NBER WORKING PAPER SERIES

THE MACROECONOMIC EXPECTATIONS OF FIRMS

Bernardo Candia
Olivier Coibion
Yuriy Gorodnichenko

Working Paper 30042
http://www.nber.org/papers/w30042

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
May 2022

This research was funded in part by National Science Foundation grants 1919307 and 1530467. We thank the editors (Ruediger Bachmann, Wilbert van der Klaauw, Giorgio Topa) for their comments. We are grateful to Zhaosheng Li, Jake Lyons and Yizhong Zhang for excellent research assistance. We thank George Kershoff, Javier Turén, Rodrigo Lluberas, Serafín Frache, Pär Österholm, Jens Iversen, Ulf Söderström, Gustaf Lundgren, Knut Are Aastveit, Jorgovanka Tabakovi , Vesna Martin, Karen Vignisdóttir, Ásgeir Daníelsson, Michela Coppola, Péter Gábriel, Jaime Ruiz-Tagle, Lorena Flores, Ignacio Sarmiento, Gonzalo Marivil, and Martín Caruso for sharing data. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

The Macroeconomic Expectations of Firms
Bernardo Candia, Olivier Coibion, and Yuriy Gorodnichenko
NBER Working Paper No. 30042
May 2022
JEL No. E03,E30,E40,E5

ABSTRACT

Using surveys of firms around the world, we review existing evidence on how firms form their macroeconomic expectations. Several facts stand out. First, the mean inflation forecasts of firms often deviate significantly from those of professional forecasters and households. Second, disagreement about inflation among firms is large. Third, firms often change their short-run and long-run inflation expectations jointly and by similar amounts. Fourth, firms in economies with a history of low and stable inflation are inattentive to inflation and monetary policy, but this is less true in countries with more volatile environments. Fifth, firms form expectations about inflation and the real economy jointly, but the way in which they do can differ widely across countries. Finally, we show that conditioning on firms' inflation expectations generates a stable Phillips curve relationship. We also review evidence showing that exogenous variation in the macroeconomic expectations of firms affects their decisions.

Bernardo Candia
University of California, Berkeley
bernardo_candia@berkeley.edu

Olivier Coibion
Department of Economics
University of Texas at Austin
2225 Speedway
Austin, TX 78712
and NBER
ocoibion@gmail.com

Yuriy Gorodnichenko
Department of Economics
530 Evans Hall #3880
University of California, Berkeley
Berkeley, CA 94720-3880
and IZA
and also NBER
ygorodni@econ.berkeley.edu

I Introduction

How do firms think about the aggregate economy and how do those beliefs affect their decisions? A growing literature is investigating the formation of firms' expectations about the overall economic outlook as well as the role that these expectations may play in shaping firms' economic choices. We review some of these findings and provide new evidence using a broader collection of firm-level surveys from a wide range of countries. Because of data constraints, we focus on inflation expectations, but our conclusions extend to other macroeconomic expectations.

We emphasize several key features of firms' macroeconomic expectations. First, the macroeconomic expectations of firms typically differ from those of both households and professional forecasters. Although professional forecasters have been often used as a proxy for firm managers, surveys of professional forecasters are no substitute for representative survey evidence coming from firms. For example, the average expectations for firms often deviate discernably from the average expectations for professional forecasters. Furthermore, firms' average expectations can be close to households' average expectations, a pattern that is particularly evident for inflation expectations but can be found for the expectations of other macroeconomic variables as well.

Second, there is pervasive disagreement among firms about macroeconomic conditions. This disagreement dwarfs what is seen among professional forecasters. Qualitatively, the amount of disagreement across firms is generally similar to or slightly smaller than what is observed in surveys of households.

Third, there is typically a high correlation between firms' long-run and short-run inflation expectations. In principle, to the extent that many shocks to inflation are transitory, short and long-run inflation expectations should not be strongly correlated if expectations are "well-anchored": long-run expectations should be pinned down by the inflation target of the central bank. Instead, we find strong correlations between revisions in short-and long-run inflation forecasts of firms. Combined with the previous stylized facts, this indicates that firms' inflation forecasts, at least in countries with a history of low and stable inflation, cannot be characterized as well-anchored.

Fourth, firms seem to form expectations of the future as a combination of their beliefs about recent events as well as their views about very long-run "natural" levels. But both beliefs can be quite far from actual values. For example, inattention on the part of firms about recent macroeconomic dynamics implies they often have very inaccurate beliefs about recent inflation, misconceptions that then extend into their views about the future. Firms also can have a poor

understanding about long-run policy objectives, such as the central bank's inflation target, which also shapes their views about future economic outcomes. The degree of inattention, however, varies with the level of inflation. Using cross-country firm survey data, we show that, when countries experience higher inflation rates, the forecasts of firms are closer to those of professional forecasters, i.e., more informed, than when inflation rates are low. We observe a similar pattern for households. How inattentive agents are to macroeconomic conditions, and inflation in particular, depends on the economic environment.

Fifth, firms seem to form distributions across macroeconomic variables jointly. In other words, revisions in their beliefs about one macroeconomic variable are generally correlated with their revisions in beliefs about other macroeconomic variables. We provide a variety of evidence for this fact. For example, we show that the unconditional correlation between firms' expectations of future inflation and future real economic activity is non-zero. In many countries, firms associate inflation with low levels of economic activity, consistent with a stagflationary view of the world, whereas in other countries they seem to take a more demand-side view. We also show that when firms are asked to provide a joint distribution over future wage inflation and unemployment, their answers incorporate a strong negative covariance between the two.

Jointly, these stylized facts regarding firms' macroeconomic expectations can be helpful to policy-making, where expectations are central, as well as to inform theory. We provide one example of the latter by assessing the extent to which observing firms' inflation expectations can help explain the inflation history across countries through the lens of an expectations-augmented Phillips curve. Macroeconomic models with nominal or information rigidities typically imply that inflation is positively related to the level of economic activity after conditioning on the inflation expectations of firms. We show using cross-country firm surveys that this prediction is confirmed in the data: once one conditions on firms' historical inflation expectations, a clear positive relationship between inflation and economic activity is visible. This is consistent with theories in which firms' macroeconomic expectations matter for economic dynamics and policy.

Another approach to assessing the potential importance of firms' expectations is through randomized control trials that generate exogenous variation in those beliefs to determine whether they have any causal effect on firm decisions. We review recent work using surveys of firms in New Zealand and Italy that use this strategy to assess whether the inflation expectations of firms affect their decisions. This recent work provides direct causal evidence that exogenous changes in

the inflation expectations of firms do indeed affect their subsequent decisions, particularly for employment and investment. The way in which they do so, however, seems to depend on the interpretation that firms take about the source of the change in inflation.

We describe how different surveys measure firms' macroeconomic expectations in section II. Section III presents stylized facts about firms' macroeconomic beliefs. Section IV documents the fact that firms' macroeconomic expectations affect their decisions and economic outcomes. Section V concludes.

II Surveys of Firms' Macroeconomic Expectations

Implementing a survey of firms poses many challenges. First, one needs to be able to contact the desired respondent within a firm. For larger firms, reaching a top executive requires bypassing a cadre of staff who carefully protect their manager's time and accessibility. Second, one needs to convince the respondent to participate in the survey. Household surveys commonly rely on nominal amounts to induce participation in short surveys, but these nominal amounts are generally insufficient for senior executives. In addition, executives may worry about sharing confidential information or helping the competition by unilaterally sharing knowledge. Third, given the time constraints on managers' time, surveys must be short and easy to complete, or risk being discarded. As a result, few surveys ask for quantitative measures of expectations or, when they do so, they focus only on variables specific to the firm. Given these challenges, even mandatory government-managed surveys like the Annual Survey of Manufacturers run by the U.S. Census Bureau achieve response rates of only around fifty percent.[1] Surveys that are neither mandatory nor supported by a governmental authority typically struggle to develop a large pool of willing respondents to participate in a survey. As a result, many surveys of firms are either not representative of the broader population of firms or pose only qualitative questions that are of limited value for economic analysis.

Tables 1 and 2 present a non-exhaustive list of surveys of firms' macroeconomic expectations across countries.[2] Table 1 focuses on how quantitative inflation expectations of firms

[1] Response rates in the ASM are described here: https://www.census.gov/programs-surveys/asm/technical-documentation/methodology.html.

[2] There are a number of prominent firm surveys that we omit from Table 1. Some are omitted because they do not include quantitative macroeconomic forecasts. This includes for example the ifo survey of manufacturers in Germany described in Bachmann (2019) and Enders, Hunnekes, and Muller (2019) as it elicits qualitative macroeconomic forecasts. Another qualitative survey is the French Quarterly Survey of Economic Conditions in Industry studied in Andrade et al. (2020). We also omit some very high-quality firm surveys that focus on expectations about firm-specific

are measured in these surveys, as inflation expectations are the most commonly measured aggregate expectations. Even for a specific variable like inflation, there is a lot of variation in how expectations are measured across surveys. Firms may be asked about "prices in general," "inflation" or even specific measures of inflation (e.g., CPI inflation rate). They may be asked for point estimates or to assign probabilities to different possible outcomes. They may be asked about inflation over different horizons. Some may have the option of saying "I don't know" while others do not. Even small differences in the formulation of questions can have discernible effects on survey results (e.g., Haldane and McMahon 2018, Haldane, Macauley and McMahon 2020, Savignac et al. 2021, de Bruin et al. 2022).

Table 2 focuses on the broader implementation of the survey and whether each survey meets several desired characteristics identified in Coibion, Gorodnichenko, Kumar and Pedemonte (2020). For example, a survey should be broadly representative of the economy, which means covering a range of industries and firm sizes. Table 2 indicates that many surveys focus on specific sectors or geographic areas and therefore fail to be representative of the broader distribution of firms. For a survey to be useful for research or policy, it should be high-frequency (e.g., monthly or quarterly), which some surveys are not (e.g., Livingston survey). Sample sizes should be sufficiently high, which we define as exceeding 350 responses on average. Very few surveys satisfy this restriction. Another desired characteristic is that surveys do not "prime" responses, i.e., push responses in specific ways either through the formulation of the question or by providing other information to the firm. For example, some surveys offer very few bins for possible inflation outcomes, and those bins are very close to 2%, leading all responses to look "anchored". Other surveys provide information about recent inflation prior to asking about firms' inflation forecasts. As shown in Coibion, Gorodnichenko and Ropele (2020) as well as Savignac et al. (2021), this kind of information provision significantly affects reported forecasts.

Table 2 documents that most available surveys of firms suffer from several severe shortcomings as defined here. However, there are several surveys that stand out in their quality, those from Norway, Hungary, Uruguay, and Ukraine. Each country has been running a large-scale,

outcomes and uncertainty, such as the U.K. Decision Maker Panel described in Bloom et al. (2019), the U.S. Survey of Business Uncertainty described in Altig et al. (2020) or the Atlanta Fed's Business Inflation Expectations survey. Another omitted group are very new surveys that do not yet provide time series data, such as the German Business Panel described in Bischof et al. (2021) or the French survey of firms described in Savignac et al. (2021). Finally, we also do not explicitly discuss surveys with annual frequency. One notable example is the Japanese Annual Survey of Corporate Behavior, which includes firm-level forecasts of GDP growth studied in Tanaka et al. (2019).

representative and quantitative survey of firms since the early to late 2000s.[3] More recently, the Survey of Firm Inflation Expectations (SoFIE) has measured the inflation expectations of U.S. firms in a large scale, representative and quantitative way since 2018.[4] These data are described and utilized in Candia et al. (2021) and Binder and Kim (2020). The Bank of Italy's survey of firms' inflation expectations has historically provided information about recent inflation to participants, but since 2012, a randomly selected subset has not been provided any additional information. We view this subset of the survey as also satisfying most criteria for being representative, large scale, and quantitative. Finally, an intermittent survey of firms in New Zealand also satisfies many of the criteria, albeit at lower frequency than these other surveys just described. Given the availability of micro-level data from these high-quality surveys, our results will focus primarily on these specific cases, but we will illustrate how not satisfying the criteria of high-quality surveys can lead to dramatically different results.[5] In Tables 3-7, we also consider the extent to which these surveys cover non-inflation expectations. Similar issues arise in the measurement of expectations about real GDP and unemployment in terms of potential priming, size of bins, etc. as discussed in Bachmann and Cartensen (2022). These tables indicate that coverage for non-inflation questions is even more limited than for inflation.

III Properties of Firms' Macroeconomic Expectations

We now consider the properties of firms' macroeconomic expectations that can be seen in available surveys.[6] Many of these properties can directly shed light on the extent to which inflation expectations are anchored (see Kumar et al. 2015 for a detailed discussion).

3.1 Mean Inflation Forecasts

Since most surveys of firms' macroeconomic forecasts are focused primarily on their inflation expectations, we first focus on the nature of these beliefs and return to firms' forecasts about other variables in section 3.5. In Figure 1, we plot the time series of the average 12-month-ahead

[3] Unfortunately, the National Bank of Hungary stopped collecting survey data (both households and firms) in 2015.
[4] Detailed information about the survey as well as updated survey results can be found at http://www.firm-expectations.org/.
[5] Sometimes we supplement our results with surveys of firms in Sweden and South Africa.
[6] There are other ways of measuring firms' expectations that are not survey based. For example, Hassan, Hollander, van Lent and Tahoun (2019) and Gallermore, Hollander, Jacob, and Zheng (2021) rely on the content of discussions during firms' earnings calls. However, these measures are not direct quantitative forecasts per se, so we do not include them here.

inflation forecasts of firms for each of the seven countries for which we have a large-scale, representative, and quantitative survey as described in section II. For comparison, we also include the time series of actual (CPI) inflation in each country, as well as the 12-month-ahead inflation expectations for professional forecasters (from Consensus Economics for most countries) and household surveys (when available).

Panel A of Figure 1 plots U.S. firms' inflation expectations from SoFIE, as previously shown in Candia, Coibion and Gorodnichenko (2021), available for 2018Q2-2021Q3. Firms' inflation expectations were high at the start of the survey sample, well above 3 percent in 2018. At the time, professional forecasters were predicting inflation of just over 2 percent while households (from the Michigan Survey of Consumers) were predicting inflation of about 3.5 percent. Thus, firms' beliefs were initially quite close to those of households. In 2019, however, firms' inflation forecasts fell sharply to around 2 percent and remained there through 2020, close to those of professional forecasts for much of this time period. In 2021, firms' inflation expectations rose sharply, reaching 4.7 percent in 2021Q3, the last available wave of the survey.

The results from SoFIE suggest that the inflation expectations of firms can differ significantly from those of both households and professional forecasters. This result for U.S. firms is not limited to SoFIE however. The Federal Reserve Bank of Atlanta runs a survey of firms known as the Business Inflation Expectations (BIE) survey, in which firms from the Southeastern region of the U.S. are surveyed about their costs (see Born et al. (2021) for a discussion of how firms form expectations about their own prices and production). Occasionally, the survey has also asked questions about aggregate inflation. These occasional waves are described in Meyer, Parker and Sheng (2021) and are also shown in Panel A of Figure 1. For the two waves in 2014 and 2015, the average inflation forecasts from the BIE were close to those of U.S. households. For the two other waves run in 2019, the results were either very close to those from SoFIE or point to even higher inflation expectations.

Evidence from other countries for which high-quality surveys of firms' inflation expectations is available confirm that the inflation expectations of firms are generally distinct from those of either households or professional forecasts (see Clements, Rich and Tracy (2022) and de D'Acunto, Malmendier and Weber (2022) for systematic overviews of the inflation expectations of professional forecasters and households respectively). Panel B of Figure 1, for example, plots the inflation expectations of firms in Italy (specifically those firms who were *not* provided with

information about recent inflation as part of the survey) against corresponding forecasts from professionals and households (whenever available). Clear differences across agents are again visible. For example, as inflation fell sharply in 2013 and 2014, the inflation forecasts of professionals responded more rapidly than those of firms. In the case of Hungary (Panel C, Figure 1) and Norway (Panel D, Figure 1), we again observe that the inflation forecasts of firms were generally above those of professionals and below those of households, periodically moving closer to one or the other such that neither would have presented a clear substitute for a separate measure of firms' inflation expectations. Panel E of Figure 1 plots equivalent results for New Zealand. Firms' inflation forecasts in New Zealand were either higher than (in 2013-14) or very similar to (in 2016-20) to those of households and persistently well above those of professional forecasters.[7]

Panels F and G of Figure 1 present equivalent results for Ukraine and Uruguay respectively. Note that relative to the previous five countries, Ukraine and Uruguay both experienced significantly higher and more volatile inflation over this time period (as well as in earlier years). As a result, these countries are more indicative of firms' inflation expectations in high-inflation environments. Firms' inflation expectations in Ukraine, while initially higher than those of households during the inflation spike of 2015, fell sharply thereafter and subsequently remained close to those of professional forecasters. In Uruguay, we can observe that firms' inflation expectations were quite volatile and closely followed even transitory changes in inflation. This high correlation with actual inflation suggests firms were paying a lot of attention to recent inflation dynamics.

Jointly, these results make clear that firms' inflation expectations often deviate significantly from those of both professional forecasters as well as households. To the extent that firms' inflation expectations are important to economic dynamics, this pattern indicates that *high-quality* surveys of firms' inflation expectations are crucial to properly understanding their beliefs. The importance of focusing on high-quality surveys can be seen by comparing the results of these surveys to those available for other countries, for which firm surveys suffer from some of the limitations described in section 2. Figure 2 plots the resulting measures of inflation expectations of firms from these

[7] In its survey of households, the Reserve Bank of New Zealand first asks respondents to define inflation and only measures the inflation expectations of those who correctly respond (approximately 50 percent of respondents), see Kumar et al. (2015). Due to this unusual selection within the survey, the inflation expectations of households in New Zealand are likely underestimated.

surveys, as well as forecasts from professionals and households when available. In each case, we can see that firm forecasts appear to closely track those of professional forecasters.

Why are these firm forecasts so different from those in Figure 1? In the case of Japan, the survey proposes a set of bins that are centered on 2% and whose extremes are >+6% and <-2%. This kind of "guidance" in terms of what are reasonable expectations unduly pushes responses toward the 2% level. This is also in sharp contrast to the much wider bins offered firms for other questions (which range from +20% to -20%). Similarly, the use of non-representative samples and reliance on convenience sampling (which selects on firms that are particularly interested in inflation and monetary policy) in other countries similarly yields firm forecast series that track those of professionals. The differences between Figure 1 and Figure 2 are stark and highlight the importance of survey design.[8]

3.2 Disagreement about Inflation

An additional important characteristic of expectations that has been emphasized (see in particular Mankiw, Reis and Wolfers 2003) is the amount and behavior of disagreement across agents over time. Disagreement across agents indicates a departure from full-information rational expectations, and its dynamics can be informative about the nature of those deviations from FIRE (e.g., Coibion and Gorodnichenko 2012, Reis 2020). Figure 3 therefore plots the cross-sectional standard deviation of firms' 12-month-ahead inflation expectations for those same countries as in Figure 1 for which we have high-quality surveys.

Panel A of Figure 3 plots the time series of disagreement about inflation for firms in the U.S. as well as corresponding measures for households and professional forecasters. As emphasized in Mankiw, Reis and Wolfers (2003), disagreement among households is an order of magnitude larger than disagreement across professional forecasters. Results from SoFIE indicate that disagreement about inflation among U.S. firms is approximately mid-way between the two,

[8] The properties of inflation expectations also vary by who is being surveyed within firms. For example, since 2015, Deloitte has conducted the European CFO survey, collecting European Chief Financial Officers' sentiments and expectations for investments and hiring. The survey covers senior financial executives in manufacturing, services, retail, construction, and the public sector. Each wave includes responses from around 1500 CFOs based in 19 European countries. Even though this survey does not meet the desired characteristics of a high-quality survey mentioned above—it covers only very large firms and respondents are contacted using Deloitte's internal lists of clients—it is the only cross-country survey of firms' expectations in major advanced economies. In 2018, this biannual survey added a quantitative question about 12-month-ahead CPI inflation expectations. Appendix Figure 5 documents that inflation expectations of large firms' CFOs are close to professional forecasters'.

with the cross-sectional standard deviation staying around 1 to 2 percentage points. There is a mild positive correlation between firm disagreement and the level of inflation, with disagreement falling mildly with inflation from 2018 to 2020 and rising somewhat thereafter.

Panels B-G of Figure 3 suggest that similar findings hold in other countries.[9] The level of disagreement for firms is consistently higher than that among professional forecasters and generally below or at a similar level as households. We can also observe a positive correlation between the level of inflation and the amount of disagreement across countries. For example, the large spike in inflation in Ukraine in 2015 is accompanied by a large increase in disagreement among firms.

Where does disagreement among firms come from? "Island" models in the spirit of Lucas (1972) posit that firms observe noisy signals about local and aggregate economic conditions. As a result, firms may have different expectations because they observe different signals. Consistent with this hypothesis, Andrade et al. (2020) document that French firms revise their aggregate inflation expectations in response to industry-level ("idiosyncratic") variation in prices that has no bearing on the macroeconomy. In a similar spirit, Kumar et al. (2015) interview managers in New Zealand to identify sources of their information about prices and find that managers often rely on their own shopping experience to form inflation expectations. This behavior suggests that, similar to households' expectations (D'Acunto et al., 2021), managers' expectations may be sensitive to salient price changes for homogenous, frequently-purchased goods like food or gasoline for advanced economies or to variation in the exchange rate for countries with a history of dollarization or chronically high inflation (e.g., Coibion and Gorodnichenko 2015b). Because the shopping experience may be different across managers, one may observe high disagreement in managers' inflation expectation, which could be similar to the disagreement observed for households' inflation expectations. Finally, Candia, Coibion and Gorodnichenko (2021) show that some of the disagreement is systematically related to some firm characteristics. While few differences in expectations can be explained by the size of the firm, there are some notable differences across industries. For example, firms in the Telecommunications industry and in the Food and Drinks industry report systematically higher inflation expectations.

[9] Appendix Figure 3 shows the time series of countries with other surveys. Even for firm surveys with potential problems, we find that disagreement in firms' inflation expectations is much greater than disagreement in professional forecasters' expectations.

3.3 Short and Long-Run Expectations

A separate dimension of inflation expectations that has received attention in the literature is the correlation between changes in short-run vs. long-run inflation expectations (e.g., Kumar et al. 2015). This correlation is often interpreted as the degree to which inflation expectations are "anchored." If expectations are well-anchored, long-run inflation expectations should be pinned down by the inflation target and changes in beliefs about the long-run should be largely unrelated to the transitory shocks that affect inflation in the short-run. In other words, the correlation between revisions in short-run and long-run inflation expectations should be close to zero if expectations are well-anchored.

Following Candia, Coibion and Gorodnichenko (2021), Figure 4 presents some evidence on the extent of inflation anchoring for firms in the United States. Panel A plots a bin-scatter of average revisions in U.S. firms' short-run expectations vs revisions in their long-run (5-year ahead) inflation expectations. There is a very strong positive correlation between the two. The slope coefficient is close to 1 (0.71), indicating that when households revise their short-run expectations upward, they tend to raise their long-run inflation expectations upward by almost as much. The R^2 of this specification is very high (0.62), indicating that much of the variation in firms' beliefs about long-run inflation can be accounted for by the same source as those that shape their short-run inflation expectations, a finding strikingly at odds with the zero correlation expected under perfectly anchored expectations.

For comparison, Panels B and C plot equivalent figures for households (from the SCE) as well as professional forecasters (SPF) over the same period and are constructed in the same way. In each case, we observe a positive correlation between revisions in short-run inflation expectations and long-run inflation expectations, calling into question the extent to which one can characterize any agents' expectations as well-anchored in the U.S. However, firms display even stronger correlations than either households or professionals, indicating that the lack of anchoring is particularly pronounced for them.[10]

3.4 Inattention to Inflation and Monetary Policy

What lies behind the disagreement displayed by firms? One natural source of disagreement about inflation in the future is if firms disagree about what inflation has been in the past. Beliefs about

[10] Appendix Figure 4 shows that similar findings hold for Sweden and South Africa.

recent inflation rates have long been found to be a strong predictor of household expectations about future inflation (Jonung 1981) and similar evidence has been documented for firms in New Zealand (Coibion, Gorodnichenko and Kumar 2018). Another reason why firms might disagree about future inflation is if they disagree about the long-run objectives of the central bank. Inattention to recent inflation or monetary policy can therefore each provide one potential rationale to help account for the widespread disagreement in beliefs about future inflation by firms.

How inattentive are firms to monetary policy and recent inflation? In terms of the former, we can assess how informed firms are about long-run monetary policy by asking them to identify their central bank's inflation target. This question was asked of firms in SoFIE as well as in surveys of firms in New Zealand and Uruguay. The distributions of answers are presented in Figure 5. Over 50 percent of U.S. firms responded that they did not know the Fed's inflation target and did not want to provide a quantitative answer. Only about 25 percent of respondents correctly identified the 2% inflation target, with many providing answers significantly higher. This suggests that inattention to monetary policy is pervasive among firms in the United States. Results for New Zealand are similar. Despite a long-run history of inflation targeting, only about one third of New Zealand firms could correctly identify the Reserve Bank of New Zealand's 2 percent inflation target. More than 40 percent provided answers of 4 percent or above. Firms in New Zealand appear no more informed about monetary policy than those in the United States.

Figure 5 also plots corresponding results based on a survey of firms in Uruguay (Frache and Lluberas 2019, Borraz, Mello, and Zacheo 2020). The inflation target in Uruguay ranges from 3 to 7 percent. Forty-five percent of respondents said that the inflation target was 5 or 6 percent and the share reporting a number from 3 to 7 percent was approximately 70 percent. This is a much larger fraction of firms able to correctly identify their central bank's inflation target than in the U.S. or New Zealand. Hence, while inattention to monetary policy appears to be symptomatic of firms in New Zealand or the U.S., it is at odds with what we observe in Uruguay, where firms appear attentive to the central bank's objectives.[11]

Inattention to recent inflation presents another possible source of disagreement in expectations. The surveys of firms in the U.S., New Zealand and Uruguay all included questions

[11] Similar to Uruguay, firms in Russia, a country with a history of high and volatile inflation, are quite informed about the central bank's inflation target. Using a one-time survey in 2018, Karlova et al. (2019) find that, although approximately a third of respondents had "no idea" about the inflation target (Russia adopted inflation targeting in 2014), respondents who provided quantitative responses overwhelmingly picked four percent, the official inflation target.

asking firms about what they thought the most recent 12-month inflation rate had been. The distributions of responses in each country are plotted in Panels A, B and C of Figure 6 for the U.S., New Zealand, and Uruguay, respectively. In 2018Q2, when U.S. firms in SoFIE were asked about the recent inflation rate, the latest CPI inflation number was unusually high, at just around 3 percent. Less than 20 percent of respondents said that inflation had been 3 percent, while close to fifty percent answered 2 percent, with another 15 percent answering 0 or 1 percent, leaving about 25 percent of respondents answering 4 or more percent. Despite the widespread availability of data on inflation, we can nonetheless observe significant dispersion in beliefs about recent inflation in the United States. The same question was asked of firms in New Zealand in 2013Q4, when inflation was around 1.5 percent. Less than forty percent of firms reported that inflation was either 1 or 2 percent. Around 50 percent of firms responded that inflation had been running at 4 percent or more. As in the U.S., firms in New Zealand also display remarkable inattention to recent inflation with a wide variety of views about what those recent rates have been.

Corresponding results for Uruguay are for a survey wave in 2018Q2, when the same question about recent inflation was asked. At the time, the most recent inflation rate was 6.5 percent. Strikingly, around 85 percent of firms responded that inflation had been either 6 or 7 percent and only 15 percent of firms were off by more than one percentage point. Unlike what we see with firms in the U.S. and New Zealand, this result indicates that firms in Uruguay are much more attentive to aggregate inflation.

Jointly, these results yield a striking contrast. Firms in the U.S. and New Zealand are very inattentive to both inflation and monetary policy. Firms in Uruguay on the other hand are much better informed about both. One possible explanation for this contrast is their respective histories of inflation and the incentive that firms face in terms of staying informed about inflation. Both the U.S. and New Zealand have had low and stable inflation since the 1990s. During this period, inflation has rarely moved far from the 2 percent target of both central banks, and when it has, these deviations have been very transitory. The success of the U.S. Federal Reserve and the Reserve Bank of New Zealand in stabilizing inflation has therefore created an environment in which firms have little incentive to remain attentive to either inflation or monetary policy. In contrast, Uruguay has a history of higher and more volatile inflation, an environment in which firms must pay attention to inflation and monetary policy to stay afloat. As a result, we observe

little sign of inattention to either inflation or monetary policy on the part of Uruguayan firms. Afrouzi et al. (2020) document a similar finding for firms in Iran.

More generally, to what extent do economic agents in volatile environments stay more informed than agents in stable environments? Cavallo, Cruces and Perez-Truglia (2017) documented a similar result for households in Argentina who, facing an environment of high and volatile inflation, were well-informed about recent inflation and monetary policy, whereas U.S. households, who were living in an environment of low and stable inflation, were very inattentive. Similarly, there is variation in the degree of informedness of households in the U.S. over time. Their forecasts were very close to those of professionals through the 1970s and early 1980s when inflation in the U.S. was high and volatile, but household forecasts began to deviate from professional forecasts in persistent swings starting in the 1990s, as inflation fell to the lower levels experienced since. This suggests that households, like firms, likely adapt how they allocate their attention to their economic environment.

To assess this predicted relationship, we first measure the degree of attention to economic conditions by firms and households across countries. We do so by constructing a measure of the difference between their inflation forecasts from those of professional forecasters at the quarterly frequency. Specifically, for country *i* and period *t*, we measure the absolute value of the difference between the average 12-month-ahead inflation forecast of firms and the average 12-month-ahead inflation forecast of professionals. We then take the average over time of each country's series, which yields an average absolute distance from professional forecasts. Finally, we normalize this by the standard deviation of 12-month-ahead inflation forecast errors of professional forecasters over the corresponding period. Equivalently, our measure for country c is: $MAD^c = \overline{\left|E_t^{firms,c}\pi_{t+4} - E_t^{spf,c}\pi_{t+4}\right|} / std\left(\pi_{t+4}^c - E_t^{spf,c}\pi_{t+4}\right)$ where $E_t^{firms,c}\pi_{t+4}$ is the average 12-month-ahead inflation forecast of firms in country c and period *t*, $E_t^{spf,c}\pi_{t+4}$ is the average 12-month-ahead inflation forecast of professionals, π_{t+4}^c is the annual inflation rate at time $t+4$, and both the average $\left(\overline{|\cdot|}\right)$ and std operators apply across time. We then construct equivalent measures for households in countries for which we have appropriate time samples.

We plot in Figure 7 the average annual inflation rate for each country over the corresponding time period (*x*-axis) versus the distance from professional forecasts of firm and household forecasts in that country over that same period (*y*-axis). Our MAD measure is normalized by the volatility of inflation, because the fact that higher inflation tends to be more volatile inflation would naturally

lead to larger differences in forecast levels. This scale effect would tend to induce an artificial positive correlation. Instead, what we observe in Figure 7 is that there tends to be a negative correlation between the level of inflation and the distance of both firm and household forecasts from those of professional forecasters. In high inflation environments like India, Uruguay, or Ukraine, the inflation forecasts of both firms and households are relatively close to those of professionals, with average differences of less than one percentage point. As we consider countries with lower inflation, however, we tend to see rising differences between firm or household forecasts and those of professionals, indicating more inattention on the part of the former.

This evidence is of course meant to be only suggestive due to data limitations.[12] We have few firm-level surveys, for example, and some of these surveys have very limited time samples. In addition, the inflation rate in the relevant samples may not necessarily be representative of that country's historical experience. Household surveys are not necessarily constructed in the same way across countries, and different countries often apply different thresholds for identifying outliers. Despite these shortcomings, we view the cross-country experience as broadly consistent with rational inattention: households and firms allocate more attention to inflation when not knowing about inflation would become more costly.

3.5 The Joint Formation of Beliefs

While we have so far focused exclusively on the inflation expectations of firms, some surveys also consider firms' expectations about other macroeconomic variables as well, although this is a restricted subset of surveys described before. Surveys of New Zealand firms, for example, sometimes asked firms about their expectations of future output growth. The Italian survey of firms regularly asks firms about future business conditions, although responses are only qualitative in nature. Firms in Ukraine are also asked about future output growth. Surveys of firms in Sweden and South Africa ask quantitative questions about GDP growth expectations. Jointly, these surveys allow us to assess how firms perceive the relationship between inflation and output, at least unconditionally.

[12] An alternative route is to use structural models and indirect inference to relate the degree of inattention to macroeconomic or firm-specific factors. For example, Young (2019), Pasten and Schoenle (2016), Bhattarai and Schoenle (2014) examine whether multi-product firms are more attentive than single-product firms. Mackowiak, Moench, and Wiederholt (2009) examine sectoral variation in the sensitivity of prices to shocks and relate the estimated sensitivity to incentives to pay attention to aggregate shocks. This type of evidence is consistent with the direct evidence in firm surveys.

Building on Candia, Coibion and Gorodnichenko (2020), Figure 8 plots the unconditional correlation between firms' inflation forecasts and their expectations about future output growth. In the case of firms in New Zealand and Sweden (keep in mind that the survey of Sweden is not representative), we see a strong positive correlation between their expectations of growth and inflation, consistent with demand-side shocks moving the economy along a Phillips curve. In Italy, we observe very little correlation between firms' expectations of output growth and their expectations of inflation prior to the effective lower bound period on interest rates, but a much stronger positive correlation during the ELB period. This is consistent with the idea that even supply shocks inherit demand-side characteristics at the ZLB, as in New Keynesian models. Firms in Ukraine and South Africa, in contrast, exhibit a very negative correlation between their expectations of output growth and inflation, as if they perceived the economy to be primarily driven by supply-side shocks. These results suggest that firms generally do form expectations of inflation and output growth jointly, although the resulting joint distributions can look quite different across countries.[13] For comparison, professional forecasters systematically expect a positive correlation between the real economy and inflation (Online Appendix Figure 1).[14] Households (Online Appendix Figure 2), in contrast, systematically expect a negative correlation between the real economy and inflation, as emphasized in Kamdar (2018) for the United States. Thus, firms once again appear to hold economic views that are somewhere between those of professionals and households.

While unconditional correlations are suggestive of a joint formation of beliefs across macroeconomic variables, such correlations do not imply that firms necessarily see a connection between the level of economic activity and inflation. To get at this, the survey of firms in New Zealand considered a unique question that described the formation of beliefs about unemployment and wage inflation *jointly*. Specifically, firms were first asked to assign probabilities to different possible future unemployment rates. Then, for *each* unemployment rate that they assigned a positive probability to, they were asked to assign probabilities to different aggregate wage inflation outcomes. This question therefore allows us to assess how firms revise probabilities across future

[13] For Sweden, South Africa and New Zealand, we can link firms across survey waves and hence explore if the same relationships hold for forecast revisions. We find the same patterns for correlations when we use revisions.

[14] Except for Ukraine and South Africa, countries with a history of high and volatile inflation. However, the negative correlation between output growth and inflation expectations for both countries is more robust for firms than for professional forecasters.

wage inflation rates as they consider different unemployment rates, i.e., this provides a complete joint distribution over unemployment and wage inflation expectations.

The average distribution reported by firms in the New Zealand survey is plotted in Figure 9, as previously shown in Candia, Gorodnichenko and Coibion (2020), after normalizing by each firm's mean forecast of unemployment and wage inflation. The *x*-axis shows different values of unemployment above or below each firm's average unemployment forecast, while the *y*-axis shows the deviations of wage growth from each firm's mean forecast. The figure is a heat map, so the lines in the figure reflect the average probability that firms assigned to this combination of wage inflation and unemployment deviations from the mean. The key finding is the downward sloping nature of the heat map: when considering values of unemployment lower than their mean forecast, firms tend to think that wage inflation will be higher than their mean forecast, and vice versa when considering higher values of unemployment. This shape is consistent with a wage Phillips curve: high unemployment is associated with lower wage inflation while a tight labor market is associated with higher wage inflation.

One can also consider the way in which firms revise their beliefs about real and nominal variables after acquiring information. For example, in the Italian survey of firms, a significant number of (randomly selected) firms were provided with information about recent inflation each quarter ("treatment group") while others were not ('control group"). This information treatment led those treated firms to have different inflation expectations than those of the control group, as shown in Coibion, Gorodnichenko and Ropele (2018). But inflation expectations were *not* the only macroeconomic beliefs that changed. Over the entire sample, firms who revised their inflation expectations upward due to the treatment tended to become more pessimistic about the economic outlook. But during the effective lower bound period, this pattern reversed and treated firms that raised their inflation expectations tended to become optimistic about the real economy. Hence, joint revisions in expectations of different variables exist conditional on information treatments, as well as unconditionally as shown in Figures 8 and 9.

Jointly, we view this evidence as consistent with the idea that firms form expectations about macroeconomic variables jointly. However, there is much to learn about how they form these views. For example, it is not clear why in some countries firms seem to have a supply-side view of the world whereas in others their expectations are more in line with demand shocks moving the economy along a Phillips curve. One possibility is that this reflects the historical experience of

each country. For example, the historical correlation between inflation and output growth in the U.S., Sweden and New Zealand during the Great Moderation era has been mildly positive and in these countries firms perceive a positive correlation. In contrast, inflation and output growth have been much less weakly correlated, or even negatively correlated, historically in South Africa and Ukraine, and firms in these countries perceive a negative correlation. News coverage could also affect how firms view the interaction of different macroeconomic variables, as could different policy responses. The fact that the perceived correlation between inflation and output growth changes so dramatically before and the ELB period in Italy, for example, is consistent with firms incorporating monetary policy responses into their expectations. To the extent that these macroeconomic expectations matter for economic decisions and outcomes, better understanding the joint formation of economic expectations should be a priority for firm surveys.

IV Do Firms' Macroeconomic Expectations Matter?

The measurement of firms' expectations is perceived as important to the extent that these expectations should matter for economic outcomes and policy. But is it in fact the case that firms act on their macroeconomic expectations? In this section we consider two pieces of evidence that support the notion that firms' aggregate expectations matter.

4.1 Firms' Inflation Expectations and the Expectations-Augmented Phillips Curve

Since Friedman (1968) and Phelps (1968), many macroeconomic models have featured expectations-augmented Phillips curves: structural relationships linking inflation and the real side of the economy that condition on firms' aggregate inflation expectations. This role for inflation expectations arises naturally in models with either nominal or information frictions. Previous work has documented that an expectations-augmented Phillips curve fits U.S. data quite well (Coibion and Gorodnichenko 2015a).

Given the cross-country firm-level data compiled here, we can assess whether an expectations-augmented Phillips curve works more generally across countries. Coibion, Gorodnichenko and Ulate (2019) did so using inflation expectations for firms and (mostly) households, but here we focus on firm surveys more specifically. The first step is to create a measure of an inflation gap for each country, the deviation between inflation and firms' one-year inflation expectations. The second is to create an unemployment gap for each country, a measure of the

cyclical variation in the real economy. We do so by taking the difference between the unemployment rate and the HP-filtered unemployment rate with a smoothing parameter of one million, a simple way of measuring the natural rate of unemployment. We then demean both measures for each country (i.e., we control for country fixed effects) to make them comparable.

The left Panel A of Figure 10 plots the resulting correlation between inflation gaps and unemployment rates using the USA, Norway, Italy, New Zealand, Hungary, Uruguay, Japan, Sweden, South Africa, Serbia, Colombia, and Czech Republic.[15] There is a clear and strong negative relationship between the two: periods when unemployment is above the natural rate are periods when countries are experiencing inflation below expectations of future inflation. Conditioning on firms' inflation expectations is crucial for recovering this strong negative relationship between real and nominal variables. The right Panel A of Figure 10 shows the corresponding relationship when lagged inflation is used in place of expected inflation: the correlation between the inflation gap and unemployment is close to zero across countries. But just as predicted by Friedman (1968) and Phelps (1968), taking into account firms' inflation expectations helps uncover the enduring (short-run) tradeoff between inflation and unemployment in the data. Panels B and C of Figure 10 show that these results are maintained when we split the sample in low-inflation countries (USA, Italy, New Zealand, Norway, Sweden, and Japan) and high-inflation countries (Hungary, Uruguay, South Africa, Serbia, Colombia, and Czech Republic). We also find similar results if we use longer-run inflation expectations rather than one-year ahead inflation expectations.

4.2 Randomized Control Trials

Another way to determine if firms' macroeconomic expectations affect their decisions is through randomized control trials (RCT) as discussed in Fuster and Zafar (2022). The idea is to generate exogenous variation in the macroeconomic beliefs of a randomly selected subset of firms then assess whether these firms end up behaving differently than non-treated firms (the control group). A randomized control trial can provide direct *causal* evidence that changes in firms' expectations affect their economic decisions.

[15] The countries with the best firm surveys have only short time samples available, so we augment the range of countries to include some whose firm surveys are not as ideal as those emphasized in Figure 1. Ukraine is not included because of the dramatic spike in inflation in 2015, which was a clear shock due to the war, the associated elimination of energy subsidies and the currency depreciation.

One such RCT was conducted using the survey of firms in New Zealand and is described in detail in Coibion, Gorodnichenko and Kumar (2018). Two surveys of firms were run, separated by six months. In the first wave, firms were asked several questions about their expectations, both at the aggregate level as well as for their firm's planned actions over the next six months, such as recruiting plans, pricing plans, investment plans and wage plans. A randomly selected subset of these firms was then told about the inflation target of the Reserve Bank of New Zealand. As discussed in section 3.4, firms in New Zealand are largely unaware of the RBNZ's inflation target so this treatment provided many of them with new information. In light of this information, initially uninformed firms significantly and immediately changed their inflation expectations in the direction of the target. Other firms in the survey, on the other hand, were not provided with any additional information. Six months later, these firms were surveyed again and asked about how they changed prices, employment, and wages over the previous six months as well as the amount of investment they had done. Comparing this to their planned levels from six months before provides a measure of the surprise in their actions over this time period. The key finding of CGK was that uninformed firms in the treatment group significantly revised downward their inflation expectations after the information treatment and subsequently lowered their employment and investment relative to other firms but did not deviate from their price or wage plans in any systematic way relative to other firms. Coibion, Gorodnichenko, Kumar and Ryngaert (2021) subsequently replicated and expanded on this experiment and found a similar response by firms to exogenous changes in their inflation expectations arising from different sources. Hence, exogenous shocks to firms' inflation expectations in New Zealand are followed by significant adjustments along the employment and investment margins of firms, indicating that macroeconomic expectations do seem to play a role in firm decision-making.

More evidence comes from another "experiment" applied to firms in Italy. As explained in section 2, starting in 2012, some firms in the Italian survey were repeatedly and systematically given information about recent inflation while other firms in the Italian survey were not. Much like the one-time information treatment provided to firms in New Zealand, the provision of information about recent inflation led firms to change their expectations in a significant fashion relative to those who were not provided this information. But unlike the one-time New Zealand experiment, the information treatment in Italy was applied to the same firms repeatedly over the course of years, leading to long-lived differences in the inflation expectations across firms. Since many firm

decisions were observable from the repeated surveys (e.g., prices) and many others were also observable from external administrative sources (e.g., employment, investment, financial situation), Coibion, Gorodnichenko and Ropele (2020) are able to study how the exogenous variation in inflation expectations induced by the repeated information treatment led firms to adjust differentially along these margins.

Over the entire sample, firms with exogenously higher inflation expectations were found to reduce their investment and employment persistently over the next year, with little change in prices taking place. A potential explanation for this contractionary effect of expected inflation on firm decisions is that as firms in Italy raise their inflation expectations, they generally become more pessimistic about the broader economic outlook as well as the economic outlook for their firm. When looking specifically at the effective lower bound on interest rates period, this negative association with inflation is reversed and firms with higher inflation expectations become more optimistic about the economic outlook. This leads them to raise their prices and increase their employment when their inflation expectations rise. These results indicate that macroeconomic expectations clearly affect the decisions made by firms, but the manner in which they do so seems to depend on how they interpret the source of these revisions in beliefs, e.g. if they stem from demand or supply shocks. Understanding the joint formation of expectations across variables, and how they relate to perceived underlying shocks, is therefore an important avenue for future surveys to pursue.

V Conclusion

Firms' expectations about the broader economy translate into their decisions. For macroeconomists, understanding how these expectations are formed should therefore be a central area for future research. One limitation to this line of work is the paucity of high-quality surveys of firms. Indeed, Bernanke (2007) observed, "Do we need new measures of expectations or new surveys? Information on the price expectations of businesses--who are, after all, the price setters in the first instance--as well as information on nominal wage expectations is particularly scarce." This state of affairs is slowly changing as new surveys of firms gradually arise. This paper describes some of these new surveys, but others are also in the works. For example, the Bank of France is designing a new quantitative survey of firms' expectations, as described in Savignac et al. (2021). This growing list of high-quality surveys of firms' macroeconomic expectations, covering not just

inflation but increasingly also other macroeconomic variables such as output growth, interest rates, and financial market conditions, is promising for future work.

The expanding list of firm surveys will also be a boon to policymakers. Understanding the inflation outlook hinges in part on knowing what firms expect, and this can only be done with real-time high-quality quantitative surveys. As surveys such as SoFIE become more common across advanced economies, this real-time measurement and tracking will simplify the work of policymakers who are otherwise often forced to guess or presume what economic agents are anticipating (as discussed in Reis (2021), the rise of the Great Inflation in the 1970s is a grim reminder of the cost of lacking measurement of inflation expectations). These surveys will also allow policymakers to assess how well their policies are working, since many new policies like forward guidance or the announcement of average inflation targeting are supposed to operate via the inflation expectations of firms and households.

References

Afrouzi, Hassan, Saeed Bayat, Omid Ghaderi, and Ali Madanizadeh, 2020. "Inflation Expectations under High Inflation: Evidence from Iran." Manuscript.

Altig, David, Jose Maria Barrero, Nicholas Bloom, Steven J. Davis, Brent Meyer, and Nicholas Parker, 2020. "Surveying business uncertainty," *Journal of Public Economics*, forthcoming.

Andrade, Philippe, Olivier Coibion, Erwan Gautier, and Yuriy Gorodnichenko, 2020. "No Firm Is an Island? How Industry Conditions Shape Firms' Expectations," forthcoming in *Journal of Monetary Economics*.

Bachmann, Rudiger, 2019. "Comments on 'Monetary Policy Announcements and Expectations: Evidence from German Firms,'" *Journal of Monetary Economics* 108, 64-68.

Bachmann, Rudiger, and Kai Cartensen, 2022. "Firm Surveys," Handbook of Economic Expectations, Chapter 2.

Bernanke, Ben S., 2007. "Inflation Expectations and Inflation Forecasting," speech at At the Monetary Economics Workshop of the National Bureau of Economic Research Summer Institute, Cambridge, Massachusetts, July 10, 2007, available at https://www.federalreserve.gov/newsevents/speech/bernanke20070710a.htm.

Bhattarai, Saroj, and Raphael Schoenle, 2014. "Multi-Product Firms and Price-Setting: Theory and Evidence from U.S. Producers Prices," *Journal of Monetary Economics* 66: 178-192.

Binder, Carola and GwangMin Kim, 2020. “Learning-Through-Survey in Inflation Expectations,” Manuscript.

Bischof, Jannis, Philipp Doerrenberg, Davud Rostam-Afschar, Dirk Simons, and Johannes Voget, 2021. “The German Business Panel: Insights on Corporate Taxation and Accounting during the Covid-19 Pandemic.” Manuscript.

Bloom, Nicholas, Philip Bunn, Scarlet Chen, Paul Mizen, Pawel Smietanka, and Gregory Thwaites, 2019. “The Impact of Brexit on UK Firms,” NBER Working Paper 26218.

Born, Benjamin, Zeno Enders, Gernot Mueller, and Knut Niemann, 2021. “Firm Exepctations About Production and Prices: Facts, Determinants, and Effects.” Handbook of Economic Expectations, Chapter 15.

Borraz, Fernando, Miguel Mello, and Laura Zacheo, 2020. “Communication, Information and Inflation Expectations.” BIS CCA Research Network.

De Bruin, Wandi Bruine, Alycia Chin, Jeff Dominitz, and Wilbert van der Klaauw, 2022. “Household Surveys and Probabilistic Questions.” Handbook of Economic Expectations, Chapter 1.

Candia, Bernardo, Olivier Coibion and Yuriy Gorodnichenko, 2021. “The Inflation Expectations of U.S. Firms: Evidence from a new survey,” NBER Working Paper 28836.

Candia, Bernardo, Olivier Coibion, and Yuriy Gorodnichenko, 2020. “Communication and the Beliefs of Economic Agents,” NBER Working Paper 27800.

Cavallo, Alberto, Guillermo Cruces, and Ricardo Perez-Truglia. 2017. “Inflation Expectations, Learning, and Supermarket Prices: Evidence from Survey Experiments,” *American Economic Journal: Macroeconomics* 9(3): 1-35.

Clements, Michael, Robert Rich, and Joseph Tracy, 2022. “Surveys of Professionals,” Handbook of Economic Expectations, Chapter 3.

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,” *AEJ Macroeconomics* 7(1): 197-232.

Coibion, Olivier, and Yuriy Gorodnichenko, 2015b. "Inflation Expectations in Ukraine: A Long Path to Anchoring?," *Visnyk of the National Bank of Ukraine* 233: 6-23.

Coibion, Olivier, Yuriy Gorodnichenko and Tiziano Ropele. 2020. “Inflation Expectations and Firm Decisions: New Causal Evidence,” *Quarterly Journal of Economics* 135(1): 165–219.

Coibion, Olivier, Yuriy Gorodnichenko, and Saten Kumar. 2018. “How Do Firms Form Their Expectations? New Survey Evidence,” *American Economic Review* 108: 2671-2713.

Coibion, Olivier, Yuriy Gorodnichenko, Saten Kumar and Jane Ryngaert. 2021. “Do You Know That I Know That You Know...? Higher-Order Beliefs in Survey Data,” forthcoming in *Quarterly Journal of Economics*.

D’Acunto, Francesco, Ulrike M. Malmendier, Juan Ospina, and Michael Weber, 2021. "Exposure to Daily Price Changes and Inflation Expectations," *Journal of Political Economy* 129(5): 1615–1639.

D’Acunto, Francesco, Ulrike M. Malmendier and Michael Weber, 2022. “What Do the Data Tell Us about Inflation Expectations?” Handbook of Economic Expectations, Chapter 7.

Delgado, Martha E., Juan Herreño, Marc Hofstetter, and Mathieu Pedemonte, 2021. "Inflation and Exchange Rate Expectations of Colombian Firms: A new survey, " Manuscript.

Enders, Zeno, Franziska Hunnekes, and Gernot Muller, 2019. “Monetary Policy Announcements and Expectations: Evidence from German firms.” *Journal of Monetary Economics* 108: 45-63.

Frache, Serafin and Rodrigo Lluberas, 2019. “New Information and Inflation Expectations among Firms,” BIS Working Paper 781.

Friedman, Milton, 1968. “The Role of Monetary Policy,” *American Economic Review* 58: 1-17.

Fuster, Andreas and Basit Zafar, 2022. “Survey Experiments on Economic Expectations,” Handbook of Economic Expectations, Chapter 5.

Gallermore, John, Stephan Hollander, Martin Jacob, and Xiang Zheng, 2021. “Tax Policy Beliefs and Investment: Evidence from the 2016 U.S. Election and the Tax Cuts and Jobs Act,” Manuscript.

Haldane, Andrew and Michael McMahon. 2018. “Central Bank Communications and the General Public,” *American Economic Association Papers and Proceedings* 108: 578-583.

Haldane, Andrew, Alistair Macaulay, and Michael McMahon. 2020. “The 3 E’s of Central Bank Communication with the Public,” Bank of England Working Paper No. 847.

Hassan, Tarek, Stephan Hollander, Laurence van Lent, and Ahmed Tahoun, 2019. “Firm-Level Political Risk: Measurement and Effects,” *Quarterly Journal of Economics* 134: 2135-2202.

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

Kamdar, Rupal. 2018. "The Inattentive Consumer: Sentiment and Expectations," Manuscript.

Karlova, Natalia, Elena Puzanova, Irina Bogacheva, and Alexandr Morozov, 2019. "The Nature of Companies' Inflation Expectations: Survey Results." Bank of Russia Research Note.

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

Lucas, Robert Jr., 1972. "Expectations and the Neutrality of Money," *Journal of Economic Theory* 4(2): 103-124.

Mackowiak, Bartosz, Emanuel Moench, and Mirko Wiederholt, 2009. "Sectoral Price Data and Models of Price Setting," *Journal of Monetary Economics* 56(S): 78-99.

Mankiw, N. Gregory, Ricardo Reis, and Justin Wolfers. 2003. "Disagreement about Inflation Expectations," In *NBER Macroeconomics Annual* 2003(18): 209-248.

Meyer, Brent H., Nicholas B. Parker, and Xuguang Simon Sheng, 2021. "Unit Cost Expectations and Uncertainty: Firms' Perspectives on Inflation," Federal Reserve Bank of Atlanta Working Paper 2021.

Pasten, Ernesto, and Raphael Schoenle, 2016. "Rational Inattention, Multi-product Firms and the Neutrality of Money," *Journal of Monetary Economics* 80(C): 1-16.

Phelps, Edmund, 1968. "Money-Wage Dynamics and Labor-Market Equilibrium," *Journal of Political Economy* 76(4): 678-711.

Reis, Ricardo, 2020. "Comment on 'Imperfect Macroeconomic Expectations:' Yes, but We Disagree" NBER Macroeconomics Annual 2020, forthcoming.

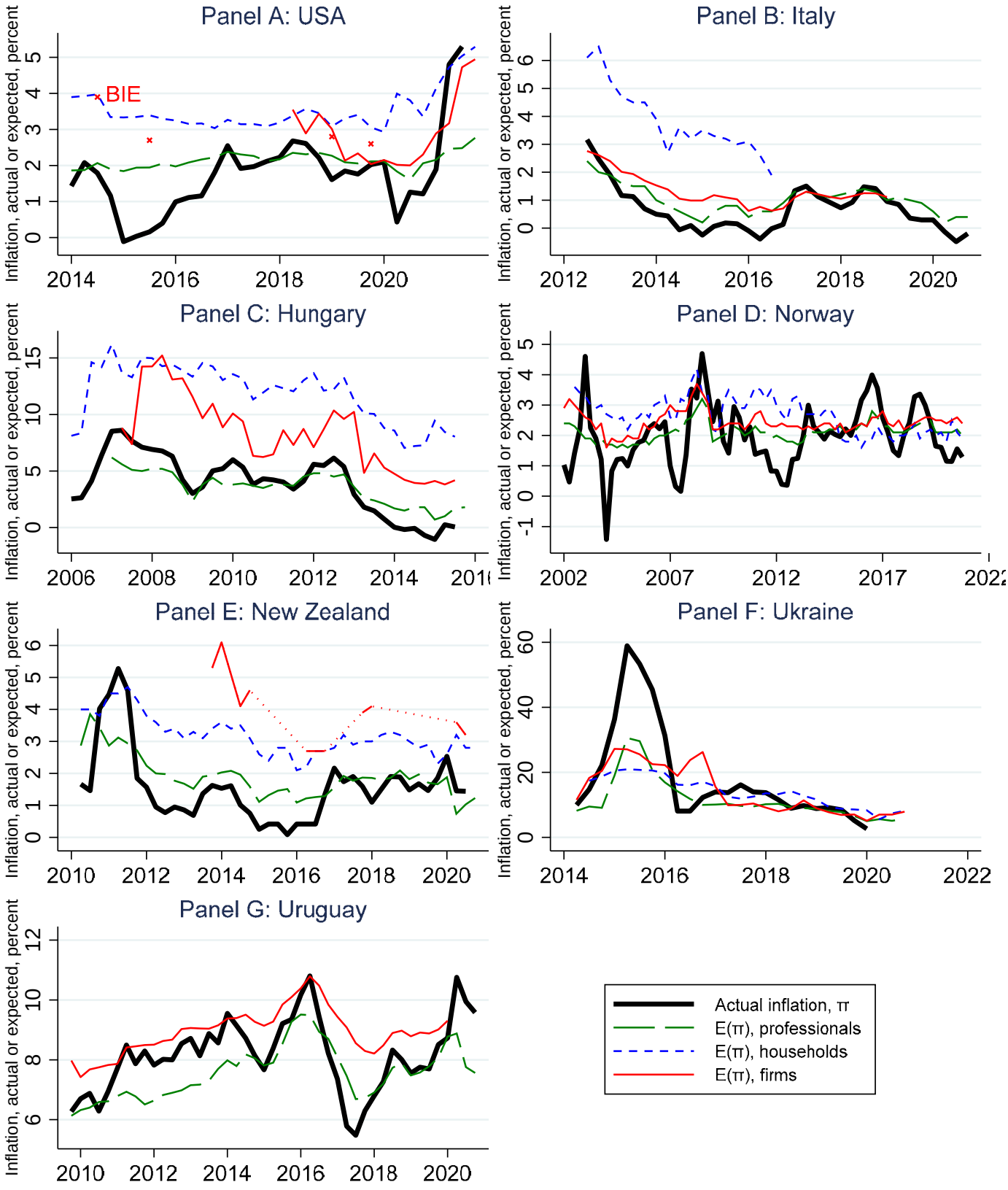
Reis, Ricardo, 2021. "Losing the Inflation Anchor." *Brookings Papers on Economic Activity*, forthcoming.

Savignac, Frederique, Erwan Gautier, Yuriy Gorodnichenko and Olivier Coibion, 2021. "Firms' Inflation Expectations: New Evidence from France," Manuscript.

Tanaka, Mari, Nicholas Bloom, Joel M. David, and Maiko Koga, 2019. "Firm performance and macro forecast accuracy," *Journal of Monetary Economics* 114: 26-41.

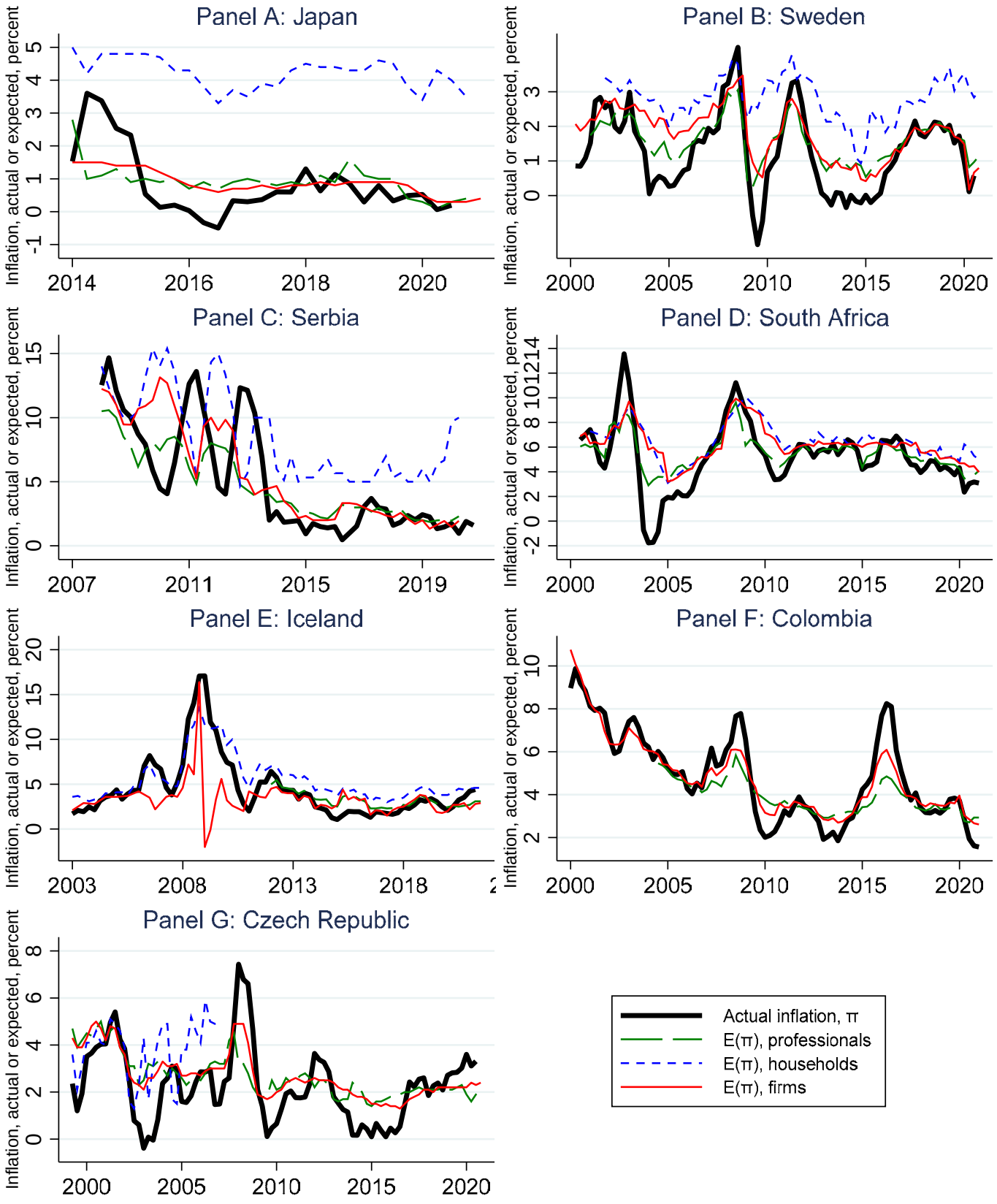
Yang, Choongryul, 2019. "Rational Inattention, Menu Costs, and Multi-Product Firms: Micro Evidence and Aggregate Implications," manuscript.

Figure 1. Actual and Expected Inflation, High-quality surveys



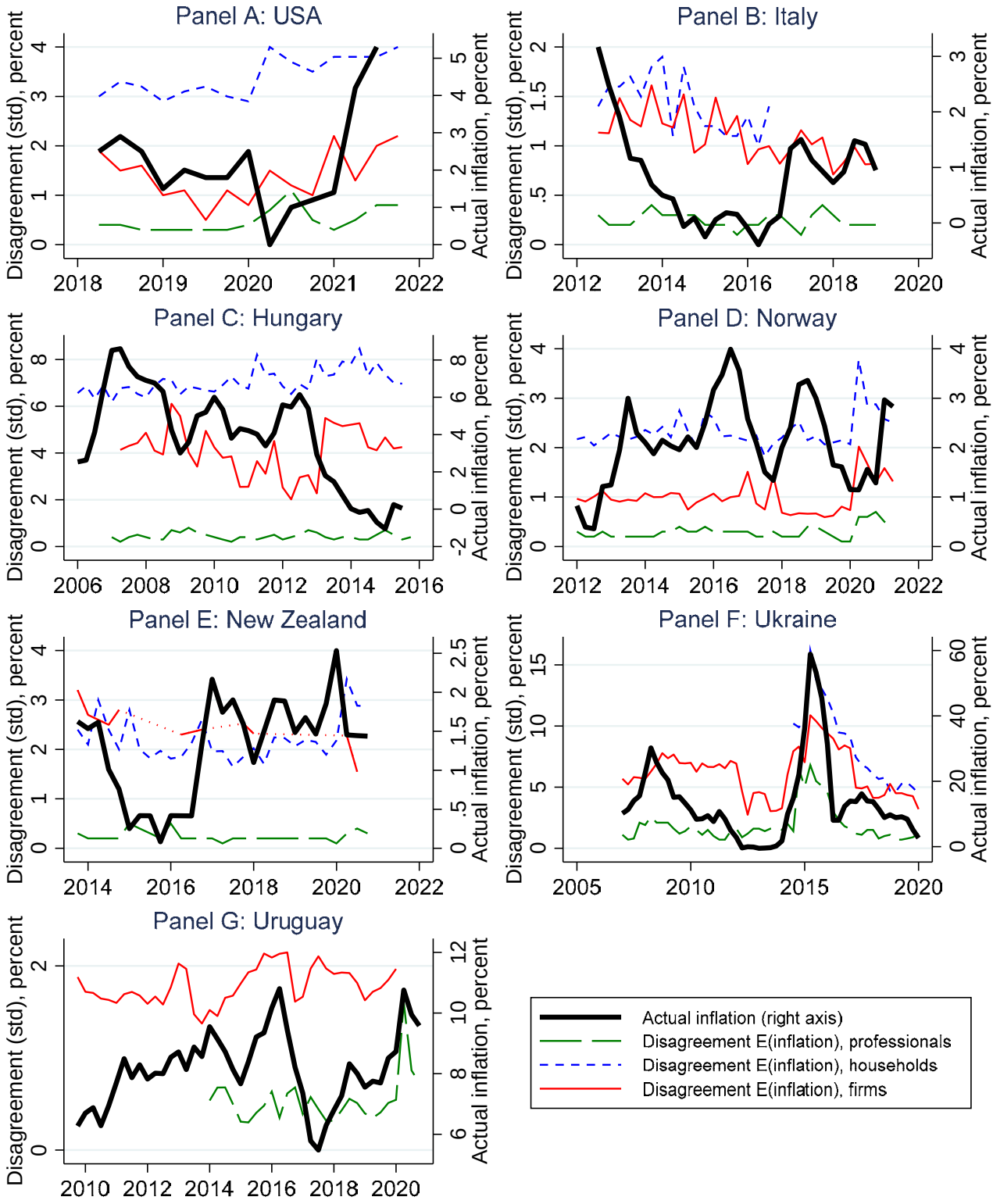
Notes: Each panel plots one-year ahead inflation expectations for professional forecasters, firms, and households, depending on data availability, as well as actual inflation. See section 3.1 for details.

Figure 2. Actual and Expected Inflation, other available surveys



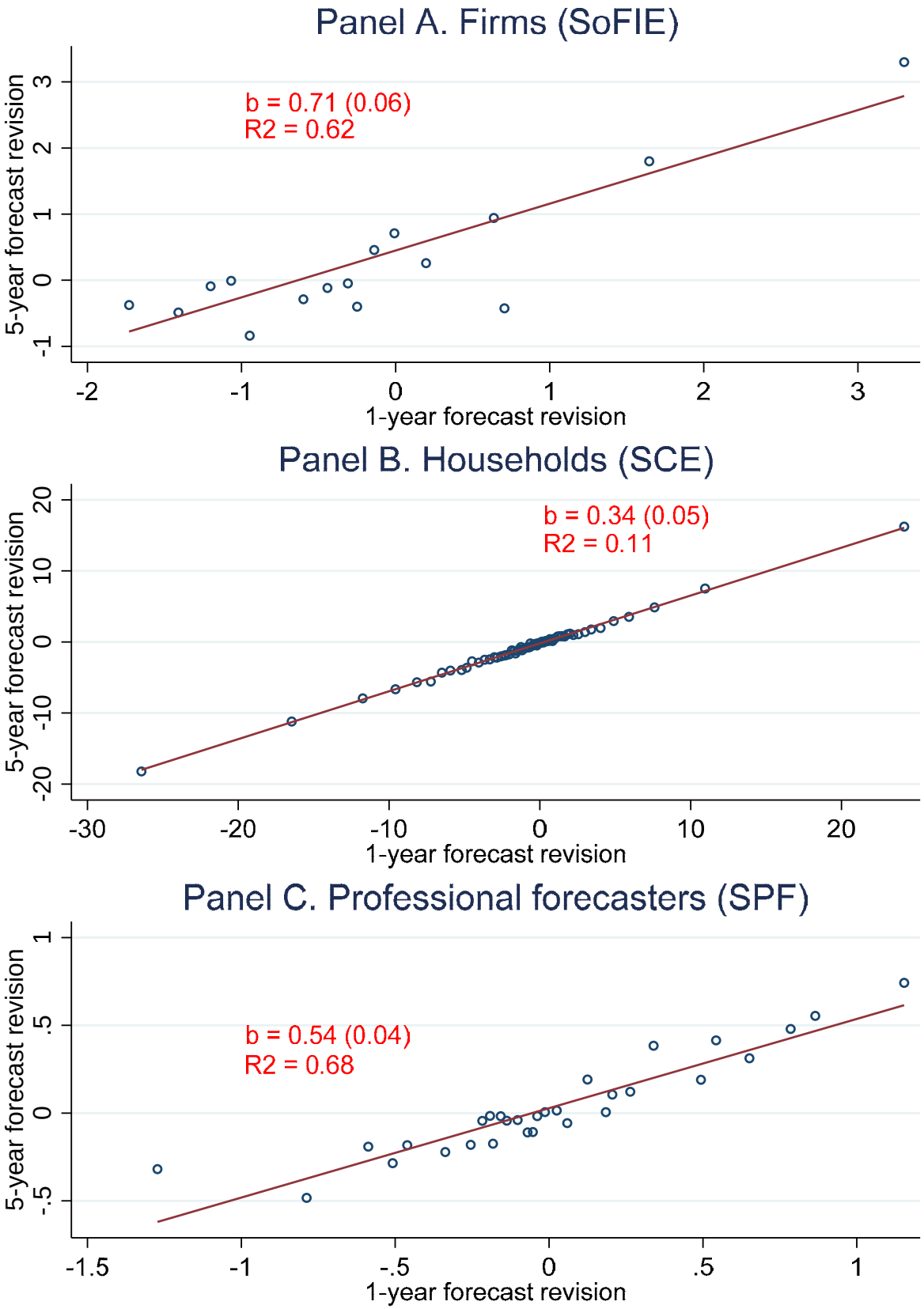
Notes: Each panel plots one-year ahead inflation expectations for professional forecasters, firms, and households, depending on data availability, as well as actual inflation. See section 3.1 for details.

Figure 3. Disagreement among Firms about Future Inflation



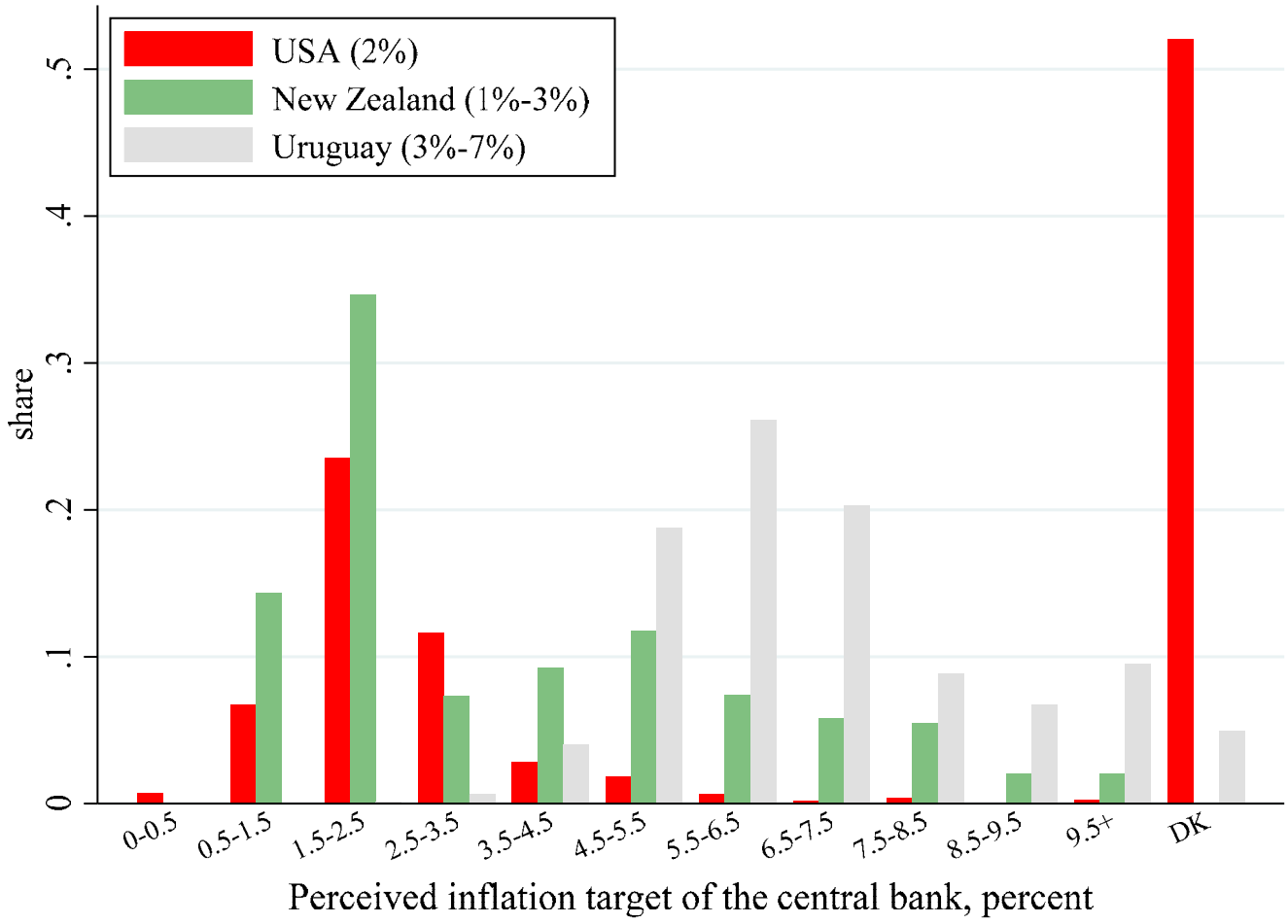
Notes: Each panel plots the cross-sectional standard deviation of one-year ahead inflation expectations for professional forecasters, firms, and households, depending on data availability, as well as actual inflation. See section 3.2 for details.

Figure 4. Correlation of Changes in Short-Run and Long-Run Inflation Expectations.



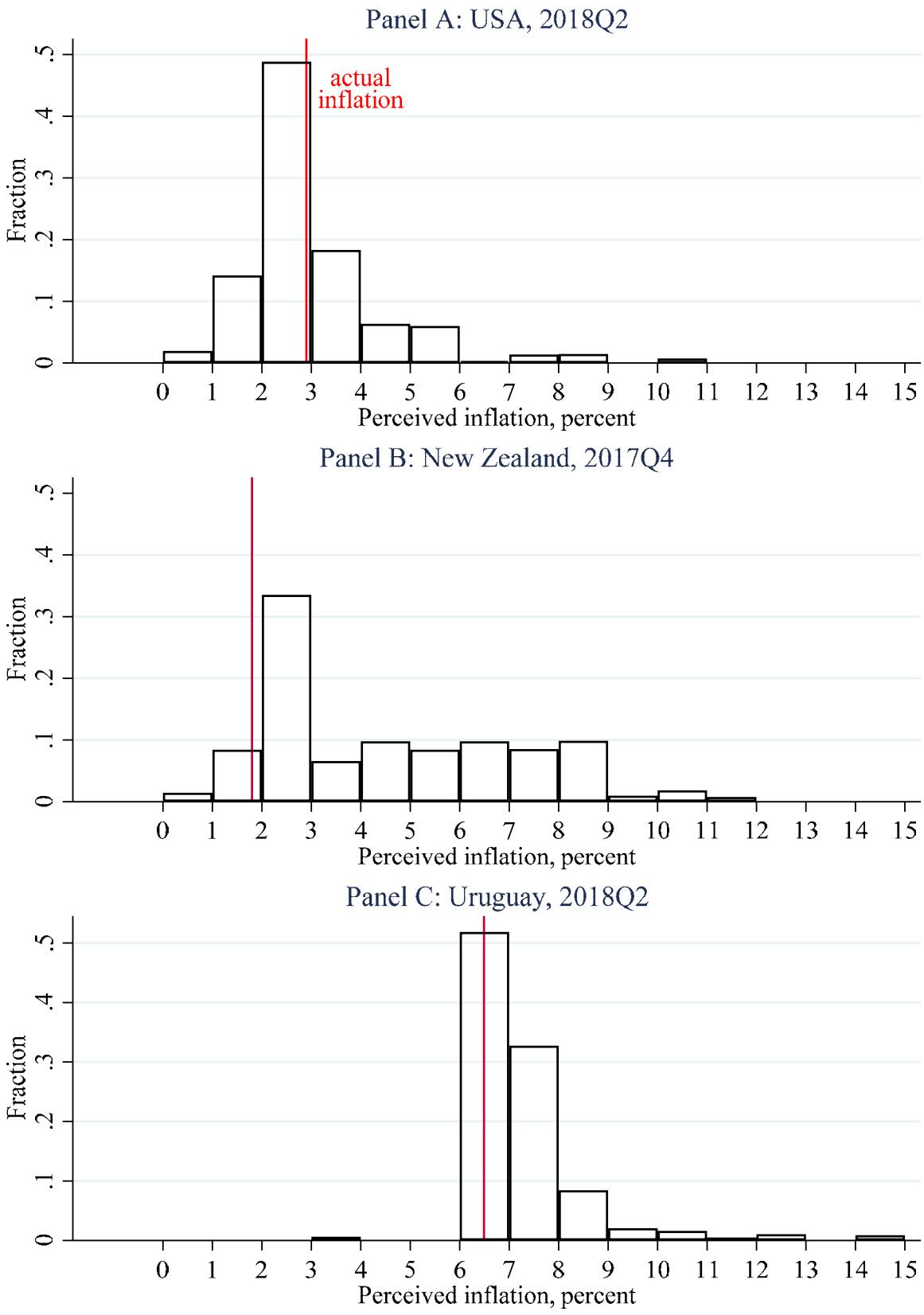
Notes: Each panel shows the relationship (binscatter) between revisions in 1-year-ahead and 5-year-ahead inflation forecasts. Firms in SoFIE 2019Q4 and 2020Q4, households in the SCE 2017Q1-2020Q4, and professional forecasters from SPF 2018Q1-2021Q3. Each specification uses Huber robust regression to downweight the importance of outliers and influential observations.

Figure 5. Perceived Inflation Target of the Central Bank.



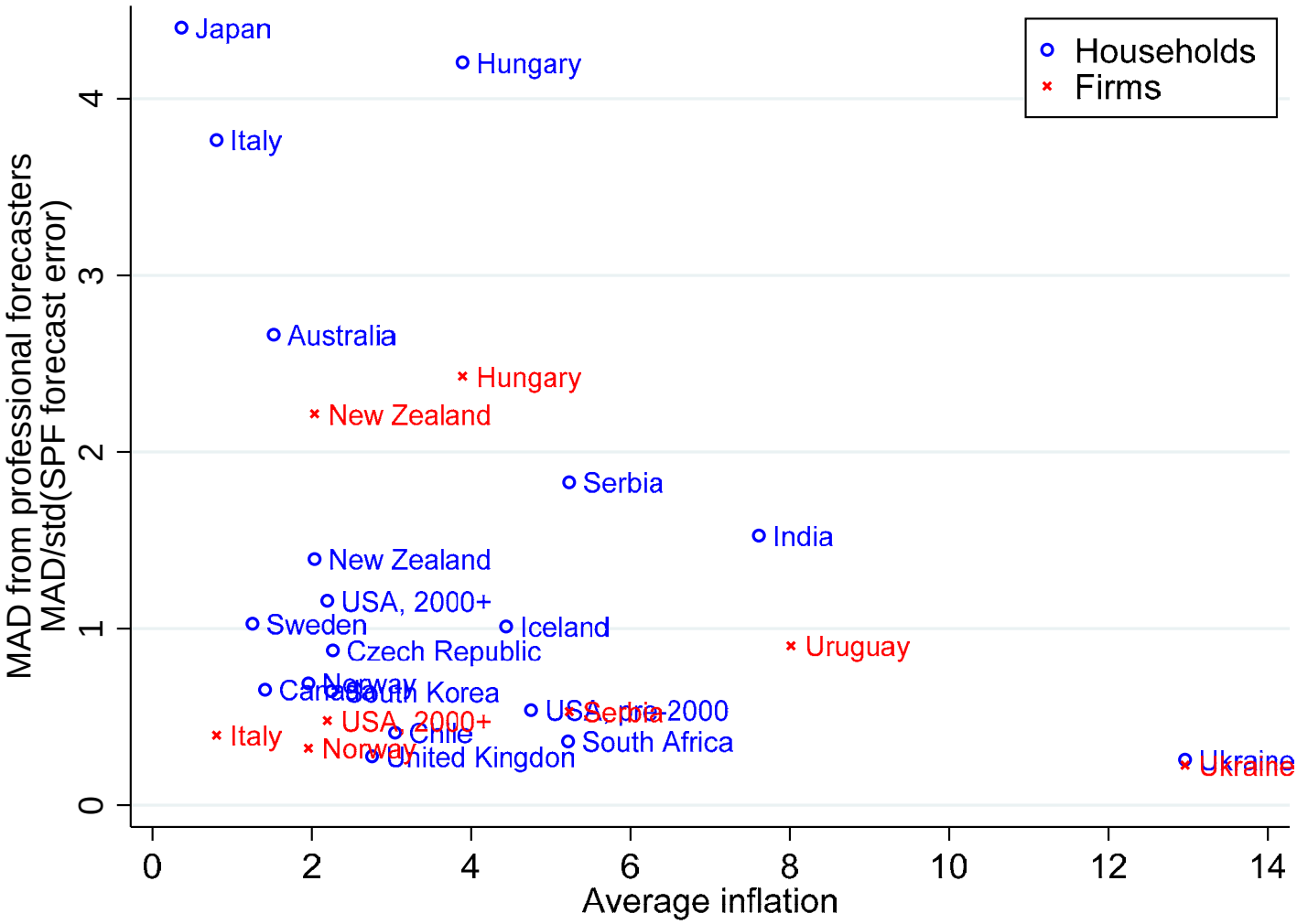
Notes: The panel plots the distribution of responses to questions about firms' perceptions of their central bank's inflation target in the U.S., New Zealand and Uruguay. "DK" stands for "Don't Know".

Figure 6. Distribution of Perceived Level of Inflation over Last 12 Months.



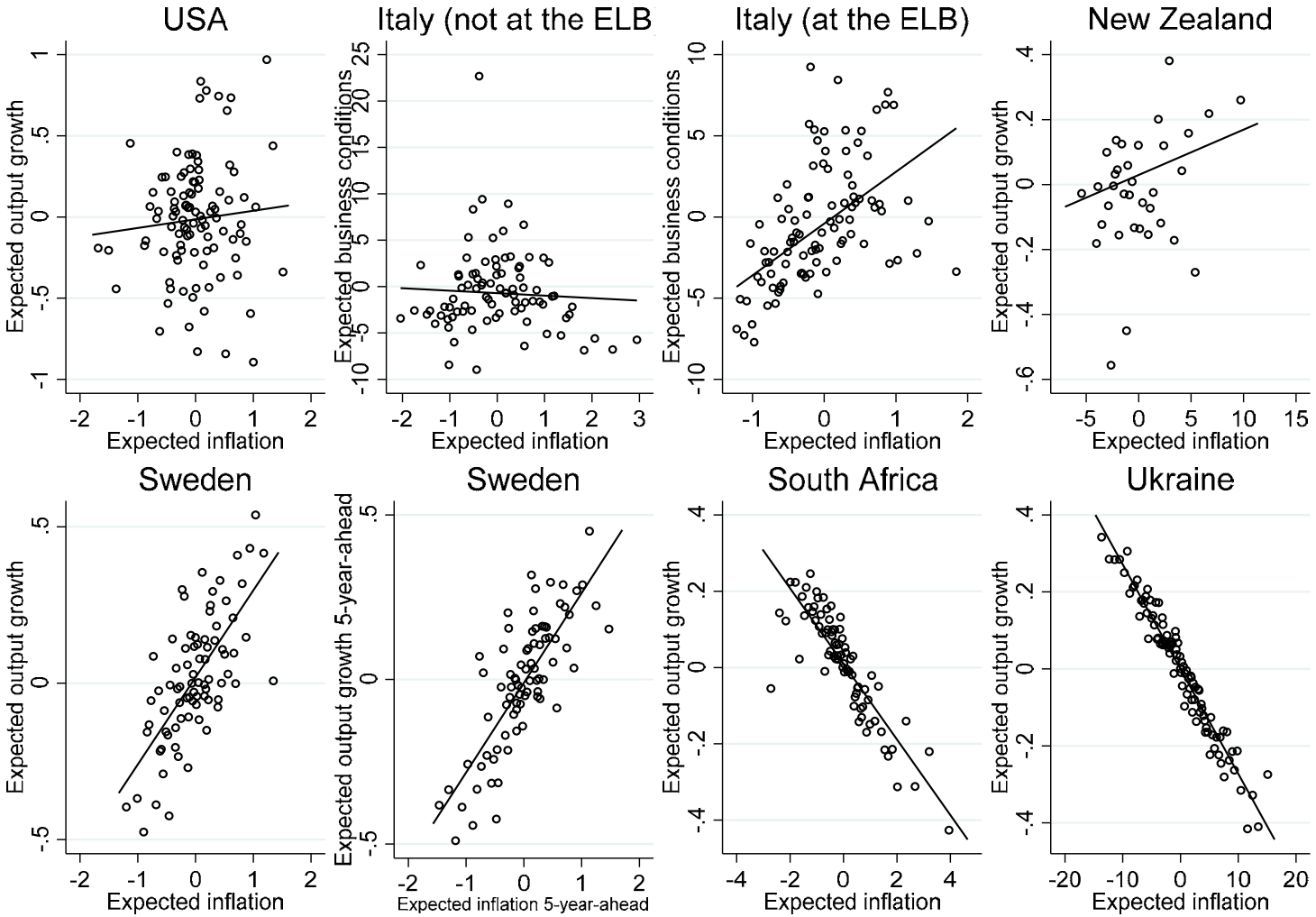
Notes: Each panel plots the distribution of perceived inflation rates over the previous twelve months for firms in each country's survey. The vertical red line in each panel indicates the actual inflation rate.

Figure 7. Inattention and Average Inflation.



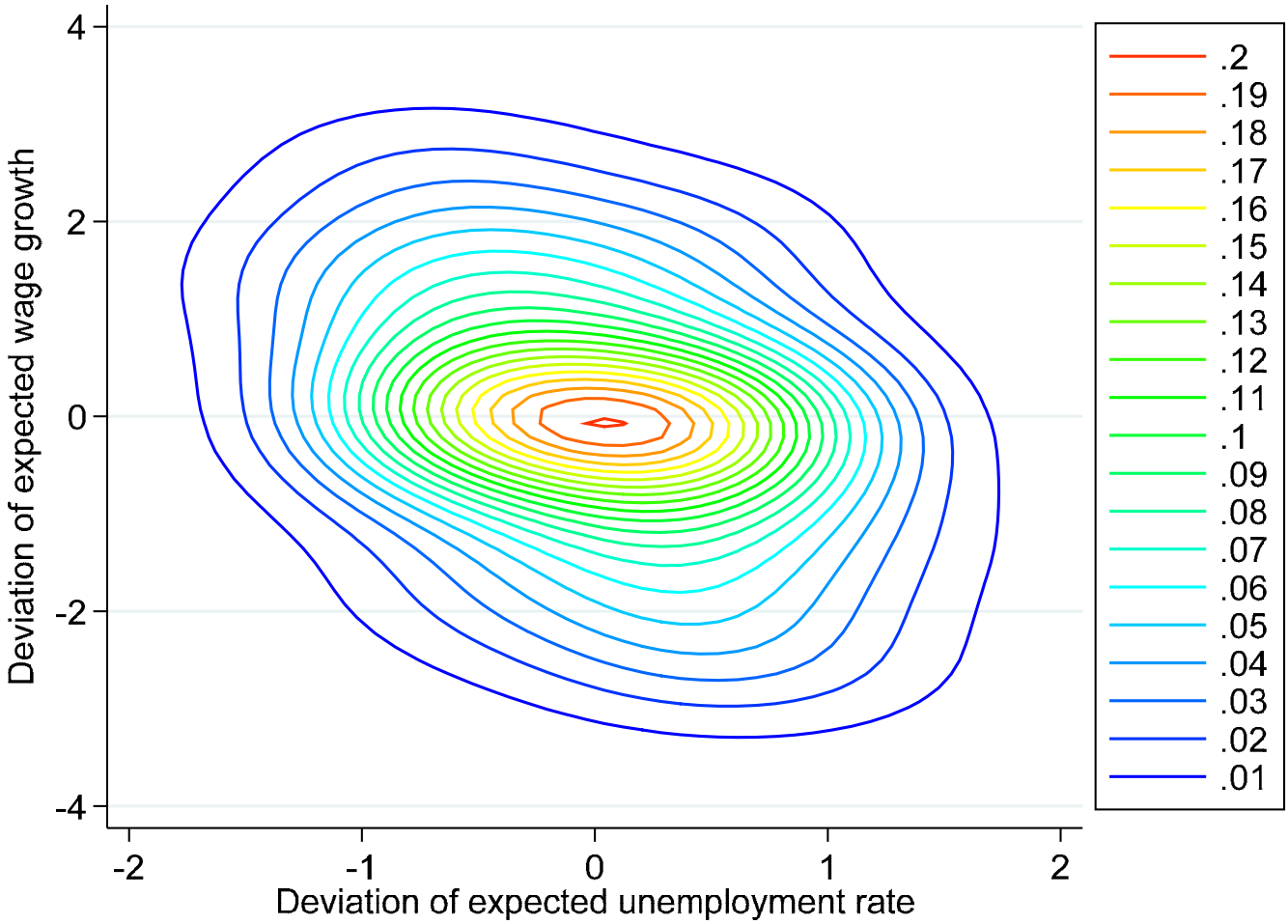
Notes: The figure plots average inflation rates against average deviations of firm or household forecasts from professional forecasts. Blue circles indicate household forecasts while red x's indicate firm forecasts. US sample for households is separated into pre-2000 and post-2000 observations. See section 3.4 for construction of y-axis variable measuring average distance of households/firms' forecasts from professional forecasts.

Figure 8. Joint Distribution of Inflation and Output Growth Expectations, Firms



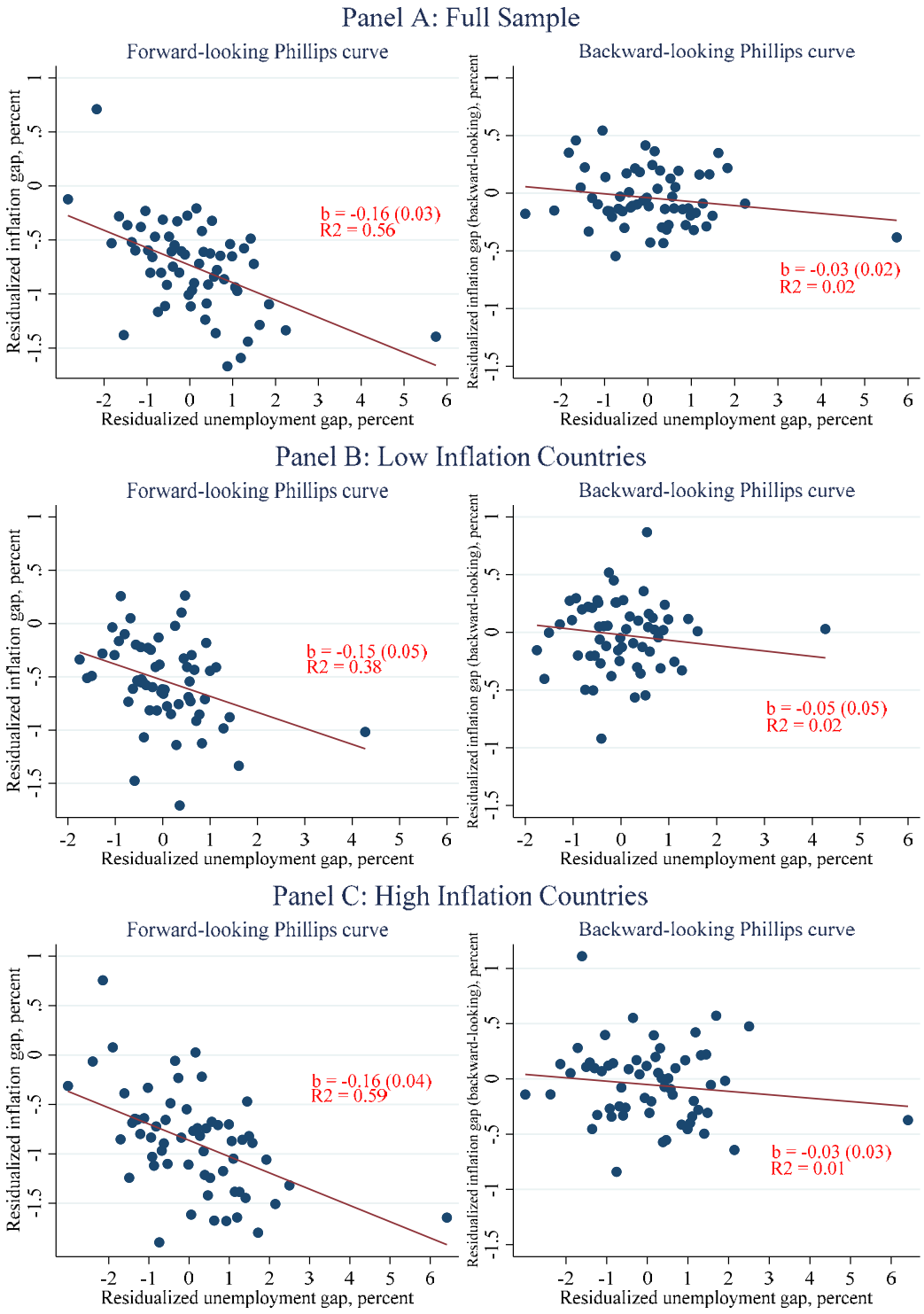
Notes: each panel plots a binscatter for the joint distribution of expectations for output growth rate and inflation in the next calendar year. For each variable, we take out the time×country fixed effect so that all variables are mean zero. Inflation expectations are for the one-year-ahead horizon. United States: output expectations are one-year-ahead predictions for real GDP growth rate. The Livingston survey is the source of the data. The sample is restricted to non-financial corporations. The sample period is 1992-2019. Italy: output expectations are responses to a multiple-choice question ("What do you think is the probability of an improvement in Italy's general economic situation in the next 3 months?") with size options: zero, 1-25 percent, 26-50 percent, 51-75 percent, 76-99 percent, 100 percent. For each option, we code responses as mid-points of the chosen ranges. Coibion, Gorodnichenko, and Ropele (2020) is the source of the data. The sample period is 2012-2019. New Zealand: output expectations measure one-year-ahead projections for GDP growth. Coibion, Gorodnichenko, and Kumar (2018) is the source of the data. The sample period is 2014-2017. Sweden: inflation and GDP growth rate expectations are elicited as point predictions. The sample period is 2000-2020. The source is Sveriges Riksbank. South Africa: inflation and GDP growth rate expectations are elicited as point predictions. The sample period is 2000-2020. The source is South African Reserve Bank. Ukraine: inflation expectations are reported as answers to multiple-choice questions (typically 7-9 options; e.g., the bins could be "less than 5%," "5 to 10%," "10 to 15%," …, "more than 40%"). Output expectations are responses to a multiple-choice question ("What changes do you expect in the dynamics for output of goods and services in Ukraine over the next 12 months?") with three options: "increase" (coded as "+1"), "same" (coded as "0"), "decrease" (coded as "-1"). The sample period is 2007-2020. The National Bank of Ukraine is the source of the data.

Figure 9. Joint Expectations of Wage Growth and Unemployment Rate for Firms in New Zealand.



Notes: the figure shows negative correlation in the within-firm joint distribution of subjective expectations for future wage growth and unemployment rate in a survey of firm managers in New Zealand. The figure shows contour maps for the average joint distribution (kernel density) of expected wage growth and unemployment rate. The joint distribution is elicited by asking managers to assign probabilities to each cell in a table of wage-growth and unemployment-rate outcomes (each dimension of the table has a series of bins with a range of possible outcomes). To aggregate distributions across managers, we demean each manager's distribution using his/her implied mean for future wage growth and unemployment rate and then we take an average across managers. The horizontal axis measures deviation of manager *i*'s expectation from his/her mean forecast for unemployment rate over the next 12 months. The vertical axis measures deviation of manager *i*'s expectation from his/her mean forecast for wage growth over the next 12 months. This figure was initially published in Candia, Coibion, and Gorodnichenko (2020).

Figure 10. Cross-Country Phillips Curve.



Notes: This figure shows a binscatter plot for inflation gap (left panel: actual inflation minus one-year-ahead expected inflation; right panel: actual current inflation minus actual lagged inflation) and unemployment gap (the cyclical component in unemployment rate after applying the HP filter with a smoothing parameter of one million). Panel A (full sample) includes the following countries: USA, Norway, Italy, New Zealand, Uruguay, Japan, Sweden, South Africa, Serbia, Colombia, Hungary, and Czech Republic. Panel B (low inflation countries) includes USA, Norway, Italy, New Zealand, Japan, and Sweden. Panel C (high inflation countries) includes Uruguay, South Africa, Serbia, Colombia, Hungary, and Czech Republic. Ukraine is excluded because the sample for Ukraine is dominated by a very large spike in inflation. The series cover the sample period shown in Figures 1 and 2, except for Norway (the survey is representative since 2009). Country fixed effects are controlled for.

Table 1. Selected Surveys and Firms' Inflation Expectations

Country	Institution	Respondents	Price Definition	Sampling	Freq.	Start date	Bins	Horizon	Question
Canada	Conf. Board of Canada	Firms	Prices in general	Convenience	Quarterly	1993	9	6 months	Do you expect prices, in general, in Canada to increase over the next six months at an annual rate of
Canada	Central bank	Firms	Inflation (CPI)	Quota	Quarterly	1997	4	2 years	Over the next two years, what do you expect the annual rate of inflation to be, based on the consumer price index?
Colombia	Centra bank	Firms	Inflation (CPI)	Quota	Quarterly	2000	open	3,6 and 9 months, 1 and 2 years	The last month, the annual inflation rate was equal to X%. What do you expect the annual inflation rate to be at the end of: (also range with max and min value)
Colombia	Delgado, Herreno, Hofstetter and Pedemonte (2021)	Firms	Inflation (CPI)	Representative (Mnfg.; retail)	Monthly	2019	open	1 year	By what percentage do you think the economy's prices, as measured by the Consumer Price Index (CPI), will increase, or decrease in Colombia over the next 12 months?
Czech Republic	Central bank	Firms	Inflation (CPI)	Representative	Quarterly	1999	open	1 and 3 years	What year-on-year consumer price change in per cent do you expect in the next 12 months?
EU Members	European Commission	Firms	Prices for consumers	Probabilistic sample	Monthly	1985	(up/down/ same)	1 year	By what percentage you would say that prices will increase for the consumer in the next 12 months?
Hungary	Central bank	Firms	Inflation (CPI)	Representative	Quarterly	2007	open	1 year	During the next 12 months, do you think that prices in general will go up, or go down, or stay where they are now? By how many percent do you expect consumer prices to go up/down in the next 12 months?
Iceland	Central bank	Firms	Inflation	Convenience	Quarterly	2003	open	1,2 and 5 years	What do you think inflation will measure over the next twelve months?
Iran	Central bank	Mnfg. Firms, ≥100 workers	Inflation	Probabilistic Sample	Quarterly	2016	open	1 year	What do you think the [yearly] inflation will be during the next year?
Israel	Ungar and Zilberfarb (1993)	Firms	Inflation (CPI)	Representative	Quarterly	1980	open	1-4 quarters	The cumulative inflation rate (not monthly average), in %, which is expected for the following periods is as follows: The next 12 months
Italy	Central bank	Firms	Inflation	Probabilistic sample	Quarterly	1999	open	1 year	The last [month] consumer price inflation, measured by the 12-month change in the harmonized index of consumer prices was equal to [IT] in Italy and to [EA] in the euro area. What do you think it will be in Italy.
Jamaica	Central bank	Firms	Inflation (CPI)	n.a.	Bimonthl y	2012	open	1 year	What do you expect the rate of inflation to be over the next 12 months?
Japan	Central bank	Firms	Prices in general (CPI)	Probabilistic sample	Quarterly	2014	10	1, 3, and 5 years	What are your institution's expectations of the annual % change in general prices (as measured by the CPI) for one year ahead, three years ahead, and five years ahead, respectively?
New Zealand	Central bank	Firms and professionals	Inflation (CPI)	Convenience	Quarterly	1987	open	1,2,5 and 10 years	What annual % change do you expect in the CPI for the:
New Zealand	ANZ Economics	Firms	Inflation (CPI)	Representative	Monthly	1983	open	1 year	What do you think the annual Inflation Rate (as measured by the Consumer Price Index) will be in 12 months' time?
Norway	Central bank	Firms, ≥20 workers	Inflation (CPI)	Representative	Quarterly	2002	open	1 and 2 years	What do you think the general rise in prices for goods and services will be in 12 months and 2 years, measured by the 12-month change in the CPI?
Poland	Central bank	Firms	Prices	Sector representation	Quarterly	2008	5	1 year	In … [month with the latest data is available] of the current year, the CPI (inflation) was equal to x% in annual terms. In the enterprise's opinion, during the next 12 months prices:
Serbia	Central bank	Firms	Inflation (CPI)	Random	Monthly	2009	open	1 and 2 years	c stands for current month. What year-on-year rate of inflation do you expect in c+12 (consumer price growth in c+12 relative to c)?
South Africa	Central bank	Firms and consumers	Inflation (CPI)	Convenience	Quarterly	2000	open	Current+follo wing 2 years and, 5 years	What do you expect the average headline inflation rate (as measured by the % change in the CPI) to be during the year
Sweden	Central bank	Firms with ≥200 workers	Inflation (CPI)	Random	Quarterly	2000	open	1 year	What do you think the annual CPI inflation in Sweden will be the next coming year (12 months forward), measured as the percentage change in the CPI
UK	Confed. of British Industry	Firms	Prices of competition	Convenience	Quarterly	2008	4	1 year	What has been the % change over the past 12 months in the general level of output prices in the UK markets that your firm competes in, and what is expected to occur over the next twelve months?
Ukraine	Central bank	Firms	Inflation	Random	Quarterly	2006	8	1 year	How do you think the level of consumer prices will change in the next 12 months?
USA	Livingston, Philly Fed	Large Firms	Inflation (CPI)	Convenience	Semi-Annual	1946	open	1 year	n.a.
USA	SoFIE	Firms	Inflation (CPI)	Representative	Quarterly	2018	open	1 and 5 years	What do you think will be the inflation rate (for the Consumer Price Index) over the next 12 months? Please provide an answer in an annual percentage rate.
Uruguay	Central bank	Firms	Inflation (CPI)	Representative	Monthly	2009	open	Current year, 1 and 2 years	What do you believe is going to be the change in the CPI?
Uruguay	Deloitte	Firms	Inflation CPI	Non-probability	Biannual	2010	open	Current and,following year, 3 or 4 years	What do you expect the rate of inflation to be during the year:
Turkey	Central Bank	Manufacturing Firms	Inflation (PPI)	Sector representation	Monthly	1987	open	1 year	What is your expectation for inflation (producer prices) rate over the next 12 months (as an annual percentage)?

Table 2. Selected Surveys and Firms' Inflation Expectations

Country	Institution	Representative Sample	Heterogenous sample	Monthly or Quarterly Frequency	Large Sample Size (>350)	No Priming	Quantitative Question	Many/wide bins	Distributional question	Aggregate Inflation
Canada	Conference Board of Canada	✕	✓	✓	✓	✓	✕	✓	✕	✓
Canada	Central bank	✕	✓	✓	✕	✕	✕	✕	✕	✓
Colombia	Central bank	✕	✕	✓	✕	✕	✓	-	✕	✓
Colombia	Delgado, Herreno, Hofstetter and Pedemonte (2021)	✓	✕	✓	✓	✓	✓	-	✕	✓
Czech Republic	Central bank	✓	✓	✓	✕	✓	✓	-	✕	✓
EU Members	European Commission	✓	✓	✓	✓	✓	✕	✕	✕	✓
Hungary	Central bank	✓	✓	✓	✓	✓	✓	✓	✕	✓
Iceland	Central bank	✕	✕	✓	✓	✓	✓	-	✕	✓
Iran	Central bank	✓	✕	✓	✓	✓	✓	-	✕	✓
Israel	Ungar and Zilberfarb (1993)	✓	✕	✕	✕	✕	✓	-	✕	✓
Italy	Central bank	✓	✕	✓	✓	✕*	✓	-	✕	✓
Jamaica	Central bank	n.a.	n.a.	✓	✕	✓	✓	-	✕	✓
Japan	Central bank	✓	✓	✓	✓	✓	✕	✓	✕	✓
New Zealand	Central bank	✕	✕	✓	✕	✓	✓	-	✕	✓
New Zealand	ANZ Economics	✓	✓	✓	✓	✓	✓	-	✕	✓
Norway	Central bank	✓	✓	✓	✓	✓	✓	-	✕	✓
Poland	Central bank	✕	✓	✓	✕	✕	✕	✕	✕	✓
Serbia	Central bank	✕	✕	✓	✕	✓	✓	-	✕	✓
South Africa	Central bank	✕	✓	✓	✓	✓	✓	-	✕	✓
Sweden	Central bank	✕	✕	✓	✕	✓	✓	-	✕	✓
UK	Confederation of British Industry	✕	✓	✓	✓	✓	✓	-	✕	✕
Ukraine	Central bank	✓	✓	✓	✓	✓	✕	✓	✕	✓
USA	Livingston, Philadelphia Fed	✕	✕	✕	✕	✓	✓	-	✕	✓
USA	SoFIE	✓	✓	✓	✓	✓	✓	-	✓	✓
Uruguay	Central bank	✓	✕	✓	✕	✓	✓	-	✕	✓
Uruguay	Deloitte	✓	✕	✕	✕	✓	✓	-	✕	✓
Turkey	Central bank	✓	✕	✓	✓	✓	✓	-	✕	✓

Notes: Column "Representative sample" indicates whether firms in a survey are representative of the group that is being surveyed. Column "Heterogeneous sample" indicates if a sample of firms covers various types (size, sector, etc.) of firms so that the resulting sample represents or resembles the population of firms in the economy. Column "Large Sample Size" indicates if a survey has more than 350 firms with non-missing responses. Column "No priming" indicates whether a survey does not provide information to firms before eliciting expectations, does not restrict the sample in any particular way (e.g., does not exclude firms that do not understand the concept of inflation), and does not restrict possible responses (e.g., does not present firms with a limited set of possible responses). Column "Quantitative question" indicates if firms are free to report an unrestricted inflation forecast (i.e., responses are not restricted to a binned/range/multiple-choice menu). Column "Many/wide bins" indicates whether a survey allows firms to choose from a wide and detailed range of possible responses if quantitative response are not available. Column "Distributional question" indicates whether a survey elicits a probability distribution for future inflation. Column "Aggregate Inflation" indicates whether a survey asks firms to report an aggregate measure of inflation, changes in prices overall, etc. (rather than firm's unit costs or prices). * last month annual inflation is given to 2/3 of the firms and firms are not allowed to report "extreme" values.

Table 3. Selected Surveys and Firms' GDP (economic activity) Expectations

Country	Institution	Question	Quantitative Question	Many/wide bins	Distributional question	Aggregate output
Canada	Conf. Board of Canada	Do you expect overall economic conditions in Canada six months from now to be: (better/same/worse)	✕	✕	✕	✓
Colombia	Central bank	What do you expect the annual economic growth rate to be during the year: (also range with minimum and maximum value)	✓	-	✕	✓
Germany	ifo Institute	According to your assessment, by how much percent will the real gross domestic product in Germany change in the year X relative to the previous year? (special question in 2018 and 2019)	✓	-	✕	✓
Italy	Central bank	What do you think is the probability of an improvement in Italy's general economic situation in the next 3	✕	✕	✕	✓
Japan	Cabinet Office, ESRI	Please enter a figure up to one decimal place in each of the boxes below as your rough forecast of Japan's nominal and real economic growth rates for: next 1,3 and 5 years	✓	-	✕	✓
New Zealand	Central bank	What is your expectation of the annual % change in real production-based GDP for the: 1 and 2 years	✓	-	✕	✓
New Zealand	ANZ Economics	With regard to the New Zealand Economy. Do you believe that General Business Conditions in 12 months' time will have? (Improved, Remain the same, Deteriorated)	✕	✕	✕	✓
South Africa	Central bank	What do you expect the average economic growth rate (as measured by the percentage change in the real GDP) to be during the year: current and following year	✓	-	✕	✓
Sweden	Central bank	What GDP-growth, in percentage terms, do you think Sweden will have; -the next coming year, counting from now and 12 months forward? -the second year (12-24 months forward) -the fifth year (48-60 months forward)	✓	-	✕	✓
Ukraine	Central bank	How do you think the level of Ukranian goods and services will change over the next 12 months? (increase/decrease/unchanged)	✕	✕	✕	✓
USA	Livingston, Philly Fed	The value of the real GDP/GNP in the current quarter, two and four quarters beyond, two annual-average forecasts (current and following year)	✓	-	✕	✓
USA	CFO, Duke/Richmond/Atlanta	Please indicate what probabilities you would attach to the various possible year-ahead percentage changes in U.S. economic output (Real Gross Domestic Product) Results should sum to 100%	✓	-	✓	✓
Uruguay	Deloitte	What do you expect the GDP growth rate to be during the year: current and following year	✓	-	✕	✓

Notes: the table reports the types of questions about expected GDP (or economic activity generally) in the set of surveys covered in Table 1.

Table 4. Selected Surveys and Firms' Unemployment Rate Expectations

Country	Institution	Question	Quantitative Question	Many/wide bins	Distributional question	Aggregate unemployment
New Zealand	Central bank	What is your expectation of the official HLFS unemployment rate for the: 1 and 2 years	✓	-	✕	✓
New Zealand	ANZ Economics	How do you expect the unemployment rate to has changed in 12 months' time? (Increased, Remain the same, Decreased)	✕	✕	✕	✓

Notes: the table reports the types of questions about expected unemployment rate in the set of surveys covered in Tables 1 and 2. See notes to these tables for more details.

Table 5. Selected Surveys and Firms' Exchange Rate Expectations

Country	Institution	Question	Quantitative Question	Many/wide bins	Distributional question
Colombia	Central bank	What do you think the exchange rate (Pesos/USD) will be for the following time periods ahead: 3,6,9 and 12 months (also range with minimum and maximum value)	✓	-	✕
Colombia	Delgado, Herreno, Hofstetter and Pedemonte (2021)	If in twelve months you were to buy dollars in the financial sector, at what exchange rate do you think you could get them?	✓	-	✕
Jamaica	Central bank	In MMYYYY the exchange rate was J$X=US$ Y. What do you think the rate will be for the following time periods ahead: 3,6 and 12 months.	✓	-	✕
New Zealand	Central bank	Relative to the following currencies (US Dollar and Australian Dollar), what spot exchange rate do you expect for the NZ Dollar at the end of: 6 and 12 months.	✓	-	✕
South Africa	Central bank	What do you expect the rand/US dollar exchange rate to be at the end of: current and following year	✓	-	✕
Ukraine	Central bank	What do you think the UAH/USD will be in the next 12 months?	✓	-	✕
Uruguay	Deloitte	What do you expect the pesos/US dollar exchange rate to be in the next 12 months	✓	-	✕

Notes: the table reports the types of questions about expected exchange rate (local currency vs the US dollar) in the set of surveys covered in Tables 1 and 2. See notes to these tables for more details.

Table 6. Selected Surveys and Firms' Interest Rate Expectations

Country	Institution	Question	Quantitative Question	Many/wide bins	Distributional question	Aggregate interest rates
Colombia	Central bank	What do you think the interest rate (DTF: 90-day annual effective interest rate) will be for the following time periods ahead: 3,6,9 and 12 months (also range with minimum and maximum value)	✓	-	✕	✓
Jamaica	Central bank	In MM YYYY the 180-day T-bill rate was X%. What do you think the rate will be for the next 3 months? In MM YYYY, the Bank of Jamaica's 30-day rate was X%. What do you think this rate will be for the next 3 months?	✓	-	✕	✓
New Zealand	Central bank	What do you expect the Official Cash Rate (OCR) to be at the end of: 1 and 2 years. What do you expect the 10-year government bond market yield to be at the end of: 1 and 2 years	✓	-	✕	✓
New Zealand	ANZ Economics	How do you expect the interest rates to have change in 12 months time? Increased, Remain the same, Decreased	✕	✕	✕	✓
South Africa	Central bank	What do you expect the prime overdraft rate to be at the end of: current and following year.	✓	-	✕	✓
Sweden	Central bank	Interest rate (Repo rate: the Riksbank's borrowing/lending rate from/to banks for seven days' money) for 3,6, 12 and 24 months ahead.	✓	-	✕	✓

Notes: the table reports the types of questions about expected nominal interest rate in the set of surveys covered in Tables 1 and 2. See notes to these tables for more details.

Table 7. Selected Surveys and Firms' Wage Expectations

Country	Institution	Question	Quantitative Question	Many/wide bins	Distributional question	Aggregate wages
New Zealand	Central bank	What is your expectation of the annual% change in QES average hourly (ordinary time, private sector)	✓	-	✕	✓
Norway	Central bank	What do you think the average annual wage growth will be this year? Next year?	✓	-	✕	✓
South Africa	Central bank	What do you expect the average salary and wage increase to be during the year: current and following	✓	-	✕	✓
Sweden	Central bank	Wage increase (the percentage increase in wages/salaries as measured over all sectors in the economy)	✓	-	✕	✓

Notes: the table reports the types of questions about expected nominal wages in the set of surveys covered in Tables 1 and 2. See notes to these tables for more details.

ONLINE APPENDIX

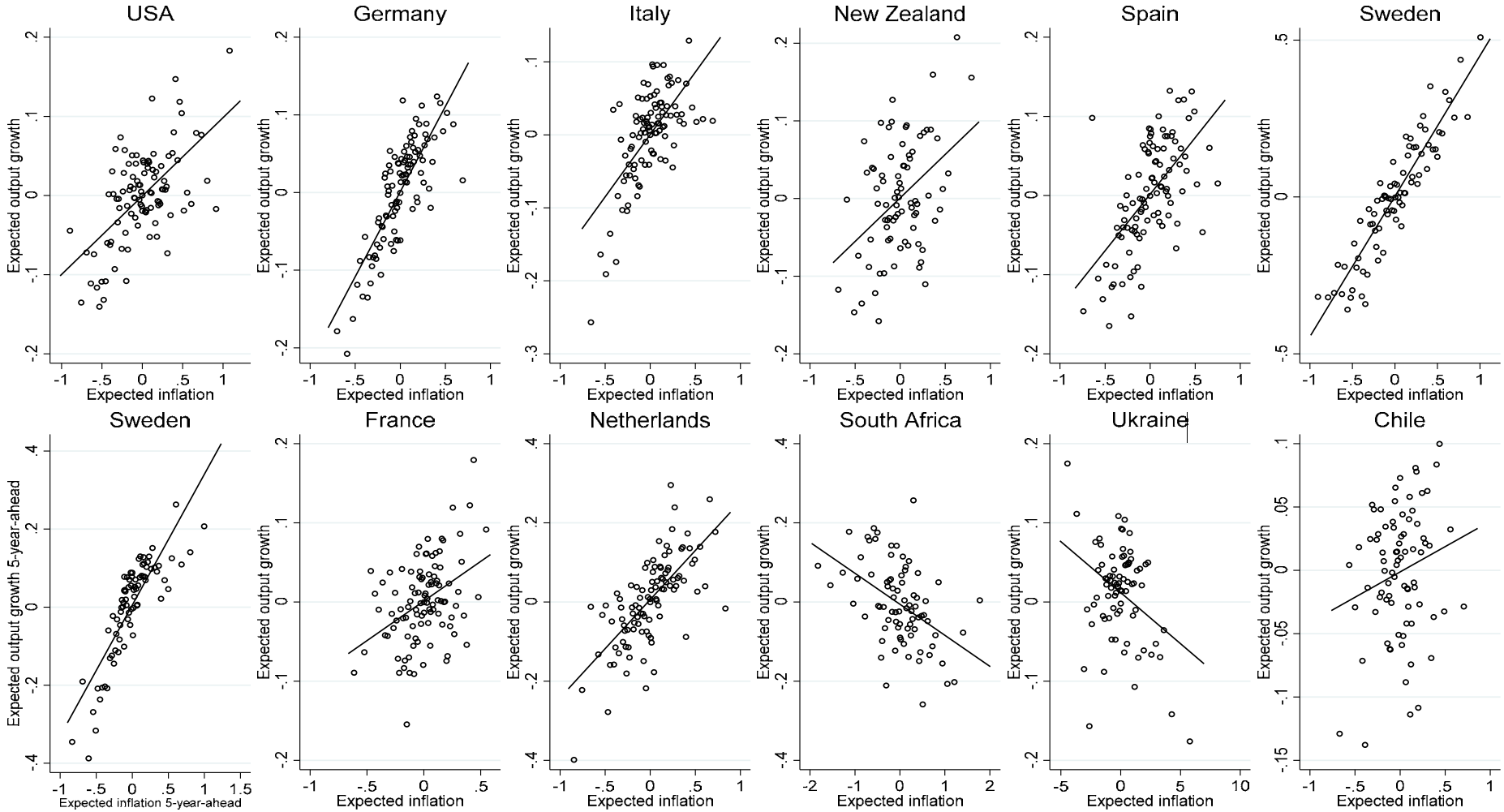
THE MACROECONOMIC EXPECTATIONS OF FIRMS

Bernardo Candia
UC Berkeley

Olivier Coibion
UT Austin
and NBER

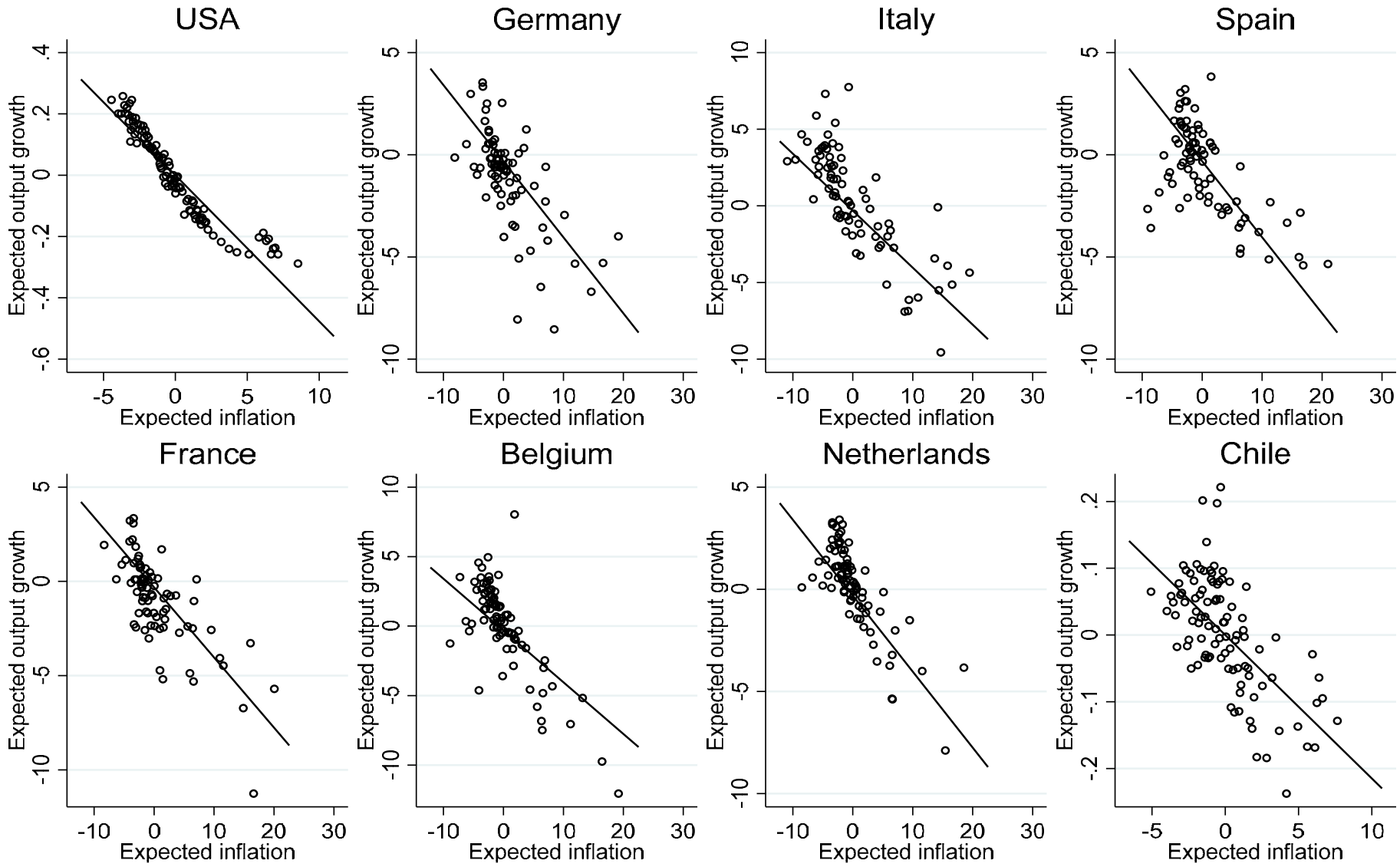
Yuriy Gorodnichenko
UC Berkeley
and NBER

Appendix Figure 1. Joint distribution of inflation and output growth expectations, professional forecasters (Consensus Economics).



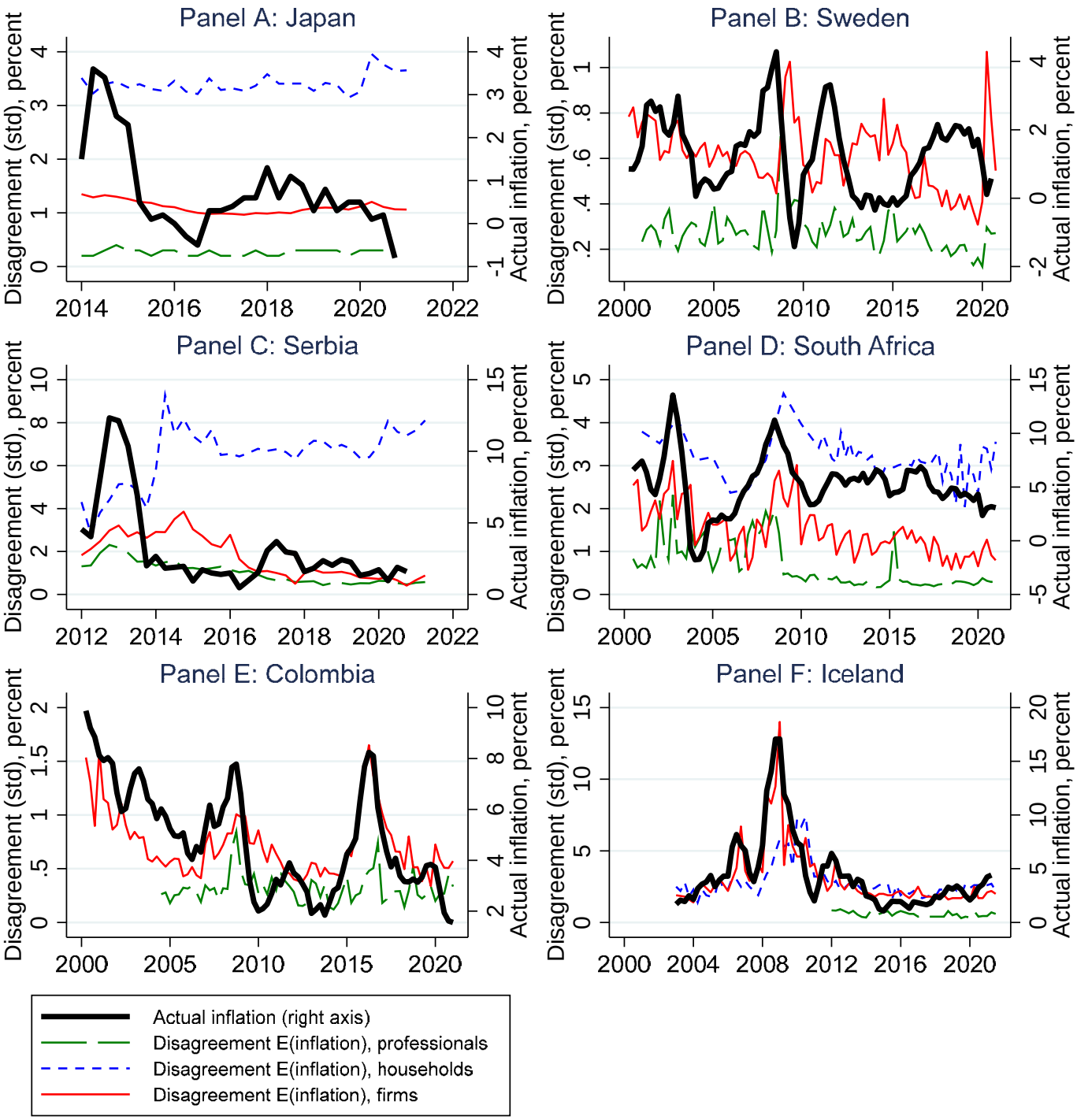
Notes: each panel plots a binscatter for the joint distribution of expectations of output growth rate and inflation in the next calendar year. For each variable, we take out the time×country fixed effect so that all variables are mean zero. The sample period is 2001-2020 for OECD economies except Chile (2005-2020), 2000-2020 for South Africa and 2007-2020 for Ukraine. To the panel for Ukraine comparable to the corresponding panel for firms in Figure 8, projections for the growth rate of GDP are coded as +1 (increase), 0 (the same), and -1 (decrease). For South Africa, the source is South African Reserve Bank.

Appendix Figure 2. Joint distribution of inflation and output growth expectations, households.



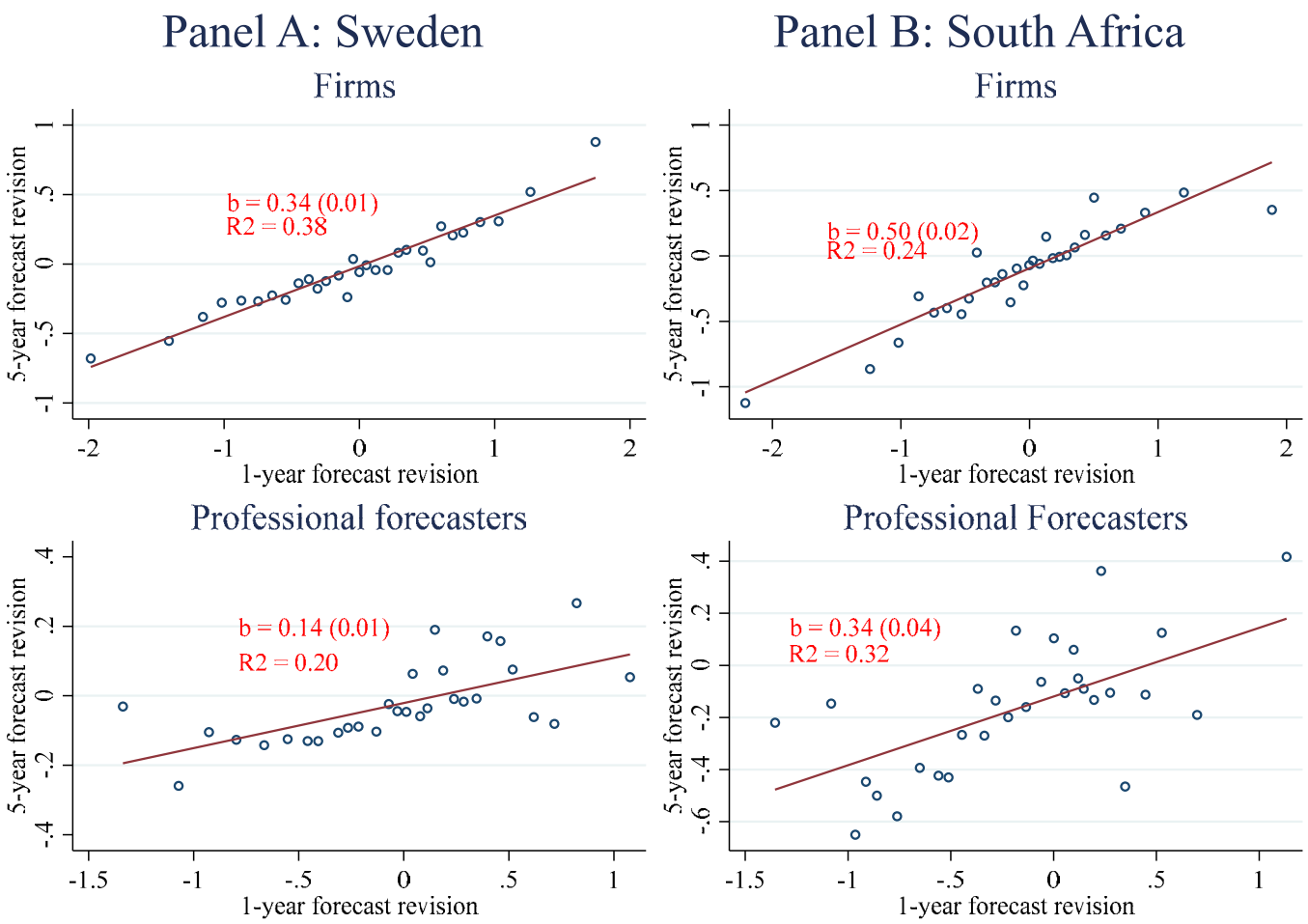
Notes: each panel plots a binscatter for the joint distribution of expectations for output growth rate and inflation in the next calendar year. For each variable, we take out the time×country fixed effect so that all variables are mean zero. The sample period for the US (Michigan Survey of Consumers) is 1978-2020. The sample period for Chile (*Encuesta de Percepciones y Expectativas Económicas de la Universidad de Chile*) is 2008-2018. The sample period for other countries (ECB's Consumer Expectation Survey) is January-June 2020.

Appendix Figure 3. Disagreement among Firms about Future Inflation, other available surveys.



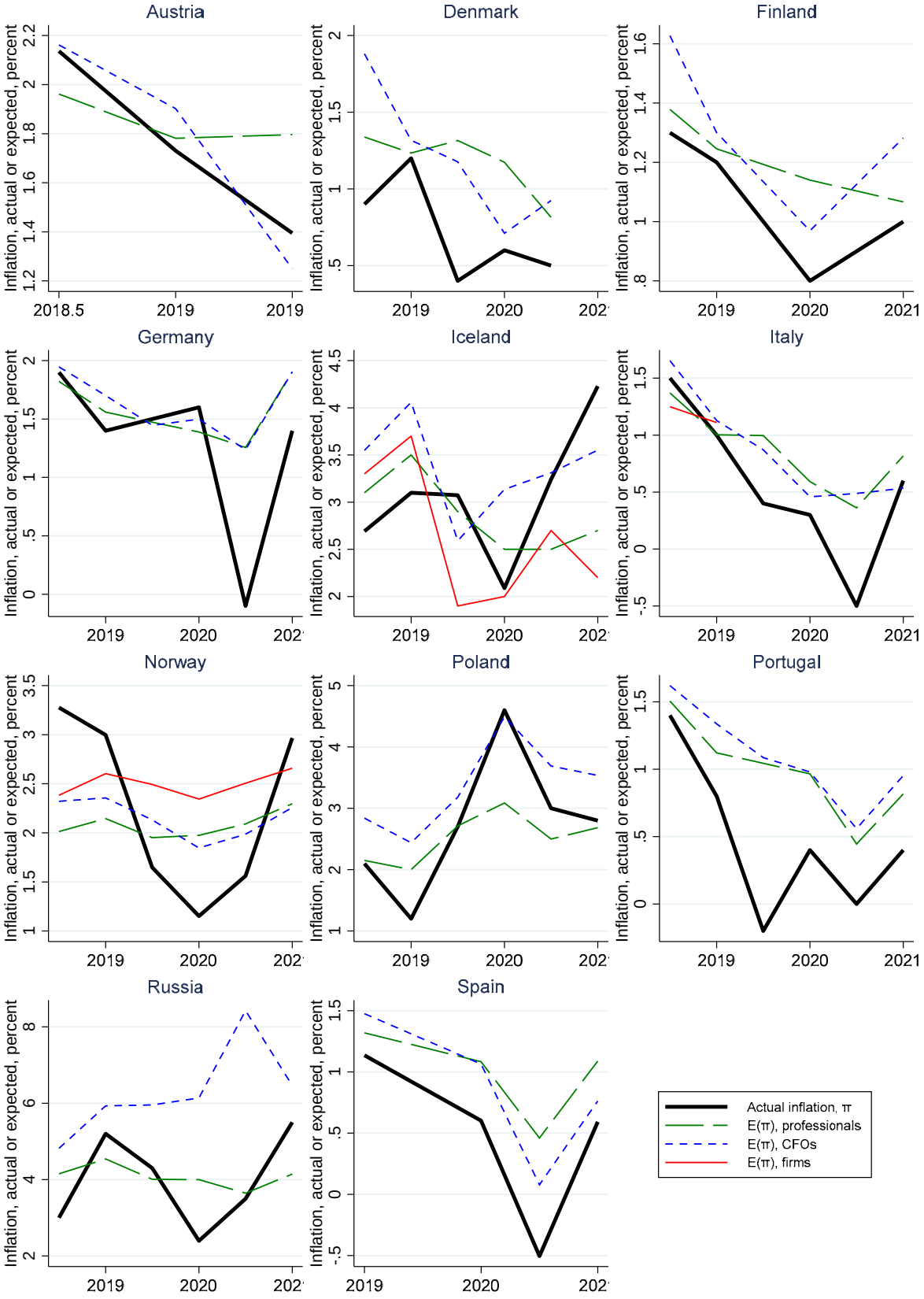
Notes: Each panel plots the cross-sectional standard deviation of one-year ahead inflation expectations for professional forecasters, firms and households, depending on data availability, as well as actual inflation. See section 3.2 for details.

Appendix Figure 4. Correlation of Changes in Short-Run and Long-Run Inflation Expectations.



Notes: Each panel shows the relationship (binscatter) between revisions in 1-year-ahead and 5-year-ahead inflation forecasts. Panel A is for Sweden: Firms (purchasing managers: manufacturing and trading) and professional forecasters (money market players) are from Prospera survey (Sveriges Riksbank), the sample period covers 2010Q1-2020Q4. Panel B is for South Africa: Firms and professional forecasters are from the Inflation Expectation Survey carried out by the Bureau of Economic Research (South African Reserve Bank); the sample period covers 2011Q3-2021Q1. Each specification uses Huber robust regression to downweight the importance of outliers and influential observations.

Appendix Figure 5. Actual and Expected Inflation, European CFO Survey.



Notes: Each panel plots one-year ahead inflation expectations for CFOs, professional forecasters, and firms, depending on data availability, as well as actual inflation. For all countries, except Russia, we exclude responses of CFOs that are greater than 15 percent or less than -2 percent. For Russia, we exclude responses of CFOs that are greater than 25 percent or less than -2 percent.