forecasters, Consensus Economics surveys), financial market participants (expectations extracted from asset prices) or policymakers (Greenbooks, FOMC member forecasts). Our work also contrasts with previous studies in combining surveys and experiments so that we can draw causal inferences, while previous work generally documents correlations. Like this prior work, we find pervasive departures from full-information rational expectations but now for the case of firms. In addition, we document not only the heterogeneity in firms' beliefs about future macroeconomic outcomes but also dramatic differences in their perceptions of recent economic developments, a key feature of imperfect information models. Furthermore, and again consistent with predictions of rational inattention models, we find systematic evidence that the quality of firms' information about macroeconomic conditions in part reflects their incentives to track and process such information, as in e.g. Gorodnichenko (2008) or Alvarez et al. (2011). We therefore interpret our results as not only filling an important

gap in the literature by studying quantitative measures of firms' expectations but also as providing some of the most direct evidence for rational inattention motives in the setting of agents' macroeconomic expectations.

Our results contribute to the growing literature on non-traditional monetary policy tools (especially forward guidance) and the ways in which they may affect economic outcomes. In traditional New Keynesian models, long-run expectations are well-anchored to the central bank's target and announcements about future monetary policies have immediate and large economic effects at the zero-bound as they shape short-run inflation and other economic expectations (see Krugman 1999, Eggertsson and Woodford 2003). Our results call for caution in taking these results at face value. While our experimental evidence does suggest that changes in firms' inflation expectations directly affect their economic decisions, breaking through the veil of firms' inattention is likely to be difficult. First, most managers do not view inflation as being a major consideration in their business decisions and devote few resources to tracking it, so transmitting information to them about new monetary policies will likely require more aggressive communication strategies than currently done. Second, our experimental evidence suggests that exogenously provided information about the central bank's inflation target is quickly tossed aside by managers, so central bankers should expect any changes in expectations to be transitory unless they engage in long-lived communications campaigns. Monetary policymakers' success in achieving low and stable inflation in countries like the U.S. and New Zealand may therefore have inadvertently made their own lives more difficult by inducing managers to turn their attention away from inflation and other aggregate risks.

The paper is organized as follows. Section 2 describes how the survey was implemented as well as evidence on the quality of firms' responses to survey questions. Section 3 describes basic results from the survey such as the mean forecasts and backcasts of firms for macroeconomic variables. Section 4 focuses in more detail on firms' attentiveness to recent macroeconomic developments. Section 5 considers how firms update their beliefs in response to new information and how this maps into their decisions. Section 6 provides additional results on how firms seek out and process information about macroeconomic conditions. Finally, section 7 concludes by discussing some implications of these results.

2 Implementation of the Survey and Quality Control

In this section, we first describe the way in which the survey was implemented (sampling frame, response rates, etc.). We also assess the quality of the responses provided by firms. We find that the quality of the survey is quite high: "error" rates hover between 1 and 5 percent.

2.1 Implementation of the Survey

The survey of firms in New Zealand was done in six waves. The first and largest wave was implemented between September 2013 and January 2014 and included 3,144 firms. Subsets of these firms were then surveyed again for each of the next three waves, which occurred in 2014Q1 (712 firms), 2014Q3 (1,601 firms), and 2014Q4 (1,257 firms) respectively. In the fifth wave, conducted in 2016Q2, we randomly selected some firms from the first wave to participate as well as new previously-uncontacted firms, yielding a total of 2,040 firms of which 150 had participated in at least the first wave and the rest had not participated in any wave. The sixth wave, in 2016Q4, and contained 1,404 firms, all of which had participated in the fifth wave.

As described in more detail in Appendix 1, the selection of firms for participation in the first wave was implemented as follows (new firms for the fifth wave were selected in the same way). We first combined two

directories of firms in New Zealand: Kompass New Zealand (KNZ) and Knowledge Management Services (KMS). Around 10,000 firms were selected from the former and an additional 5,000 new firms from the latter.[2] Both directories were purchased and contain comprehensive profiles of New Zealand businesses including their activities, brands, management, products and services. Firms come from four broad industrial groups: manufacturing; retail and wholesale trade; construction and transportation; professional and financial services, where sectors are defined according to the Australia and New Zealand Standard Industrial Classification 2006 (ANZSIC06). Following the standard classification of New Zealand firms, firm size within each industry is classified as small (6-19 workers), medium (20-49 workers) and large (50 or more workers).

Since manufacturing and professional and financial services account for relatively large shares of New Zealand's GDP (Statistics NZ, 2012), we aimed to have two thirds of our sample from these two industries. The remaining one third is a combination of firms from other industries. We excluded industries related to the government, community service, agriculture, fishing and mining, and energy, gas and water from the sample. These sectors are often dominated by a few extensively regulated firms or by very small firms.

The general managers of the approximately 15,000 firms were emailed the information sheet and questionnaire about ten days before receiving a phone call to collect their responses, giving them time to consider their participation.[3] The phone survey occurred as follows: a research assistant (RA) called the general manager and asked questions. The RA recorded the answers in the questionnaire by hand and also recorded the responses in the phone. An independent RA then confirmed that the answers written in the questionnaire corresponded to the recorded responses in the phone. To maintain confidentiality of the participants and information, the phone records were deleted at the end of the survey. The collected data was verified by two independent RAs. Specifically, they checked whether the spreadsheet responses matched the answers in the hardcopy questionnaire. Responses that were observable outliers were deleted from the sample, for instance, a firm that claims to have employed around 300 workers and sells about $10,000 worth of goods in three months. At the onset, we ran a pilot survey of 60 firms (which are not included in the main survey) to verify if the questions made sense to firms or if there were some questions which they systematically refused to answer. The response rate for the first wave was approximately 20 percent, with 3,144 managers completing the survey. The response rate of new firms for the fifth wave was 14% percent. For waves 2-4 and 6, response rates were 23%, 51%, 40% and 69% respectively from the previous pool of firms.[4]

In addition to the four main industries (which constitute a slightly more aggregated grouping than SIC1), we also consider more disaggregated classifications, which we will refer to as "sub-industries," and which are more aggregated than SIC2 (Appendix 2 describes ANZSIC codes associated with each sub-industry). This level of aggregation ensures that each sub-industry has more than 100 firms in the first wave of the survey. The

[2] KNZ contains information about 15,000 firms, but approximately 5,000 have less than 6 employees or annual GST turnover less than NZ$30,000, which are cutoffs that we impose for inclusion in the sample. The KMS directory contains around 30,000 firms and we randomly selected around 5,000 new firms not included in the KNZ directory.

[3] The most frequently mentioned reason for not participating was a concern for confidentiality, and especially an unwillingness to answer questions on total production value and capacity, as well as questions about profit margins. In wave 1, there were 394 incomplete surveys. We drop these firms from our sample.

[4] In Appendix I, we document that attrition of firms from wave 1 to waves 2, 3, 4 is not explained by observable characteristics of firms. We find a similar result for attrition from wave 5 to wave 6. Thus, non-participating firms are missing approximately at random.

Construction and Transportation industry is not further decomposed as this sector contains significantly fewer firms in the survey than other industries. We construct sampling weights for firms in each wave of the survey at the level of the sub-industry/firm-size cell to correct for any discrepancies between the distribution of employment by firms in our sample relative to the population of employment by firms in New Zealand.

Appendix Table 1.5.1 presents some summary characteristics about firms in the first wave of the sample. The average age of firms in our sample is 14.5 years and the average number of employees is just under 30. Both mask substantial underlying heterogeneity. For example, the largest firm in this sample has just under 700 employees. The combined employment of firms in the first wave represents about 5% of total employment in New Zealand. The share of total revenues going to labor costs varies significantly across sectors but averages nearly 50% across all firms in the survey, with significantly lower shares in manufacturing firms and significantly higher shares in professional services. The share of revenues from foreign sales also varies widely: manufacturing firms have much higher shares of revenues coming from abroad than do other firms. Firms in professional and business services reported significantly higher margins both on average and at the time of the first survey than did firms in other industries, with finance having the largest average margin while construction and transportation firms report the lowest average margins. Firms in all industries reported that margins at the time were below historical margins.

The set of questions varies across survey waves. A significant portion of the first wave was devoted to price setting and information collection decisions by firms. For example, we asked firms how frequently they formally review their prices (e.g. weekly, monthly, quarterly, etc.). The average duration between price reviews for all firms is 7.4 months, with much higher durations in construction and transportation (almost 11 months) and non-food retailing (over 11 months). We also asked firms when they expected to change the price of their main product and by how much. The average firm reported an expectation of nearly six months before their next price change, which would be a 5.6% increase in price on average. Within industries, sectors in which firms report longer durations until their next price change also report, on average, larger expected price changes. While some of the questions are repeated across two or more waves, each wave generally included a new set of questions. For example, the second wave expanded the set of macroeconomic variables which firms were asked about, the third wave primarily focused on collecting individual characteristics of the respondent (e.g. age, income, education), and the fourth wave explored how firms acquire and process new information. The fifth and sixth waves focused primarily on an experiment designed to assess whether firms' economic decisions are affected by changes in their beliefs about aggregate inflation. We provide specific questions used from each wave in Appendix 5.

2.2 Assessing the quality of the survey data

Because firms have no direct incentive to participate in the survey or to provide thoughtful or truthful answers, one may be concerned about the quality of the responses to the questions. To ascertain the quality of the survey responses, we considered a number of checks.

The first is to directly verify the quality of those responses which can be checked against other sources. We do so in a number of ways (see Appendix 4 for a full description). For example, respondents were asked about the age of their firm. Since firms must be registered with the government, we can check administrative records to verify whether the reported age of the firm and administrative records conform. We performed this check for all firms in the survey and found that, for 87% of the firms in the sample, the reported age of the firm conformed to administrative records. Similarly, we can compare what managers report for the price of their

main product against what the company websites report online. For the 245 randomly-selected firms for which we could either identify prices on their websites or via direct online enquiry, only nine reported prices different from those in the follow-up survey, an "error" rate of 3.7%. For another randomly selected subset of managers, we checked whether their responses about their position, qualifications and experiences were consistent with the publicly available data about them and found a very strong match with the survey responses (≈99%).

In addition to verifying firms' survey responses against outside sources, we can also assess the internal consistency of their responses. For example, the survey includes a question about the *average* frequency at which firms review their prices, which we convert to an average number of months between price reviews, and also includes questions about their actual prices over the previous twelve months. As illustrated in Appendix 4, longer durations between price reviews are negatively related to the number of price changes reported by firms for the previous twelve months. We can also verify whether firms report the same answers in response to the same question across the two surveys. For example, managers are asked about the average frequency of price reviews in two different waves. Regressing one response on the other yields a coefficient that is indistinguishable from one, and an extremely high R^2, consistent with very low reporting errors. Similarly, managers asked about their prices for overlapping periods in different waves give consistent answers over time.

Ultimately, because we will focus on firms' beliefs about macroeconomic conditions, we would like to verify the quality of reported expectations of firms. We can do so using two survey questions. First, we asked firms in the first wave in how many months they expected to next change their price. Given that the second wave includes reported price changes since the main survey, we can therefore verify whether firms that expected to change their prices soon did so at a higher frequency than firms that expected not to change their prices for an extended period. For each firm, we determine whether the firm has changed its price between the first and second waves, by comparing the "current" price in the second wave with either the "current price" from the first wave or the 3- or 6-month prior price in the second wave. We then construct the fraction of firms that changed their price within each bin of possible durations until next price change reported in the first wave. As illustrated in Panel A of Figure 1, for firms that expected to change their price within the next four months at the time of the first wave, approximately 90% did indeed change their price by the time of the second wave. For firms that originally expected not to change their price for at least seven months, almost none of the firms changed their price (exactly none when price changes are measured relative to the price from the main survey). In between four and seven months of expected price duration, there is a sharply falling share of firms which changed their prices, consistent with the time difference between the surveys. Hence, firms' original answers about when they next expected to change their prices have very strong predictive power for their ex-post decisions about whether to change prices.

One possible limitation of this test is that if firms change their prices at very fixed frequencies (as in Taylor 1980), then their ability to predict the date of the next price change may not be very informative about the quality of their expectations. An alternative test is to examine their expectation of the *size* of their next price change. We do so in Panel B of Figure 1, which plots the expected percentage price change reported in the first wave against actual price changes (percentage difference between "current" prices in the second wave and "current" prices in the first wave). Note that these can differ because firms changed prices by a different amount than expected or changed them more than once. Nonetheless, there is a strikingly strong correlation between the ex-ante expectation of firms about the amount by which they will change their prices and their ex-post price

changes from the follow-up survey, with most of the observations laying very close to the 45 degree line.[5] These results are therefore consistent with firms reporting their true expectations in the survey.[6]

While one should always bear in mind the limitations of survey data, these results suggest that the quality of this survey data is quite high. For questions which can be independently verified against external sources, we find high consistency between responses and outside sources. There is also high consistency across related questions within the survey, e.g. firms which review their prices frequently also change prices more frequently on average. Finally, firms' responses about their expectations also line up very closely with their subsequent actions, suggesting that we can be confident about the quality of respondents' answers about their beliefs and that firms' actions are based on these beliefs.

3 Baseline Results of the Survey

In Table 1, we report means and standard deviations of macroeconomic forecasts, both from firms in our survey as well as other agents' forecasts for New Zealand over the same periods. At the time of the first wave, in December 2013, the Reserve Bank of New Zealand was predicting that annual CPI inflation for September 2014 would be 1.3%, just slightly below the 1.5% annual CPI inflation rate experienced over the preceding twelve months. Professional forecasters included in the December 2013 Consensus Economics survey for New Zealand were forecasting annual CPI inflation of 2.0% over the next twelve months. The cross-sectional standard deviation of these forecasts was very low, at 0.2%, indicating widespread agreement among professional forecasters about the likely future dynamics of inflation. Household forecasts of 1-year ahead annual inflation are available from a quarterly survey of 1,000 households run by the Reserve Bank of New Zealand. Reported values from this survey are trimmed, dropping all inflation forecasts above 15% and below -2%. In the December 2013 survey, households in New Zealand were on average forecasting an inflation rate of 3.4%, with a much higher level of disagreement indicated by a cross-sectional standard deviation of 2.0%. The much wider disagreement in inflation forecasts among households than for professional forecasters has been widely documented in the literature, especially for the U.S. (e.g. Mankiw, Reis and Wolfers, 2003). The higher mean of household inflation forecasts, which is also observed in the U.S. over the same time period, is another unique characteristic of household forecasts, although this difference is not always historically present.

The mean forecast of inflation among firms, after applying the same trimming procedure as that used for households, was 5.3%, with a cross-sectional standard deviation of 3.1%. Thus, firms in New Zealand, at least during this time period, exhibited the same upward bias in inflation forecasts as households relative to professional forecasters and the same characteristic of widespread disagreement. This is despite nearly twenty-five years of official inflation targeting on the part of the Reserve Bank of New Zealand. These large disparities in means and dispersion also suggest that professional forecasts are unlikely to be representative of firms' macroeconomic beliefs. The same qualitative results obtain using the subsequent waves: the mean forecast and

[5] Panel D of Appendix Table 1.3.1 confirms the fact that the estimated slope of the relationship is not statistically different from ones.

[6] Low predictability of subsequent outcomes from ex-ante expectations would not necessarily imply that expectations are poorly measured, since there could be shocks occurring after expectations are formed that would lead to different decisions ex-post relative to those anticipated ex-ante. But the fact that there is high predictability of ex-post outcomes from ex-ante expectations requires the expectations measures to be of high-quality.

the standard deviation of firm inflation beliefs remain significantly higher than what is observed for professional forecasters. However, by the final two waves in 2016, firms' inflation forecasts had declined to under 3%, as had those of households.[7] As illustrated in Figure 2, these short-run swings in inflation expectations coincide closely with large changes in gasoline prices, a feature that has been already documented in the case of U.S. households (Coibion and Gorodnichenko 2015a).

Table 1 also reports means and standard deviations of forecasts from waves 2, 4, 5 and 6 for other macroeconomic variables, including the unemployment rate and the growth rate of real GDP. Unfortunately, no household forecasts of these variables are available for households in New Zealand, so we can only compare forecasts of firms to those of professional forecasters and the Reserve Bank of New Zealand. For unemployment rates, the Reserve Bank of New Zealand projected in its March 2014 Monetary Policy Report that the unemployment rate in March 2015 would decline to 4.9%, from its value of 6.0% in December 2013. Professional forecasters in March 2014 were predicting an unemployment rate of 5.3%, again with very little disagreement as displayed by a standard deviation of only 0.3%. In contrast, while firms in the second wave were predicting a mean unemployment rate twelve months later of 5.2%, there was again much more disagreement among firms than professionals, with a standard deviation of firm forecasts of 1.2%. Very similar results obtain for the expected annual growth in real GDP over the next twelve months and in subsequent waves for these variables: mean forecasts of firms and professionals are similar, but the disagreement among firms is larger. Nonetheless, it is clear that inflation forecasts present the largest disparities between firms and professionals.

Why do firms' inflation forecasts have such different characteristics than those of professionals? One possibility is that managers are not predicting aggregate prices but rather their own consumption bundles. Consistent with this, previous work has found that the responses of households are sensitive to whether questions about inflation are framed as being about "prices overall in the economy" (as in the Michigan Survey of Consumers) or more specifically about "inflation" or a specific price index (Bruine de Bruin et al. 2012 and Drager and Fritsche 2013). To investigate this conjecture, managers in the fifth wave randomly received different wording for inflation questions.[8] One-third (approximately 500 firms) were surveyed using the term "prices overall," one-third were asked about "overall inflation" and the remaining third were asked about "inflation (*specifically the Consumer Price Index*)." As documented in Appendix 3, we find no difference in either the mean or dispersion of inflation forecasts across these different groups of firms, in contrast to previous results found for households.[9] Hence, the properties of managers' inflation forecasts that we document are *not* driven by the specific language used. A related possibility is that point forecasts may be biased or unduly dispersed if respondents round their answers. One alternative, as suggested by Engelberg, Manski and Williams (2009), is to ask respondents to assign probabilities to a set of possible outcomes. Managers in the fifth wave were asked to assign probabilities to

[7] This finding is not driven by the presence of new firms in the sample or prior firms "learning" from their repeated participation in the survey. We find no meaningful difference in the forecasts of newly incorporated firms relative to those who participated in previous waves.

[8] The standard wording of the question we use is "*During the next twelve months, by how much do you think prices will change overall in the economy? Please provide an answer in percentage terms.*" which follows the wording used in the Michigan Survey of Consumers.

[9] Kumar et al. (2015) document additional differences between the forecasts of managers in the New Zealand survey and those of households. For example, whereas many households cannot define inflation, Kumar et al. (2015) find that 86% of firm managers who were asked could correctly explain what inflation means. In addition, managers believed that statistical agencies were credible in measuring price changes (86%).

different inflation outcomes (with randomly selected participants receiving different bin sizes), but as documented in more detail in Appendix 3, their answers to these questions are consistent with their point forecasts. For example, the mean point forecast of inflation in 2016Q2 was 2.8% with a cross-sectional dispersion of 2.3% while the equivalents using bin-based questions are 2.6% and 2.5%. Similar results obtain in other waves in which distributional questions were asked and also hold for other macroeconomic variables. The properties of managers' inflation forecasts therefore are insensitive to the use of either distributional or point forecasts.

While the specific wording used to characterize aggregate inflation or the manner in which respondents are asked to provide their answers matter little for the results, whether managers are asked about aggregate conditions or what their own firm will do yield very different results. For example, firms in the survey were asked how much they expect to change their prices or by how much they expect their unit costs to change. As documented in Appendix 3, the correlation between their answers to these questions and their expectations about *aggregate* inflation is essentially zero in this specific survey. This means that correctly measuring firms' expectations of aggregate inflation requires the survey to explicitly ask firms about their expectations about aggregate inflation, and that one should be wary of drawing any immediate inference about their aggregate expectations from their expectations over their own price changes or unit costs. Some surveys of firms, such as the Business Inflation Expectations survey of the Atlanta Federal Reserve, ask firms only about expectations over their own unit costs rather than about aggregate inflation. While firms' expectations of their own prices and costs are interesting in their own right, the absence of any strong correlation between the two in our survey suggests that these surveys are uninformative about firms' beliefs about *aggregate* inflation.

There is very little other evidence on firm forecasts to compare these results to. In September 2014, the Bank of Atlanta surveyed selected U.S. firms and found that their mean forecast of aggregate inflation was 4.4%, with a cross-sectional standard deviation of 4.2% (Bryan et al. 2015), while U.S. households were predicting an average of 3.7%, with a cross-sectional standard deviation of 3.5%, very similar to our results in New Zealand. In contrast, a new survey of firms in Iran, where inflation has been high and volatile, finds firms there to be relatively more informed about aggregate inflation dynamics (Central Bank of Iran 2016). Coibion and Gorodnichenko (2015c) find that the inflation forecasts of firms in Ukraine, where inflation has also been high and volatile, have tracked actual inflation closely. This suggests that the history of low and stable inflation in inflation targeting countries in the U.S. and New Zealand may be reducing the incentives of managers to pay close attention to actual inflation. A similar result for households is documented by Cavallo et al. (2016), finding that households in high-inflation Argentina are more informed about aggregate inflation than households in the U.S.

Consistent with this interpretation, we find (Table 1) that the amount of disagreement among firms about *recent* inflation dynamics (over the last 12 months) is of the same order of magnitude as the disagreement in their forecasts of future inflation, with mean beliefs about recent inflation tracking mean beliefs about future inflation across surveys. Similar results hold for other macroeconomic variables. One possibility is thus that managers are optimally *choosing* to not be as well informed about recent macroeconomic conditions as professional forecasters, and that the resulting misinformation about recent economic dynamics affects their views about the future.

4 (In)Attentiveness to current and recent economic conditions

An unusual dimension of the survey is that we ask firms about their beliefs regarding *recent* macroeconomic conditions. Whereas full-information rational expectations models assume that agents can immediately observe economic developments, models of inattention imply that agents find it optimal to limit the resources they devote to tracking information about the economy, leading to imperfect information about current and past economic conditions. The questions in the survey about perceptions of recent and current economic conditions can therefore provide a metric to evaluate the amount of inattention to aggregate economic conditions on the part of firms. In this section, we first document how beliefs about the past shape beliefs about the future then discuss possible sources of firms' inattention to recent economic conditions.

4.1 Beliefs about the Past and Beliefs about the Future

To understand the link between managers' beliefs about the recent past and their forecasts of future events, we exploit the fact that our survey provides each individual's backcasts/nowcasts of a variety of macroeconomic variables and their forecasts of these variables. Jonung (1981) documents that in a survey of Swedish households from 1978, those households who believed recent inflation to have been higher than other households also tended to have higher forecasts of future inflation. Armantier et al. (2016) find similar patterns in a 2011 survey of U.S. households. We follow this previous work using forecasts and backcasts and estimate the following regressions:

$$F_t^i x_{t+12} = \alpha + \beta B_t^i x_t + \delta_j + error \qquad (4.1)$$

where $F_t^i x_{t+12}$ denotes the 12-month ahead forecast of firm i for variable x, which we regress on the firm's belief (nowcast or backcast) about recent values of that variable ($B_t^i x_t$). The δ_j are sub-industry fixed effects. Estimates for each variable are pooled across all waves for which both forecasts and nowcasts/backcasts are available. The specific variables for which we have at least one set of forecasts and nowcasts/backcasts are aggregate and industry-specific inflation rates, the unemployment rate, the growth rate of GDP, and the level of the exchange rate vis-à-vis the dollar. We also consider specifications with firm-specific fixed effects when multiple waves are available for a variable. Each regression uses sampling weights and is a Huber-robust regression, which automatically controls for outliers and influential observations. The estimated β's from this regression are presented in Table 2. For every variable, we find that backcasts/nowcasts are strong predictors of manager forecasts, including when manager-specific fixed effects are included. These results corroborate the findings of Jonung (1981) that differences in beliefs about past economic conditions play an important role in accounting for differences in beliefs about the future, but in this case for firms.

Another way to assess the role played by different information sets is to compare the distribution of inflation forecasts for "informed" firms, i.e. those with absolute errors about recent inflation of less than 2 percentage points, with that for "uninformed" firms, i.e. those making larger errors about recent inflation. This is illustrated in Panel A of Figure 3, using data from the first wave of the survey. The distribution of forecasts for informed firms is much more concentrated than that for uninformed firms, with the latter having a much more pronounced tail of very high inflation forecasts, a pattern which is repeated in each wave of the survey. Few firms that are aware of recent inflation levels predict inflation rates above 10%, in contrast to uninformed firms. However, if we classify firms as informed and uninformed using their errors in the first wave of the survey and compare the distributions of inflation forecasts of these two groups in the *fourth* wave, as illustrated in Panel B of

Figure 3, we find that the two distributions are much closer to each other than in the first wave. This finding is consistent with the view that as firms' information about recent inflation dynamics evolves over time, their forecasts change as well. In section 5, we test this notion directly using an experimental design. Jointly, these results imply that to understand the heterogeneity in firms' forecasts, a first step is to understand the sources of the differences in their beliefs about recent economic dynamics.

4.2 Measuring Inattention

Given that recent economic conditions are largely observable in real-time, we can measure inattention to aggregate conditions by examining the size of their nowcast or backcast errors, i.e. the difference between actual values of each variable and managers' beliefs about them. For example, in the case of inflation, we construct the "errors" made by firms with respect to inflation over the preceding 12 months by subtracting their reported belief about recent inflation from the actual inflation rate over this time period. Panel A of Figure 4 plots the distribution of these errors vis-a-vis recent inflation in the first wave. About half of firms (49%) made relatively small errors, within 2 percentage points of the actual inflation rate, and we refer to these as "informed" firms. Approximately one in three firms made errors of more than 5 percentage points, and one in ten firms in that wave made errors of more than 10 percentage points. This points to large heterogeneity in firms' attentiveness to recent inflation dynamics, with a wide range of beliefs about recent price changes in the New Zealand economy.

A second point to note from Panel A of Figure 4 is that the distribution of inflation errors is highly asymmetric. Large errors are systematically negative, with these firms believing that price changes have been much larger than what actually happened. Only 5% of firms report a perception of recent inflation that is lower than actual inflation. Thus, the distribution of firm beliefs about recent inflation is very unevenly distributed around the actual value, despite the fact that inflation at the time of the survey was not exceptionally low. Armantier et al. (2016) document a similar distribution of perception errors on the part of U.S. households.

The dramatic heterogeneity in beliefs about recent inflation is not unique to inflation, but the asymmetry of errors is. In the fourth wave of the survey, we also asked firms about their perceptions of the growth rate of GDP over the last twelve months and the current unemployment rate, from which we can construct analogous backcast errors made by firms. The distributions of these errors are also plotted in Panel A of Figure 4. As with inflation, there is significant heterogeneity in beliefs across firms about the recent GDP growth rate and unemployment rate, although the dispersion of beliefs for these variables is significantly lower than for inflation and is largely symmetric around true values. In the fourth wave of the survey, we also asked firms to report their beliefs about price changes in their industry over the last 12 months. Using PPI inflation rates at the two-digit industry (SIC2) level, we also display the distribution of errors made by firms about industry-specific inflation rates in Panel A of Figure 4. Unlike errors about aggregate inflation, the distribution of errors about industry-specific inflation rates is symmetric and centered around zero, with the same order of dispersion as errors about GDP growth and unemployment. Hence, these results suggest that aggregate inflation generates unique patterns of errors on the part of firms that differ both qualitatively and quantitatively from those that arise for other macroeconomic variables or industry-specific price changes.

There is also significant heterogeneity in the dispersion of firm-level errors about inflation within industries. Panel B of Figure 4 plots these inflation errors from the first wave for the four broad industry

groupings: manufacturing; trade; professional and financial services; construction and transportation. In both manufacturing and trade, the majority of firms are well-informed. For example, two-thirds of firms in the manufacturing sector and eighty percent of firms in the trade sector have inflation errors of less than two percentage points. In contrast, the equivalent shares for the professional and financial services sector and the construction and transportation sector are only thirteen percent and twenty percent respectively. Furthermore, these last two sectors also have much larger fractions of firms making large errors than do firms in manufacturing or trade. These features systematically occur within each sub-industry as well, suggesting that inattention to inflation reflects deeper structural characteristics of firms or respondents.

4.3 Sources of Inattention to Inflation

What accounts for the degree of inattention paid by firms to recent inflation dynamics? Panel B of Figure 4 highlights pronounced industry characteristics as one potential source. There are many economic differences between these sectors. For example, manufacturing and trade firms have, on average, a smaller share of costs coming from labor, lower profit margins, more exposure to foreign trade, and more frequent price reviews than do firms in construction, transportation, and professional financial services (Appendix Table 1.5.1). There could also be differences in the recent pricing decisions of firms in these industries which affect their perceptions of overall price changes. Alternatively, differences in inattention could be driven by the personal characteristics of respondents, such as their age, income or education.

To assess the relative importance of these potential determinants of firm-level inattention, we regress firms' inattention to inflation, as measured by their absolute errors about recent inflation rates, on four groups of variables. The first group includes firm-level characteristics, such as the (log) age of the firm, its (log) total employment, labor costs as a share of revenues, and the share of foreign sales in total revenues.

The second group of explanatory variables focuses on the amount of competition faced by firms. Specifically, we include the number of direct competitors faced by the firm in its primary product, the average profit margin of the firm (similar results obtain using contemporaneous margins), as well as the firm's perception of how its price compares to those of its main competitors (as a percentage differential). Rational inattention arguments would imply that more competition should induce firms to devote more resources to collecting and processing information about their economic environment, as emphasized in Afrouzi (2016). The last variable in this block is the absolute value of the slope of the profit function with respect to firm's price. We calculate the slope as the ratio of by how much a firm could increase its profit (as a percent of revenue) if it could reset its price freely at the time of the survey relative to the percent price change the firm would implement if it could reset its price freely at the time of the survey. Economic theory (e.g., Gorodnichenko 2008, Alvarez et al. 2011) suggests that if the slope of the profit function around the current price is close to zero, then a firm's incentive to change its price or to acquire information is low since the incremental gain in profits is approximately second-order while the costs could be first order. A greater slope in the profit function should therefore be associated with better information and hence smaller forecast errors.

The third block of variables that we include focuses on price changes, both at the level of the firm and the industry. These include the percentage change in the firm's price over the previous twelve months. One might expect that firms which have raised their prices more could be extrapolating from their own behavior to that of others in forming beliefs about recent inflation, leading to larger errors about recent inflation. Similarly, we include

the PPI inflation rate over the preceding twelve months for the firm's industry.[10] Again, one might expect that firms in industries where prices have gone up more rapidly would extrapolate these patterns to the broader economy leading to larger errors over recent inflation dynamics. Rational inattention motives suggest an opposite effect: firms that have raised their prices by more (or that are in industries where prices have gone up by more) face higher incentives to track economic conditions because of this greater volatility, potentially leading to smaller errors about recent inflation. We also include firms' reports about the expected size of their next price change as well as the number of months until they expect to change their price next. There is a clear rational inattention interpretation for the latter: firms have an incentive to collect information prior to changing prices (e.g. Gorodnichenko 2008, Alvarez et al. 2011) so one would expect firms which report short durations until the next price change to have more precise information about economic conditions. Correlation among these variables could also be going in the opposite direction: if firms think inflation is high, then they should be more likely to change their prices sooner and by more. This channel would induce a positive correlation between inflation errors (since these are almost exclusively driven by beliefs of high inflation) and the expected size of price changes and negative correlation between inflation errors and expected durations until the next price change.

The fourth and final group of variables focuses on the characteristics of the individual respondent rather than the firm. These include the age of the respondent, income, education, and tenure at the firm.[11] Unlike all other variables, which were collected in the first wave of the survey, personal characteristics of respondents were collected in the third wave are therefore available only for a subset of firms. We therefore present results excluding individual characteristics but using all firms in the first wave in Table 3 (column 1), results using only individual characteristics of respondents (column 2) for firms participating in the third wave, and results using all variables (column 3). In each case, we use the absolute value of inflation errors in the first wave as the dependent variable since some control variables (such as expected duration until next price change) are not time-invariant and were only measured in the first wave of the survey.

As documented in Table 3, the correlations in the data are broadly supportive of rational inattention motives. First, the correlation between inflation errors and the expected duration until the next price change is negative, as suggested by rational inattention motives since firms which do not expect to change their price soon should value information less. Second, the coefficient on the slope of the profit function is negative, such that firms with steeper slopes in their profit functions have better information on average. Third, firms facing more competitors also make smaller errors on average. As emphasized in Afrouzi (2016), firms with fewer competitors are expected to allocate more of their attention toward tracking the actions and beliefs of their competitors rather than aggregate economic conditions. Fourth, firms that sell more of their products abroad have less incentive to track domestic prices and make larger errors about aggregate inflation. These results are robust to controlling for individual characteristics of respondents and therefore point squarely toward rational inattention motives in firms' decisions about tracking inflation dynamics.

[10] PPI inflation rates are not made available at a consistent aggregation level. We use the most detailed level of industry inflation rates available for each firm. For some firms, these inflation rates are available at a more disaggregated level than the sub-industry sector while for others, inflation rates are available only at more aggregated levels than our sub-industry classification.

[11] Respondents are asked to report their income by choosing one of six income bins. We construct a continuous variable by assigning the mid-point of each income bin.

The strong correlation between beliefs about the past and forecasts of the future noted in section 4.1 suggests that the same forces which account for the heterogeneity in beliefs about recent inflation might also account for much of the variation in beliefs about future inflation. We illustrate that this is indeed the case for these rational inattention motives in Figure 5. In the figure, we show both average backcasts and forecasts of inflation for firms grouped by each of these characteristics: number of competitors, duration until the next price change, and slope of the profit function. Firms which face more competitors, firms which expect to change their prices sooner, and firms with steeper profit functions have not only lower backcasts of inflation on average but also much lower inflation forecasts.

Two other results stand out from Table 3. First, older and larger firms make systematically larger errors about inflation, even after controlling for other firm or industry characteristics. However, firms in New Zealand are much smaller on average than firms in larger economies like the U.S. (for example, the largest firm in our sample has 698 employees), so it is unclear to what extent this result would apply in other countries. Second, the personal characteristics of respondents play little role in determining inflation errors once firm-level characteristics are included. This may reflect selection issues, since all respondents are general managers of firms and thus are not representative of the broader population, for which household surveys typically reveal systematic differences in beliefs about inflation according to individual characteristics.

4.4 Persistence of Inattention

Because our data has a panel component, we can assess the average persistence of inattention among firms, i.e. do firms with bigger errors in one period also tend to make bigger errors in the following period? This persistence, as shown in Coibion and Gorodnichenko (2012), can be mapped directly into the underlying degree of information rigidity and shed light about the economic significance of information frictions. To assess the persistence of inattention, we regress firms' absolute errors in later survey waves on the absolute errors they made in the previous waves:

$$\left|x_t - B_t^i x_t\right| = \alpha + \beta\left|x_{t-1} - B_{t-1}^i x_{t-1}\right| + \delta_j + error \qquad (4.2)$$

where x is the variable being predicted by firms, B_t^i denotes firm i's belief (nowcast or backcast) about variable x, and δ_j is a fixed effect for the industry or sub-industry.

Panels A and B of Table 4 present results using beliefs about inflation over the last twelve months across the first two waves of the survey as well as between the first and fourth waves (no question about inflation backcasts was asked in the third wave). The persistence of inflation errors between the first two waves is about 0.75. With the average time between waves 1 and 2 of the survey being 5 months, an estimate of 0.75 in the persistence of inflation errors at this frequency is equivalent to a quarterly rate of 0.83, which is approximately the convergence rate of 12-month ahead inflation forecast errors found for different agents in the U.S. (Coibion and Gorodnichenko 2012). This amount of persistence points to economically large information rigidities. For example, Mankiw and Reis (2002) assume a lower persistence of 0.75 in their sticky information model while Woodford (2001) and Sims (2003) use similar magnitudes in their noisy information models. Using data from wave 4 relative to wave 1, we find a similar implied level of quarterly persistence in forecast errors of 0.80. The implied quarterly persistence in errors for unemployment is even higher, indicating that the degree of information rigidity is economically large across macroeconomic variables.

Jointly, these results indicate that the high levels of cross-sectional dispersion in inflation forecasts across managers are in large part a reflection of their different perceptions of recent inflation dynamics. These differences are consistent with rational inattention motives. Finally, the implied economic significance of this imperfect information is large.

5 New Information and Firms' Revisions in their Forecasts

The robust link between firms' beliefs about the past and their forecasts of the future suggests that different information sets play a leading role in accounting for the heterogeneity in macroeconomic forecasts of firms. However, firms do revise their forecasts. A key question is therefore how firms adjust their forecasts when they receive new information and how changes in these beliefs then affect their economic decisions. In this section, we use two unique experiments to assess this question.

5.1 The Short-Run Effect of New Information on Expectations

We first consider how managers revise their macroeconomic expectations in the face of exogenously provided information. We do so using two experiments. The first was conducted in the fourth wave of the survey. Firms in this wave were asked to assign probabilities to different outcomes for future inflation, output growth and unemployment rates, from which we can compute their mean forecasts and the uncertainty surrounding these forecasts. 700 firms were then randomly allocated to one of 7 groups of 100 firms, each which were treated with additional information about the economy. After receiving this information, firms were asked for a point forecast for the variable about which they received the information, allowing us to measure the extent to which they revised their forecasts in response to new information. The remainder of the firms did not receive additional information.

There were two groups of firms which received information about unemployment rates or GDP growth. For each of these groups, firms were told the most recent outcomes for one of these two variables (the most recent unemployment rate of 5.4% or the most recent annual real GDP growth rate of 3.9%). The remaining five groups were provided with information about inflation: 1) the most recent professional forecast of inflation over the next twelve months (2.0%), 2) the central bank's inflation target (2%), 3) both the professional forecast and the central bank's inflation target, 4) the most recent value of inflation (1.0%), and 5) the average inflation forecast of other firms in the survey (4.9%). Firms in each treatment group received only one piece of additional information.

Figure 6 plots, for each macroeconomic variable, firms' priors against their posteriors after receiving the information. Firms with above average beliefs tended to revise their forecasts down while those with beliefs below average tended to revise their forecasts up, as indicated by the regression lines having slopes less than one. This pattern is consistent with firms engaging in Bayesian learning.

To see the workings of Bayesian learning more formally, suppose firm i has prior with mean μ_i and precision τ_i (one can relate precision to the standard deviation of the "forecast/nowcast error" $\tau_i = 1/\sigma_i^2$). We assume that the prior is normally distributed. Each firm receives a common signal s (this is equivalent to the information treatment in each group) with precision ψ_s. The precision can vary with the type of signal depending on, for example, the credibility that firms attribute to the source. We assume that the signal is also normally distributed. Firms use Bayesian updating to obtain posterior p_i:

$$p_i = \mu_i + \frac{\psi_s}{\psi_s+\tau_i}(s-\mu_i) \Leftrightarrow (p_i-\mu_i) = \frac{\psi_s}{\psi_s+\tau_i}(s-\mu_i). \quad (5.1)$$

Firms should revise their forecasts in the direction of the signal and should do so by more when the signal they receive is further from their prior. This revision should also be larger when the source of the signal is more credible, i.e. interpreted as having a greater precision ψ_s.

We can evaluate this insight more formally using the following regression:

$$p_i = c + \beta\mu_i + error \quad (5.2)$$

where we present estimates pooled across the different inflation treatment groups (with fixed effects for each treatment group), as well as for each group separately. In this specification, $\beta = 1 - \frac{\psi_s}{\psi_s+\tau_i}$ and the constant term absorbs the common signal. Panel A of Table 5 and Figure 6 show that the pooled estimate of β for inflation is 0.339, much lower than the estimates of 0.647 and 0.565 for unemployment and GDP growth respectively. Thus, the sensitivity of firms' inflation beliefs to new information is much higher than it is for real macroeconomic variables. This does not appear to reflect the source of the information: when we estimate the sensitivity of inflation revisions to information about the most recent values (equivalent to the information provided about unemployment and GDP growth), the coefficient is similar.

There is considerable variation in the sensitivity of inflation forecast revisions depending on the source of the information. Firms revised their forecasts by the most when presented with information about the central bank's inflation target or recent inflation values, and responded by less when presented with professional forecasts and even less so with the forecasts of other firms in the survey. This suggests that firms assign the highest precision to the signal about the central bank's inflation target and recent inflation dynamics, more so than to predictions of professional forecasters or those of other firms.

A related prediction of Bayesian updating is that the precision of the firm's prior also matters in determining by how much it revises its forecast in light of new information. To demonstrate this intuition formally, we can approximate the revision in firm forecasts in equation (5.1) as

$$\log\left(\frac{p_i-\mu_i}{s-\mu_i}\right) = -\frac{1}{\psi_s} \times \left(\frac{1}{\sigma_i^2}\right) + h.o.t. \quad (5.3)$$

Firms with more uncertainty about their priors (high σ_i^2) should revise their forecasts by more for a given difference between the signal and their prior. This effect should be weaker when the precision of the signal is high. In the limit, if the signal is perfectly informative, the prior uncertainty does not matter as $p_i = s$ and hence $\log\left(\frac{p_i-\mu_i}{s-\mu_i}\right) = 0$. We examine this prediction using the following regression:

$$\frac{p_i-\mu_i}{s-\mu_i} = c + \beta\sigma_i + error \quad (5.4)$$

where we expect $\beta > 0$ and to be lower for signals associated with higher levels of credibility. With the exception of GDP growth, we indeed find that firms with more uncertainty about their priors tend to revise their forecasts by more, as illustrated in Panel B of Table 5. The magnitudes of the coefficients conform to those found in the previous set of regressions: the implied precision of the signal is highest when firms are told about the central bank's inflation target and lowest when they are told of other firms' forecasts.

At the end of wave 5, we ran a second, related experiment. A randomly chosen subset of 1,020 firms (half of the sample) was told about the Reserve Bank of New Zealand's inflation target after having been asked about their belief over this target. We then immediately asked respondents for their new point estimates of inflation as well as their updated forecasts of other economic variables. Thus, this experiment allows us to assess how firms revise their beliefs about other economic variables when they also revise their inflation expectations. For simplicity

of exposition, we group firms based on their prior belief about the inflation target and report their average revisions after the provision of information relative to a control group with the same prior beliefs but that received no information. Table 6 illustrates that managers who initially expected inflation to be high revised their inflation forecasts by 1.2-1.3 percentage points on average, revised their long-term forecasts of inflation down by almost a full percentage point, but had almost no revision in their expectations of either GDP or unemployment.[12] Hence, information about the central bank's inflation target primarily affects managers' short-run and long-run inflation expectations but has little effect on their expectations of real outcomes.

In short, when presented with new macroeconomic information, firms update their beliefs in a Bayesian manner, both in that they revise their forecasts toward the signal they receive and do so more when they are more uncertain. This updating is particularly strong for inflation forecasts, which likely reflects the lack of information firms seem to have about recent inflation dynamics and the high levels of uncertainty that they report around their forecasts.

5.2 The Long-Run Effects of New Information on Expectations

A unique feature of our second experiment is that firms that participated in the fifth wave were asked to participate in a follow-up survey six months later (wave 6) so that we can characterize the persistence of the effects on expectations of the exogenously provided information. Of the initial 2,040 firms from wave 5, 1,404 participated in the follow-up survey, of which 712 were provided information about the RBNZ's inflation target in the fifth wave and 692 were not.[13]

Firms in the sixth wave were again asked for their one-year ahead and long-run inflation expectations, as well as their expectations of real variables and their beliefs about the RBNZ's inflation target. In Table 6, we provide results for the average change in each of these expectations relative to their initial beliefs (i.e. those extracted prior to the information being provided) and relative to firms which did not receive any information. Strikingly, we find no difference in the beliefs about the RBNZ's inflation target between the treatment group and the control group, regardless of whether their initial beliefs were close to the truth or not. Hence, within six months, the effect of the information on their beliefs about the RBNZ target had *completely* dissipated, in line with the Cavallo et al. (2016) estimates for households.

Consistent with this dissipation, we find few differences across groups in their expectations of macroeconomic conditions. Firms in the treatment group that initially were quite uninformed about the RBNZ target have somewhat lower long-run forecasts of inflation (-0.4%) relative to their prior beliefs and the control group, less than half of the initial change in beliefs. For other variables, the effects are even smaller. Firms in the treatment group have marginally higher one-year ahead inflation forecasts and marginally lower forecasts of unemployment. Firms that were initially well-informed about the RBNZ target have economic forecasts that appear unaffected by the treatment after six months.

[12] Of the firms with initial beliefs about the target between 1 and 3 %, most were below 2%. This explains why their average inflation expectation rises slightly when told about the RBNZ's 2% inflation target. We find similar results when we estimate specifications (5.2) and (5.4) on the data generated in this experiment (see Appendix Table 4.4.).

[13] As documented in Appendix 1, there is little predictability in terms of which firms chose to participate in this follow-up wave and which did not.

Hence, while the provision of information about the RBNZ's target has relatively large contemporaneous effects on agents' inflation expectations, these effects are quite transitory, having largely dissipated within six months. One implication of this result is that successfully anchoring the expectations of economic agents requires a long-lived communication campaign by central bankers as one-time announcements are unlikely to have persistent effects on the beliefs of agents.

5.3 How Inflation Expectations Affect Firms' Actions

Ultimately, policymakers care about inflation expectations because models predict that they affect agents' decisions. While some evidence of this has been documented for households (e.g., Armantier et al. 2015), no equivalent evidence exists for how inflation expectations affect firms' decisions. The second experiment was designed to address this question. In wave 5, all managers were asked to provide forecasts of their expected price, employment, investment, unit cost, wage, and sales changes over the next six months. The follow-up wave, done six months later, then asked them to report the outcomes for each of these variables over the previous six months. Hence, for each firm, we can assess the extent to which their actions deviated from their ex-ante expectations, and whether firms in the treatment group did so in a systematic way relative to those in the control group. This design therefore should capture the causal effect, if any, of firms' revisions in inflation expectations (since their other expectations are largely unchanged) on their subsequent actions.

Table 6 reports the results for each group of firms in the treatment group (relative to the control group), namely those that initially were uninformed about the RBNZ target and sharply revised down their inflation expectations and those that were informed and slightly raised their inflation expectations. Firms in the group with high priors about the RBNZ's target had investment 2% below their ex-ante expectations and employment growth 3% lower over this six month period than firms in the control group. Given that inflation expectations for this group of firms were only 1% point lower on impact and that this effect had faded within six months, this points toward a high elasticity in investment and employment decisions to inflation expectations.[14] In contrast, we find few effects on prices, wages and unit costs: firms in the treatment group that significantly revised their inflation expectations downward had slightly lower prices and wages, but the effect is not generally statistically significant. Hence, the most direct effect of inflation expectations appears to be on firms' decisions about their desired quantities of inputs into the production process.

To our knowledge, this is the first direct *causal* evidence that inflation expectations meaningfully impact firms' economic decisions. Furthermore, the implied economic magnitudes for employment and investment are large. So the inattention that we observe in managers' inflation expectations is not due to the fact that inflation expectations play no role in their decisions. One implication for policymaking is that policies that are successful in changing managers' inflation expectations should be expected to have direct real effects, even more so than the nominal effects that are commonly emphasized. Knowing what types of communications strategies are likely to succeed, however, requires better understanding when and how firms seek out information on macroeconomic conditions, a point to which we now turn.

[14] Because we do not know whether (or if) managers revise their expectations about nominal interest rates when they revise their expectations of inflation, we cannot make a precise statement about the implied elasticity of employment and investment decisions with respect to perceived real interest rates.

6 How Do Firms Seek Out New Information?

To understand why some firms have more precise information about different economic variables than others, we first focus on which variables firms report as being important to their business decisions and how this correlates with the errors firms make about these variables. We then investigate which macroeconomic variables firms actually track and the ways in which they acquire information about economic conditions. Finally, we consider the degree of strategic complementarity and how this relates to their information acquisition decisions.

6.1 Which Variables Do Firms Care About?

In rational inattention models (e.g. Mackowiack and Wiederholt 2009, Afrouzi 2016), agents face limited information processing capacity and endogenously choose how to allocate these limited resources to tracking information which most matters for their objective function. In such a setting, one would expect firms to therefore have better information about recent values of the variables that affect their profits more. In the fourth wave of the survey, firms were asked to rank inflation, GDP and unemployment in terms of their importance for firms' business decisions. Approximately half of firms ranked inflation as the least important variable among the three while just over a third ranked it as most important. GDP was the most commonly top-ranked macroeconomic variable. We can utilize these firm rankings of the relative importance of different macroeconomic variables to determine whether a variable's relative importance to a firm's business decisions is reflected in the quality of the firm's information about that variable. For each possible pair of macroeconomic variables (among inflation, unemployment and GDP), we create two metrics to capture their relative importance to firm *i*. The first is a dummy variable equal to one if firm *i* identifies variable *X* as more important than variable *Y* and zero otherwise. The second is the difference between the rank of variable *X* and the rank of variable *Y*. Managers were also asked how much they would be willing to pay, per year, for forecasts on each macroeconomic variable, which provides a simple quantitative metric of how valuable (ex ante) information about each variable would be to firms. As illustrated in Panel A of Table 7, firms which rank inflation as more important than unemployment or GDP would be willing to pay twice as much (around 80 log points) more for inflation forecasts than for forecasts about either of these other variables.

We use the two rank metrics as explanatory variables in regressions where the dependent variable is either the relative uncertainty in forecasts about the two variables reported by firms, $\log(\sigma_i^X/\sigma_i^Y)$, or the relative size of backcast errors made by firms about the two variables, $\log\left(\frac{|B_t X_{t-h} - X_{t-h}|}{|B_t Y_{t-h} - Y_{t-h}|}\right)$. Note that given the structure of the survey, we compare uncertainty and inattention across variables within a firm so one can interpret these regressions as controlling for firm fixed effects.

Using either the relative uncertainty in forecasts (Panel B, Table 7) or the relative size of backcast errors (Panel C, Table 7) as well as either metric for the relative rank of two macroeconomic variables, we find robust evidence that when firms rank one variable as more important than another for their business decisions, then they tend to have better knowledge of recent dynamics of that variable and have less uncertain forecasts of that variable.[15] The only exception is when comparing the effect of UE and GDP relative ranks on the relative

[15] We find similar qualitative evidence if we use the relative willingness to pay for each variable as dependent variable (Appendix Table 4.3).

uncertainty surrounding firms' forecasts of these variables, in which case the estimates are not significantly different from zero (they are statistically significant in the case of relative backcast errors). Jointly, these results are supportive of rational inattention channels through which firms have better knowledge of those variables which matter for their objective functions.

6.2 Which Variables Do Firms Track and How?

Better knowledge of those variables which matter more for firms' business decisions could reflect an endogenous information acquisition decision or it could reflect stronger procyclicality in a firm's production. To assess whether the previous results reflect firms choosing to collect more information about specific macroeconomic variables, we asked them to identify which macroeconomic variables (out of inflation, unemployment and GDP) they keep track of. Approximately 60 percent of firms report that they do not track inflation, compared to only 21 percent of firms that report not tracking GDP.[16] Hence, consistent with what firms reported about the relative importance of macroeconomic variables to their business decisions, inflation is tracked by a much smaller fraction of firms than real variables like GDP. In fact, the modal answer (32% of firms) is that they track both unemployment and GDP but not inflation. Conditional on tracking multiple variables, the vast majority of firms (over 90%) try to synchronize their acquisition of information across the variables they track. This feature of the data is strongly predicted by the canonical sticky information model where updates of information are perfectly synchronized across variables. It is also consistent with noisy information models in which firms track variables continuously and thus obtain new information about macroeconomic aggregates at the same time.

The mapping between firms' answers as to which variables they track and the relative importance of different macroeconomic variables is summarized in Table 8 and illustrates the consistency of answers across these questions. For example, of the firms that reported that inflation was the most important out of the three macroeconomic variables for their business decisions, 99% of them reported that they track inflation. Similarly, 98% of the firms that ranked inflation as the least important of the three macroeconomic variables choose not to track inflation dynamics. Firms which rank inflation highest are willing to pay more than twice as much for inflation forecasts as firms which rank inflation as least important. Interestingly, of the firms that rank inflation as second most important to their business decisions, only one in five actually report tracking inflation. This is significantly at odds with what we observe for unemployment and GDP, where even among firms ranking these variables as least important, around 50% of them still track that variable. In the same spirit, there is significantly less variation in willingness to pay for unemployment or GDP forecasts than there is for inflation forecasts.

These answers do not appear to be cheap talk on the part of firms, as the answers that they provide are very strongly associated with the forecasts and backcasts that they report. Table 8 also presents the mean size of backcast errors for each variable depending on whether firms reported tracking that variable or not, as well as corresponding mean forecasts and mean uncertainty around the forecasts. There are pronounced differences between firms that report tracking a variable and those that do not, especially for inflation. Firms that track inflation have average absolute backcast errors of approximately one percentage point compared to an average error of five percentage

[16] A full breakdown on responses is given in Appendix Table 4.5.

points for those which do not track inflation.[17] Differences in average forecasts of inflation are also very pronounced: firms that track inflation have an average year-ahead forecast of 3.3% while those that do not track inflation forecast inflation of 5.9% on average with higher levels of uncertainty around their forecasts. Thus, the endogenous decisions of firms as to whether or not to track a macroeconomic variable have profound consequences on their knowledge about this variable's recent dynamics and future values.

One can also relate a firm's decision about whether or not to track inflation or the relative rank of inflation in terms of their business decisions to observable and time-invariant characteristics of firms and managers, as done in section 4.3 to explain the size of errors about recent inflation made by firms. Because inflation backcast errors and a firm's decision about whether or not to track inflation are so highly correlated, the results are qualitatively similar (see Appendix Table 4.2) in that rational inattention forces go a long way in accounting for how important firms view inflation or whether they track inflation. Firms facing fewer competitors and those for which foreign sales account for a larger share of revenues are less likely to track inflation and view inflation as important to their business decisions. Thus, much of the cross-sectional variation in firms' knowledge of inflation dynamics can be reconciled with rational inattention motives.

In addition to choosing which macroeconomic variables to track and whether to synchronize their updating about different variables, firms must decide when to collect new information. To better try and understand the circumstances that induce firms to seek out information, we presented them with two hypothetical questions. One was if they heard *bad* news about the economy on TV, would they be more or less likely to look for more information? This question targets whether there is state-dependence in the acquisition of information (if they say it is more likely), or whether information updating is time-dependent (if they say it makes no difference). The results (Appendix Table 4.6) strongly support state-dependence in the information updating process: over 75% of firms report that they are much more likely or somewhat more likely to seek our new information when they receive bad news about the economy. This evidence is in line with the lower levels of information rigidity found during recessions in Coibion and Gorodnichenko (2015b).

The second question firms were asked was if they heard *good* news about the economy on TV, would they be more or less likely to look for more information? This question targets not just state-dependence of information acquisition but also its symmetry. The results are the opposite of those found in response to bad economic news: over 60% of firms report that they are much less or somewhat less likely to seek out more information in response to good economic news. This evidence points toward an asymmetry in firms' information acquisition over the course of the business cycle, with firms actively looking for more information during downturns when news are bad but relying on their outdated information during booms when news are good.

6.3 Strategic Complementarity

Another important channel emphasized in the literature on firms' information acquisition is strategic complementarity in price setting (e.g. Afrouzi 2016, Hellwig and Veldkamp 2009). When firms place more

[17] Even if a firm tracks inflation closely, we should still not expect backcast errors to be zero as there are several additional sources of error. One is the fact that not all of the data is available at the time of the survey, so even an agent who knew all of the recently available data would not know the contemporaneous values. E.g. if we ask someone by how much prices have changed over the last twelve months, they would not be able to rely on reported inflation rates for the most recent few months (delays are particularly long in New Zealand, as inflation reports are released quarterly and with significant delays). Another source of error is rounding: most managers report integer values.

weight on the decisions of others, this should affect their information acquisition decisions as well. For example, firms with higher levels of strategic complementarity should prefer to receive signals which are received by others ("common signal") over signals that are available only to themselves ("private signal"), since the common signal also provides information about the likely actions of other firms.

Our survey data allows us to measure one important component of the strategic complementarity faced by firms, namely how sensitive their revenues are to competitors' price changes, by asking them the following hypothetical question: "Suppose a typical firm in your industry cuts its price by 10%, by how much would your sales be affected?" The average response to this question is a decline in sales of 7%. We can also determine firms' preferences for signals which only they observe versus signals received by other firms by asking firms which signal they would prefer. 75 percent of firms reported that they would prefer to receive the common signal. To assess whether higher levels of strategic interaction lead firms to prefer public signals, we regress one on the other and present results in Panel A of Table 9. Regardless of whether we control for industry fixed effects or include firm-specific and manager-specific controls, we find a robust positive correlation between the firms' degree of strategic complementarity and their preference for a common signal. This provides unique and direct evidence for the effects of strategic interaction on firms' choice of signals, as emphasized in Hellwig and Veldkamp (2009).

A related prediction from Gorodnichenko (2008) is that firms facing uncertainty about the state will tend to wait for other firms to act instead of immediately changing their prices when there is strategic complementarity in price setting, since they can extract information about the state from the actions of others. Firms in the survey were asked "Suppose you want to adjust your prices but are uncertain about the state of the economy, what would you do?" Firms selecting the answer "wait until other firms make a price adjustment" would then be acting in the way predicted by the model. Using a dummy variable equal to one when firms select this answer and zero otherwise, we find (Panel B of Table 8) that firms with higher levels of strategic complementarity are more likely to report that they would prefer to wait for other firms to adjust their prices, as predicted by the theory. This supports theories of inertia in prices that rely on the notion that information from other firms' prices does not rapidly diffuse through the economy because each firm is waiting for others to adjust their prices first.

A third implication of this class of models is that, when strategic complementarity is high, another firm's price change is more informative about aggregate conditions than when strategic complementarity is low. This is because other firms also have an incentive to wait to change their prices and therefore tend to do so only when they have strong information about the economy. As a result, firms should draw stronger inferences from the price changes of others when everyone has an incentive to delay their own actions. We can assess this prediction using another question from the survey: "Suppose your main competitor raises its price by 10%, by how much would you revise your expectation of inflation over the next twelve months?" We regress answers to this question on the dummy variable for whether firms prefer to wait until other firms change their prices. The results, in Panel C of Table 8, point toward a significantly positive correlation between firms' desire to wait for other firms to change prices first and the inference they draw from their competitors' price changes, in line with theory.

These results therefore provide novel and direct evidence for models in which the gradual diffusion of information and price stickiness interact to delay the response of the economy to shocks when strategic complementarity is high. The latter induces firms to focus on public signals and rely on other firms' price changes as a source of information. As firms become more reticent to change prices, any firm that does change its price

is providing a stronger signal to other firms about fundamentals. Each of these channels is supported by the survey data in a direct and transparent manner that illustrates the usefulness of surveys of firms.

7 Conclusion

Using a novel survey of firms' macroeconomic expectations, we document a number of new stylized facts about firms' beliefs. One such fact is that disagreement among firms is pervasive and much larger than that among professional forecasters, both about past and future macroeconomic conditions. This disagreement about macroeconomic conditions resembles that among households along a number of dimensions, such as its size, its persistence, and its asymmetry. Twenty five years after the Reserve Bank of New Zealand became the first country to officially adopt an inflation target, we find little evidence that firms fully grasp the stability that has characterized inflation dynamics in New Zealand.

Inattention among firms varies along some dimensions predicted by theory. Specifically, much of the inattention to macroeconomic conditions appears related to firms' incentives to collect and process information, as predicted by models of rational inattention in which firms face costs or frictions in collecting and processing information. For example, firms facing more competition or important pricing decisions in the near future have better information about inflation. And firms facing steeper profit functions, for which information should thus be more valuable, also have better information on average.

While we document pervasive inattention by firms to different macroeconomic variables, aggregate inflation stands out as the variable about which firms seem least well-informed on average. Many firms view inflation as relatively unimportant to their business decisions and choose not to track its recent values, leading to large misperceptions about recent inflation dynamics and forecasts that are far out of line with historical values, even though they display significant knowledge about industry-specific price changes. While firms respond in a Bayesian manner to new information about inflation and incorporate this information into their economic decisions, they seem to find little incentive to seek out this information themselves, except when news reports are negative. Since negative news reports about inflation tend to occur when inflation is unusually high, this may account for why firms' average beliefs about inflation, like those of households, are frequently higher than those of professional forecasters.

One potential implication of these results is that firms' expectations, especially about inflation, may not be nearly as well "anchored" as has been recently emphasized (e.g. Bernanke 2010), as developed further in Kumar et al. (2015). This could be problematic for policymakers for a number of reasons. First, there is little data currently available on firms' expectations for policymakers to track. Second, the wide dispersion in firms' and households' beliefs suggests that the average degree of inattention to economic conditions, and especially inflation trends, is high among these agents. To the extent that monetary policymakers have recently been relying upon policies whose key transmission mechanism is supposed to be inflation expectations, the outlook for such policies working effectively is likely limited unless policymakers find an efficient way to transmit this information to economic agents. Third, the willingness of monetary policymakers to engage in non-traditional actions at the zero-bound hinges on their view that agents' expectations are well-anchored, leaving little concern about expectations becoming unmoored in the long-run. But if expectations are not nearly as anchored as posited by policymakers, then the potential risks of these policies may well have been underestimated.

References

Afrouzi, Hassan, 2016. "Strategic Inattention, Inflation Dynamics and the Non-Neutrality of Money," manuscript.

Andrade, Philippe, and Herve Le Bihan, 2013. "Inattentive Professional Forecasters." *Journal of Monetary Economics* 60(8), 967-982

Alvarez, Fernando E., Francesco Lippi, and Luigi Paciello, 2011. "Optimal Price Setting with Observation and Menu Costs," *Quarterly Journal of Economics* 126, 1909-1960.

Armantier, Olivier, Scott Nelson, Giorgio Topa, Wilbert van der Klaauw, and Basit Zafar, 2016. "The Price is Right: Updating Inflation Expectations in a Randomized Price Information Experiment," *Review of Economics and Statistics* 98(3), 503-523.

Armantier, Olivier, Wändi Bruine de Bruin, Giorgio Topa, Wilbert Klaauw, and Basit Zafar, 2015. "Inflation Expectations And Behavior: Do Survey Respondents Act On Their Beliefs?" *International Economic Review* 56(2), 505-536.

Bachmann, Rudiger, and Steffen Elstner, 2013. "Firms' Optimism and Pessimism," manuscript.

Bernanke, Ben, 2007. "Inflation Expectations and Inflation Forecasting," speech delivered at the Monetary Economics Workshop of the National Bureau of Economic Research Summer Institute, Cambridge, Massachusetts, July 10, 2007.

Bernanke, Ben, 2010. "The Economic Outlook and Monetary Policy," speech delivered at the Federal Reserve Bank of Kansas City Economic Symposium, Jackson Hole, Wyoming, August 27, 2010.

Bryan, Michael F., Brent H. Meyer, and Nicholas B. Parker, 2015. "The Inflation Expectations of Firms: What Do They Look Like, Are They Accurate, and Do They Matter?" Bank of Atlanta Working Paper 2014-27a.

Bruine de Bruin, W., W. van der Klaauw, G. Topa, J. S. Down, and O. Armantier, 2012. "The effect of question wording on consumers' reported inflation expectations," *Journal of Economic Psychology* 33, 749-757.

Carroll, Christopher D. 2003. "Macroeconomic Expectations of Households and Professional Forecasters," *Quarterly Journal of Economics* 118(1), 269-298.

Carvalho, Carlos and Fernanda Nechio, 2014. "Do People Understand Monetary Policy?" *Journal of Monetary Economics* 66(C), 108-123.

Cavallo, Alberto, Guillermo Cruces and Ricardo Perez-Truglia , 2016. "Inflation Expectations, Learning, and Supermarket Prices: Evidence from Field Experiments," forthcoming in *American Economic Journal: Macroeconomics*.

Central Bank of Iran, 2016. "Results of a Survey from Owners and Managers of Industrial Firms in Iran," Special Report, Department of Statistics.

Coibion, Olivier, and Yuriy Gorodnichenko. 2012. "What Can Survey Forecasts Tell Us About Informational Rigidities?" *Journal of Political Economy* 120, 116-159.

Coibion, Olivier, and Yuriy Gorodnichenko. 2015a. "Is the Phillips Curve Alive and Well After All? Inflation Expectations and the Missing Disinflation," *American Economic Journal – Macroeconomics* 7, 197-232

Coibion, Olivier, and Yuriy Gorodnichenko. 2015b. "Information Rigidity and the Expectations Formation Process: A Simple Framework and New Facts," *American Economic Review* 105(8), 2644–2678.

Coibion, Olivier, and Yuriy Gorodnichenko. 2015c. "Inflation Expectations in Ukraine: A Long Path to Anchoring?" *Visnyk of the National Bank of Ukraine* 223(2015), 6-21

Drager, Lena and Ulrich Fritsche, 2013. "Don't Worry, Be Right! Survey Wording Effects on Inflation Perceptions and Expectations," DEP Discussion Papers, Macroeconomics and Finance Series, 8/2013.

Eggertsson, Gauti B. and Michael Woodford, 2003. "The Zero Bound on Interest Rates and Optimal Monetary Policy," *Brookings Papers on Economic Activity* 2003(1), 139-211.

Engelberg, Joseph, Charles F. Manski, and Jared Williams, 2009. "Comparing the Point Predictions and Subjective Probability Distributions of Professional Forecasters," *Journal of Business and Economic Statistics* 27(1), 30-41.

Gorodnichenko, Yuriy. 2008. "Endogenous Information, Menu Costs, and Inflation Persistence," NBER Working Paper no. w14184.

Jonung, Lars, 1981. "Perceived and Expected Rates of Inflation in Sweden," *American Economic Review* 71(5), 961-968.

Hellwig, Christian, and Laura Veldkamp, 2009. "Knowing What Others Know: Coordination Motives in Information Acquisition," *Review of Economic Studies* 76(1), 223-251.

Krugman, Paul R., 1999. "It's Baaack: Japan's Slump and the Return of the Liquidity Trap," *Brookings Papers on Economic Activity* 1999(2), 137-87.

Kumar, Saten, Hassan Afrouzi, Olivier Coibion, and Yuriy Gorodnichenko, 2015. "Inflation Targeting Does Not Anchor Inflation Expectations: Evidence from Firms in New Zealand," *Brookings Papers on Economic Activity* 2015(2), 151-225.

Lucas, Robert E. 1972. "Expectations and the Neutrality of Money." *Journal of Economic Theory* 4, 103-124.

Mackowiak, Bartosz and Mirko Wiederholt. 2009. "Optimal Sticky Prices under Rational Inattention." *American Economic Review* 99, 769-803.

Mankiw, N. Gregory and Ricardo Reis. 2002. "Sticky Information Versus Sticky Prices: A Proposal to Replace the New Keynesian Phillips Curve." *Quarterly Journal of Economics* 117, 1295-1328.

Mankiw, N. Gregory, Ricardo Reis, and Justin Wolfers. 2003. "Disagreement about Inflation Expectations." *NBER Macroeconomics Annual 2003*, Cambridge, MIT Press, 18: 209-248, 2004.

Reis, Ricardo, 2006. "Inattentive Producers," *Review of Economic Studies* 73(3), 793-821.

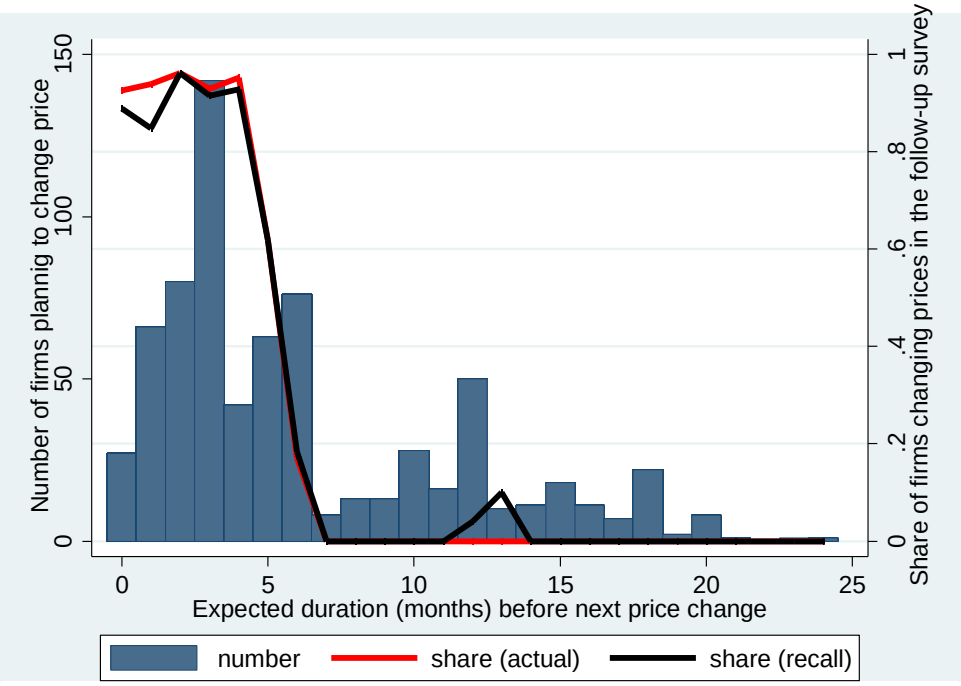
Sims, Christopher A. 2003. "Implications of Rational Inattention." *Journal of Monetary Economics* 50, 665-690.

Taylor, J.B., 1980 "Aggregate Dynamics and Staggered Contracts," *Journal of Political Economy* 88(1), 1-23.

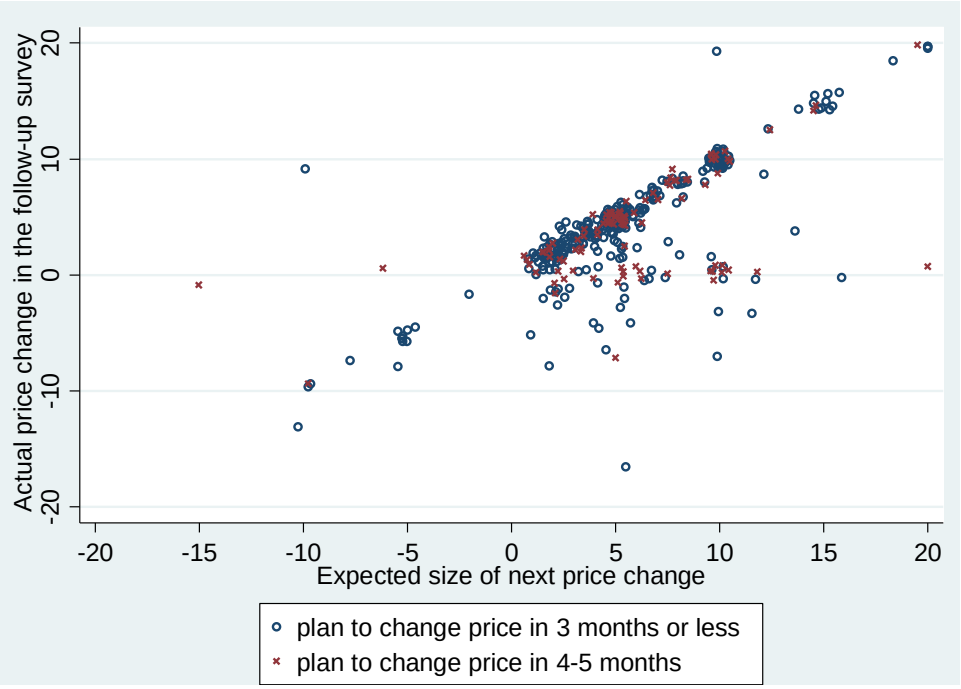
Woodford, Michael. 2001. "Imperfect Common Knowledge and the Effects of Monetary Policy." published in P. Aghion, R. Frydman, J. Stiglitz, and M. Woodford, eds., *Knowledge, Information, and Expectations in Modern Macroeconomics: In Honor of Edmund Phelps*, Princeton Univ. Press, 2002.

Figure 1: Firms' Expected and Actual Price Changes.

Panel A: Expected Durations until Price Change

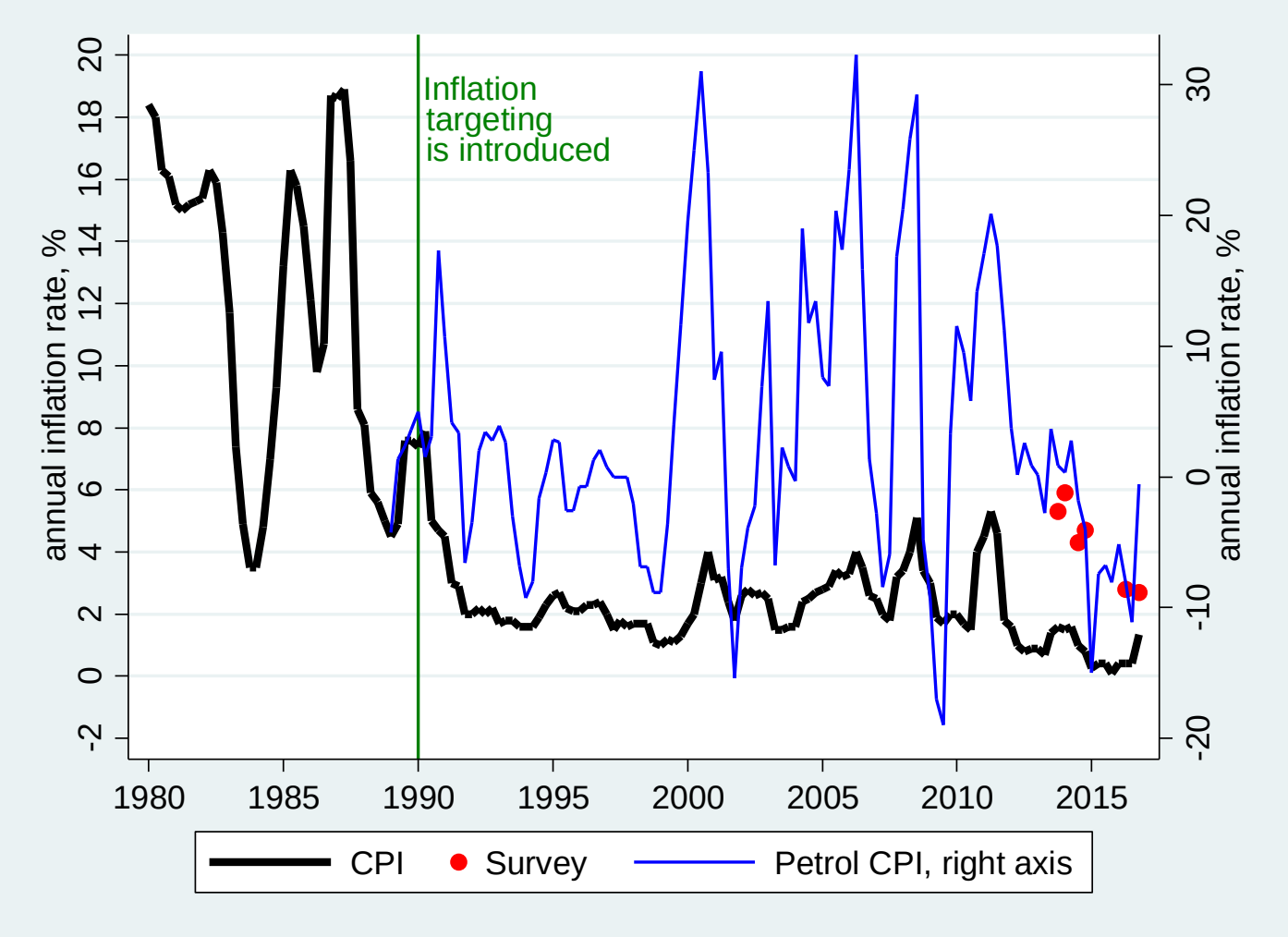


Panel B: Expected Size of Price Changes



Notes: In Panel A, the bars (left axis) show the number of firms reporting a given expected duration before next price change in the first wave. The lines show the fraction of firms that actually adjusted their prices between the first and second waves, grouped by each duration. The red line measures changes in prices as the difference in current prices reported in the two waves. The black line measures changes in prices as the change between the current price reported in the second wave and the previous price reported in the second wave. The previous price is the price 3 months ago for firms surveyed in December 2013 or January 2014 and 6 months ago for firms surveyed in September 2013, October 2013, or November 2013. Panel B plots firms' expectation of the size of their next price change (in %) as reported in the first wave (*x*-axis) versus firms' actual percentage change in price between the first and second waves (*y*-axis) for firms that reported that they expected to change prices within the next five months. Circles and crosses indicate the expected duration (reported in the first wave) before the next price change. See section 2 for details.

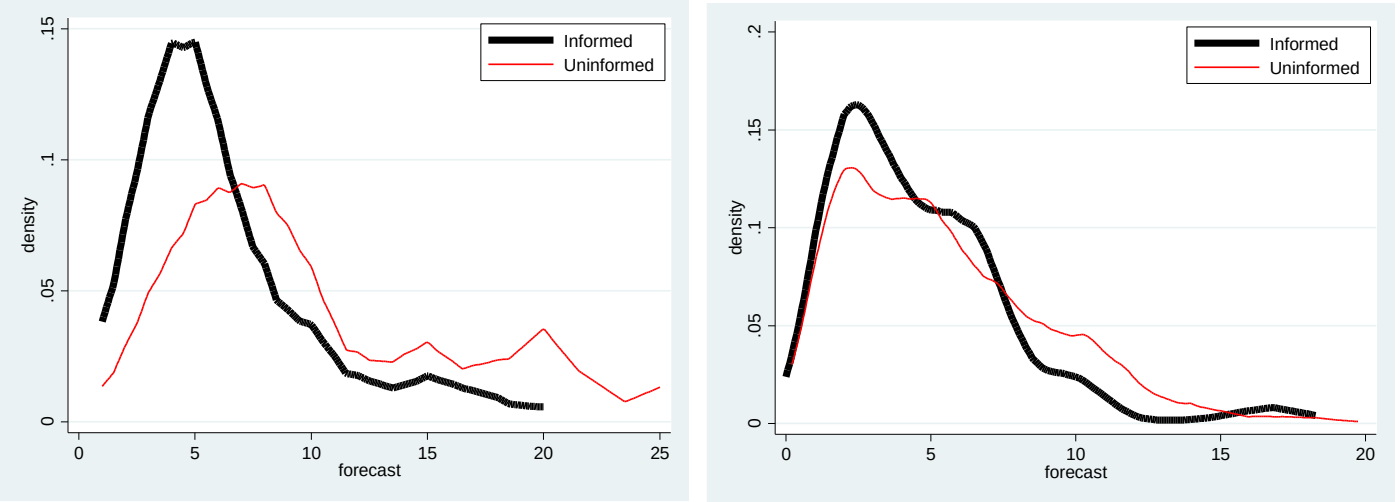
Figure 2: Inflation in New Zealand.



Notes: The figure plots annual CPI inflation in New Zealand, inflation rate for petrol products, and mean inflation expectations reported in six survey waves.

Figure 3: Distribution of Inflation Expectations across Firms.

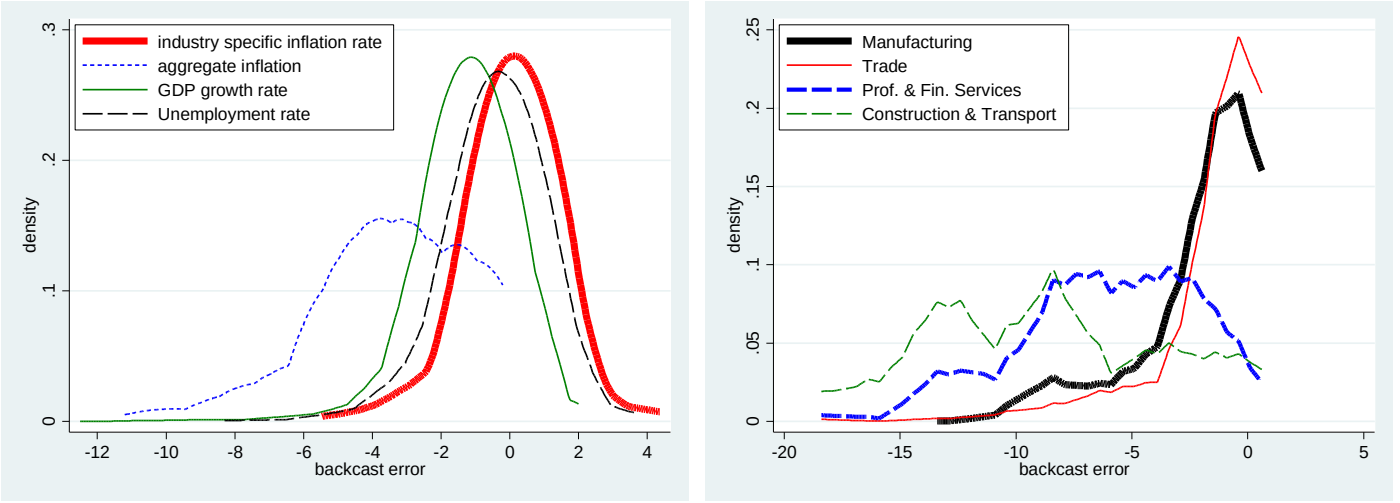
Panel A: Wave #1 ⟹ Wave #1 Panel B: Wave #1 ⟹ Wave #4



Notes: The two panels plot distributions of firms' inflation forecasts over the next twelve months. Panel A plots the distribution for "informed" firms (those with errors about recent inflation were less than 2% points) versus "uninformed" firms in the first wave. Panel B plots equivalent distributions in the fourth wave of the survey, but continuing to identify "informed" and "uninformed" firms based on the size of their backcast errors in the first wave. Sample weights are used for both panels. See section 4.2 for details.

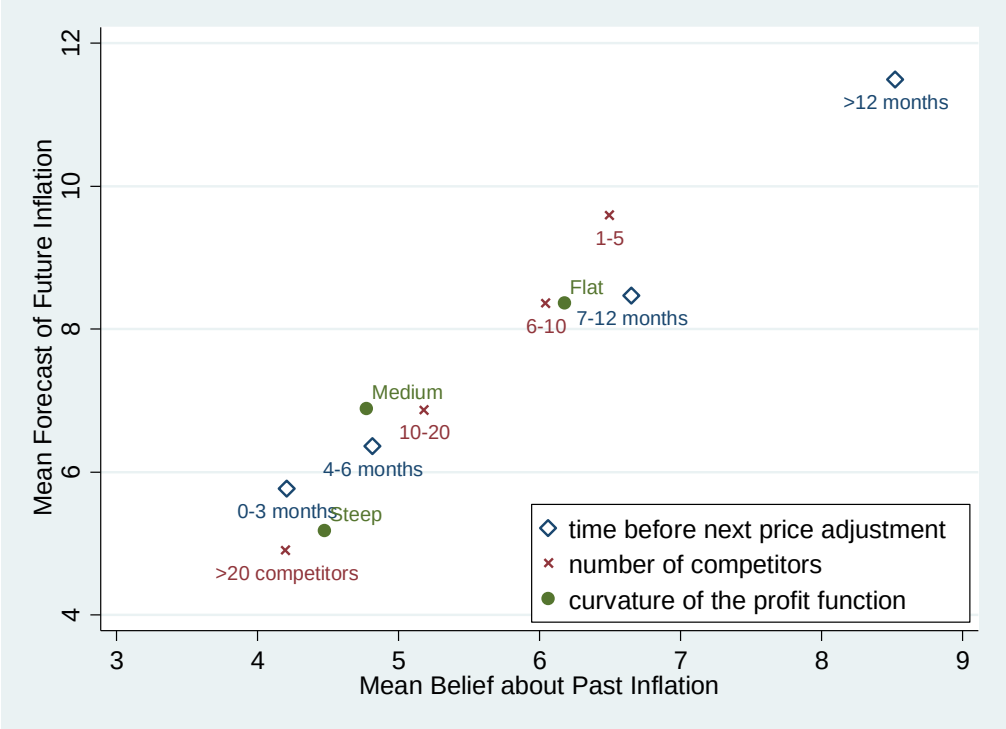
Figure 4: Distributions of Errors about Recent Macroeconomic Conditions

Panel A: Errors about Different Macroeconomic Variables *Panel B: Inflation Errors by Industry*



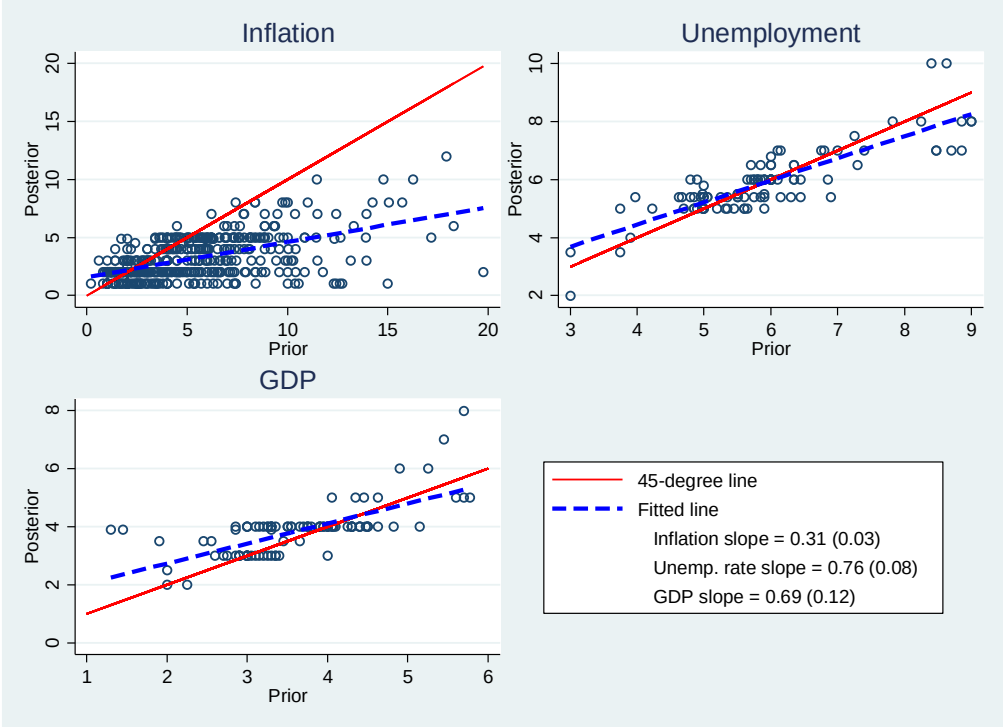
Notes: Panel A plots kernel density estimates of distributions of errors about recent values of different macroeconomic variables made by firms. Panel B plots kernel density estimates of the distribution of errors about recent inflation made across different industries. Sample weights are used for both panels. See section 4.2 for details.

Figure 5: Inflation Backcasts and Forecasts by Firm Characteristic



Notes: The figure plots mean backcasts and forecasts of inflation for firms grouped by firm characteristics in the first wave. One grouping is by number of months until next expected price change, a second grouping is by the number of competitors, and the third grouping is by the tercile of the distribution of the steepness of the profit function. See section 4.3 for details.

Figure 6. Forecast Updating by Firms upon Receiving New Information.



Notes: Each panel plots initial forecasts of firms in wave 4 ("prior") against their revised forecasts ("posterior") after being provided with new information. Panels include the 45 degree line and regression lines. Each panel is for forecasts of individual macroeconomic variable. See section 5 for details.

Table 1: Macroeconomic Forecasts of Firms and Other Economic Agents.

	Recent data	12-Month Ahead Forecasts, percent									Nowcasts/Backcasts, percent					
		Central Bank	Professional Forecasters		Households			Firms			Households			Firms		
			Mean	Std	Mean	Med.	Std	Mean	Med.	Std	Mean	Med.	Std	Mean	Med.	Std
	Survey Date: 2013Q4 (Wave I, #obs: 3,144)															
Inflation	1.4	1.3	2.0	0.2	3.6	3.0	2.4	5.3	4.0	3.2	3.08	2.5	2.0	4.4	3.0	3.5
	Survey Date: 2014Q1 (Wave II, #obs 712)															
Inflation	1.6	1.9	2.0	0.3	3.7	3.0	2.1	6.1	5.0	2.7	2.9	2.5	1.8	5.5	5.0	3.3
Unempl.	5.6	4.9	5.3	0.3	n.a.	n.a.	n.a.	5.2	5.0	0.7	n.a.	n.a.	n.a.	6.5	6.3	1.4
GDP growth	1.7	3.5	3.4	0.5	n.a.	n.a.	n.a.	3.1	3.2	0.7	n.a.	n.a.	n.a.	n.a.	n.a.	n.a
	Survey Date: 2014Q3 (Wave III, #obs 1,601)															
Inflation	1.6	1.6	1.9	0.2	3.5	3.0	2.4	4.1	4.0	2.5	2.9	2.5	2.0	n.a.	n.a.	n.a.
	Survey Date: 2014Q4 (Wave IV, # obs 1,257)															
Inflation	1.0	1.1	1.7	0.3	3.1	3.0	2.0	4.5	4.0	2.8	2.9	2.5	2.2	3.9	4.0	2.4
Unempl.	5.2	5.2	5.2	0.3	n.a.	n.a.	n.a.	5.9	5.9	1.2	n.a.	n.a.	n.a.	6.1	6.0	1.2
GDP growth	3.4	3.5	3.0	0.3	n.a.	n.a.	n.a.	3.6	3.5	1.0	n.a.	n.a.	n.a.	3.7	3.5	1.2
	Survey Date: 2016Q2 (Wave V, #obs 2,040)															
Inflation	0.4	1.6	1.3	0.2	2.3	2.0	2.1	2.8	2.0	2.3	1.8	2.0	1.5	2.6	2.0	2.1
Unempl.	5.2	5.2	5.5	0.2	n.a.	n.a.	n.a.	5.5	5.5	0.6	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
GDP growth	3.9	3.4	2.6	0.3	n.a.	n.a.	n.a.	2.7	2.6	0.5	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	Survey Date: 2016Q4 (Wave VI, #obs 1,404)															
Inflation	0.4	1.7	1.6	0.2	2.8	2.0	2.6	2.7	2.0	2.4	2.4	2.0	2.4	n.a.	n.a.	n.a.
Unempl.	4.9	4.7	4.8	0.3	n.a.	n.a.	n.a.	5.5	5.5	0.6	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
GDP growth	4.1	3.4	3.0	0.4	n.a.	n.a.	n.a.	2.4	2.0	0.6	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Notes: The table reports recent values, forecasts and the dispersion in forecasts, as well as nowcasts/backcasts (beliefs about values of each variable for the current quarter) of different macroeconomic variables for different agents. "Inflation" refers to annual changes in prices (CPI when specified), "Unemployment" refers to the unemployment rate at a specific quarter, "GDP growth" refers to annual changes in real GDP. "Central Bank" forecasts are from Monetary Policy Statements of the Reserve Bank of New Zealand. "Professional Forecasters" are from Consensus Economics. "Households" are from the Reserve Bank of New Zealand's Survey of Households. The inflation forecasts of households are trimmed by the Reserve Bank of New Zealand and exclude all forecasts of inflation above 15% and below -2%, so same trimming is applied to firms' inflation forecasts for comparison. Other firm forecasts are unadjusted. Moments for firms and households are calculated using sampling weights. See section 3.1 for details.

Table 2: Beliefs about Future and Past Values of Macroeconomic Variables.

Variables	No firm fixed effects	Firm fixed effects
	(1)	(2)
Inflation rate, aggregate	0.339***	0.286***
	(0.025)	(0.044)
N	5,130	3,531
R^2	0.389	0.730
Inflation rate, industry	1.038***	
	(0.014)	
N	1,154	
R^2	0.959	
Unemployment rate	0.863***	0.758***
	(0.012)	(0.091)
N	1,842	770
R^2	0.826	0.828
GDP growth rate	0.909***	
	(0.010)	
N	1,194	
R^2	0.928	
Exchange rate	0.998***	
	(0.002)	
N	1,035	
R^2	0.994	

Notes: The table reports Huber-robust estimates of firms' 12-month-ahead forecasts of a given variable—indicated in the left column—on the backcast (over previous 12 months) or nowcast of the variable. Nowcasts are used for the unemployment rate and the exchange rate. Sub-industry fixed effects (defined as in Table 1) are included but not reported. In column (1), a constant term is included but not reported. Column (2) reports results for the specification when data are pooled across waves and firm fixed effects are included. *Aggregate inflation* uses data from waves 1, 2, 4, and 5. *Unemployment rate* uses data from waves 1 and 2. *Industry inflation rate*, *GDP growth rate*, and *Exchange rate* use data from wave 4. Robust standard errors (clustered at the 3-digit ANZ SIC level) are reported in parentheses.***,**, * denotes statistical significance at 1%, 5%, and 10% levels respectively. See section 4.1 for details.

Table 3. Determinants of Firm Inattention.

	(1)	(2)	(3)
Firm characteristics			
Log(Age)	0.114***		0.175***
	(0.031)		(0.059)
Log(Employment)	0.384***		0.486***
	(0.061)		(0.074)
Labor's share of costs	-0.005		-0.005
	(0.004)		(0.005)
Foreign trade share	0.009***		0.011***
	(0.003)		(0.004)
Number of Competitors	-0.006***		-0.005**
	(0.002)		(0.003)
Avg. margin	0.002		0.003
	(0.004)		(0.003)
Price rel. to competitors	0.003		0.001
	(0.003)		(0.003)
Firm's past price changes	-1.165***		-0.872**
	(0.264)		(0.364)
Industry PPI inflation	-0.011		-0.015**
	(0.007)		(0.007)
Expected size of price change	-0.002		-0.001
	(0.003)		(0.004)
Duration until price change	0.028***		0.029**
	(0.009)		(0.013)
Abs. slope of profit function	-0.203***		-0.323***
	(0.044)		(0.059)
Manager characteristics			
Age		-0.002	-0.003
		(0.003)	(0.004)
Education:			
Some college		0.032	0.073
		(0.069)	(0.066)
College		0.064	0.086
		(0.069)	(0.084)
Graduate (MA+)		-0.058	-0.065
		(0.078)	(0.092)
Tenure		0.029***	-0.013
		(0.006)	(0.008)
Income		0.000	-0.000
		(0.001)	(0.001)
Industry FE	Y	Y	Y
N	2,912	1,332	1,338
R^2	0.799	0.828	0.834

Notes: The table reports results for the Huber robust regression. Dependent variable is the absolute value of firm errors about past 12-month inflation from Wave #1 survey. Industry fixed effects are defined as in Table 1. Omitted category for manager's education is" high school diploma or less." Sample weights are applied to all specifications. Robust standard errors (clustered at the 3-digit ANZ SIC level) are reported in parentheses. ***,**, * denotes statistical significance at 1%, 5%, and 10% levels respectively. See section 4.3 for details.

Table 4: Persistence of Inattention.

Dependent variable: abs. error in the follow-up surveys	
Panel A: Inflation over the previous 12 months, Wave #2	
Abs. error for inflation in Wave #1	0.744***
	(0.026)
Observations	667
R^2	0.719
Panel B: Inflation over the previous 12 months, Wave #4	
Abs. error for inflation in Wave #1	0.410***
	(0.018)
Observations	1,211
R^2	0.554
Panel C: Output Gap, Wave #2	
Abs. error for output gap in Wave #1	0.994***
	(0.004)
Observations	569
R^2	0.981
Panel D: Unemployment rate, Wave #4	
Abs. error for unemployment rate in Wave #2	0.771***
	(0.026)
Observations	441
R2	0.794

Notes: The table reports Huber-robust regressions of firms' absolute errors for inflation over the last twelve months (Panels A and B), the contemporaneous output gap (Panel C), and contemporaneous unemployment rate (Panel D) in waves 1, 2, and 4 on firms' errors over the same variables in waves 1 and 2. Sample weights are used in all specifications. Constant is included but not reported. Robust standard errors (clustered at the 3-digit ANZ SIC level) are reported in parentheses. ***,**, * denotes statistical significance at 1%, 5%, and 10% levels respectively. See section 4.2 for details.

Table 5. Information updates.

Information source:	Inflation						Unempl.	GDP
	pool	SPF	CB target	CB target + SPF	π_{t-1}	$\overline{E_{-\iota}\pi_{t+12}}$	$UE_{t,t-12}$	$GDP_{t,t-12}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A. Dependent variable: posterior p_i								
Prior, μ_i	0.339***	0.309***	0.228***	0.284***	0.282***	0.567***	0.647***	0.565***
	(0.021)	(0.062)	(0.047)	(0.038)	(0.041)	(0.033)	(0.042)	(0.067)
Observations	500	100	100	100	100	100	98	99
R-squared	0.375	0.319	0.195	0.273	0.347	0.676	0.737	0.498
Panel B. Dependent variable: scaled revision of posterior: $\frac{p_i-\mu_i}{s-\mu_i}$								
Uncertainty, σ_i	0.058***	0.065*	-0.024	0.041*	0.036***	0.140***	0.294**	-0.471**
	(0.012)	(0.036)	(0.023)	(0.021)	(0.013)	(0.027)	(0.136)	(0.178)
Observations	448	86	78	91	89	98	81	80
R-squared	0.082	0.021	0.011	0.028	0.029	0.118	0.040	0.055

Notes: Panel A reports results for specification (4.3) where the dependent variable is the posterior point prediction of the variable indicated in the first row of the table and the regressor is the prior, i.e. the point prediction implied by the reported probability distribution for the corresponding variable. The prior is the belief of a firm *before* the firm is presented with additional information. The posterior is the belief of a firm *after* the firm is presented with additional information. Fixed effects for source of information are included in column (1) but not reported. Panel B reports result for specification (4.4) where the dependent variable is the revision in beliefs (posterior minus prior) scaled by the difference between the signal s and the prior for the variable indicated in the first row of the table. The posterior and prior are defined as in Panel A. The regressor is the standard deviation implied by the probability distribution for the corresponding variable. Fixed effects for source of information are included in column (1) but not reported. To minimize the effects of extreme observations, the sample in each column is constrained to include only observations with $\left|\frac{p_i-\mu_i}{s-\mu_i}\right| \leq 2$. Huber robust regression is used for all specifications. Robust standard errors are reported in parentheses. ***,**, * denotes statistical significance at 1%, 5%, and 10% levels respectively. See section 5 for more details.

Table 6. Effects of information about RBNZ target on firms' choice.

Variable	No controls for firm characteristics		Controls for firm characteristics	
	High prior about RBNZ target (4 or more percent)	Low prior about RBNZ target (1 to 3 percent)	High prior about RBNZ target (4 or more percent)	Low prior about RBNZ target (1 to 3 percent)
	(1)	(2)	(3)	(4)
Forecast error in firm-level outcome				
Sales growth	0.044	0.202	0.032	0.227
	(0.301)	(0.336)	(0.306)	(0.350)
Wage growth	-0.112	-0.037	-0.121*	-0.046
	(0.069)	(0.055)	(0.072)	(0.055)
Unit cost growth	-0.069	0.287*	-0.142	0.285*
	(0.107)	(0.168)	(0.112)	(0.161)
Investment	-1.954*	0.222	-2.129*	0.227
	(1.075)	(0.582)	(1.125)	(0.597)
Employment growth	-2.925***	-0.001	-3.544***	-0.043
	(0.949)	(0.411)	(1.007)	(0.552)
Price change	-0.103	0.025	-0.095	0.031
	(0.077)	(0.116)	(0.077)	(0.117)
Change in expectations immediately after treatment				
One-year ahead inflation	-1.271***	0.475***	-1.212***	0.467***
	(0.220)	(0.162)	(0.208)	(0.151)
Five-year ahead inflation	-0.892***	-0.108	-0.960***	-0.147
	(0.182)	(0.161)	(0.202)	(0.162)
One-year ahead unemployment	0.046	-0.173	0.100	-0.190
	(0.116)	(0.133)	(0.127)	(0.130)
One-year ahead GDP growth rate	0.176**	0.217*	0.189**	0.214*
	(0.077)	(0.119)	(0.076)	(0.116)
Change in expectations 6 months after treatment				
One-year ahead inflation	0.310*	0.024	0.341**	-0.031
	(0.157)	(0.096)	(0.161)	(0.092)
Five-year ahead inflation	-0.405**	-0.194	-0.389**	-0.225
	(0.202)	(0.176)	(0.193)	(0.175)
One-year ahead unemployment	-0.186*	-0.091	-0.157*	-0.090
	(0.096)	(0.148)	(0.090)	(0.146)
One-year ahead GDP growth rate	0.043	0.146	0.053	0.115
	(0.063)	(0.105)	(0.058)	(0.094)
RBNZ inflation target	0.073	-0.026	0.073	0.015
	(0.150)	(0.089)	(0.142)	(0.082)

Notes: The table shows estimates of the treatment effect on providing information about the inflation target of the Reserve Bank of New Zealand on firms with priors close to the true target (columns 2 and 4) and on firms with priors far from the true target (column 1 and 3). Influential observations are identified as observations that move the estimation by more than 0.5 of the standard error. These observations are excluded. Robust standard errors are reported in parentheses. ***,**, * denotes statistical significance at 1%, 5%, and 10% levels respectively. See section 5 for more details.

Table 7. Ranking of attention and associated backcast errors and forecast uncertainty.

	Regressor: $\mathbf{1}(Rank_i^X > Rank_i^Y)$			Regressor: $Rank_i^X - Rank_i^Y$		
X	Inflation	Inflation	UE	Inflation	Inflation	UE
Y	UE	GDP	GDP	UE	GDP	GDP
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: dependent variable is the relative size of willingness to pay for a prof. forecast $\log\left(\frac{Pay_i^X}{Pay_i^Y}\right)$						
Rank regressor	0.760***	0.831***	0.607***	0.286***	0.293***	0.271***
	(0.012)	(0.015)	(0.011)	(0.003)	(0.003)	(0.004)
Observations	1,212	1,217	1,215	1,214	1,221	1,217
R-squared	0.798	0.824	0.794	0.870	0.892	0.804
Panel B: dependent variable is the relative uncertainty in forecasts $\log\left(\frac{\sigma_i^X}{\sigma_i^Y}\right)$						
Rank regressor	-0.183***	-0.107***	-0.050*	-0.068***	-0.028**	-0.010
	(0.025)	(0.032)	(0.027)	(0.008)	(0.011)	(0.011)
Observations	1,067	1,108	1,052	1,067	1,109	1,053
R-squared	0.053	0.017	0.004	0.062	0.011	0.001
Panel C: dependent variable is the relative size of backcast errors $\log\left(\frac{\lvert B_t X_{t-h} - X_{t-h}\rvert}{\lvert B_t Y_{t-h} - Y_{t-h}\rvert}\right)$						
Rank regressor	-2.001***	-1.724***	-0.929***	-0.723***	-0.530***	-0.471***
	(0.059)	(0.043)	(0.053)	(0.017)	(0.014)	(0.020)
Observations	1,213	1,199	1,198	1,217	1,188	1,198
R-squared	0.650	0.601	0.263	0.678	0.625	0.352

Notes: Panel A: $\log\left(\frac{Pay_i^X}{Pay_i^Y}\right)$ is the log of the ratio of willingness to pay ($/year) for a professional forecast for variable X to willingness to pay ($/year) for a professional forecast for variable Y. Panel B: $\log(\sigma_i^X/\sigma_i^Y)$ is the relative uncertainty in forecasts where σ_i^X measures uncertainty in forecasts from the probability distribution for variable X. Panel C: relative size of backcast errors $\log\left(\frac{|B_t X_{t-h} - X_{t-h}|}{|B_t Y_{t-h} - Y_{t-h}|}\right)$ where $B_t X_{t-h}$ is the backcast made at time t for variable X at time $t-h$. The horizon h is 12 month for inflation and GDP growth rate and 0 for the unemployment rate.

We use this question to rank variables in terms of relative attention

> **Which macroeconomic variables are most important to you in making your business decisions?** Please rank the variables below from 1 (most important) to 3 (least important)
>
> *a.* *Unemployment rate* …
> *b.* *GDP* …
> *c.* *Inflation* …
> *d.* *None of these is important to my decisions*

$Rank_i^X - Rank_i^Y$ is the difference in ranks of variables X and Y as perceived by firm i. Ranks can take values 1, 2, 3. Thus the maximum difference is 2 and the minimum is -2. A higher value of the difference indicates that variable X is more important than variable Y. $\mathbf{1}(Rank_i^X > Rank_i^Y)$ is the dummy variable equal to one if firm i thinks that variable X is more for firms business decisions than variable Y. All estimates are based on Huber robust regressions. Sample weights are applied in all specifications. Robust standard errors (clustered at the 3-digit ANZ SIC level) are reported in parentheses. ***,**, * denotes statistical significance at 1%, 5%, and 10% levels respectively. See section 6 for details.

Table 8. Macroeconomic variables: importance for business decisions and tracking.

Importance for business decisions (1=high, 3=low)	Follow, percent	Do not follow, percent	Willingness to pay for a professional forecast, $/year
	(1)	(2)	(3)
Panel A: Inflation			
Shares, percent			
1	41.87	0.10	211.38
2	3.63	9.47	138.85
3	1.57	43.36	92.04
Total	47.07	52.93	148.26
Backcast error	1.10	4.96	
Forecast	3.34	5.85	
Forecast uncertainty (st. dev.)	1.75	2.12	
Panel B: Unemployment			
Shares, percent			
1	18.02	1.13	166.60
2	39.32	8.83	115.88
3	13.99	18.71	110.73
Total	71.33	28.67	123.91
Backcast error	0.46	1.98	
Forecast	5.59	6.80	
Forecast uncertainty (st. dev.)	0.79	0.71	
Panel C: GDP			
Shares, percent			
1	37.01	1.87	168.32
2	30.54	8.21	132.94
3	11.43	10.94	102.69
Total	78.99	21.01	139.93
Backcast error	1.02	2.42	
Forecast	3.50	4.15	
Forecast uncertainty (st. dev.)	0.73	0.73	

Notes: The table shows shares of firms reporting importance of a given macroeconomic variable for their business decisions and whether they track the variable. The difference between "follow" and "do not follow" means for forecasts, backcast errors and forecast uncertainty is statistically different from zero at 1 percent for all cases but one: forecast uncertainty for GDP. Column (3) shows the average willingness to pay for a professional forecast of a given variable. See section 6 for details.

Table 9. Complementarity in acquisition of information

	No controls	Sub-industry FE	Sub-industry FE Firm controls Manager controls
	(1)	(2)	(3)
Panel A: Information complementarity			
Price complementarity	0.311***	0.313***	0.326***
	(0.036)	(0.037)	(0.034)
Observations	1,252	1,252	1,135
R-squared	0.153	0.172	0.214
Panel B: Importance of waiting for other firms			
Price complementarity	0.613**	0.618**	0.828***
	(0.298)	(0.302)	(0.314)
Observations	1,241	1,242	1,125
R-squared	0.004	0.019	0.077
Panel C: Revision of inflation expectations when the main competitor raises its price			
Importance of waiting for other firms	0.151***	0.150***	0.150***
	(0.028)	(0.028)	(0.030)
Observations	1,252	1,252	1,135
R-squared	0.033	0.048	0.080

Notes: **Panel A**: The dependent variable is information complementarity which is a dummy variable equal to one if a firm picks "The source that can be seen by other firms" and zero otherwise. The regressor is price complementary which measures (in percent, absolute value) by how much sales of a given firm fall when a typical firm in your industry cuts its price by 10%. The response is divided by 10.

Panel B: The dependent variable is the dummy variable equal to one when a firm chooses "*Wait until other firms make a price adjustment*" in response to "*Suppose you want to adjust your prices but you are uncertain about the state of the economy. What would you do?*" and zero otherwise. The response is divided by 10. Price complementarity is defined as in Panel A. Influential observations are identified as observations that move the estimation by more than 0.2 of the standard error. These observations are excluded.

Panel C: The dependent variable is the response to the following question: "Suppose your main competitor raises the price of its product by 10 percent. By how much would you revise your expectation of inflation over the next 12 months". The response is divided by 10. The regressor is the dummy variable equal to one when a firm chooses "*Wait until other firms make a price adjustment*" in response to "*Suppose you want to adjust your prices but you are uncertain about the state of the economy. What would you do?*" and zero otherwise.

Robust standard errors (clustered at the 3-digit ANZ SIC level) are reported in parentheses. ***,**, * denotes statistical significance at 1%, 5%, and 10% levels respectively. See section 6 for details.

ONLINE APPENDIX

APPENDIX 1

Survey design

1. Sampling frame

The firm names and their basic details were purchased from the Kompass New Zealand (KNZ) and Knowledge Management Services (KMS) databases. To get details about all existing firms with more than 6 workers in New Zealand, we use both databases. Following the ANZSIC 2006, firms were randomly chosen from four broad industries: manufacturing, retail and wholesale trade, construction and transportation, and professional and business services. We targeted 2/3 of the sample of firms from manufacturing and professional and business services since these industries have relatively large shares of GDP. The remaining one third is a combination of firms from other industries.

We started the firm selection process by first computing the proportion of firms in New Zealand that fall into each employment size group (6 to 19 workers, 20 to 49 workers and >50 workers) for each sector. This data is readily available in Statistics New Zealand. http://nzdotstat.stats.govt.nz/wbos/Index.aspx#. The employment size groups for each sector is reported in Appendix Tables 1.1.1 and 1.1.2. The KNZ and KMS databases provide us with information about the firm size. We used this information to match the survey sampling frame with the population of firms in the economy. For example, the manufacturing industry in 2012 had around 67 percent of firms in the employment size group of 6 to 19 workers, 21 percent in the 20 to 49 workers and 12 percent in greater than 50 workers. Our population in manufacturing industry contained similar proportions.

We selected firms from the databases as follows. There are 5409 firms in the manufacturing sector in NZ. From this population, we did several random draws of 5000 firms in each case. We selected a sample that is representative in terms of employment size groups and sub-sectors. The share of firms in each employment size group is similar to the Statistics New Zealand. Data on the share of firms in each employment size group for each sub-sector is not available, so we ensure there are firms from each subsector. Similar approach was used to select firms from other industries. Appendix Tables 1.1.3 and 1.1.4 provide information on employment size groups for each sector in the sampling frame of our survey. The industry/size composition of the sampling frame is very similar to the composition of population.

We invited all 15,000 firms to participate in the survey. In the first phase of this survey, we focused on manufacturing firms. The first round of calls provided us with a response of around 450 firms (manufacturing). To increase the sample of firms, we rang (2^{nd} call) all the remaining manufacturing firms to seek their interest to participate. The second round of calls yielded around 600 responses. After the second-round call, we examined the responses received so far in regards to the employment size groups and sub-sectors. To further increase the sample of manufacturing firms, we looked at the sub-sectors and employment size groups where responses were low. We then targeted approaching/interviewing all the firms in the specific sub-sectors and employment size groups where responses were low. The final sample for manufacturing is 997 firms. The second and third phases involved similar procedures with firms from the professional financial services, and transportation and construction industries, respectively. We keep only fully completed surveys. Appendix Table 1.1.5 provides information on responses achieved according to each employment size group and sector. Appendix Table 1.1.6 shows response rate by industry/size cells.

In wave 5 of the survey, we replenish firms in the survey and keep only 150 randomly selected firms that participated in survey wave 1. In the process of replenishing firms, we generally use the approach for survey wave 1. For example, in a very few cases (subsectors), we added new firms that were not in the sampling frame of the first wave to construct a sampling frame for wave 6. Appendix Table 1.1.7 shows the composition of firms in terms of sector/size in the sampling frame and the population. The composition is

similar. The key difference between the survey design for waves 1 and 5 is the treatment of large firms. In contrast to the first wave, our target in wave 5 was to get high response rates from larger firms. Therefore, attempts to recruit smaller firms to participate in the survey were only once. Medium and larger firms were contacted at most 10 times to participate in the survey. As a result, the response rate for smaller firms is about 6 percent (given the large number of firms in this size category, we have sufficiently many responses), while the response rate for larger firms is 30 to 40 percent (see Appendix Table 1.1.8). In wave 6 of the survey, we contacted firms that participated in survey wave 6. The attrition rates are close to 25% and the distribution of rates across sectors is generally similar.

2. Construction of weights

Once the survey is complete, we construct a set of weights to ensure that our results are representative of the whole economy. Specifically, we group firms into cells defined by firm size and industry. For the industry dimension, we use 3-digit ANZ SIC industry level of aggregation. For the firm size dimension, we consider four groups: 6 to 9 employees, 10 to 19 employees, 20-49 employees, 50 or more employees. Using data from Statistics New Zealand, we calculate total population employment for each cell. Then we calculate total employment in a cell for firms that participated in the survey. The weight for a firm in a given cell is set to the total population employment divided by the total sample employment in the cell. To avoid extreme weights, we cap weights at 100 whenever necessary. As a result, when weights are applied, the role of surveyed firms in a cell is amplified/attenuated so that we match the importance of the cell for aggregate economy. Given the design of the survey, weighted and unweighted moments tend to be very similar.

3. Validation of survey responses

Because firms have no direct incentive to participate in the survey or to provide thoughtful or truthful answers, one may be concerned about the quality of the responses to the questions. To ascertain the quality of the survey responses, we considered a number of checks.

The first is to directly verify the quality of those responses which can be checked against other sources. For example, respondents were asked about the age of their firm. Since firms must be registered with the government, we can check administrative records to verify whether the reported age of the firm and administrative records conform. We performed this check for all firms in the survey and found that, for 87% of the firms in the sample, the reported age of the firm conformed to administrative records. When the two did not match, we inquired with the general managers as to the source of the mismatch. In almost all cases, the source of the difference was either that the firm had been registered before it started operating or that there had been a change in ownership. There were only three cases in which general managers had made a mistake as to the age of the firm, a “mistake” rate of less than one-tenth of one percent.

A second response provided by firms which we could independently verify was the stated price of their main product. Because some firms maintain an online presence that includes prices of their goods, we verified two forms of firms’ responses. First, does the firm actually sell the good which they claimed constitutes their primary revenue-generating product? For the 300 (randomly selected) firms for which we performed this check, only forty-seven did not explicitly list their main product on their website. We then called each of these firms to verify that they indeed sell the product. There were six firms for which we found that the product was not sold by the firm, a “mistake” rate of 2%. Second, we verified the listed price of the good online against the price reported in the survey. Out of the 300 firms we checked, many did not have prices listed online. In these cases, we verified via online enquiries what price was available for the “main product” in the survey. There were 55 firms for which we were not able to verify prices. For the remaining 245 firms for whom we could either identify prices on their websites or via direct online enquiry, only nine reported prices different from those in the follow-up survey, a “mistake” rate of 3.7%.

A third response which we could asses was whether the firm exports products or services abroad. To verify this, we again checked 300 firms. Of these 300 firms, 87 claimed in the survey to receive a positive share of revenues from foreign sales. We visited the websites of the 300 firms to determine whether they appeared to export products or services. For the 213 firms who claimed no foreign sales, only four reported clear export availability on their websites. Of the 87 firms who claimed foreign sales, we checked their websites to determine whether they appeared to export. If this could not be verified from the website, we then called the firms to enquire about their ability to sell products and services abroad. Only seven of the 87 firms reported that they do not export despite having claimed positive shares of foreign sales in the survey. Jointly, this again yields a "mistake" rate of 3.7%.

Another dimension of the survey that we could independently verify is the quality of answers to questions about individual characteristics of the survey respondent, primarily from the third wave of the survey. Many firms maintain an online profile of their staff, especially directors and managers. We randomly selected 10 percent of respondents from the third wave of the survey to assess whether the responses given by them about their position, qualifications and experiences were consistent with the publicly available data. We were unable to find names (position details) of only around 5% (8%) of the survey respondents. This is because some firms do not have an online profile of their staff. For those that had online details about qualification and experiences of their staff, we found a very strong match with the survey responses (≈99%).

In addition to verifying firms' survey responses against outside sources, we can also assess the internal consistency of their responses. For example, the survey includes a question about the *average* frequency at which firms review their prices, which we convert to an average number of months between price reviews, and also includes questions about their actual prices over the previous twelve months. Specifically, we asked firms to report their current price as well as their price three months, 6 months, 9 months and 12 months prior. From this last set of questions, we can measure the number of times prices were changed at this quarterly frequency. One would expect that firms who report higher frequencies of price reviews should, on average, report more frequent price changes as well. We test this in our data by regressing the number of price changes over the previous twelve months on the average number of months between price reviews from the main survey. The results are reported in Panel A of Appendix Table 1.3.1. Longer durations between price reviews are negatively related to the number of price changes reported by firms for the previous twelve months, even with industry fixed effects or the use of sampling weights.

Second, we can verify whether firms report the same answers in response to the same question across the two surveys. We do this in two ways. The first is that, in both surveys, we asked firms to report the average frequency of price reviews. We can then compare whether firms report the same answer across surveys. As documented in Panel B of Appendix Table 1.3.1, the coefficient on the time between price reviews in the main survey is approximately one, and the R^2 is extremely high. A second way comes from the fact that we ask firms to report their prices at 3-month intervals going back one year in each survey. Because the surveys are separated in time by less than a year, there are overlapping periods for which firms reported prices in the first two waves of the survey. We can then assess whether these prices are consistent across the two surveys. As documented in Panel C of Appendix Table 1.3.1, when we regress prices in the follow-up survey on those in the main survey for these common periods, we find coefficients not statistically different from one and very high R^2.[1]

4. Attrition

The survey is designed to follow firms over time because we want to study the evolution of beliefs over time. In the first wave over **3,144** firms participated. In waves 2 ,3 and 4, the sample size was smaller: **712**, **1,601**, and **1,257**. This variation in sample size is due to our budget constraints, our inability to reach

[1] One should not expect perfect correlation between the two because the time periods for which firms are reporting prices may not perfectly overlap.

respondents, and managers' refusal to participate. The first reason was the main constraint for wave 2. For this wave, we randomly assigned ordering to firms within an industry/size cell and stopped when the budget for a cell was exhausted.

In wave 5, we effectively replenished the sample. In wave 6, these firms were surveyed again. The sample sizes are **2,040** and **1,404** respectively. Only 150 firms in wave 5 participated in a previous wave. We find that responses of these continuing firms have moments similar to those of newly surveyed firms.

To verify that non-participation does not involve sample selection, we run the following linear probability model:

$$D_{ist} = b_1 F_{ist_0}\pi_{t_0+12} + b_2 \log(Age_{ist_o}) + b_3 \log(Employment_{ist_0}) + b_4 share^L_{ist_0} + b_5 share^{Trade}_{ist_0} + b_5 NCompetitors_{ist_0} + \lambda_s + error \quad (1.4.1)$$

where i,s,t index firms, sectors and waves, t_0 is the baseline wave, $F_{ist_0}\pi_{t_0+12}$ is the one-year-ahead forecast for inflation, Age is the age of a firm, $Employment$ is the number of employees in a firm, $share^L$ is the share of labor costs in total costs, $share^{Trade}$ is the share of foreign sales (export) in total sales, $NCompetitors$ is the self-reported number of competitors for a firm, λ_s is a sector fixed effect. D_{ist} is equal to one if firm i participated in wave t and zero otherwise. We consider to baseline waves: wave 1 and wave 5.

Appendix Table 1.4.1 shows that, by and large, there is little if any selection on these observable characteristics of firms. For example, column (1) of the table documents that none of the characteristics has statistical power to predict participation in wave 2 conditional on participating in wave 1. Also note that R^2 is small. Column (4) also shows that the characteristics cannot predict which firms consistently participate in the survey, that is, participate in waves 2, 3 and 4 after participating in wave 1. Likewise, we find that these characteristics have little power to predict participation in wave 7 conditional on participating in wave 6. We conclude that firms are missing from the survey approximately at random.

5. Descriptive statistics

Appendix Table 1.5.1 presents basic firm characteristics across sectors. There is considerable variation. For example, firms in manufacturing tend to be 50 percent larger than firms in trade. The frequency of price reviews varies from 6.4 months for manufacturing to 10.8 months in construction. There is, however, more similarity in the expected size of price changes: it is approximately 5-6 percent for all sectors. These results underscore the importance of sampling firms from as many sectors as possible.

Appendix Table 1.1.1: Number of firms by sector and size in NZ, 2012

	Number of workers			
	6-19	20-49	>=50	Total >6 workers
Manufacturing	3628	1114	667	5409
Rental Hiring & Real Estate	857	118	50	1025
Professional Technical Scientific Services & Administrative Support Services	4042	973	567	5582
Financial and Insurance Services	507	203	96	806
Construction	3308	635	212	4155
Wholesale Trade	2365	587	317	3269
Retail Trade	3730	593	523	4846
Accommodation	4584	1001	262	5847
Transport Postal Warehousing & Information Media	1356	433	299	2088
Totals	24377	5657	2993	33027

Source: Statistics New Zealand.

Appendix Table 1.1.2: Percentage of firms by sector and size in NZ, 2012

	Number of workers			
	6-19	20-49	>=50	Total >6 workers
Manufacturing	67.07	20.60	12.33	100
Rental Hiring & Real Estate	83.61	11.51	4.88	100
Professional Technical Scientific Services & Administrative Support Services	72.41	17.43	10.16	100
Financial and Insurance Services	62.90	25.19	11.91	100
Construction	79.61	15.28	5.10	100
Wholesale Trade	72.35	17.96	9.70	100
Retail Trade	76.97	12.24	10.79	100
Accommodation	78.40	17.12	4.48	100
Transport Postal Warehousing & Information Media	64.94	20.74	14.32	100

Source: Statistics New Zealand.

Appendix Table 1.1.3: Number of firms by sector/size in the sampling frame of survey wave 1, 2013.

	Number of workers			
	6-19	20-49	>=50	Total >6 workers
Manufacturing	3350	1030	620	5000
Rental Hiring & Real Estate	580	82	38	700
Professional Technical Scientific Services & Administrative Support Services	2754	662	384	3800
Financial and Insurance Services	332	135	60	527
Construction	818	157	52	1027
Wholesale Trade	585	145	78	808
Retail Trade	923	147	129	1199
Accommodation	1134	248	65	1447
Transport Postal Warehousing & Information Media	336	107	74	517
Totals	10812	2713	1500	15025

Source: Kompass New Zealand and Knowledge Management Services databases.

Appendix Table 1.1.4: Percentage of firms by sector/size in the sampling frame of survey wave 1, 2013

	Number of workers			
	6-19	20-49	>=50	Total >6 workers
Manufacturing	67.00	20.60	12.40	100
Rental Hiring & Real Estate	82.86	11.71	5.43	100
Professional Technical Scientific Services & Administrative Support Services	72.47	17.42	10.11	100
Financial and Insurance Services	63.00	25.62	11.39	100
Construction	79.65	15.29	5.06	100
Wholesale Trade	72.40	17.95	9.65	100
Retail Trade	76.98	12.26	10.76	100
Accommodation	78.37	17.14	4.49	100
Transport Postal Warehousing & Information Media	64.99	20.70	14.31	100

Source: Kompass New Zealand and Knowledge Management Services databases.

Appendix Table 1.1.5: Sample framework of survey wave 1, Number of Enterprises or Firms.

	Number of workers										
	6-19			20-49			>=50			Totals	
	Statistics NZ Records	Kompass-KMS Firms Approached	Our Sample (Responses Achieved)	Statistics NZ Records	Kompass-KMS Firms Approached	Our Sample (Responses Achieved)	Statistics NZ Records	Kompass-KMS Firms Approached	Our Sample (Responses Achieved)	Statistics NZ Records	Responses Achieved
Manufacturing	3628	3350	636	1114	1030	208	667	620	170	5409	1014
Rental Hiring & Real Estate	857	580	105	118	82	30	50	38	28	1025	163
Professional Technical Scientific Services & Administrative Support Services	4042	2754	270	973	662	145	567	384	100	5582	515
Financial and Insurance Services	507	332	295	203	135	100	96	60	37	806	432
Construction	3308	818	51	635	157	10	212	52	15	4155	76
Wholesale Trade	2365	585	151	587	145	50	317	78	20	3269	221
Retail Trade	3730	923	171	593	147	91	523	129	35	4846	297
Accommodation	4584	1134	200	1001	248	70	262	65	35	5847	305
Transport Postal Warehousing & Information Media	1356	336	80	433	107	30	299	74	20	2088	130
Totals	24377	10812	1959	5657	2713	734	2993	1500	460	33027	3153

Appendix Table 1.1.6: Response rate in survey wave 1.

	Number of workers			
	6-19	20-49	>=50	Total >6 workers
Manufacturing	19.0%	20.2%	27.4%	20.3%
Rental Hiring & Real Estate	18.1%	36.6%	73.7%	23.3%
Professional Technical Scientific Services & Administrative Support Services	9.8%	21.9%	26.0%	13.6%
Financial and Insurance Services	88.9%	74.1%	61.7%	82.0%
Construction	6.2%	6.4%	28.8%	7.4%
Wholesale Trade	25.8%	34.5%	25.6%	27.4%
Retail Trade	18.5%	61.9%	27.1%	24.8%
Accommodation	17.6%	28.2%	53.8%	21.1%
Transport Postal Warehousing & Information Media	23.8%	28.0%	27.0%	25.1%
Totals	18.1%	27.1%	30.7%	21.0%

Appendix Table 1.1.7: Percentage of firms by sector/size in the population and the sampling frame of survey wave 5.

	Statistics New Zealand (population)			Survey sampling frame (KMZ and KMS)		
	6-19 workers	20-49 workers	>=50 workers	6-19 workers	20-49 workers	>=50 workers
Manufacturing	67.1	20.6	12.3	68.1	20.6	11.3
Rental Hiring & Real Estate	83.6	11.5	4.9	88.5	9.7	1.9
Professional Technical Scientific Services & Administrative Support Services	72.4	17.4	10.2	75.6	15.7	8.6
Financial and Insurance Services	62.9	25.2	11.9	47.2	37.0	15.7
Construction	79.6	15.3	5.1	79.2	15.2	5.7
Wholesale Trade	72.3	18.0	9.7	73.9	16.2	9.9
Retail Trade	77.0	12.2	10.8	83.4	6.2	10.4
Accommodation	78.4	17.1	4.5	81.8	15.6	2.6
Transport Postal Warehousing & Information Media	64.9	20.7	14.3	61.7	25.3	13.0

Appendix Table 1.1.8: Survey wave 5, Number of Enterprises or Firms and Response rate.

	6-19 workers			20-49 workers			>50 workers			Total >6 workers		
	Kompass-KMS Firms Approached	Our Sample (Responses Achieved)	Response rate	Kompass-KMS Firms Approached	Our Sample (Responses Achieved)	Response rate	Kompass-KMS Firms Approached	Our Sample (Responses Achieved)	Response rate	Total Approached	Our Sample (Responses Achieved)	Response rate
Manufacturing	2714	153	5.6%	822	265	32.2%	450	186	41.3%	3986	604	15.2%
Rental Hiring & Real Estate	475	29	6.1%	52	15	28.8%	10	10	100.0%	537	54	10.1%
Professional Technical Scientific Services & Administrative Support Services	2484	95	3.8%	517	91	17.6%	284	37	13.0%	3285	223	6.8%
Financial and Insurance Services	120	109	90.8%	94	81	86.2%	40	37	92.5%	254	227	89.4%
Construction	767	23	3.0%	147	60	40.8%	55	43	78.2%	969	126	13.0%
Wholesale Trade	434	23	5.3%	95	30	31.6%	58	42	72.4%	587	95	16.2%
Retail Trade	752	94	12.5%	56	45	80.4%	94	20	21.3%	902	159	17.6%
Accommodation	934	33	3.5%	178	35	19.7%	30	15	50.0%	1142	83	7.3%
Transport Postal Warehousing & Information Media	256	19	7.4%	105	84	80.0%	54	42	77.8%	415	145	34.9%
Totals	8936	578	6.5%	2066	706	34.2%	1075	432	40.2%	12077	1716	14.2%

Appendix Table 1.1.9: Survival rates in wave 6.

	6-19 workers			20-49 workers			>50 workers			Total >6 workers		
	Firms Approached	Responses Achieved	Response rate	Firms Approached	Responses Achieved	Response rate	Firms Approached	Responses Achieved	Response rate	Firms Approached	Responses Achieved	Response rate
Manufacturing	153	122	80%	265	198	75%	186	139	75%	604	459	76%
Rental Hiring & Real Estate	29	18	62%	15	8	53%	10	6	60%	54	32	59%
Professional Technical Scientific Services & Administrative Support Services	95	54	57%	91	60	66%	37	24	65%	223	138	62%
Financial and Insurance Services	109	70	64%	81	48	59%	37	27	73%	227	145	64%
Construction	23	20	87%	60	45	75%	43	34	79%	126	99	79%
Wholesale Trade	23	15	65%	30	23	77%	42	32	76%	95	70	74%
Retail Trade	94	72	77%	45	39	87%	20	15	75%	159	126	79%
Accommodation	33	24	73%	35	30	86%	15	9	60%	83	63	76%
Transport Postal Warehousing & Information Media	19	16	84%	84	69	82%	42	37	88%	145	122	84%
Totals	578	411	71%	706	520	74%	432	323	75%	1716	1254	73%

Appendix Table 1.3.1: Verification of Quality and Consistency of Survey Responses

Industry FE	N	Y	N
Sub-Industry FE	N	N	Y
	(1)	(2)	(3)
Panel A: Number of price changes over the previous year			
Time between price reviews	-0.182***	-0.181***	-0.188***
	(0.006)	(0.006)	(0.006)
Observations	3,144	3,144	3,144
R^2	0.648	0.677	0.684
Panel B: Average freq. of price reviews in the follow-up survey			
Average frequency of price reviews	0.997***	0.998***	0.995***
	(0.004)	(0.004)	(0.005)
Observations	712	712	712
R^2	0.984	0.984	0.984
Panel C: Recall price (log) in the follow-up survey			
Log price	0.999***	1.000***	0.999***
	(0.003)	(0.002)	(0.003)
Observations	712	712	712
R^2	0.999	0.999	0.999
Panel D: Actual price change between the main and follow-up surveys			
Expected price change	1.048***	1.029***	1.022***
	(0.051)	(0.057)	(0.058)
Observations	374	374	374
R^2	0.767	0.770	0.773

Notes: Panel A: the dependent variable is the number of quarterly price changes over the previous year. The maximum number of price changes is four. The time between price reviews takes values 0.25 (weekly), 1 (monthly), 3 (quarterly), 6 (every size month), 12 (annually), 18 (less frequently than annually). Panel B: the dependent variables is the average frequency of price reviews reported in the follow-up survey. Panel C: the dependent variable is the price 3 month ago (for firms surveyed in December 2013 or January 2014) or 6 month ago (for firms surveyed in September 2013, October 2013, or November 2013) reported in the first follow-up survey. The regressor is the actual price reported in the main survey. Panel D: the dependent variable is the percent change of current prices reported in waves 1 and 2. The regressor is the expected percent change in the next price review reported in wave 1. The sample is constrained to firms that had an actual price change and that expected to have a price review in the next five months. Constant is included but not reported. Industry and sub-industry fixed effects are as defined in Table 1. Column (4) applies sampling weights. Robust standard errors (clustered at 3-digit ANZ SIC) are reported in parentheses. ***,**, * denotes statistical significance at 1%, 5%, and 10% levels respectively. See section 2 for details.

Appendix Table 1.4.1: Determinants of Attrition

Dependent variables: 1 = a firm stays in the survey 0 = a firm is not in the survey	Attrition from wave X to wave Y (X => Y)				
	1 => 2	1 => 3	1 => 4	1 => 2,3,4	6 => 7
	(1)	(2)	(3)	(4)	(5)
Expected inflation	-0.001	0.003	0.002	-0.001	-0.004
	(0.002)	(0.002)	(0.002)	(0.001)	(0.006)
Ln(age)	0.016	0.021	0.025*	0.014	-0.010
	(0.011)	(0.013)	(0.013)	(0.010)	(0.013)
Ln(employment)	-0.013	-0.006	-0.007	-0.002	0.027*
	(0.014)	(0.016)	(0.016)	(0.012)	(0.016)
Labor cost share	-0.000	0.001	0.000	0.000	-0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Trade share	0.001	0.002*	0.002***	0.001	-0.001*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
# of competitors	-0.001	0.000	0.000	-0.001	0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Observations	3,153	3,153	3,153	3,153	2,040
R-squared	0.017	0.014	0.008	0.012	0.060

Notes: The table reports OLS estimates of specification (1.4.1). Robust standard errors are in parentheses. ***,**, * denotes statistical significance at 1%, 5%, and 10% levels respectively. See section 4 of Appendix I for further details.

Appendix Table 1.5.1: Summary Statistics from Firm Survey

	Number of firms	Firm Characteristics							Next Price Change	
		Age	Employment	Labor's Share	Trade Share	Current Margin	Average Margin	Duration between Price Reviews	Months until next change	Expected Size
All firms	3,150	10.9	22.1	47.0	2.3	23.0	29.2	7.9	5.7	6.1
Manufacturing	997	17.7	32.7	39.2	8.7	21.3	28.1	6.3	5.8	5.9
Chemicals and metals	213	14.8	26.3	38.0	9.8	22.2	28.7	6.1	5.3	6.1
Equipment and machinery	164	17.6	29.8	37.9	6.5	22.6	29.2	5.9	5.4	5.9
Food and beverage	261	23.1	47.6	40.1	9.3	21.4	27.2	7.3	7.0	5.5
Paper/wood, printing and furniture	139	15.4	26.2	39.7	7.2	20.0	28.4	5.8	5.3	5.8
Textile and clothing	220	14.0	23.4	40.0	11.0	18.6	26.4	5.7	4.9	6.5
Trade	837	8.0	18.8	44.2	2.1	19.7	26.2	7.4	4.4	6.3
Car, supermarket and food retailing	116	11.2	25.9	40.5	1.8	18.2	25.9	7.0	3.2	5.6
Hotel and food services	305	7.1	16.4	41.0	3.1	16.1	26.5	4.5	2.5	5.5
Other store retailing	181	7.0	17.6	49.6	0.0	23.8	27.5	11.2	7.0	7.4
Wholesale trade	235	8.3	18.2	42.0	4.2	18.5	24.2	5.1	3.2	5.9
Professional and financial services	1,146	14.3	24.6	57.8	0.5	35.9	40.4	7.7	6.3	5.3
Accounting services	186	11.3	19.6	58.9	0.2	36.4	40.7	6.0	6.2	4.5
Finance	151	17.8	25.7	57.0	0.0	39.1	43.3	7.9	5.9	4.8
Insurance	156	36.8	48.6	56.1	1.3	39.7	42.8	10.4	8.0	5.4
Aux. finance and insurance	125	10.5	19.7	58.3	0.4	39.2	42.0	6.7	4.8	4.4
Legal services	139	11.9	19.4	59.0	0.6	37.4	41.3	6.7	5.8	4.5
Rental, hiring and real estate	163	9.4	14.1	59.9	0.2	32.4	36.9	6.7	4.6	5.8
All other professional services	226	14.9	28.0	57.1	0.7	35.1	40.1	8.3	7.0	5.6
Construction and transportation	170	9.8	19.9	48.3	0.0	17.6	24.1	11.0	8.8	7.0

Notes: The first column of the table presents the number of firms in each industry and sub-industry category in the main survey (wave #1). Other columns are mean values across all firms in each industry or sub-industry of specific variables listed. Sectors in italics are defined as "industries" while sectors not in italics are defined as "sub-industries", with the exception of "Construction and Transportation" which is counted as both. See section 2 for details.

APPENDIX 2

Classification of firms into industries and sub-industries

	SIC2 Codes
Manufacturing	
Chemicals and metals	1700-2299
Equipment and machinery	2300-2499
Food and beverage	1110-1219
Paper/wood, printing and furniture	1400-1699, 2500-2599
Textile and clothing	1300-1399
Trade	
Car, supermarket and food retailing	3900-4199
Hotel and food services	4400-4599
Other store retailing	4200-4399
Wholesale trade	3300-3899
Professional and financial services	
Accounting services	6932
Finance	6200-6299
Insurance	6300-6399
Aux. finance and insurance	6400-6499
Legal services	6931
Rental, hiring and real estate	6600-6799
All other professional services	5400-6099, 6900-7399 (excl. 6931, 6932)
Construction and transportation	3000-3299, 4600-5399

Notes: The table reports allocation of SIC codes to industries (in italics) and sub-industries (not in italics + Construction and transportation).

APPENDIX 3

Design of inflation expectation questions

1. Sensitivity of inflation expectations to wording of questions

Consistent with the Michigan Survey of Consumers, we asked firms about the expected change in general level of *prices*. The economists, however, often operate with inflation rates. While there is a one-to-one mapping between changes in prices and inflation rates, one may be concerned that the wording of the question may be important here since people may have cognitive biases or difficulties with respect to this mapping. In addition, managers may have different notions of what prices are included in the general level of prices.

To assess the quantitative significance of possible biases arising from the wording of the question, we take the following questions:

During the *last twelve* months, by how much do you think prices changed overall in the economy? Please provide an answer in percentage terms.

Answer:	**……**	**%**

During the *next twelve* months, by how much do you think prices will change overall in the economy? Please provide an answer in percentage terms.

Answer:	**……**	**%**

Please assign probabilities (from 0-100) **to the following ranges of overall price changes in the economy over the next 12 months for New Zealand:** (Note that the probabilities in the column should sum to 100)

Percentage Price Changes in 12 Months	**Probabilities**	
More than 25%:	**……**	**%**
From 15 to 25%:	**……**	**%**
From 10 to 15%:	**……**	**%**
From 8 to 10%:	**……**	**%**
From 6 to 8%:	**……**	**%**
From 4 to 6%:	**……**	**%**
From 2 to 4%:	**……**	**%**
From 0 to 2%:	**……**	**%**
From 0 to -2%:	**……**	**%**
From -2 to -4%:	**……**	**%**
From -4 to -6%:	**……**	**%**
From -6 to -8%:	**……**	**%**
From -8 to -10%:	**……**	**%**
From -10 to -15%:	**……**	**%**
From -15 to -25%:	**……**	**%**
Less than -25%:	**……**	**%**
Total (the column should sum to 100%):	**100**	**%**

and consider three alternative wordings:

A. "by how much do you think prices will/have change(d) overall in the economy"

B. "what will be/has been the overall inflation rate over the next/last 12 months"
C. "what will be/has been the inflation rate (specifically the *Consumer Price Index*) over the next/last 12 months"

Firms are randomly chosen to answer a specific version of the questions.

Appendix Table 3.1 shows that the responses across questions are very similar. Thus, firms do not appear to systematic biases or exhibit difficulties with interpreting the questions.

Appendix Table 3.1. Responses to baseline and alternative formulations of inflation expectation questions.

Group	N	Inflation forecast, one-year ahead			Inflation forecast, 5-10-year ahead			Inflation backcast, previous 12 months	
		Mean	St.dev.	Uncertainty	Mean	St.dev.	Uncertainty	Mean	St.dev.
A	679	3.72	2.55	1.02	3.29	2.49	1.04	3.42	2.22
B	681	3.73	2.54	1.04	3.31	2.50	1.11	3.40	2.27
C	680	3.71	2.53	1.04	3.31	2.46	1.04	3.43	2.26
Total	2040	3.72	2.54	1.04	3.30	2.48	1.06	3.42	2.25

2. Sensitivity of inflation expectations to the design of questions

In the baseline wording of probability questions, we present managers with a broad spectrum of possible outcomes. In contrast, other surveys present fewer and narrower options. Furthermore, sometimes the inflation forecast is proxied with forecast for the change in a firm's unit cost. To assess the quantitative importance of these differences, we randomized a set of questions presented to firms. Specifically, the first group of firms is presented with questions mimicking questions in the Business Inflation Expectations survey run the Federal Reserve Bank of Atlanta:

Projecting ahead, to the best of your ability, please assign a percent likelihood to the following changes to unit costs over the next twelve months (values should sum to 100%).

- Unit costs down (less than -1%) ……. %
- Unit costs about unchanged (-1% to 1%) ……. %
- Unit costs up somewhat (1% to 3%) ……. %
- Unit costs up significantly (3% to 5%) ……. %
- Unit costs up very significantly (more than 5%) ……. %

Please indicate what probabilities you would attach to the various possible percentage changes to the CORE (excluding food and energy) CONSUMER PRICE INDEX over the next twelve months (values should sum to 100%).

- 4 percent or more ….. %
- 3.5 to 3.9 percent ….. %
- 3.0 to 3.4 percent ….. %
- 2.5 to 2.9 percent ….. %
- 2.0 to 2.4 percent ….. %
- 1.5 to 1.9 percent ….. %

- 1.0 to 1.4 percent ….. %
- 0.5 to 0.9 percent ….. %
- 0.0 to 0.4 percent ….. %
- Will decline ….. %

Another group of firms is presented with the following questions which are in the baseline format of our survey:

Projecting ahead, to the best of your ability, please assign a percent likelihood to the following changes to unit costs over the next twelve months (values should sum to 100%).

More than 25%:	**……**	**%**
From 15 to 25%:	**……**	**%**
From 10 to 15%:	**……**	**%**
From 8 to 10%:	**……**	**%**
From 6 to 8%:	**……**	**%**
From 4 to 6%:	**……**	**%**
From 2 to 4%:	**……**	**%**
From 0 to 2%:	**……**	**%**
From -2 to 0%:	**……**	**%**
From -4 to -2%:	**……..**	**%**
From -6 to -4%:	**……..**	**%**
From -6 to -8%:	**……**	**%**
From -8 to -10%:	**……**	**%**
From -10 to -15%:	**……**	**%**
From -15 to -25%:	**……**	**%**
Less than -25%:	**……**	**%**
Total (the column should sum to 100%):	**100**	**%**

Please indicate what probabilities you would attach to the various possible percentage changes to the CORE (excluding food and energy) CONSUMER PRICE INDEX over the next twelve months (values should sum to 100%).

More than 25%:	**……**	**%**
From 15 to 25%:	**……**	**%**
From 10 to 15%:	**……**	**%**
From 8 to 10%:	**……**	**%**
From 6 to 8%:	**……**	**%**
From 4 to 6%:	**……**	**%**
From 2 to 4%:	**……**	**%**
From 0 to 2%:	**……**	**%**
From -2 to 0%:	**……**	**%**
From -4 to -2%:	**……..**	**%**
From -6 to -4%:	**……..**	**%**
From -6 to -8%:	**……**	**%**
From -8 to -10%:	**……**	**%**
From -10 to -15%:	**……**	**%**
From -15 to -25%:	**……**	**%**
Less than -25%:	**……**	**%**
Total (the column should sum to 100%):	**100**	**%**

For each question, we compute the implied mean and standard deviation of the reported densities. Appendix Table 3.2 presents summary statistics. We find that using a larger number of bins covering a broader set of possibilities for the core CPI inflation rate yields results similar to those of the percent change in general

level of prices (our baseline question). Using the same question in the BIE format produces a mean forecast similar to the mean in the baseline format of the question. However, the cross-sectional dispersion of implied means across firms is considerably smaller than in the baseline (1.30 vs 2.37). Furthermore, the implied uncertainty (measured as the standard deviation of the reported probability distribution) is nearly four times smaller in the BIE question than in the baseline question (0.26 vs. 0.94). This pattern suggests that the BIE format can overstate the degree of anchoring of inflation expectations in the sense of Kumar et al. (BPEA).

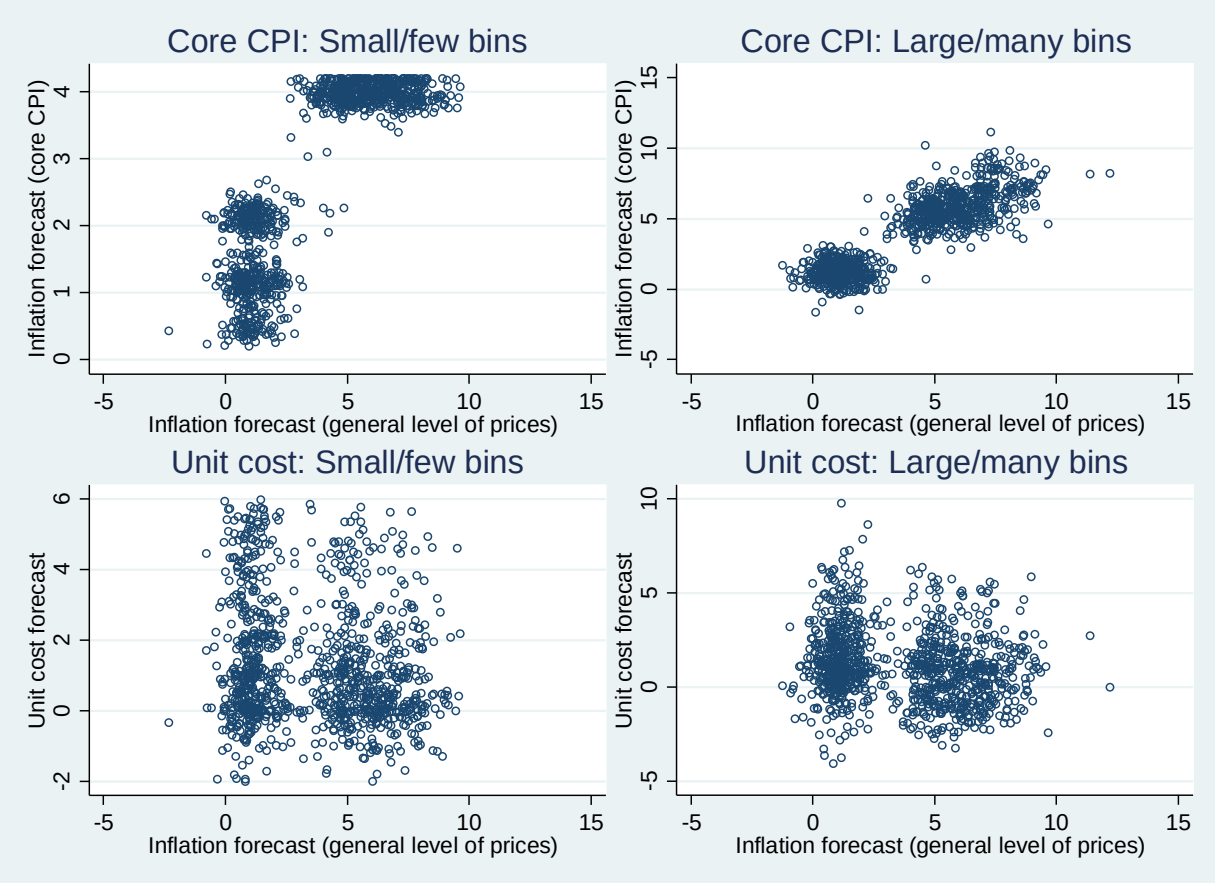
Forecasts of unit cost also display some sensitivity to the size/spectrum of bins. Although point forecasts are similar across the two question formats, the cross-sectional dispersion and uncertainty is smaller in the BIE format than in the baseline format. More importantly, the implied mean forecasts for changes in unit costs are essentially uncorrelated with implied mean forecasts for inflation. The BIE uses this question to measure inflation expectations. Our results suggest that using expectations for a firm's change in unit costs may be a poor proxy for a firm's inflation expectations.

Appendix Figure 3.1. shows the scatter plots to demonstrate how different formats of the questions are related the baseline question about change in the general level of prices. The bottom-row figures show that expected changes in a firm's own unit costs are effectively uncorrelated with expected inflation. The expected core CPI with a large number of bins covering a broad spectrum are highly correlated with the expected inflation in the baseline format of the expected inflation question. In contrast, using the BIE format of the question for core CPI shows that a considerable mass of responses is bunched at the top bracket of the BIE question. In other words, the format of the BIE question is too restrictive. Indeed, when asked the baseline format of the question, one average managers assign 28% probability to have inflation greater than 4% which is effectively outside the range given to firms in the BIE format.

Appendix Table 3.2. Responses to baseline and alternative formulations of inflation expectation questions.

One-year ahead forecast	N	mean	median	st.dev.	uncertainty	Correlation with the change in the general level of prices
Change in the general level of prices	2,032	2.59	1.40	2.48	0.92	1.00
Core CPI						
Large/many bins	1,011	2.58	1.40	2.37	0.94	0.90
Small/few bins (BIE)	1,021	2.26	2.10	1.30	0.26	0.85
Unit cost						
Large/many bins	1,011	1.28	1	1.89	1.04	0.13
Small/few bins (BIE)	1,021	1.28	1	1.74	0.98	-0.003

Appendix Figure 3.1. Responses to baseline and alternative formulations of inflation expectation questions.



3. Point forecasts vs. means from probability distributions

In addition to asking firms about their point forecasts of inflation, we asked firms to provide probability distribution for their forecasts in wave #5. The question is formulated as follows:

Please assign probabilities (from 0-100) **to the following ranges of overall price changes PER YEAR in the economy over the next 5-10 years for New Zealand:** (Note that the probabilities in the column should sum to 100)

Percentage Price Changes PER YEAR over the next 5-10 Years.	**Probabilities**
More than 25%:	**…… %**
From 15 to 25%:	**…… %**
From 10 to 15%:	**…… %**
From 8 to 10%:	**…… %**
From 6 to 8%:	**…… %**
From 4 to 6%:	**…… %**
From 2 to 4%:	**…… %**
From 0 to 2%:	**…… %**
From -2 to 0%:	**…… %**

From -4 to -2%:	**……..**	**%**
From -6 to -4%:	**……..**	**%**
From -6 to -8%:	**……**	**%**
From -8 to -10%:	**……**	**%**
From -10 to -15%:	**……**	**%**
From -15 to -25%:	**……**	**%**
Less than -25%:	**……**	**%**
Total (the column should sum to 100%):	**100**	**%**

One may be concerned that the implied mean from the probability distribution may be different from the point forecast reported by firms because firms may have cognitive biases and difficulties in connecting point forecasts and distributions for their forecasts. We calculate the mean forecast implied by the probability distribution as follows:

$$\begin{aligned}\tilde{F}_t^i\pi_{t,t+12} = {} & (-25)\times(\textbf{Less than } -25\%) + (-20)\times(\textbf{From } -15 \textbf{ to } -25\%) \\ & + (-12.5)\times(\textbf{From } -10 \textbf{ to } -15\%) + (-9)\times(\textbf{From } -8 \textbf{ to } -10\%) \\ & + (-7)\times(\textbf{From } -6 \textbf{ to } -8\%) + (-5)\times(\textbf{From } -6 \textbf{ to } -4\%) \\ & + (-3)\times(\textbf{From } -4 \textbf{ to } -2\%) + (-1)\times(\textbf{From } -2 \textbf{ to } 0\%) + (+1)\times(\textbf{From } -2 \textbf{ to } 0\%) \\ & + (+3)\times(\textbf{From } -4 \textbf{ to } -2\%) + (+5)\times(\textbf{From } -6 \textbf{ to } -4\%) \\ & + (+7)\times(\textbf{From } -6 \textbf{ to } -8\%) + (+9)\times(\textbf{From } -8 \textbf{ to } -10\%) \\ & + (+12.5)\times(\textbf{From } -10 \textbf{ to } -15\%) + (+20)\times(\textbf{From } -15 \textbf{ to } -25\%) \\ & + (+25)\times(\textbf{Less than } -25\%)\end{aligned}$$

Appendix Figure 3.2 plots point forecast for inflation $F_t^i\pi_{t,t+12}$ against the mean value implied from the probability distribution $\tilde{F}_t^i\pi_{t,t+12}$. Appendix Table 3.3 shows that the basic moments of inflation forecasts obtained from point predictions and mean forecasts implied by the reported probability distributions are similar. We present results of regressing $\tilde{F}_t^i\pi_{t,t+12}$ on $F_t^i\pi_{t,t+12}$ using OLS, Huber robust and quantile (median) regressions (Appendix Table 3.4). Huber and Quantile regressions minimize the effect of influential observations and outliers. We find that $\tilde{F}_t^i\pi_{t,t+12}$ and $F_t^i\pi_{t,t+12}$ are tightly related and point prediction provides a good proxy for the mean forecast implied by the reported probability distributions.

Appendix Table 3.3. Moments of inflation forecasts: point estimate vs. mean implied by the probability distribution.

	Mean	Median	St. Dev.
	(1)	(2)	(3)
Mean forecast implied by the distribution, $\tilde{F}_t^i\pi_{t,t+12}$	2.59	1.40	2.48
Point forecast $F_t^i\pi_{t,t+12}$	2.75	2.00	2.34

Notes: all statistics are calculated with employment-based sampling weights.

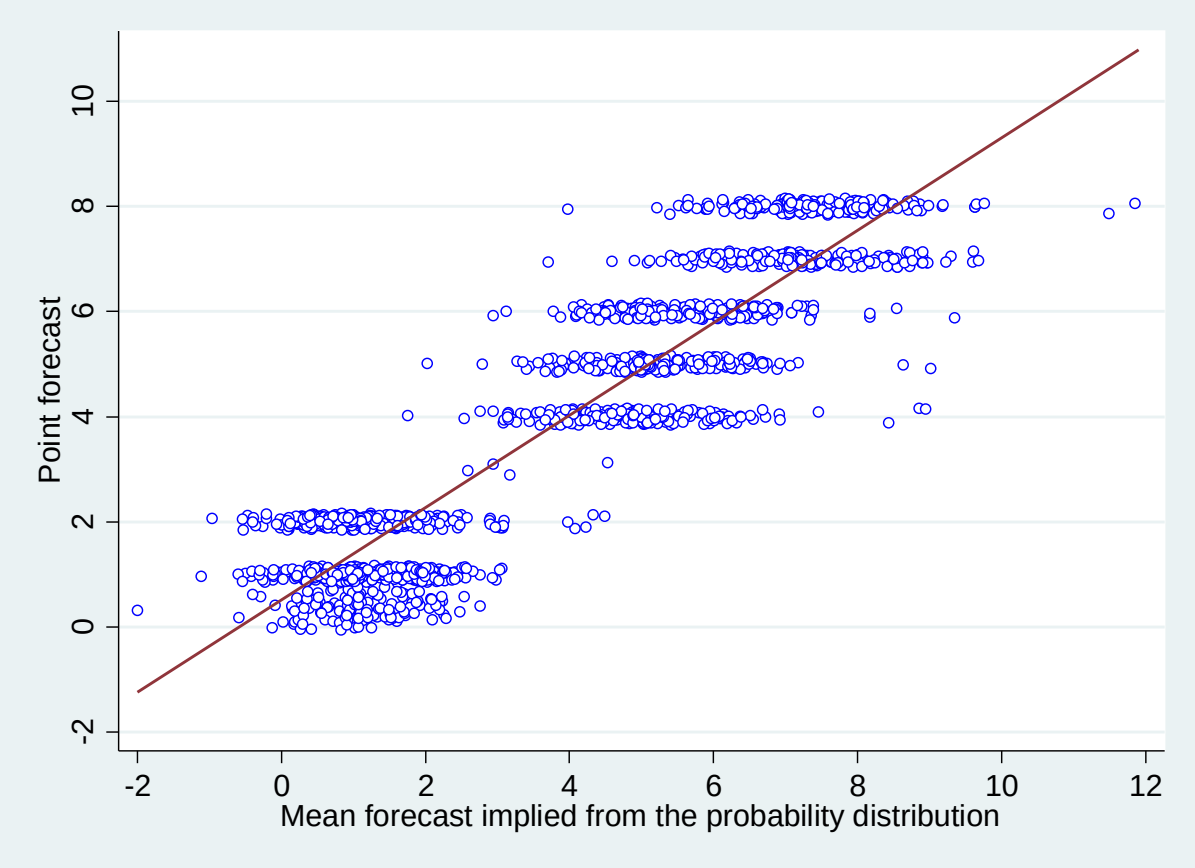
Appendix Table 3.4. Consistency of inflation forecasts: point estimate vs. mean implied by the probability distribution.

Dependent variable:	OLS	Huber	Quantile
Mean forecast implied by the distribution, $\tilde{F}_t^i\pi_{t,t+12}$	(1)	(2)	(3)

Point forecast $F_t^i \pi_{t,t+12}$	0.972***	0.967***	0.986***
	(0.009)	(0.009)	(0.008)
Observations	2,040	2,040	2,040
R-squared	0.855	0.855	

Notes: All regressions are estimated with employment-based sampling weights. Standard errors are reported in parentheses. ***, **, * shows statistical significance at 1%, 5%, and 10% levels respectively.

Appendix Figure 3.2. Point forecast for inflation vs. mean forecast implied by the probability distribution.



Notes: $\tilde{F}_t^i \pi_{t,t+12}$ is on the horizontal axis. $F_t^i \pi_{t,t+12}$ is on the vertical axis. The scatter plot is jittered to show the mass of observations for a given combination of $\tilde{F}_t^i \pi_{t,t+12}$ and $F_t^i \pi_{t,t+12}$.

4. Firms' expectations of aggregate inflation vs. expected changes in own unit costs

Some surveys of firms, such as the Business Inflation Expectations (BIE) survey of the Atlanta Federal Reserve, ask firms about their expectations of future changes in their unit costs rather than their expectations

of aggregate inflation. In the third wave of the survey, we asked firms the following two questions to assess the potential relationship between these two distinct concepts:

Expected changes in own unit costs:

> "During the next twelve months, by how much do you think your firm's unit costs will change? Please provide an answer in percentage terms."

Benchmark inflation question:

> During the next twelve months, by how much do you think overall prices in the economy will change? Please provide an answer in percentage terms.

In the fifth and sixth waves, we also asked the following questions:

> **Has your firm experienced changes in unit costs during the last 12 months and by how much do you think your firm's unit costs will change over the next six months?** Please provide a quantitative answer in percentage terms over each period.

Percentage change in unit costs:		
In the last twelve months:	**……**	**%**
In the next six months:	**……**	**% (relative to current level)**

> **During the *next twelve* months, by how much do you think prices will change overall in the economy?** Please provide an answer in percentage terms.

Answer:	**……**	**%**

We then compare firms' answers to the two questions in Appendix Figure 3.3 below. The correlation between firms' expectations over future aggregate inflation and their expectations over their future changes in unit costs is essentially zero.

We also explore if questions about changes in a firm's price are correlated with managers' perceptions about future inflation. Specifically, we use the 12-month-ahead forecast from the following question in waves 5 and 6:

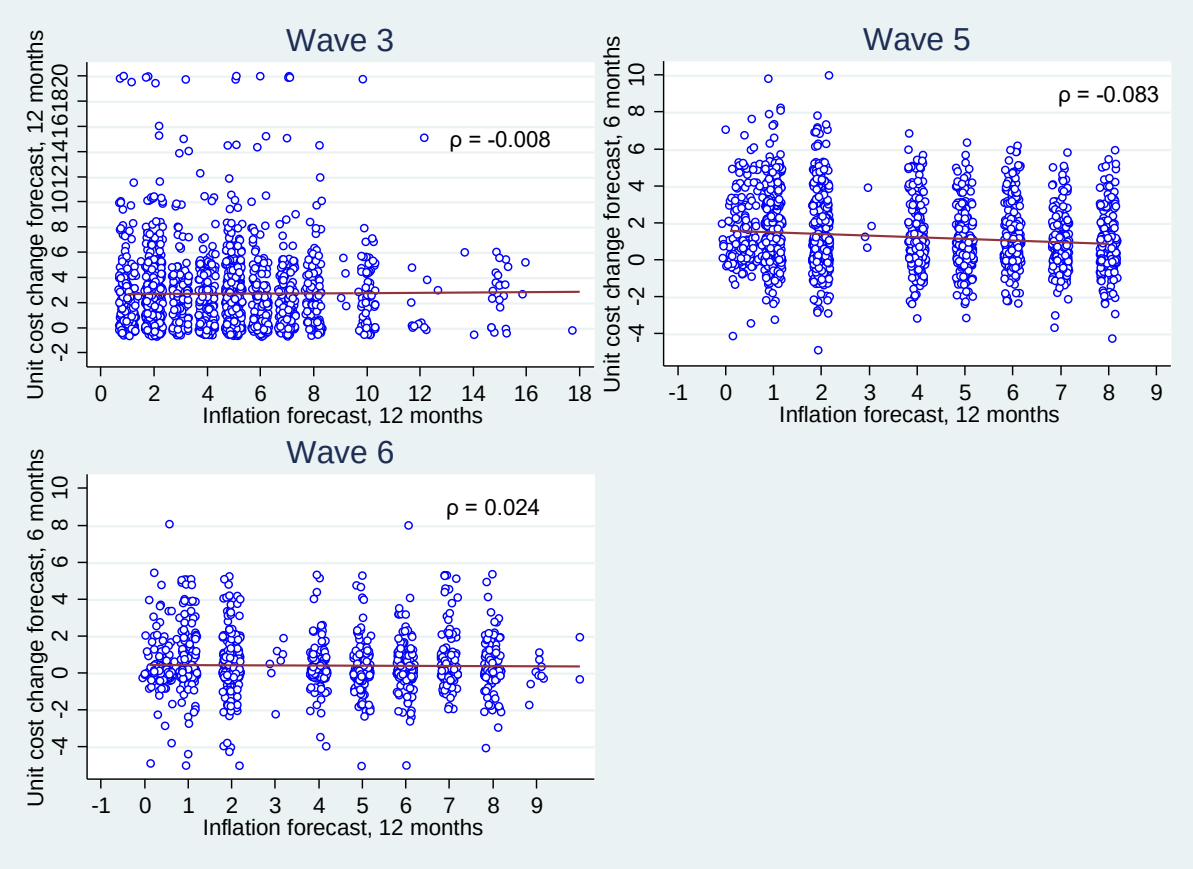
> **By how much has your firm changed the price of its main product over the last six months and by how much do you think it will change the price of its main product over the next six/twelve months?** Please provide a quantitative answer in percentage terms (e.g. "-X%" for X percent decline in price, "+X%" for X percent increase in price, etc.) over each period.

Percentage change in the price:		
In the last six months:	**……**	**%**
In the next six months:	**……**	**% (relative to current price)**
In the next twelve months:	**……**	**% (relative to current price)**

We find that, similar to expected changes in unit costs, expected changes in firms' own prices are effectively uncorrelated with managers' inflation forecasts (Appendix Figure 3.4).

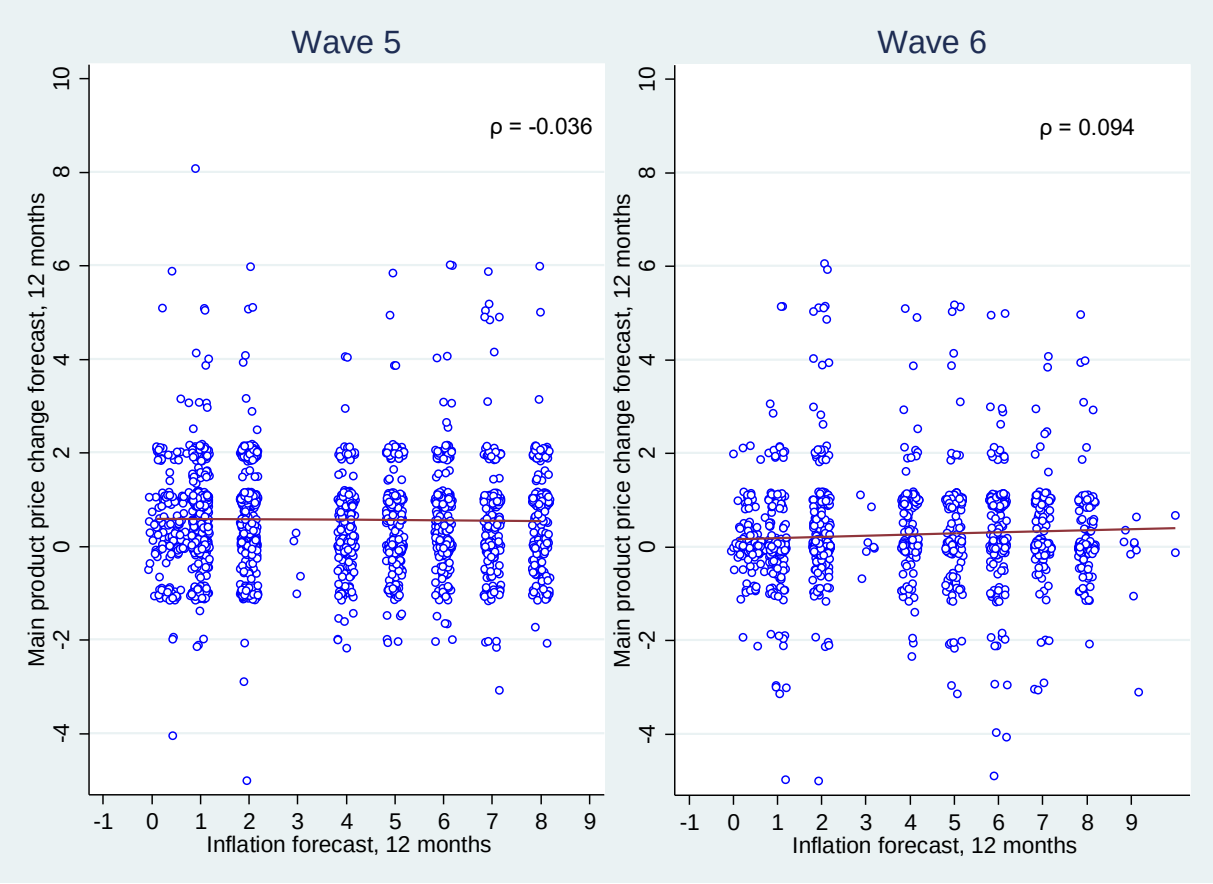
Appendix Table 3.5 shows that basic moments of responses about inflations, changes in own unit costs, and own price changes differ in key important respects. First, managers tend to expect inflation greater than expected changes in either own prices or unit costs. Second, managers exhibit greater disagreement (cross-sectional standard deviation) about inflation than changes in own prices or unit costs.

Appendix Figure 3.3. Expectations of future inflation vs. future changes in own unit costs.



Notes: The vertical axis is firm's expectations about aggregate inflation and horizontal axis is firm's expectations about future changes in their own unit costs. Scatter plots are jittered to show the mass of observations for each combination of unit cost and inflation forecasts.

Appendix Figure 3.4. Expectations of future inflation vs. future changes in own prices.



Appendix Table 3.5. Expectations of future inflation vs. future changes in own prices.

	N obs	Mean	Median	St.Dev.
Wave 3				
Expected inflation, 12-month ahead	1,601	4.48	4.00	2.97
Expected change in own unit cost, 12-month ahead	1,601	2.80	2.00	3.01
Wave 5				
Expected inflation, 12-month ahead	2,032	2.75	2.00	2.35
Expected change in own unit cost, 6-month ahead	2,032	1.27	1.00	1.88
Expected change in own price (main product), 6-month ahead	2,032	0.59	0.50	1.17
Wave 6				
Expected inflation, 12-month ahead	1,399	2.74	2.00	2.38
Expected change in own unit cost, 6-month ahead	1,399	0.46	0.00	1.47
Expected change in own price (main product), 6-month ahead	1,399	0.21	0.00	0.98

APPENDIX 4

Additional Tables and Figures

Appendix Table 4.1. Ranking of attention and associated backcast errors and forecast uncertainty.

	Regressor: $\mathbf{1}(Rank_i^X > Rank_i^Y)$			Regressor: $Rank_i^X - Rank_i^Y$		
X	Inflation	Inflation	UE	Inflation	Inflation	UE
Y	UE	GDP	GDP	UE	GDP	GDP
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: dependent variable is the relative size of willingness to pay for a prof. forecast $\log\left(\frac{Pay_i^X}{Pay_i^Y}\right)$						
Rank regressor	0.732***	0.844***	0.620***	0.285***	0.295***	0.275***
	(0.014)	(0.015)	(0.011)	(0.004)	(0.003)	(0.004)
Observations	1,087	1,107	1,099	1,095	1,105	1,092
R-squared	0.826	0.832	0.824	0.887	0.903	0.834
Panel B: dependent variable is the relative uncertainty in forecasts $\log\left(\frac{\sigma_i^X}{\sigma_i^Y}\right)$						
Rank regressor	-0.166***	-0.076**	-0.079***	-0.057***	-0.019*	-0.023**
	(0.030)	(0.029)	(0.025)	(0.011)	(0.010)	(0.011)
Observations	953	1,000	948	955	1,000	948
R-squared	0.246	0.139	0.178	0.233	0.138	0.174
Panel C: dependent variable is the relative size of backcast errors $\log\left(\frac{\lvert B_t X_{t-h} - X_{t-h}\rvert}{\lvert B_t Y_{t-h} - Y_{t-h}\rvert}\right)$						
Rank regressor	-1.983***	-1.496***	-0.896***	-0.707***	-0.484***	-0.469***
	(0.060)	(0.048)	(0.053)	(0.018)	(0.016)	(0.023)
Observations	1,096	1,080	1,073	1,097	1,073	1,084
R-squared	0.689	0.665	0.378	0.711	0.684	0.450

Notes: Panel A: $\log\left(\frac{Pay_i^X}{Pay_i^Y}\right)$ is the log of the ratio of willingness to pay ($/year) for a professional forecast for variable X to willingness to pay ($/year) for a professional forecast for variable Y. Panel B: $\log(\sigma_i^X/\sigma_i^Y)$ is the relative uncertainty in forecasts where σ_i^X measures uncertainty in forecasts from the probability distribution for variable X. Panel C: relative size of backcast errors $\log\left(\frac{|B_t X_{t-h} - X_{t-h}|}{|B_t Y_{t-h} - Y_{t-h}|}\right)$ where $B_t X_{t-h}$ is the backcast made at time t for variable X at time $t-h$. The horizon h is 12 month for inflation and GDP growth rate and 0 for the unemployment rate.

We use this question to rank variables in terms of relative attention

> **Which macroeconomic variables are most important to you in making your business decisions?**
> Please rank the variables below from 1 (most important) to 3 (least important)
> *a.* *Unemployment rate* …
> *b.* *GDP* …
> *c.* *Inflation* …
> *d.* *None of these is important to my decisions*

$Rank_i^X - Rank_i^Y$ is the difference in ranks of variables X and Y as perceived by firm i. Ranks can take values 1, 2, 3. Thus the maximum difference is 2 and the minimum is -2. A higher value of the difference indicates that variable X is more important than variable Y. $\mathbf{1}(Rank_i^X > Rank_i^Y)$ is the dummy variable equal to one if firm i thinks that variable X is more for firms business decisions than variable Y. All estimates are based on Huber robust regressions. Sample weights are applied in all specifications. Robust standard errors (clustered at the 3-digit ANZ SIC level) are reported in parentheses. ***,**, * denotes statistical significance at 1%, 5%, and 10% levels respectively. Controls for firm and manager characteristics from Table 3 are included but not reported.

Appendix Table 4.2. Determinants of tracking and importance of inflation for business decisions.

	Track inflation	Relative importance of inflation for business decisions
	(1)	(2)
Firm characteristics		
Log(Age)	-0.015	0.008
	(0.012)	(0.030)
Log(Employment)	-0.039***	0.030
	(0.014)	(0.028)
Labor's share of costs	-0.000	0.001
	(0.001)	(0.002)
Foreign trade share	-0.011***	0.011***
	(0.001)	(0.002)
Number of Competitors	0.001*	-0.004***
	(0.001)	(0.001)
Avg. margin	-0.002**	0.002
	(0.001)	(0.002)
Share of revenue from LT customers	-0.003***	0.006***
	(0.000)	(0.001)
Manager characteristics		
Age	0.001	-0.004*
	(0.001)	(0.002)
Education:		
Some college	-0.027**	-0.001
	(0.013)	(0.032)
College	-0.001	0.007
	(0.015)	(0.037)
Graduate (MA+)	0.024	-0.021
	(0.015)	(0.046)
Tenure	0.001	0.003
	(0.001)	(0.003)
Income	-0.000***	0.001**
	(0.000)	(0.000)
Industry FE	Yes	Yes
Observations	1,068	1,069
R-squared	0.821	0.765

Notes: The dependent variable in column (1) is the dummy variable equal to one if a firm tracks inflation and zero otherwise. The dependent variable in column (2) is the importance rank of inflation (relative to GDP and unemployment rate) for a firm's business decisions. The score runs from 1 (most importance) to 3 (least importance). All estimates are based on Huber robust regressions. Sample weights are applied in all specifications. Robust standard errors (clustered at the 3-digit ANZ SIC level) are reported in parentheses. ***,**, * denotes statistical significance at 1%, 5%, and 10% levels respectively.

Table 4.3. Ranking of attention and associated backcast errors and forecast uncertainty.

	Regressor: $\log\left(\frac{Pay_i^X}{Pay_i^Y}\right)$		
X	Inflation	Inflation	UE
Y	UE	GDP	GDP
	(1)	(2)	(3)
Panel A: dependent variable is the relative uncertainty in forecasts $\log\left(\frac{\sigma_i^X}{\sigma_i^Y}\right)$			
Rank regressor	-0.217***	-0.052	-0.072**
	(0.022)	(0.037)	(0.034)
Observations	1,067	1,108	1,052
R-squared	0.073	0.004	0.006
Panel B: dependent variable is the relative size of backcast errors $\log\left(\frac{\lvert B_t X_{t-h} - X_{t-h}\rvert}{\lvert B_t Y_{t-h} - Y_{t-h}\rvert}\right)$			
Rank regressor	-1.795***	-1.375***	-0.924***
	(0.067)	(0.047)	(0.073)
Observations	1,219	1,191	1,195
R-squared	0.525	0.533	0.185

Notes: Panel A: dependent variable is relative uncertainty in forecasts $\log(\sigma_i^X/\sigma_i^Y)$ where σ_i^X measures uncertainty in forecasts from the probability distribution for variable X. Panel B: relative size of backcast errors $\log\left(\frac{\lvert B_t X_{t-h} - X_{t-h}\rvert}{\lvert B_t Y_{t-h} - Y_{t-h}\rvert}\right)$ where $B_t X_{t-h}$ is the backcast made at time t for variable X at time $t-h$. The horizon h is 12 month for inflation and GDP growth rate and 0 for the unemployment rate. $\log\left(\frac{Pay_i^X}{Pay_i^Y}\right)$ is the log of the ratio of willingness to pay ($/year) for a professional forecast for variable X to willingness to pay ($/year) for a professional forecast for variable Y. All estimates are based on Huber robust regressions. Sample weights are applied in all specifications. Robust standard errors (clustered at the 3-digit ANZ SIC level) are reported in parentheses. ***,**, * denotes statistical significance at 1%, 5%, and 10% levels respectively.

Table 4.4. Information update, Wave 5.

Regressor	Dependent variable			
	posterior p_i		scaled revision of posterior $\frac{p_i-\mu_i}{s-\mu_i}$	
	12-month ahead	5-10-year ahead	12-month ahead	5-10-year ahead
	(1)	(2)	(3)	(4)
Prior, μ_i	0.549***	0.409***		
	(0.013)	(0.009)		
Uncertainty, σ_i			0.021	0.069***
			(0.020)	(0.016)
Observations	1,021	1,018	783	619
R-squared	0.638	0.622	0.001	0.018

Notes: The table replicates Table 5 in the paper using data from Wave 5. Columns (1) and (2) report results for specification (4.3) where the dependent variable is the posterior point prediction of the variable indicated in the first row of the table and the regressor is the prior, i.e. the point prediction implied by the reported probability distribution for the corresponding variable. The prior is the belief of a firm *before* the firm is presented with additional information. The posterior is the belief of a firm *after* the firm is presented with additional information. Fixed effects for source of information are included in column (1) but not reported. Columns (3) and (4) report result for specification (4.4) where the dependent variable is the revision in beliefs (posterior minus prior) scaled by the difference between the signal s and the prior for the variable indicated in the first row of the table. The posterior and prior are defined as for columns (1) and (2). The regressor is the standard deviation implied by the probability distribution for the corresponding variable. To minimize the effects of extreme observations, the sample in columns (3) and (4) is constrained to include only observations with $\left|\frac{p_i-\mu_i}{s-\mu_i}\right| \leq 2$. All estimates are based on the Huber robust regressions. Robust standard errors are reported in parentheses. ***,**, * denotes statistical significance at 1%, 5%, and 10% levels respectively. See section 5 for more details.

Appendix Table 4.5. Which Macroeconomic Variables Do Firms Track?

Variables followed	Fraction of firms	Fraction of firms that try to look at all the indicators simultaneously that they follow
	(1)	(2)
Inflation, Unemployment, GDP	0.238	0.909
Inflation, Unemployment	0.088	0.863
Inflation, GDP	0.120	0.960
Unemployment, GDP	0.290	0.968
Inflation	0.025	-
Unemployment	0.097	-
GDP	0.142	-

Notes: Column (1) reports the share of firms that track a combination of variables shown in the left column. Column (2) reports the share of firms tracking variables simultaneously conditional on firms tracking multiple variables.

Appendix Table 4.6. State-Dependence in Acquisition of Information.

		Suppose you hear on TV that the economy is doing poorly. Would it make you more likely to look for more information?					
		Much more likely	Somewhat more likely	No change	Somewhat less likely	Much less likely	Total
Suppose you hear on TV that the economy is doing well. Would it make you more likely to look for	Much more likely	4.20	4.29	0.45	0.48	0.34	9.77
	Somewhat more likely	9.14	6.12	1.21	1.58	1.37	19.42
	No change	3.07	2.16	2.12	1.16	0.17	8.67
	Somewhat less likely	24.82	15.69	7.34	3.41	2.09	53.35
	Much less likely	3.74	2.65	1.45	0.53	0.42	8.79
	Total	44.96	30.91	12.56	7.16	4.40	100.00

Notes: The table reports shares of firms by their desire to seek for more/less information in response to good/bad news about the economy.

APPENDIX 5

Selected Survey Questions

Wave #1

What is the main product of this firm?
"Main product": The product (good or service) or product group from which this firm gets its largest share of revenue.

How many workers are employed in this firm? How many are used for the main product or product line?

	Employment for firm:	Employment for main product:
Full-time:	.....	.....
Contracted:	.....	.....
Part-time:	.....	.....
Casual:	.....	.....

How many years old is the firm?

Answer: …… year(s) old

Report the dollar value of the total amount produced by this firm over the last 3 months and that for the main product or product line. Please also report the dollar value of the amount the firm *could* have produced over the last 3 months if it had been operating at full capacity (i.e. given the equipment and machinery already in place and ready to operate; with normal downtime; with the number of shifts, hours of operation and overtime pay that can be sustained under normal conditions and a realistic work schedule in the long run; labor, materials, utilities, etc. are fully available; the same product mix as the actual production).

	Total Production Value	**Production Value for Main Product**
Actual Production:	**…… $**	**…… $**
Potential Production:	**…… $**	**…… $**

What percentage of the firm's revenues in the last 12 months came from sales in New Zealand (vs. other countries)**?**

Answer: …… % of sales originating in New Zealand

How many direct competitors does this firm face in its main product line?

Answer: …… firms.

Out of the total revenues of the firm, what fraction is used for compensation of all employees and what fraction is used for the costs of materials and intermediate inputs (raw materials, energy inputs, etc…)?

	Labor Costs	**Costs of Materials and other Inputs**
Share of total revenues:	**…… %**	**…… %**

What is the average selling price of this firm's main product (or product group)?

Domestic market current price = (NZ$) .....
Overseas market current price (if applicable) = (currency.....). .....
N/A (please tick) ☐

How would you compare the price of this firm's main product relative to the prices of competing products (of similar quality, characteristics, warranty)? Please provide an answer in percentage terms (e.g. "-10%" if your product is 10% cheaper than that of most comparable competitors).

Answer: …… %

What was the average selling price (in domestic market) of this firm's main product (or product group) in previous periods?

3 months ago = (NZ$)	
6 months ago = (NZ$)	
9 months ago = (NZ$)	
12 months ago = (NZ$)	
N/A (please tick) ☐	

Considering your main product line or main line of services in the domestic market, by what margin does your sales price exceed your operating costs (i.e., the cost material inputs plus wage costs but not overheads and depreciation)? Please report your current margin as well as historical or average margin for the firm.

	Current Margin	**Average Margin**
Answer:	**…… %**	**…… %**

Approximately how often does this firm regularly review (formally) the price of its product?

Please circle the appropriate number:
1 = daily
2 = weekly
3 = monthly
4 = quarterly
5 = half-annually
6 = annually
7 = less frequently than annually
8 = N/A

When do you expect this firm to next change its price of the main product and by how much? Please provide a numerical answer in months for the former (e.g. "0" for within the next month, 1 for one month from now, …) and a percentage answer for the latter (e.g. "+10%" for a 10% increase in price or "-10%" for a 10% decrease)

Answer: I expect my firm to change the price of our main product by …… % in …….. months

If this firm was free to change its price (i.e. suppose there was no cost to renegotiating contracts with clients, no costs of reprinting catalogues, etc…) **right now or in three months, by how much would it change its price in either case?** Please provide a percentage answer (e.g. "+10%" for a 10% increase in price). **By how much do you think profits would change as a share of revenues in either case?** Please provide a numerical answer in percent (e.g. "+10%" if profits are expected to rise by 10% of revenues).

	If price could change this month:	**If price could change in three months:**
Expected change in price:	**…… %**	**…… %**
Expected change in profits:	**…… % of revenues**	**…… % of revenues**

During the *last twelve* months, by how much do you think prices changed overall in the economy? Please provide an answer in percentage terms.

Answer:	**……**	**%**

During the *next twelve* months, by how much do you think prices will change overall in the economy? Please provide an answer in percentage terms.

Answer:	**……**	**%**

By how much higher or lower than normal do you think the *current* level of overall economic activity is? Please provide an answer in percentage terms (e.g. "-5%" for five percent lower than normal, "+10%" for ten percent higher than normal, etc…).

Answer:	**……**	**%**

Wave #2

SECTION A. QUESTIONS ABOUT THE FIRM

What is the selling price of this firm's main product (or product group)?

Domestic market current price =	(NZ$) .....
Overseas market current price (if applicable) =	(currency.....) .....
N/A (please tick) ☐	

What was the average selling price (in domestic market) of this firm's main product (or product group) in previous periods?

3 months ago =	(NZ$) .....
6 months ago =	(NZ$) .....
9 months ago =	(NZ$) .....
12 months ago =	(NZ$) .....
N/A (please tick) ☐	

SECTION B. MACROECONOMIC EXPECTATIONS

During the *last twelve* months, by how much do you think prices changed overall in the economy? Please provide an answer in percentage terms.

Answer: …… %

During the *next twelve* months, by how much do you think prices will change overall in the economy? Please provide an answer in percentage terms.

Answer: …… %

By how much higher or lower than normal do you think the *current* level of overall economic activity is? Please provide an answer in percentage terms (e.g. "-5%" for five percent lower than normal, "+10%" for ten percent higher than normal, etc…).

Answer: …… %

What do you think the unemployment rate currently is in New Zealand and what do you think it will be in twelve months? Please provide a quantitative answer in percentage terms (e.g. "5.2%" for an unemployment rate of 5.2%) over each period.

Current unemployment rate	**Unemployment rate in 12 months**
…… %	**…… %**

What do you think is the interest rate on a 1-year government bond currently and what do you think it will be in twelve months? Please provide a quantitative answer in percentage terms (e.g. "5.2%" for an unemployment rate of 5.2%) over each period.

Current interest rate	**Interest rate in 12 months**
…… %	**…… %**

Please assign probabilities (from 0-100) **to the following ranges of growth rates of the overall economy (real GDP) over the next 12 months:** (Note that the probabilities in the column should sum to 100)

Possible growth rates for real GDP	**Probabilities**
More than 5% per year:	**…… %**
From 4 to 5% per year:	**…… %**
From 3 to 4% per year:	**…… %**
From 2 to 3% per year:	**…… %**
From 1 to 2% per year:	**…… %**
From 0 to 1% per year:	**…… %**
The economy will contract (<0% per year):	**…… %**
Total (each column should sum to 100%):	**100 %**

Please assign probabilities (from 0-100) **to the following ranges of overall percentage price changes in the economy over the next 12 months:** (Note that the probabilities in the column should sum to 100)

Possible percentage changes in prices	**Probabilities**	
More than 5% per year:	**……**	**%**
From 4 to 5% per year:	**……**	**%**
From 3 to 4% per year:	**……**	**%**
From 2 to 3% per year:	**……**	**%**
From 1 to 2% per year:	**……**	**%**
From 0 to 1% per year:	**……**	**%**
Prices will fall (<0% per year):	**……**	**%**
Total (each column should sum to 100%):	**100**	**%**

Wave #3

What is your age? …….years

What is your gender? Please tick a box: ☐ male ☐ female

What is your highest educational qualification?

1. Less than high school 2. High school diploma 3. Some college or Associate's degree

4. College diploma 5. Graduate studies (Masters or PhD)

How many years of work experience do you have in this firm? …….years

How many years of work experience do you have in this industry? …….years

How many years have you worked outside of NZ? …….years

How much is your gross income per annum?

1. Less than $30,000 2. 30,000-49,999 3. 50,000-74,999 4. 75,000-99,999

5. 100,000-149,999 6. 150,000 or more

During the next twelve months, by how much do you think your firm's unit costs will change? Please provide an answer in percentage terms.

During the *next twelve* months, by how much do you think overall prices in the economy will change? Please provide an answer in percentage terms.

If you thought overall prices in the economy over the next 12 months were going to rise by more than what you are currently forecasting, would you:

a) Be more likely to increase your prices
b) No change
c) Be more likely to decrease your prices

Please explain your answer briefly: ……..

If you thought overall prices in the economy over the next 12 months were going to rise by more than what you are currently forecasting, would you:

a) Be more likely to increase the wages that you pay
b) No change
c) Be more likely to decrease the wages that pay

Please explain your answer briefly: ……..

If you thought overall prices in the economy over the next 12 months were going to rise by more than what you are currently forecasting, would you:

a) Be more likely to increase your employment
b) No change
c) Be more likely to decrease your employment

Please explain your answer briefly: ……..

If you thought overall prices in the economy over the next 12 months were going to rise by more than what you are currently forecasting, would you:

a) Be more likely to increase your investments (capital expenditures)
b) No change
c) Be more likely to decrease your investments (capital expenditures)

Please explain your answer briefly: ……..

Wave #4

During the *last twelve* months, by how much do you think prices have changed in your industry? Please provide a precise and quantitative answer in percentage terms.

ANSWER: …….. %

During the *next twelve* months, by how much do you think prices will change in your industry? Please provide a precise and quantitative answer in percentage terms.

ANSWER: …….. %

During the *last twelve* months, by how much do you think prices have changed overall in the economy? Please provide a precise and quantitative answer in percentage terms.

ANSWER: …….. %

What do you think the real GDP growth rate has been in New Zealand during the last 12 months? Please provide a precise quantitative answer in percentage terms.

ANSWER: …….. %

What do you think the unemployment rate currently is in New Zealand? Please provide a precise quantitative answer in percentage terms.

ANSWER: …….. %

Please assign probabilities (from 0-100) **to the following ranges of overall price changes in the economy over the next 12 months for New Zealand:** (Note that the probabilities in the column should sum to 100)

Percentage Price Changes in 12 Months	**Probabilities**	
More than 25%:	**……**	**%**
From 15 to 25%:	**……**	**%**
From 10 to 15%:	**……**	**%**
From 8 to 10%:	**……**	**%**
From 6 to 8%:	**……**	**%**
From 4 to 6%:	**……**	**%**
From 2 to 4%:	**……**	**%**
From 0 to 2%:	**……**	**%**
Less than 0%:	**……**	**%**
Total (the column should sum to 100%):	**100**	**%**

Please assign probabilities (from 0-100) **to the following ranges of growth rates of the overall economy (real GDP) over the next 12 months:** (Note that the probabilities in the column should sum to 100)

Possible growth rates for real GDP	**Probabilities**	
More than 5% per year:	**……**	**%**
From 4 to 5% per year:	**……**	**%**
From 3 to 4% per year:	**……**	**%**
From 2 to 3% per year:	**……**	**%**

From 1 to 2% per year:	**……**	**%**
From 0 to 1% per year:	**……**	**%**
The economy will contract (<0% per year):	**……**	**%**
Total (the column should sum to 100%):	**100**	**%**

Please assign probabilities (from 0-100) **to the following ranges of unemployment rates in 12 months for New Zealand:** (Note that the probabilities in the column should sum to 100)

Possible Unemployment Rates in 12 Months	**Probabilities**	
More than 8%:	**……**	**%**
From 7 to 8%:	**……**	**%**
From 6 to 7%:	**……**	**%**
From 5 to 6%:	**……**	**%**
From 4 to 5%:	**……**	**%**
Less than 4%:	**……**	**%**
Total (the column should sum to 100%):	**100**	**%**

Randomly select firms into five sets [do not select firms based on their previous answers about inflation, price/information stickiness, etc.]

Subset 1 of firms: [no additional information]. Go to question 13.

Subset 2 of firms: Professional forecasters are currently predicting that the overall prices in New Zealand will rise by 2.0% over the next twelve months. By how much do you think overall prices in the economy will change during the next twelve months? Please provide a precise quantitative answer in percentage terms.

ANSWER: …….. %

Go to question 15.

Subset 3 of firms: Professional forecasters are currently predicting that the overall prices in New Zealand will rise by 2.0% over the next twelve months. The Reserve Bank of New Zealand targets an overall rise in prices of approximately 2% each year. By how much do you think overall prices in the economy will change during the next twelve months? Please provide a precise quantitative answer in percentage terms.

ANSWER: …….. %

Go to question 15.

Subset 4 of firms: The Reserve Bank of New Zealand targets an overall rise in prices of approximately 2% each year. By how much do you think overall prices in the economy will change during the next twelve months? Please provide a precise quantitative answer in percentage terms.

ANSWER: …….. %

Go to question 15.

Subset 5 of firms: Overall prices in New Zealand have gone up by 1.0% over the last twelve months. By how much do you think overall prices in the economy will change during the next twelve months? Please provide a precise quantitative answer in percentage terms.

ANSWER: …….. **%**

Go to question 15.

Subset 6 of firms: Firms in the economy expect overall prices to increase by X.X% over the next twelve months. By how much do you think overall prices in the economy will change during the next twelve months? Please provide a precise quantitative answer in percentage terms.

ANSWER: …….. **%**

Go to question 15.

For firms in subsets 2-5, add no information. For firms in subset 1, randomly select firms into

a. **subset and provide additional information (subset 1.a). Ask the question below.**
b. **others no information (subset 1.b). If selected in this subset, go to question 14.**

The most recent data for real GDP in New Zealand indicate that the economy grew 3.9% over twelve months. By how much do you think real GDP will grow overall in the economy over the next twelve months? Please provide a precise quantitative answer in percentage terms.

ANSWER: …….. **%**

Go to question 15.

For firms in subsets 2-5 and subset 1a, provide no additional information. For other firms, randomly select firms into

c. **subset and provide additional information (subset 1.a.i). Ask the question below.**
d. **others no information (subset 1.b.ii). If selected in this subset, go to question 15.**

The most recent unemployment rate in New Zealand is 5.4%. What do you think the unemployment rate will be in New Zealand in twelve months? Please provide a precise quantitative answer in percentage terms.

ANSWER: …….. **%**

15. Which macroeconomic variables are most important to you in making your business decisions?
Please rank the variables below from 1 (most important) to 3 (least important)

e. *Unemployment rate* …
f. *GDP* …
g. *Inflation* …
h. *None of these is important to my decisions*

16. Which macroeconomic variables do you keep track of? Check each variable that you keep track of**.**

a. *Unemployment rate* …
b. *GDP* …
c. *Inflation* …
d. *None of these is important to my decisions* …

If they check three variables go to 14a.
If they check two variables go to 14b.
If they check one variable, go straight to question 15.

16a. How do you acquire information about macroeconomic variables (inflation, unemployment or GDP)?

a. I try to look at all these indictors at the same time
b. I try to look at unemployment and GDP together
c. I try to look at unemployment and inflation together
d. I try to look at inflation and GDP together
e. I look at each of these variables separately

16b. How do you acquire information about macroeconomic variables (inflation, unemployment or GDP)?
a. I try to look at both indictors at the same time
b. I look at them separately.

17. Suppose you hear on TV that the economy is doing well. Would it make you more likely to look for more information?
a. Much more likely
b. Somewhat more likely
c. No change
d. Somewhat less likely
e. Much less likely

18. Suppose you hear on TV that the economy is doing poorly. Would it make you more likely to look for more information?
a. Much more likely
b. Somewhat more likely
c. No change
d. Somewhat less likely
e. Much less likely

19. Suppose a typical firm in your industry cuts its price by 10%. By how much would YOUR sales be affected?
a. Increase by … percent
b. No change
c. Decrease by … percent

20. Suppose that there are two sources of information about the state of the economy. These sources are equally informative/useful, but they can give different signals about the state of the economy (that is, they can disagree). In addition, the first source can be seen by other firms in your industry while the second sources is available only to you. You can see only one source. Which source would you pick?
a. The source that can be seen by other firms
b. The source that can be seen only by you

21. Suppose your main competitor raises the price of its product by 10 percent. By how much would you revise your expectation of inflation over the next 12 months?
a. Increase by … percent
b. No change
c. Decrease by … percent

22. Suppose you want to adjust your prices but you are uncertain about the state of the economy. What would you do
a. Collect more information now and then make a decision
b. Wait another quarter until more information comes in (but do not look for it actively)
c. Wait until other firms make a price adjustment
d. Change your price right away

23. What share of your turnover (total vs. for main product) comes from long-term versus short-term customers?

	Share of total turnover	**Share of turnover for main product**
Long-term customers		
(relationship lasting more than one year)	….. %	….. %
Short-term customers		
(relationship lasting 1 year or less)	….. %	….. %
	[check if sum =100]	*[check if sum =100]*

24. ***What do you think is the current exchange rate of the New Zealand Dollar relative to the U.S. Dollar?***
Answer: …. *(either US dollar / NZ dollar or vice-versa)*

25. What do you think the exchange rate of the New Zealand Dollar will be in twelve months relative to the U.S. Dollar?
Answer: …. *(either US dollar / NZ dollar or vice-versa)*

Wave #5

SECTION A. BASIC CHARACTERISTICS OF THIS FIRM

1. **What is the main product of the firm?**
   "Main product": The product (good or service) or product group from which this firm gets its largest share of revenue.

2. **What is the total number of employees working at this firm? How many are used for the main product or product line?**

	Employment for firm:	**Employment for main product:**
Number:	.....	.....

3. **How many years old is the firm?**

Answer: …… year(s) old

4. **Report the dollar value of the total amount produced by this firm over the last twelve months and that for the main product or product line. Please also report the dollar value of the amount the firm *could* have produced over the last twelve months if it had been operating at full capacity** (i.e. given the equipment and machinery already in place and ready to operate; with normal downtime; with the number of shifts, hours of operation and overtime pay that can be sustained under normal conditions and a realistic work schedule in the long run; labor, materials, utilities, etc. are fully available; the same product mix as the actual production).

	Total Production Value		**Production Value for Main Product**	
Actual Production:	**……**	**$**	**……**	**$**
Potential Production:	**……**	**$**	**……**	**$**

5. **What percentage of the firm's revenues in the last 12 months came from sales in New Zealand** (vs. other countries)**?**

Answer: …… % of sales originating in New Zealand

6. **How many direct competitors does the firm face in its main product line?**

Answer: …… firms.

SECTION B. Firm Decision Making and Plans

9. **By how much has your firm changed the price of its main product over the last twelve months and by how much do you think it will change the price of its main product over the next three/six/twelve months?** Please provide a quantitative answer in percentage terms (e.g. "-X%" for X percent decline in price, "+X%" for X percent increase in price, etc.) over each period.

Percentage change in the price:		
In the last six months:	**……**	**%**
In the next six months:	**……**	**% (relative to current price)**
In the next twelve months:	**……**	**% (relative to current price)**

10. **Has your firm changed the number of employees over the last twelve months and does it expect to change the number of employees over the next three/six/twelve months?** Please provide a quantitative answer in percentage terms (e.g. "-X%" for X percent decline in employment, "+X%" for X percent rise in employment, etc.) over each period.

Percentage change in the number of employees:		
In the last twelve months:	**……**	**%**
In the next six months:	**……**	**% (relative to current number)**

11. **Has your firm invested in new capital over the last twelve months and does it expect to invest in new capital over the next three/six/twelve months?** Please provide a quantitative answer for capital expenditures as a share of annual revenues over each period.

New capital expenditures as a share of annual revenues:

In the last twelve months:	**……**	**%**
In the next six months:	**……**	**%**

12. **Has your firm experienced changes in unit costs during the last 12 months and by how much do you think your firm's unit costs will change over the next three/six/twelve months?** Please provide a quantitative answer in percentage terms over each period.

Percentage change in unit costs:		
In the last twelve months:	**……**	**%**
In the next six months:	**……**	**% (relative to current level)**

13. **Has your firm experienced changes in average wages during the last 12 months and by how much do you think your firm's average wages will change over the next three/six/twelve months?** Please provide a quantitative answer in percentage terms over each period.

Percentage change in average wages:		
In the last twelve months:	**……**	**%**
In the next six months:	**……**	**% (relative to current level)**

14. **Has your firm experienced changes in the number of units sold of your main product line or service during the last 12 months and by how much do you think your unit sales will change over the next three/six/twelve months?** Please provide a quantitative answer in percentage terms over each period.

Percentage change in number of units sold:		
In the last twelve months:	**……**	**%**
In the next six months:	**……**	**% (relative to current level)**

17. **If this firm was free to change its price** (i.e. suppose there was no cost to renegotiating contracts with clients, no costs of reprinting catalogues, etc.) **right now, by how much would it change its price?** Please provide a percentage answer. **By how much do you think profits would change as a share of revenues?** Please provide a numerical answer in percent.

Expected change in price:	**……**	**% changes**
Expected change in profits:	**……**	**% of revenues**

18. **For the next three questions, suppose that you get news that the general level of prices went up by 10% in the economy:**
    a. **By what percentage do you think your competitors would raise their prices on average?** …….. **%**
    b. **By what percentage would your firm raise its price on average?** …….. **%**
    c. **By what percentage would your firm raise its price if your competitors did not change their price at all in response to this news?** …….. **%**

19. **Suppose demand for goods in your industry were to increase by 10%. By what percentage would your firm ideally like its price to change (if it could do so freely, without constraints from previous contracts, etc.) relative to that of its competitors?** Please provide an answer in percentage terms. Answer: **…… %**

SECTION D. ECONOMIC EXPECTATIONS

For *all* subsequent inflation related questions, we consider three wordings:

- **D. "by how much do you think prices will/have change(d) overall in the economy"**
- **E. "what will be/has been the overall inflation rate over the next/last 12 months"**
- **F. "what will be/has been the inflation rate (specifically the *Consumer Price Index*) over the next/last 12 months"**

Firms are randomly assigned to three groups of equal size where each group receives different version of the language.

Also, within each of these groups, firms are then randomly assigned to one of two sub-groups (6 groups total). There are two versions of questions 39 & 40 (see below).

22. **During the *last twelve* months, by how much do you think prices changed overall in the economy?** Please provide an answer in percentage terms.

Answer:	**……**	**%**

23. **During the *next twelve* months, by how much do you think prices will change overall in the economy?** Please provide an answer in percentage terms.

Answer:	**……**	**%**

24. **Please assign probabilities** (from 0-100) **to the following ranges of overall price changes in the economy over the next 12 months for New Zealand:** (Note that the probabilities in the column should sum to 100)

Percentage Price Changes in 12 Months	**Probabilities**	
More than 25%:	**……**	**%**
From 15 to 25%:	**……**	**%**
From 10 to 15%:	**……**	**%**
From 8 to 10%:	**……**	**%**
From 6 to 8%:	**……**	**%**
From 4 to 6%:	**……**	**%**
From 2 to 4%:	**……**	**%**
From 0 to 2%:	**……**	**%**
From 0 to -2%:	**……**	**%**
From -2 to -4%:	**……**	**%**
From -4 to -6%:	**……**	**%**
From -6 to -8%:	**……**	**%**
From -8 to -10%:	**……**	**%**
From -10 to -15%:	**……**	**%**
From -15 to -25%:	**……**	**%**
Less than -25%:	**……**	**%**
Total (the column should sum to 100%):	**100**	**%**

25. **Please assign probabilities** (from 0-100) **to the following ranges of overall price changes PER YEAR in the economy over the next 5-10 years for New Zealand:** (Note that the probabilities in the column should sum to 100)

Percentage Price Changes PER YEAR over the next 5-10 Years.	**Probabilities**	
More than 25%:	**……**	**%**
From 15 to 25%:	**……**	**%**
From 10 to 15%:	**……**	**%**
From 8 to 10%:	**……**	**%**
From 6 to 8%:	**……**	**%**
From 4 to 6%:	**……**	**%**
From 2 to 4%:	**……**	**%**
From 0 to 2%:	**……**	**%**
From -2 to 0%:	**……**	**%**
From -4 to -2%:	**……..**	**%**
From -6 to -4%:	**……..**	**%**
From -6 to -8%:	**……**	**%**
From -8 to -10%:	**……**	**%**
From -10 to -15%:	**……**	**%**
From -15 to -25%:	**……**	**%**
Less than -25%:	**……**	**%**
Total (the column should sum to 100%):	**100**	**%**

26. **Please assign probabilities** (from 0-100) **to the following ranges of price changes in your industry over the next 12 months:** (Note that the probabilities in the column should sum to 100)

Percentage Price Changes in 12 Months	**Probabilities**	
More than 25%:	**……**	**%**

From 15 to 25%:	**……**	**%**
From 10 to 15%:	**……**	**%**
From 8 to 10%:	**……**	**%**
From 6 to 8%:	**……**	**%**
From 4 to 6%:	**……**	**%**
From 2 to 4%:	**……**	**%**
From 0 to 2%:	**……**	**%**
From -2 to 0%:	**……**	**%**
From -4 to -2%:	**……**	**%**
From -6 to -4%:	**……**	**%**
From -6 to -8%:	**……**	**%**
From -8 to -10%:	**……**	**%**
From -10 to -15%:	**……**	**%**
From -15 to -25%:	**……**	**%**
Less than -25%:	**……**	**%**
Total (the column should sum to 100%):	**100**	**%**

27. **Please assign probabilities** (from 0-100) **to the following ranges of growth rates of the overall economy (real GDP) over the next 12 months:** (Note that the probabilities in the column should sum to 100)

Possible growth rates for real GDP	**Probabilities**	
More than 6% per year:	**……**	**%**
From 5 to 6% per year:	**……**	**%**
From 4 to 5% per year:	**……**	**%**
From 3 to 4% per year:	**……**	**%**
From 2 to 3% per year:	**……**	**%**
From 1 to 2% per year:	**……**	**%**
From 0 to 1% per year:	**……**	**%**
From -1 to 0% per year:	**……**	**%**
From -2 to -1% per year:	**……**	**%**
From -2 to -3% per year:	**……**	**%**
From -3 to -4% per year:	**……**	**%**
From -4 to -5% per year:	**……**	**%**
From -5 to -6% per year:	**……**	**%**
Less than -6% per year:	**……**	**%**
Total (each column should sum to 100%):	**100**	**%**

28. **Please assign probabilities** (from 0-100) **to the following ranges for what the unemployment rate might be in 12 months in New Zealand:** (Note that the probabilities in the column should sum to 100)

Possible Unemployment Rates in 12 Months	**Probabilities**	
More than 10%:	**……**	**%**
From 9 to 10%:	**……**	**%**
From 8 to 9%:	**……**	**%**
From 7 to 8%:	**……**	**%**
From 6 to 7%:	**……**	**%**
From 5 to 6%:	**……**	**%**
From 4 to 5%:	**……**	**%**
From 3 to 4%	**……**	**%**
Less than 3%:	**……**	**%**
Total (the column should sum to 100%):	**100**	**%**

SUBGROUP I:

31. Projecting ahead, to the best of your ability, please assign a percent likelihood to the following changes to unit costs over the next twelve months (values should sum to 100%).

- Unit costs down (less than -1%) ……. %

- Unit costs about unchanged (-1% to 1%) ……. %
- Unit costs up somewhat (1% to 3%) ……. %
- Unit costs up significantly (3% to 5%) ……. %
- Unit costs up very significantly (more than 5%) ……. %

32. Please indicate what probabilities you would attach to the various possible percentage changes to the CORE (excluding food and energy) CONSUMER PRICE INDEX over the next twelve months (values should sum to 100%).

- 4 percent or more ….. %
- 3.5 to 3.9 percent ….. %
- 3.0 to 3.4 percent ….. %
- 2.5 to 2.9 percent ….. %
- 2.0 to 2.4 percent ….. %
- 1.5 to 1.9 percent ….. %
- 1.0 to 1.4 percent ….. %
- 0.5 to 0.9 percent ….. %
- 0.0 to 0.4 percent ….. %
- Will decline ….. %

SUBGROUP II:

31. Projecting ahead, to the best of your ability, please assign a percent likelihood to the following changes to unit costs over the next twelve months (values should sum to 100%).

More than 25%:	**……**	**%**
From 15 to 25%:	**……**	**%**
From 10 to 15%:	**……**	**%**
From 8 to 10%:	**……**	**%**
From 6 to 8%:	**……**	**%**
From 4 to 6%:	**……**	**%**
From 2 to 4%:	**……**	**%**
From 0 to 2%:	**……**	**%**
From -2 to 0%:	**……**	**%**
From -4 to -2%:	**……..**	**%**
From -6 to -4%:	**……..**	**%**
From -6 to -8%:	**……**	**%**
From -8 to -10%:	**……**	**%**
From -10 to -15%:	**……**	**%**
From -15 to -25%:	**……**	**%**
Less than -25%:	**……**	**%**
Total (the column should sum to 100%):	**100**	**%**

32. Please indicate what probabilities you would attach to the various possible percentage changes to the CORE (excluding food and energy) CONSUMER PRICE INDEX over the next twelve months (values should sum to 100%).

More than 25%:	**……**	**%**
From 15 to 25%:	**……**	**%**
From 10 to 15%:	**……**	**%**
From 8 to 10%:	**……**	**%**
From 6 to 8%:	**……**	**%**
From 4 to 6%:	**……**	**%**
From 2 to 4%:	**……**	**%**
From 0 to 2%:	**……**	**%**
From -2 to 0%:	**……**	**%**
From -4 to -2%:	**……..**	**%**
From -6 to -4%:	**……..**	**%**
From -6 to -8%:	**……**	**%**
From -8 to -10%:	**……**	**%**
From -10 to -15%:	**……**	**%**
From -15 to -25%:	**……**	**%**
Less than -25%:	**……**	**%**
Total (the column should sum to 100%):	**100**	**%**

33. **What annual percentage rate of change in overall prices do you think the Reserve Bank of New Zealand is trying to achieve?** *Answer: ……..…….. %*

Thank you for participating in the survey. When we call you on the phone, we will ask a few additional short follow-up questions to help us better understand how managers process information about the economy. We appreciate your patience and understanding in participating in this survey.

PAPER SURVEY ENDS HERE. PHONE SURVEY CONTINUES BELOW. THIS SECTION IS NOT BE PROVIDED TO RESPONDENTS AHEAD OF TIME. INSTEAD, AT THE END OF INTERVIEW, WE READ THEM TEXT BELOW, WHICH PROVIDES THEM WITH NEW INFORMATION AND ASKS THEM TO ANSWER NEW QUESTIONS. HALF OF THE FIRMS IS RANDOMLY SELECTED TO RECEIVE INFORMATION.

SECTION E. EXPERIMENT:.

You said that you think the Reserve Bank of New Zealand targets an annual rate of overall price changes in the economy of around [X%]. The Reserve Bank of New Zealand's official target range is between 1% and 3%, so approximately 2% on average per year. In light of this, we would like to ask you a few follow-up questions.

34. **During the *next twelve* months, by how much do you think prices will change overall in the economy?** Please provide an answer in percentage terms. **…… %**

35. **Over the *five-ten years*, by what average annual rate do you think prices will change overall in the economy?** Please provide an answer in percentage terms. **…… %**

36. **What do you think will be the annual growth rate of real GDP in New Zealand in twelve months?** Please provide an answer in percentage terms. **…… %**

37. **In twelve months, what do you think the unemployment rate will be in New Zealand?**
…… %

39. **During the next twelve months, by how much do you think prices in your industry will change?** Please provide an answer an percentage terms. **…… %**

42. **During the next twelve months, by how much do you think the price of your main product is going to change?** Please provide an answer in percentage terms. **…… %**

Wave #6

SECTION A. ECONOMIC EXPECTATIONS
For each follow-up, we want to present firms with the same wording as they had in the previous survey.

1. **During the *next twelve* months, by how much do you think prices will change overall in the economy?** Please provide an answer in percentage terms. **…… %**

2. **Over the *five-ten years*, by what average annual rate do you think prices will change overall in the economy?** Please provide an answer in percentage terms. **…… %**

3. **What do you think will be the annual growth rate of real GDP in New Zealand in twelve months?** Please provide an answer in percentage terms. **…… %**

4. **In twelve months, what do you think the unemployment rate will be in New Zealand? …… %**

6. **During the next twelve months, by how much do you think prices in your industry will change?** Please provide an answer an percentage terms. **…… %**

8. **By how much has your firm changed the price of its main product over the last six months and by how much do you think it will change the price of its main product over the next six/twelve months?** Please provide a quantitative answer in percentage terms (e.g. "-X%" for X percent decline in price, "+X%" for X percent increase in price, etc.) over each period.

Percentage change in the price:		
In the last six months:	**……**	**%**
In the next six months:	**……**	**% (relative to current price)**
In the next twelve months:	**……**	**% (relative to current price)**

9. **Has your firm changed the number of employees over the last six months and does it expect to change the number of employees over the next six months?** Please provide a quantitative answer in percentage terms (e.g. "-X%" for X percent decline in employment, "+X%" for X percent rise in employment, etc.) over each period.

Percentage change in the number of employees:		
In the last six months:	**……**	**%**
In the next six months:	**……**	**% (relative to current number)**

10. **Has your firm invested in new capital over the last six months and does it expect to invest in new capital over the next six months?** Please provide a quantitative answer for capital expenditures as a share of annual revenues over each period.

New capital expenditures as a share of annual revenues:		
In the last six months:	**……**	**%**
In the next six months:	**……**	**%**

11. **Has your firm experienced changes in unit costs during the last six months and by how much do you think your firm's unit costs will change over the next six months?** Please provide a quantitative answer in percentage terms over each period.

Percentage change in unit costs:		
In the last six months:	**……**	**%**
In the next six months:	**……**	**% (relative to current level)**

12. **Has your firm experienced changes in average wages during the last six months and by how much do you think your firm's average wages will change over the next six months?** Please provide a quantitative answer in percentage terms over each period.

Percentage change in average wages:		
In the last six months:	**……**	**%**
In the next six months:	**……**	**% (relative to current level)**

13. **Has your firm experienced changes in the number of units sold of your main product line or service during the last six months and by how much do you think your unit sales will change over the next six months?** Please provide a quantitative answer in percentage terms over each period.

Percentage change in number of units sold:

In the last six months:	**……**	**%**
In the next six months:	**……**	**% (relative to current level)**

14. **Please assign probabilities** (from 0-100) **to the following ranges of overall price changes in the economy over the next 12 months for New Zealand:** (Note that the probabilities in the column should sum to 100)

Percentage Price Changes in 12 Months	**Probabilities**	
More than 25%:	**……**	**%**
From 15 to 25%:	**……**	**%**
From 10 to 15%:	**……**	**%**
From 8 to 10%:	**……**	**%**
From 6 to 8%:	**……**	**%**
From 4 to 6%:	**……**	**%**
From 2 to 4%:	**……**	**%**
From 0 to 2%:	**……**	**%**
From 0 to -2%:	**……**	**%**
From -2 to -4%:	**……**	**%**
From -4 to -6%:	**……**	**%**
From -6 to -8%:	**……**	**%**
From -8 to -10%:	**……**	**%**
From -10 to -15%:	**……**	**%**
From -15 to -25%:	**……**	**%**
Less than -25%:	**……**	**%**
Total (the column should sum to 100%):	**100**	**%**

15. **Please assign probabilities** (from 0-100) **to the following ranges of overall price changes PER YEAR in the economy over the next 5-10 years for New Zealand:** (Note that the probabilities in the column should sum to 100)

Percentage Price Changes PER YEAR over the next 5-10 Years.	**Probabilities**	
More than 25%:	**……**	**%**
From 15 to 25%:	**……**	**%**
From 10 to 15%:	**……**	**%**
From 8 to 10%:	**……**	**%**
From 6 to 8%:	**……**	**%**
From 4 to 6%:	**……**	**%**
From 2 to 4%:	**……**	**%**
From 0 to 2%:	**……**	**%**
From -2 to 0%:	**……**	**%**
From -4 to -2%:	**……..**	**%**
From -6 to -4%:	**……..**	**%**
From -6 to -8%:	**……**	**%**
From -8 to -10%:	**……**	**%**
From -10 to -15%:	**……**	**%**
From -15 to -25%:	**……**	**%**
Less than -25%:	**……**	**%**
Total (the column should sum to 100%):	**100**	**%**

16. **Please assign probabilities** (from 0-100) **to the following ranges of price changes in your industry over the next 12 months:** (Note that the probabilities in the column should sum to 100)

Percentage Price Changes in 12 Months	**Probabilities**	
More than 25%:	**……**	**%**
From 15 to 25%:	**……**	**%**
From 10 to 15%:	**……**	**%**
From 8 to 10%:	**……**	**%**
From 6 to 8%:	**……**	**%**
From 4 to 6%:	**……**	**%**
From 2 to 4%:	**……**	**%**
From 0 to 2%:	**……**	**%**

From -2 to 0%:	**……**	**%**
From -4 to -2%:	**……**	**%**
From -6 to -4%:	**……**	**%**
From -6 to -8%:	**……**	**%**
From -8 to -10%:	**……**	**%**
From -10 to -15%:	**……**	**%**
From -15 to -25%:	**……**	**%**
Less than -25%:	**……**	**%**
Total (the column should sum to 100%):	**100**	**%**

17. **Please assign probabilities** (from 0-100) **to the following ranges of growth rates of the overall economy (real GDP) over the next 12 months:** (Note that the probabilities in the column should sum to 100)

Possible growth rates for real GDP	**Probabilities**	
More than 6% per year:	**……**	**%**
From 5 to 6% per year:	**……**	**%**
From 4 to 5% per year:	**……**	**%**
From 3 to 4% per year:	**……**	**%**
From 2 to 3% per year:	**……**	**%**
From 1 to 2% per year:	**……**	**%**
From 0 to 1% per year:	**……**	**%**
From -1 to 0% per year:	**……**	**%**
From -2 to -1% per year:	**……**	**%**
From -2 to -3% per year:	**……**	**%**
From -3 to -4% per year:	**……**	**%**
From -4 to -5% per year:	**……**	**%**
From -5 to -6% per year:	**……**	**%**
Less than -6% per year:	**……**	**%**
Total (each column should sum to 100%):	**100**	**%**

18. **Please assign probabilities** (from 0-100) **to the following ranges for what the unemployment rate might be in 12 months in New Zealand:** (Note that the probabilities in the column should sum to 100)

Possible Unemployment Rates in 12 Months	**Probabilities**	
More than 10%:	**……**	**%**
From 9 to 10%:	**……**	**%**
From 8 to 9%:	**……**	**%**
From 7 to 8%:	**……**	**%**
From 6 to 7%:	**……**	**%**
From 5 to 6%:	**……**	**%**
From 4 to 5%:	**……**	**%**
From 3 to 4%	**……**	**%**
Less than 3%:	**……**	**%**
Total (the column should sum to 100%):	**100**	**%**

19. **What annual percentage rate of change in overall prices do you think the Reserve Bank of New Zealand is trying to achieve?** *Answer: ……..…….. %*