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JULY 2023

ISSN: 2365-9793

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ABSTRACT

Information and the Formation of Inflation Expectations by Firms: Evidence from a Survey of Israeli Firms*

This study analyzes how firms form their inflation expectations during a regime change in monetary policy and a transition to a low-inflation environment. Using the Bank of Israel survey of firms, we document the basic properties of firms' inflation expectations and examine how Israeli firms update their inflation expectations after receiving new information about inflation or monetary policy. We find that even after successful de-dollarization and disinflation a positive inflation surprise leads to a sizable upward adjustment in inflation expectations for the next year and quarter. A surprise hike in the monetary interest rate leads to a downward adjustment in inflation expectations.

JEL Classification: D22, E31, E52

Keywords: monetary policy, surveys, firms, inflation expectations

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* *The views presented are those of the authors and not necessarily of the Bank of Israel. We are grateful to the Bank of Israel for providing us access to the survey data. The processing was carried out at the bank. We Thank Amir Yaron, Yossi Yachin, the participants at the 2023 North America Summer Meeting of the Econometric Society, and the participants of the Bank of Israel's "Monetary Policy during a Period of Price Stability" conference for their helpful comments and suggestions.

1. Introduction

In recent decades the tracking and management of inflation expectations has become a cornerstone of modern monetary policy. This is especially important when central banks employ unconventional policies, such as forward guidance, since they affect the behavior of firms and households by adjusting their expectations. However, the way in which firms form inflation expectations – and, more generally, how they build macroeconomic forecasts – is unclear. As noted by Bernanke (2007),[1] a core difficulty is the lack of high-quality surveys with data on firms' expectations. The data are even scarcer for times of important changes in the monetary policy regime or the macroeconomic environment. In this context, a key question is how macroeconomic news shocks impact firms' expectations.

To address this question, we utilize a survey of Israeli firms in which they report their inflation expectations as well as other economic variables. The study provides an initial analysis of the way in which firms form inflation expectations during a unique period in which there was a regime change in monetary policy, and during which the central bank concluded a transition to a regime of inflation targeting (see Elkayam and Offenbacher, 2020). During this period, the de-dollarization of the economy was largely completed[2] and thus one can learn how the sensitivity of inflation expectations to news changes when economic agents have more confidence in local currency.

The empirical research on expectations has found that in developed countries, firms and households are inattentive to the rate of inflation and monetary policy (see Candia et al., 2023). One of the main explanations offered for this inattention is the success of monetary policy: in countries with a long history of low and stable inflation, there is little incentive to track inflation and monetary policy, with firms and households tending systematically to be less informed regarding these figures in comparison to those in countries with high or volatile inflation (see Cavallo, Cruces, and Perez-Truglia, 2017, and Coibion et al., 2020). A significant part of this inattention is related to incentives for gathering and processing information, as predicted by theoretical models of rational inattention

[1] Bernanke (2007) notes: "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."

[2] During 1990, approximately 40% of savings plans and deposits held by the Israeli public were nominated or linked to foreign currency. The proportion dropped significantly between 1993 and 1997, reaching around 20%. Since 1997, the proportion has remained relatively stable (Figure Appendix B1).

when there are costs or frictions in gathering and processing information (for more on this, see Coibion, Gorodnichenko and Kumar, 2018). The analysis of expectations of Israeli firms is a special case study, because of the proximity of our sample to a period of high and volatile inflation, the transition to a low-inflation environment and to a regime of inflation targeting. However, for most of our sample, the rate of inflation in Israel was low and stable.

Our contribution can be divided into two parts. First, we present the Bank of Israel Firms' Survey and describe the main facts about the characteristics of inflation expectations, on the backdrop of the main economic developments, from the second half of the 1990s to 2018. Second, we examine how Israeli firms update their inflation expectations after receiving information on inflation and monetary policy. One of the characteristics of the firms' survey is that there is no fixed time that the firms are responding, and there is a significant variation in the dates they respond. This variation allows us to identify the relation between macroeconomic news and firms' expectations by comparing the expectations of firms who responded to the survey before and after some information about inflation or monetary policy could become available.

Our main finding is that macroeconomic news leads Israeli firms to update their inflation expectations. A positive inflation surprise, that is, an unexpected upward change in the Israeli Consumer Price Index (CPI) of one percentage point, leads to an upward adjustment of the yearly expectations by about a half percentage point. The impact on quarterly inflation expectations is weaker. The fact that an inflation surprise has a stronger impact on annual expectations than on quarterly expectations shows that, on average, Israeli firms perceive inflation surprises as persistent shocks. That is, the firms expect a continued rise in prices over the coming quarters.

We also find that new information about monetary policy leads firms to update their inflation expectations. A positive "monetary surprise," i.e., an unexpected hike in policy interest rate of one percentage point, leads to a downward adjustment of approximately 0.3 percentage points in inflation expectations for the year. However, in contrast to an inflation surprise, the result regarding a surprise in monetary policy interest rate is sensitive to the sample period and stems mostly from the significant shocks that took place at the beginning of our sample period (2001-2002). Finally, we find that our results are robust when estimated in a period of stable inflation, firms in Israel continue to monitor macroeconomic news, even after a prolonged period of low and stable inflation. In light of the recent global increase in inflation, the Israeli experience offers valuable insights that are informative for many countries experiencing now a bout of high inflation.

Our study relates to several strands of economic research. First, an emergent literature shows that the inflation expectations of firms are somewhere between the expectations of professional forecasters and those of households (Candia et al. 2023). Our findings are largely consistent with this view. For example, we find that there is greater disagreement regarding inflation expectations among firms than among professional forecasters. We find support for this view, and we provide unique evidence regarding a country that went through a process of disinflation, i.e., a transition from an environment of high and volatile inflation to an environment of low and stable inflation. In spirit of Jonung (1981), we also explore which firm characteristics can explain the cross-sectional variation in inflation expectations among Israeli firms and how responses to news vary by firm characteristics. We find that firms' responses to new information largely are not correlated with the size of the firm and its industry sector.

Second, our study relates to the strand of research trying to better understand the nature of expectation formation. For example, D'Acunto et al. (2021) found that shopping experience has a major effect on how U.S. households form their inflation expectations. On the other hand, Coibion and Gorodnichenko (2015) document that inflation expectations of households and firms are sensitive to exchange rate movements in Ukraine (a country with a history of high and volatile inflation). Kumar et al. (2015) used interviews with managers to elicit the sources of information that managers in New Zealand (a country with a history of low and stable inflation since the 1990s) use for forming inflation expectations. This literature also explores how inflation expectations are affected by macroeconomic news (e.g., Beechey, Johannsen, and Levin, 2011). Our work is closest in spirit to Lamla and Vinogradov (2019) who compare inflation expectations of households at the daily frequency before and after monetary announcements. Our contribution to this line of work is to study how firms respond to economic and monetary news in an environment with a history of high inflation and dollarization.

Finally, macroeconomists have been long interested in how the expectations formation changes following significant shifts in policy. Sargent (1982) is a classic example that illustrates how a credible change in policy led to the end of four hyper-inflations and wiped-out inflationary expectations. In a similar spirit, Mankiw, Reis and Wolfers (2003) studied how Volcker's dis-inflation process in the 1980s affected households' inflation expectations. However, much less is known about the evolution of firms' inflation expectations during a period of policy regime change. The near-complete absence of research reflects the challenges associated with carrying out high-

quality surveys of managers (for further discussion see Coibion et al., 2020), as well as the rarity of cases in which this kind of regime change took place. Therefore, our analysis utilizes a unique combination: a high-quality survey available for a unique period covering the transition of monetary policy to an inflation-targeting regime.

The rest of the paper is structured as follows. Section 2 describes the survey and the institutional environment. We show that the design of the survey has a number of desirable features and the macroeconomic environment provides a useful natural experiment. Section 3 investigates how news about inflation and monetary policy is incorporated into inflation expectations. In this section, we also explore how sensitivity varies across time and firm characteristics. Section 4 concludes.

2. Macroeconomic environment and data

2.1 Macroeconomic environment

The sample of our study began during an era in which the Israeli economy was making its final and successful shift to eradicate inflation; for more on inflation in Israel and the process of disinflation see Cukierman and Melnick (2015). The final step in the disinflation process took place against the background of a change in the monetary policy regime, from a policy based on the exchange rate as the anchor for monetary policy to a regime of inflation targeting (Figure 1).

Israeli monetary policy gained credibility during two key episodes: the first was the Bank of Israel's policy response to the LTCM crisis in 1998, and the second was the reversal of the monetary policy, after the surprise step taken by the Bank, drastically reducing the interest rate resulting in a large shock in markets at the end of 2001 (for details see Melnick and Strohsal, 2017). On both occasions, the shocks led to strong capital flows out of the economy, which led to the depreciation of the currency and created price shocks against the backdrop of the dollarization of the economy, a pathological inheritance of Israel's history of inflation (Shiffer, 2001). The Bank of Israel dealt with the shocks through a sharp increase in the interest rate, which had an immediate impact and reversed the capital flows. The outward flow was reversed, and the exchange rate returned to the pre-crisis levels while preserving inflation targets.

Around 2003, inflation expectations reached two percent. Cukierman and Melnick (2015) identified this point as the time when inflation expectations in Israel were anchored at two percent,

the level defined today as the midpoint of the target range. Since 2004 and until the end of the sample period, the rate of inflation was close to the inflation target (1%-3% range). Despite several deviations from the target range, the result of various shocks, the inflation expectations from most sources have remained near the midpoint of the target range or lower.

2.2 Survey Description

The Bank of Israel Firms' Survey is a quarterly survey that began in the third quarter of 1983. The goal of the survey is to supply policymakers with real-time information about the economic conditions of Israeli firms. Most questions are qualitative and relate to the firms' assessments of their business activities, especially regarding output and employment. In the early 1990s the survey was amended and improved, and the sample size was significantly increased. In 1997 two quantitative questions regarding annual and quarterly inflation expectations were added to the survey. The wording of the key questions is in Appendix A.

Participation in the survey is voluntary, and as a result, firms entered and left the sample over the years. The sample is not a balanced panel, and the number of firms in each quarter is not fixed (Figure 2). Although the survey covers a heterogeneous set of firms, it is not a representative sample of Israeli firms. In the last years in our sample (2016-2018), the number of firms who participated declined to an average of around 250-300. Figure 3 presents the distribution of the number of quarters that firms participated in the survey during the 2001Q3-2018Q3 period.

The survey includes firms in six industries: manufacturing, construction, transportation and communications, hotels, commerce, and services. Service firms were included in the survey for the first time in the third quarter of 1999, and their share has grown gradually ever since. From the second half of 2009, the proportion of firms in each industry remained relatively stable: manufacturing (36 percent), construction (4 percent), transportation and communications (5 percent), hotels (5 percent), commerce (14 percent) and services (36 percent) (Figure 4).[3] Some of the questions are identical for all the industries (for example, output and number of employees), while some are unique to one or two industries (for example, inventory of raw materials or the number of overnight stays by foreign tourists). The survey also includes stratified sampling by

[3] The industry distribution is presented for the sample of firms who answered the question regarding annual inflation expectations.

geographic region (Haifa and the north, Tel Aviv and the center, Jerusalem and its surroundings, southern region or whole Israel) and the number of employees (Figure 5).

The response to the survey was carried out for the most part by the vice-president of finance, firm accountant, or an external accountant, and in smaller firms by the CEO or owners. During the early years, the answers to the survey were written on hard copy and sent to the Bank of Israel by mail or fax; over the years, this transitioned to an electronic survey. Since 2016, all the answers have been sent electronically. The survey was sent to the firms between the 13th and the 15th of the last month of each quarter. The answers were received from the second half of the last month of the quarter. Most of the firms respond between the 15th of the last month of the quarter and the 20th of the first month of the next quarter. Firms that do not respond to the first invitation receive between one and two reminders. The first reminder was generally sent at the end of the quarter and the second reminder during the second half of the following month. At the end of the sample period the survey's rate of response amounted to around 30 percent.

The questions regarding economic activity are qualitative, and the firms are asked to report on the change in their business activity – an increase, decrease, or stability – and to indicate the magnitude of the change – significant or moderate. The firms are requested to report the change in their activities in the current quarter in comparison with the previous quarter, except the hotel industry in which firms are asked to compare their activities to the corresponding quarter in the previous year. They also report their qualitative assessment of the limitations (very severe, severe, moderate, mild, or no limitation) affecting their activity in relation to the economic condition. In addition to the qualitative questions, the survey includes four quantitative questions about inflation and exchange rate expectations for the coming quarter and year. From time to time, the survey includes a one-time special question. The survey was discontinued at the end of 2020 and replaced by a similar survey of Israeli firms administered by the Central Bureau of Statistics in Israel. The survey questionnaire is given in Appendix A.

2.3 Descriptive statistics

Figure 1 presents the average development of annual inflation expectations for firms participating in the survey as well as the actual rate of inflation and the target range of inflation. The average expectations are one percent lower in comparison to households but between 0.5 and one

percentage point higher when compared to the other sources. To visualize this property, Figure 6 plots the time series of average firms' inflation expectations and the expectations of other agents in the economy. Professional forecasters' expectations are based on the Bank of Israel's Forecasters Survey, which regularly reports their expectations. The expectations of the commercial banks are based on the reports on five of the leading commercial banks in Israel, which are calculated as the difference between their internal nominal interest rates and their internal CPI-indexed interest rates. The internal interest rate is calculated for each bank as an average between its marginal price for fundraising (deposits) and its marginal price for allocation of uses (credit).[4] Household expectations are based on a consumer confidence survey carried out by the Israeli Central Bureau of Statistics.[5] We generally find clear co-movement of expectations across the agents (Appendix Table B1 reports cross-correlations). Figure 7 documents the evolution of disagreement regarding expected inflation for professional forecasts, firms, and households. Consistent with earlier studies, the disagreement for firms is between the disagreement for households and the disagreement for professional forecasters. Panel A in Table 1 presents descriptive statistics for our sample (2001Q3-2018Q3). Panel B in Table 1 below focuses on a shorter period, 2011Q1 and onwards, but includes two additional sources: households and commercial banks.

The average inflation expectations are similar across industries (Figure 8 and Table 2) and co-move strongly (Appendix Table B2). However, there are some differences across the industries with expectations in the hotel industry being a little higher, while the expectations in the transportation and communications industry being a little lower. We find broadly similar levels of disagreement in inflation expectations across industries (Figure 9 and Appendix Table B3), and they co-move strongly (Appendix Table B4).

To examine whether firm characteristics explain the differences between firms' inflation expectations, we run a panel regression of annual inflation expectations on a set of dummy

[4] There are differences in the reporting period between the firms' survey and that of the reporting by other sources. Therefore, an adaptation was made between them. The expectations from the capital market, the banks, and the professional forecasters are based on the average daily data between the 15th of the last month of the quarter and the 20th of the first month after that – the period during which most of the firms responded to the survey. The household expectations data is based on a monthly survey; therefore, the quarterly data is taken from the last month of each quarter. In addition, there are differences regarding the precise horizon of the forecast. The firms survey specified an exact horizon to the firm. For example, "your expectations for cumulative change in the CPI (percentage) over the coming 12 months (April 2016 to March 2017)." On the other hand, the professional forecasters were asked about inflation in next 12 CPI indices and the expectations from the capital market are for one year ahead (365 days).

[5] For additional details see: www.cbs.gov.il.

variables: industry, number of employees, and geographical area; we also control time (quarter) fixed effect. The results (Table 3) show that most firm characteristics are not statistically or economically significant.

2.4 Timing of responses

One of the characteristics of the firms' survey is that the firms do not respond to it on the same date, and in practice, there is a significant variation in reporting dates. Broadly, the timing of the responses can be grouped into four periods (Figure 10):

- **Period 1** – Responses that were received before the second monthly CPI of the quarter (before the 15th of the last month of the quarter).[6,7]
- **Period 2** – Responses that were received after the publication of the second monthly CPI and before the publication of the third monthly CPI (between the 15th of the last month of the quarter and before the 15th of the following month).
- **Period 3** – Responses that were received after the publication of the third monthly CPI of the quarter (after the 15th of the first month of the following quarter).
- **Period 0** – Includes responses of firms for which we do not have a precise reporting date or responses received after the end of the second month of the following quarter.[8]

Throughout the response period, several important and relevant macroeconomic news announcements are published, which include information that is not known fully by the public prior to its publication, and therefore is expected to impact the expectations. This variation allows us to examine whether Israeli firms respond to important macroeconomic news announcements. Specifically, since the firms' survey is carried out on a quarterly basis and the CPI and monetary

[6] In Israel, the Consumer Price Index is published monthly, on the 15th of each month, measuring the previous month. For example, the January index is published on February 15th. If the 15th of the month is on a Saturday or holiday, the index is published the day before, on the 14th of the month.
[7] As a rule, the survey is sent to the firms prior to the publication of the Consumer Price Index for the second month of the quarter, for example, before the 15th of March in the first quarter.
[8] Over time, there was a decline in the number of firms for whom a reporting date was missing. For further details see Appendix Figure B2, which presents the number of responding firms, divided into four periods. Appendix Figure B3 presents the development of firms' inflation expectations according to the division above.

interest rate are published monthly, our data allows for two different inflation surprises and one monetary surprise.[9] In each quarter, the firms who responded after the publication became available are defined as the "treatment group," and the firms who responded beforehand are defined as the "control group."

Figure 11 illustrates that most firms reported during the second period defined above, but there is a significant number of firms who reported during the first and third periods. Figure 12 shows the distribution of firms across groups over time depending on what information they could receive based on the timing when they submit their survey responses.[10]

Our identifying assumption is that the timing of responses is random. To assess this assumption, we regress an indicator variable equal to one if a given firm responds in a given period (i.e., it could have been exposed to news about CPI releases or policy decisions) on observable firm characteristics. We find (Table 4) that firm characteristics generally do not predict when firms submit their responses to the Bank of Israel. These results are consistent with our identifying assumption being satisfied.

In a first pass at the data, we compare the expectations of firms who responded to the survey after the information was made available to the public, to those who responded beforehand. Table 5 presents descriptive statistics of the firms' expectations in the four periods and presents the differences in firms' expectations in relation to the amount of information that they have – firms that responded before the publication of the CPI, and therefore did not have access to the information, in contrast to firms who answered after its publication. The table presents initial evidence that the firms are affected by the CPI publication and adjust their inflation expectations. The data shows that the average and median inflation expectations decline as the quantity of information available to the firms increases. The disagreement (measured with the standard deviation of expected inflation) weakly declines with the increase in the available information.

[9] Until 2017, monetary interest rate decisions in Israel were made on a date set in advance, 12 times a year, at the end of each month. Since then, the decision is made eight times a year, every six weeks. Considering the distribution of the responses to the firms' survey, until 2017 we can use the interest rate surprise of the third month of each quarter in order to examine the firms' responses. To broaden the sample to a later period, we used – beginning in 2017 – the interest decision of the first month of the following quarter. If in a certain month, there was, more than one interest rate decision (due to an unscheduled decision), the interest rate surprise was calculated as the sum of surprises.

[10] We emphasize that, in accordance with the publication dates of the price indexes and the interest rate decisions, if a firm received the third monthly CPI surprise treatment (answered after the index's publication), it received treatments for the second monthly index and of the interest decision. Similarly, until the fourth quarter of 2016, if the firm received interest rate surprise treatment it also received treatment of the second monthly index.

2.5. Information surprises

We use two types of information surprises. The first one is an inflation surprise, i.e., the unexpected change in the CPI, defined as the difference between the realized CPI's rate of change and the average expectations of professional forecasters,[11] which are regularly reported to the Bank of Israel. The second one is a monetary policy surprise, i.e., the unexpected change in the Bank of Israel's monetary interest rate, defined as the difference between the announced monetary interest rate and the average expectations by forecasters[12], which are also reported regularly to the Bank of Israel.

Figures 13 and 14 present the time series of surprises in each quarter. Table 6 presents descriptive statistics of the surprises. As shown in Figure 14, there were several large interest rate surprises (1.5 – 2 percentage points) at the beginning of the sample period. The shocks were the result of a policy deal made between the Bank of Israel and the government. In December 2001 the Bank of Israel unexpectedly reduced the monetary interest rate by two percentage points, to 3.8 percent. This reduction surprised the markets and led to a capital outflow from Israel, a currency depreciation, and an increase in prices. Shortly afterward, the fear of an acceleration in inflation led to a policy reversal and the Bank of Israel increased the monetary rate to 9.1 percent. The monetary tightening took place even though the economy was suffering from a significant recession during this period.

Table 7 presents descriptive statistics for the shocks aggregated to the quarterly frequency. To establish that firms should pay attention to these shocks, we utilize additional survey questions. Specifically, firms are asked in the survey about their economic activity in qualitative terms and are asked specifically to report changes in output and employment in the current quarter: a significant increase, a moderate increase, no change, a moderate decline, or a significant decline. In our analysis, we code the firms' answers into 1 (significant or moderate increase), 0 (no change), or -1 (significant or moderate decline). Then, we estimate a Jordà (2005) local projection:

$$(1)\quad y_{i,t+h} = \gamma_{0,h} + \gamma_{1,h} \times surprise_t^{\pi_{total}} + \gamma_{2,h} \times surprise_t^{i_{total}} + \gamma_{3,h} \times y_{i,j,t-1} + \sum_{year} \gamma_{year,h} \times D_{year} + \alpha_{i,h} + error$$

[11] The average expectations from the end of the calendar month until the day of the index's publication, i.e., from the 1st to the 15th of the following month.

[12] The difference between the realized rate of inflation – five days after the Bank of Israel's announcement and the average expectations on the day of the decision. It is important to note that in Israel, several days pass from the decision day to the implementation of the new interest rate.

where $y_{i,t+h}$ is the self-report indicator of firm i regarding their economic activity: output or employment, h periods after quarter t; $surprise_t^{\pi\_total}$ and $surprise_t^{i\_total}$ are the sum of CPI and interest rate surprises in quarter t. The regressions include firm fixed effect ($\alpha_{i,h}$) and time (year) fixed effects (D_{year} equal to one if quarter t is in $year$), the lagged dependent variable ($y_{i,j,t-1}$).

Table 8 presents the results. We find that interest rate surprises correlated with an increase in output (Panel A) and employment (Panel B) in quarters 0 and 1, and with a decline in quarters 2 and 3. In addition, we find a negative correlation between inflation surprises and activity in quarters two and onwards. However, the effects in quarters 0 and 1 are not significant. This non-monotonic pattern could reflect a combination of conventional effects of monetary policy (higher rates reduce economic activity) and information effects (a higher policy rate can signal a stronger economy). In any case, firms' behavior is affected by the shocks thus suggesting that beliefs of the firms should respond to these shocks as well. This conjecture we explore next.

3. The response of inflation expectations

We test the surprise effect on inflation expectations by estimating panel regressions with two-way fixed effects (firm and quarter), in which we compare the expectations of firms who had access to information (treatment group) with those who did not (control group). Formally, we estimate the following specification:

$$(2)\qquad \pi_{i,t}^{e,h} = \beta_{1,h} \times D_{i,t}^{m_2} + \beta_{2,h} \times D_{i,t}^{m_3} + \beta_{3,h} \times D_{i,t}^{I} + \beta_{4,h} \times D_{i,t}^{m_2} \times surprise_t^{m_2} + \beta_{5,h} \times D_{i,t}^{m_3} \times surprise_t^{m_3} + \beta_{6,h} \times D_{i,t}^{I} \times surprise_t^{I} + \xi_h \times \pi_{i,t-1}^{e,h} + \gamma_{t,h} + \alpha_{i,h} + error$$

where $\pi_{i,t}^{e,h}$ is the inflation expectations for firm i in quarter t for h periods in advance (year or quarter). $D_{i,t}^{m_2}$,$D_{i,t}^{m_3}$ and $D_{i,t}^{I}$ are dummy variables for receiving the treatment of the second monthly CPI surprise, third monthly CPI surprise, or interest rate surprise, respectively. $surprise_t^{m_2}$, $surprise_t^{m_3}$ and $surprise_t^{I}$ are the size of the surprises in the second monthly CPI, the third monthly CPI, and the interest rate surprises, respectively ("size of treatment"). The regressions include controls for time (quarter) fixed effect ($\gamma_{t,h}$) and firm fixed effect ($\alpha_{i,h}$) and the variable the lag dependent variable ($\pi_{i,t-1}^{e,h}$).

This specification is a way to measure how anchored inflation expectations. For example, Bernanke (2007) observed,

> "*... I use the term "anchored" to mean relatively insensitive to incoming data. So, for example, if the public experiences a spell of inflation higher than their long-run expectation, but their long-run expectation of inflation changes little as a result, then inflation expectations are well anchored. If, on the other hand, the public reacts to a short period of higher-than-expected inflation by marking up their long-run expectation considerably, then expectations are poorly anchored*."

While the focus of this quote is on long-term inflation expectations, the sensitivity of short-term inflation expectations is also interesting. In particular, if estimated $\beta_{4,h}, \beta_{5,h}, \beta_{6,h}$ are large, one may be concerned that inflation expectations could be unanchored. In other words, surprise movements in inflation translate into inflation expectations.

Columns 1 and 3 in Table 9 present the impact of inflation and monetary interest rate surprises on inflation expectations for the 1-year and 1-quarter, respectively. Assignment to the second monthly CPI treatment group (D^{m_2}), reduces the expectations by 0.07 percentage points on average, a small magnitude in economic terms. However, because shocks can be positive or negative, this average masks important heterogeneity and thus $\beta_{4,h}, \beta_{5,h}, \beta_{6,h}$ are more informative on how anchored inflation expectations are. We find that a surprise at the rate of one percentage point in the second ($D^{m_2} \times surprise^{m_2}$) and the third ($D^{m_3} \times surprise^{m_3}$) monthly CPI leads to an upward adjustment of 0.5 and 0.7 percentage points in the 1-year inflation expectations, respectively. The analysis shows that a surprise of one percentage point in interest rate ($D^{I} \times surprise^{I}$) leads to a downward adjustment in 1-year inflation expectations of approximately 0.3 percentage points.

The effect on quarterly expectations (column 3) is lower, 0.1-0.3 in the case of inflation surprises and approximately -0.15 percent for interest rate surprises. The fact that the effect of the inflation surprises on the 1-year inflation expectations are higher than the effect on the 1-quarter inflation expectations consistent with an explanation that firms in Israel perceived the CPI shocks (on average) to be persistence ones and not as temporary price shocks, i.e., the firms also expected an increase in prices over the following quarters. The lower impact of the interest rate surprises on 1-quarter inflation expectations in comparison with 1-year inflation expectations aligns with an explanation that the main effect of monetary policy occurs with a lag.

Columns 2 and 4 in Table 6 present the results of the estimation for a shorter sample period, which does not include the period of significant interest rate shocks, which took place at the beginning of the sample. While the results for inflation surprises remain without significant changes, the results of the effect of monetary surprises are not significant and their signs change. These results are consistent with earlier findings in the literature documenting that policy shocks in stable macroeconomic environments tend to have little effect on the beliefs of households and firms (see Coibion et al. 2020). This is also consistent with the results in Ilek (2021) that examined the effect of interest rate surprises on the inflation expectations of professional forecasters in Israel and found similar results. In a placebo test, we replace the dependent variable from quarter t to $t-1$ and we find no effect of macroeconomic news on the expectation in the previous quarter (Appendix Table B5).

To examine if firms continue to closely monitor macroeconomic news, even in the face of a prolonged period characterized by low and stable inflation, we split our sample into two sub-samples and repeat the analysis, allowing the effects to change over time. We estimate how firms update their expectations before and after 2010, the year the monetary committee was established, which is seven years after the time in which Cukierman and Melnick (2015) identified inflation expectations to be anchored at the midpoint of the target range. We find that the impact of inflation surprises on inflation expectations for the 1-year is almost identical before and after 2010. The effect on the 1-quarter inflation expectations is similar, and if anything, it even appears to have strengthened in the later period (Table 10).

In the next step, we explore if these results vary by firm characteristics. To this end, we estimate the following specification:

$$
\begin{aligned}
(3) \qquad \pi_{i,t}^{e,h} = \beta_{0,h} &+ \sum_j \beta_{1,j,h} \times \mathbb{1}_{i\in j} \times D_{i,t}^{m_2} + \sum_j \beta_{2,j,h} \times \mathbb{1}_{i\in j} \times D_{i,t}^{m_3} \\
&+ \sum_j \beta_{3,j,h} \times \mathbb{1}_{i\in j} \times D_{i,j,t}^{I} + \sum_j \beta_{4,j,h} \times \mathbb{1}_{i\in j} \times D_{i,j,t}^{m_2} \times surprise_t^{\boldsymbol{m_2}} \\
&+ \sum_j \beta_{5,j,h} \times \mathbb{1}_{i\in j} \times D_{i,j,t}^{m_3} \times surprise_t^{\boldsymbol{m_3}} \\
&+ \sum_j \beta_{6,j,h} \times \mathbb{1}_{i\in j} \times D_{i,j,t}^{m_2} \times surprise_t^{\boldsymbol{I}} + \beta_{7,h} \times \pi_{i,t-1}^{e,h} + \gamma_{t,h} + \alpha_{i,h} \\
&+ error
\end{aligned}
$$

where $\mathbb{1}_{i\in j}$ is an indicator function that is equal to 1 if firm i is of the $j \in$ J type.

Table 11 presents the results of the effect for the inflation surprises ($\beta_{4,j}$ and $\beta_{5,j}$) and policy surprises ($\beta_{6,j}$) separately for three groups according to firm size: small, medium, and large. The table also reports on the coefficient of the lag dependent variable (β_7). Relative to the pooled estimates reported in Table 9, the estimated effects of CPI surprises on annual inflation expectations are similar, and all three types of firms respond to CPI surprises. The differences between the groups are overall not statistically significant. In addition, we find that for the effect on the next quarter inflation expectations, the statistical significance is lower. The estimated effect of the interest rate surprises in the case of medium or large firms is similar to the estimates based on pooled data but we do not find statistically significant results for small firms.

The results by industry are presented in Table 12. The estimated effects of CPI surprises on 1-year inflation expectations are positive and statistically significant in nearly every industry. The estimated effect of interest rate surprises on 1-year inflation expectations (full sample) is negative and statistically significant only in the manufacturing sector. In summary, our findings largely show that firms respond to new information across sizes and industries.

4. Conclusion

Our study uses the Bank of Israel's Firms Survey to establish key facts about the qualities of the firms' inflation expectations in a macroeconomic environment with significant developments between the second half of the 1990s and 2018. We examine the impact of macroeconomic news on inflation expectations. We find that new information regarding inflation leads firms to update their inflation expectations and that new information about monetary policy also leads firms to adjust their inflation expectations when policy shocks are large. Specifically, we find that a positive surprise in inflation at a rate of one percentage point leads to an upward adjustment of yearly inflation expectations by approximately a half percentage point. The effect on quarterly inflation expectations is weaker. The fact that an inflation surprise has a stronger impact on expectations for the year than the quarter is consistent with an explanation that firms in Israel perceived the CPI shocks (on average) to be persistent. We also find that a monetary interest rate surprise of one percentage point leads to a downward adjustment of approximately 0.3 percent in yearly inflation expectations. The result regarding the monetary interest rate surprise is sensitive to the sample

period. It stems mostly from the significant shocks that took place at the beginning of the sample period (2001-2002), while the effect of the inflation surprise is not sensitive to these shocks.

These findings are important because the empirical literature on expectations has found that in many advanced economies, firms are characterized by inattention to the rate of inflation and monetary policy. One of the main explanations offered is the success of monetary policy in stabilizing inflation, resulting in weak incentives to monitor inflation and monetary policy. Therefore, an analysis of the Israeli case is an informative case study of how firms form inflation expectations when the history of high and volatilely inflation is recent. Because our findings suggest that firms continue to monitor macroeconomic news closely, despite a prolonged period characterized by low and stable inflation, we shed new light on how inflation and inflation expectations can evolve in countries experiencing a bout of high inflation. Our analysis also suggests that de-dollarization does not necessarily imply that firms' trust in local currency translates into firms' inattention to inflation. Hence, the path to (re)anchoring inflation expectations (in the sense of making inflation expectations insensitive to news) may take a long time.

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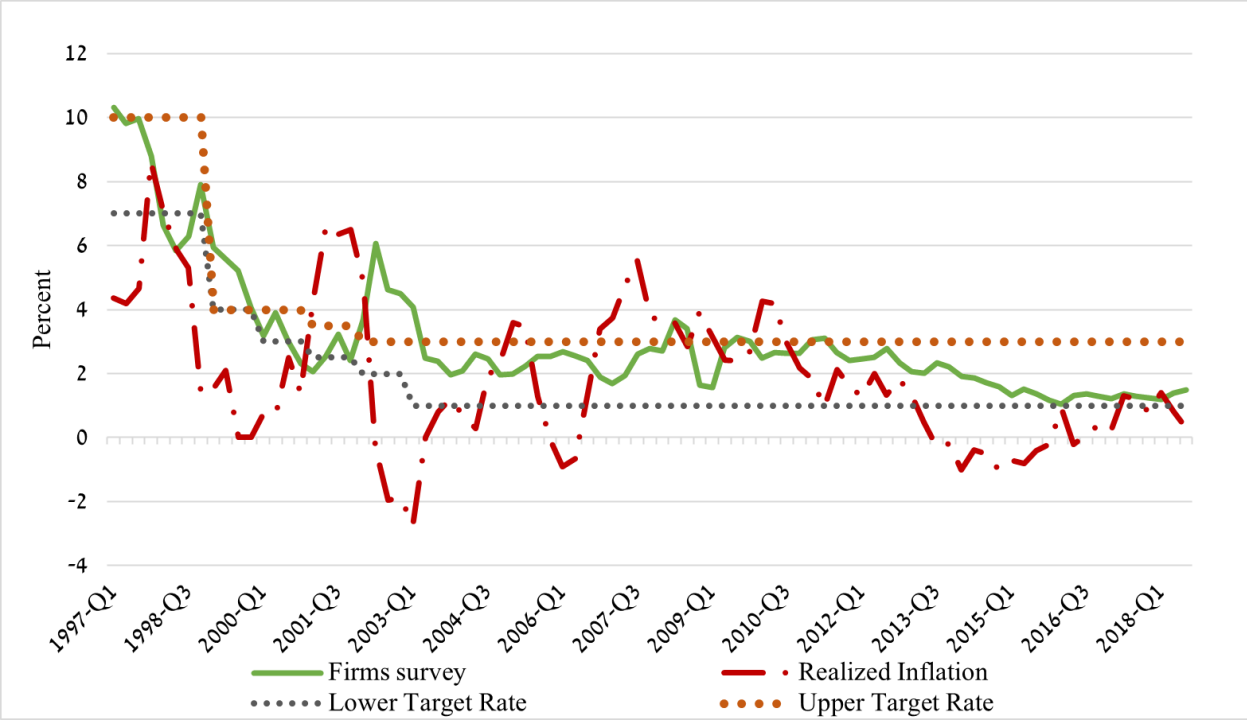
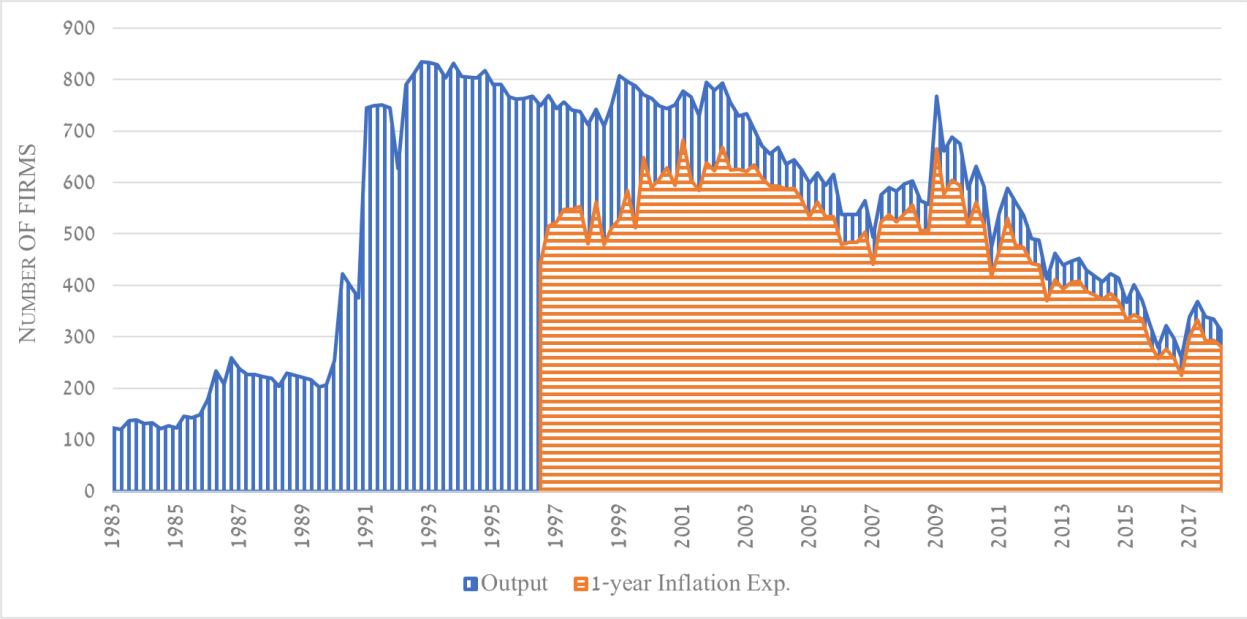
Figure 1. Annual inflation expectations from the firms' survey, actual inflation and the inflation target range (quarterly data, 1997Q1-2018Q3, percent)



Notes: This Figure presents the average annual inflation expectations from the firms' survey, without outliers – that is omitting expectations that are two S.D.s higher or lower than the quarter average. For most of the period, there are no significant differences between the two series, but at the end of the period there is a slight upward bias. Also presented is the actual annual inflation in Israel over 12 months – in a 12-month shift– so it corresponds to the survey's expectation horizon and the inflation target range at any point in time.

Figure 2: The number of firms who responded to the survey (1983Q3-2018Q3, quarterly data, number of firms)



Notes: This figure presents the number of firms who answered the questions relating to their activities and annual inflation expectations in each quarter.

Figure 3. The number of quarters in which the firms participated in the survey

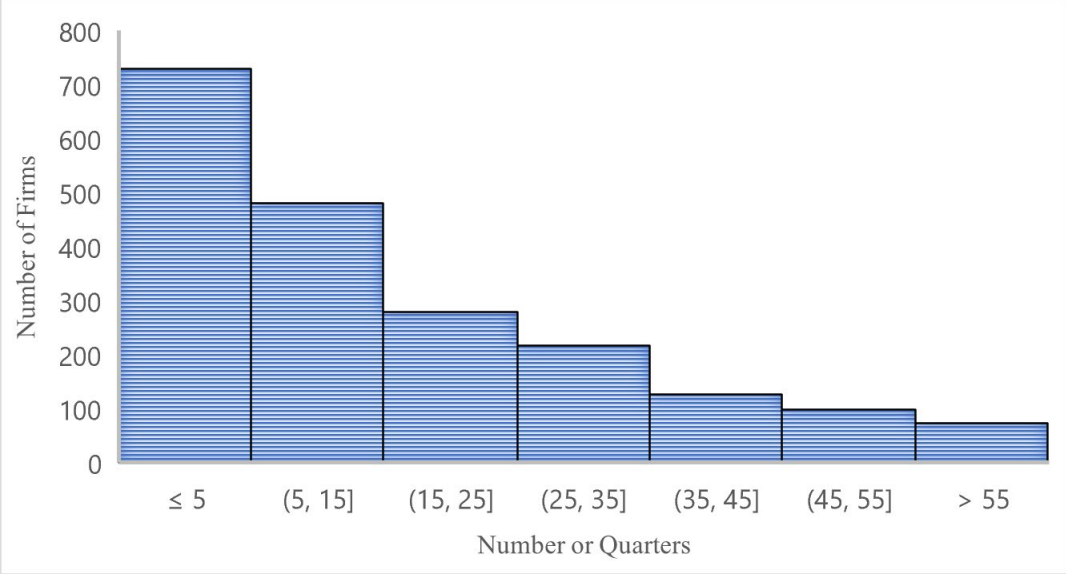


Figure 4. Distribution of firms according to industry sector (1997Q3-2018Q3, quarterly data, percent)

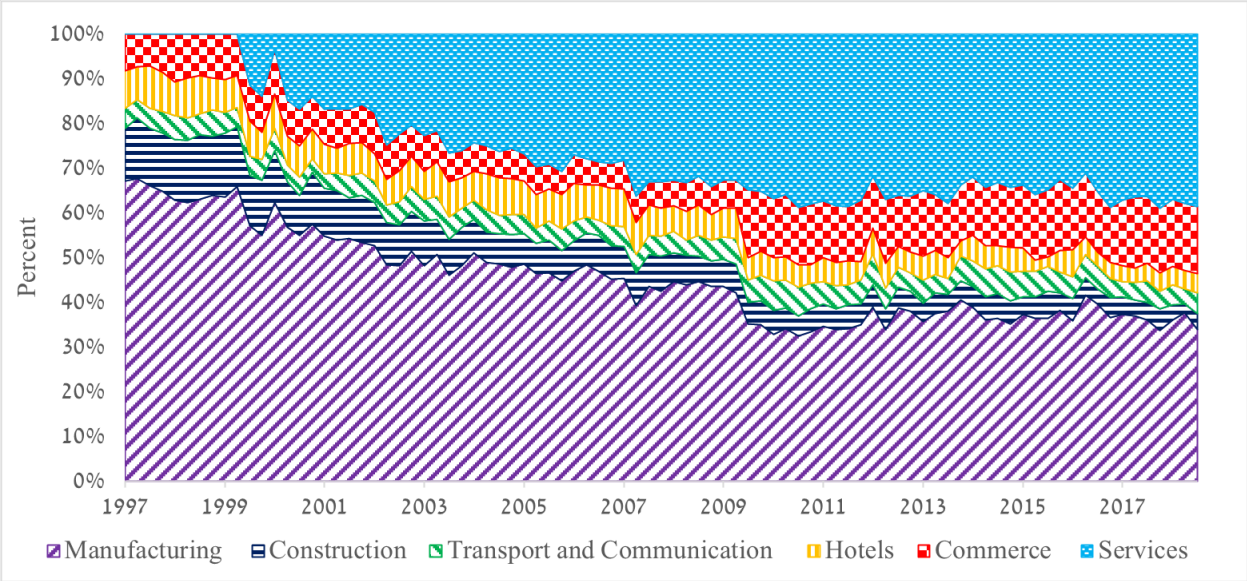


Figure 5. Distribution of firms by the number of employees (2001Q3-2018Q3)

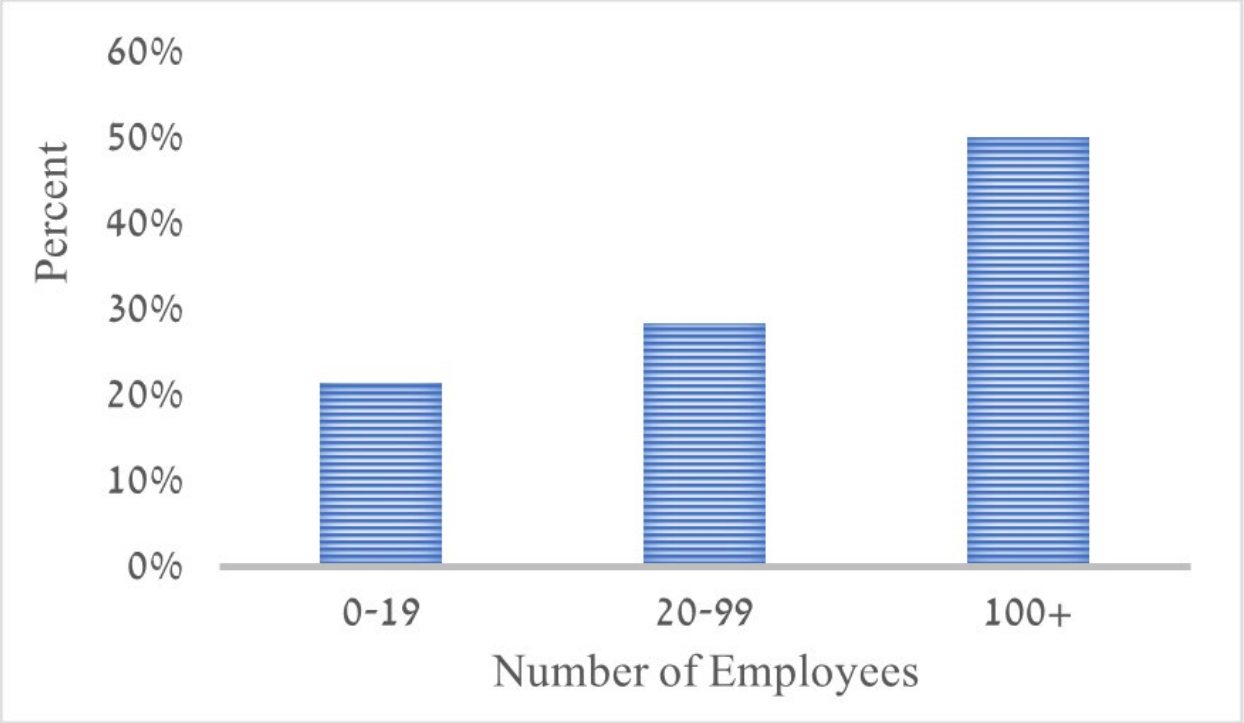
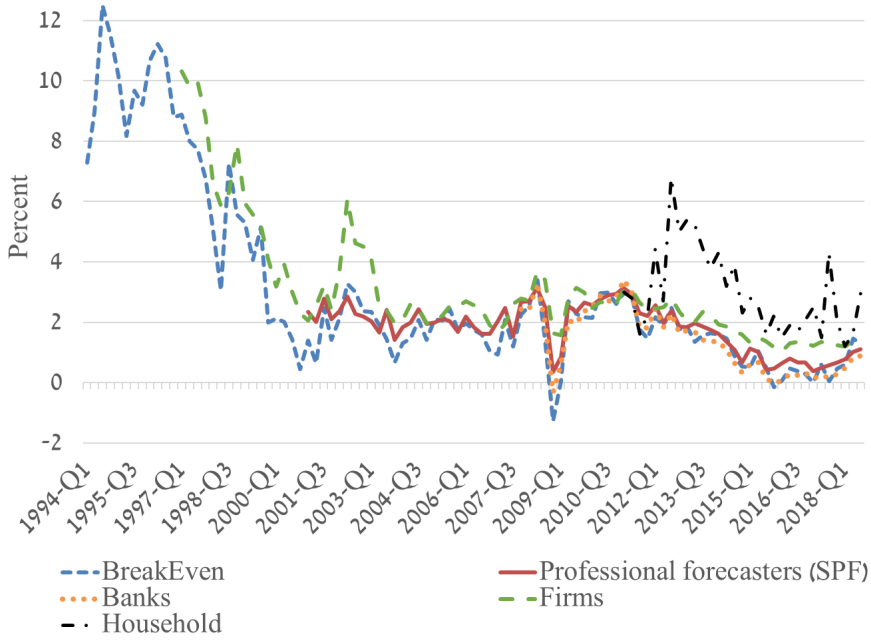
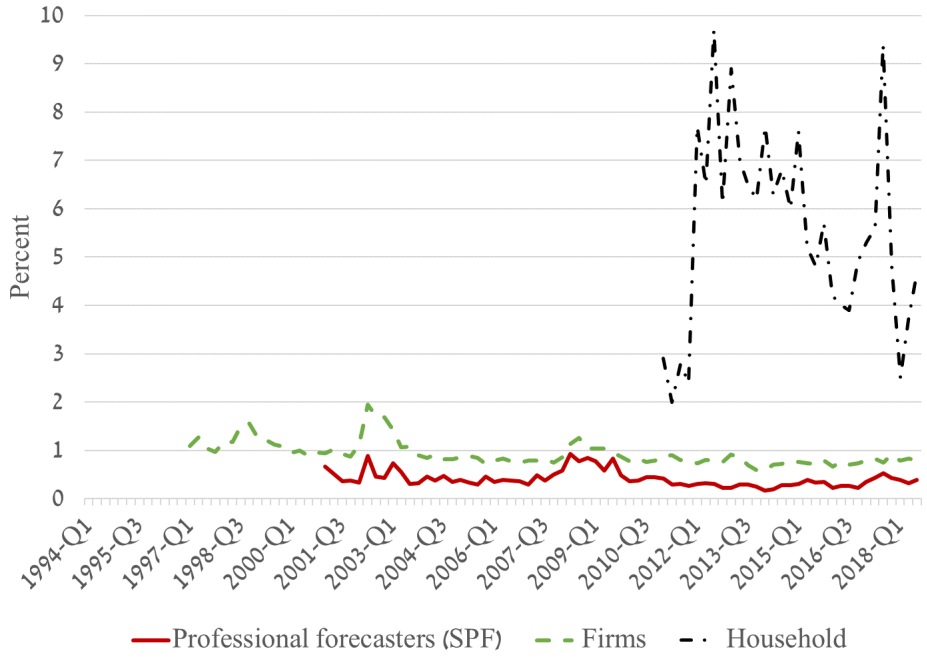


Figure 6. Inflation expectations of firms, households, professional forecasters, banks, and the capital market (Quarterly data, 1994Q1-2018Q3, percent)



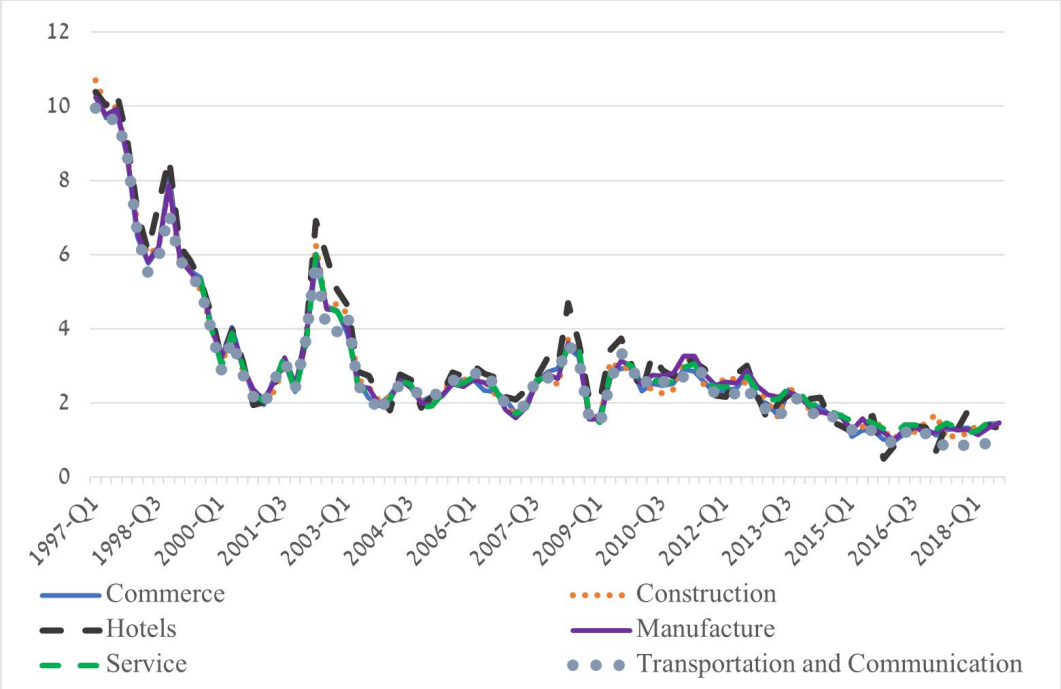
Notes: This Figure presents the average development of expectations from different sources: the firms' survey, without outliers – that is omitting expectations that are two S.D.s higher or lower than the quarter average, professional forecasters, households, and commercial banks, as well as expectations from the capital market (break-even). For more details see section 3.

Figure 7. Standard deviations in expectations of firms, households, and professional forecasters (Quarterly data, 1994Q1-2013Q3, percent)



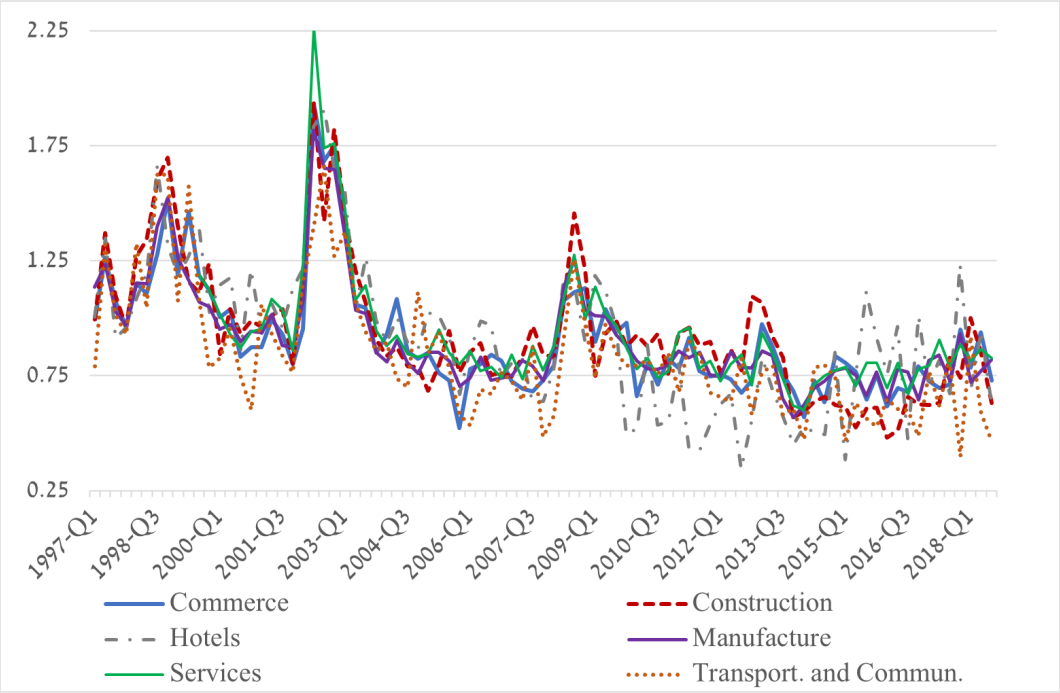
Notes: This figure presents S.D.s over a cross-section of annual expectations from different sources: the firms' survey, without outliers – that is omitting expectations that are two S.D.s higher or lower than the quarter average, professional forecasters, and households. For further details see Section 3.

Figure 8. Average annual inflation expectations by industries (Quarterly data, 1997Q1-2018Q3)



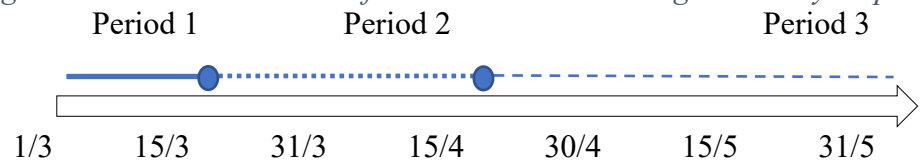
Notes: This figure presents the industries average annual inflation expectations from the firm survey (without outliers).

Figure 9. Standard deviations in annual inflation expectations by industries (Quarterly data, 1997Q1-2018Q3)



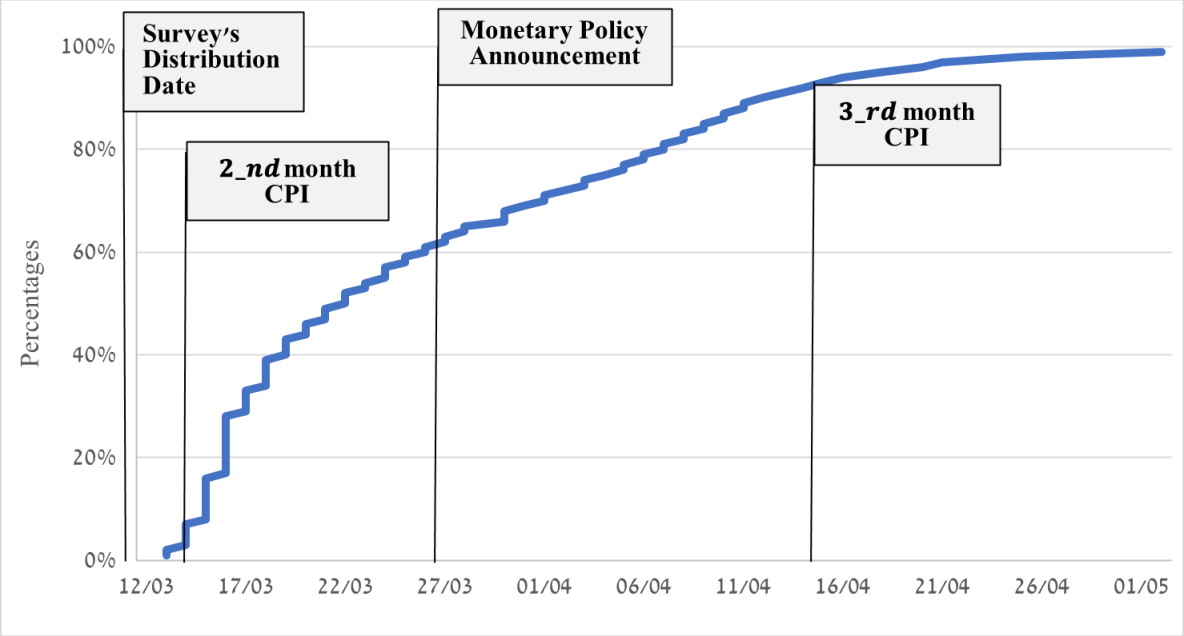
Notes: This figure presents the cross-sectional S.D. of annual inflation expectations from the firms' survey, across the industries and in each quarter, without outliers.

Figure 10. Publication dates of the CPI in Israel during the survey response period



Notes: This figure presents the CPI publication dates during the survey response period. The final month of the quarter is represented by March; April and May represent the two following months, respectively. The survey was sent during each period, between the 13th and 15th of the end of the last month of the quarter (March).

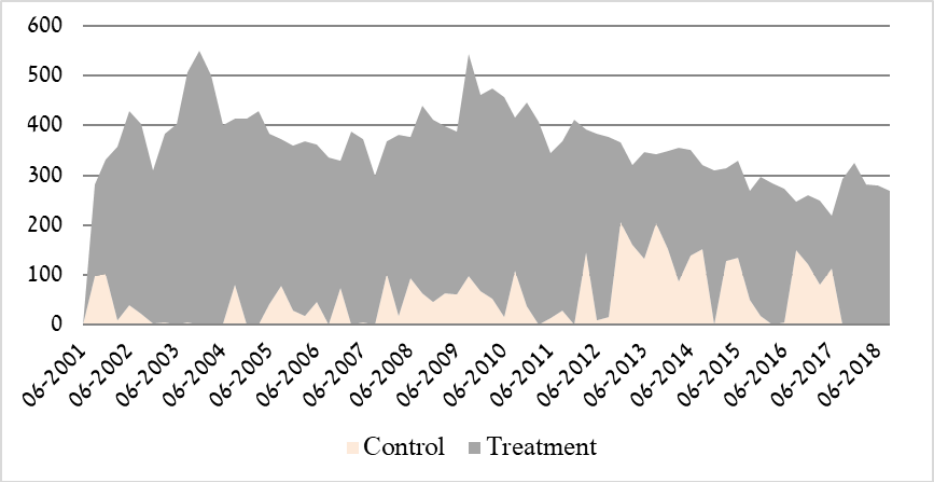
Figure 11. Cumulative rate of response (average), according to the date(2001Q3-2018Q3)



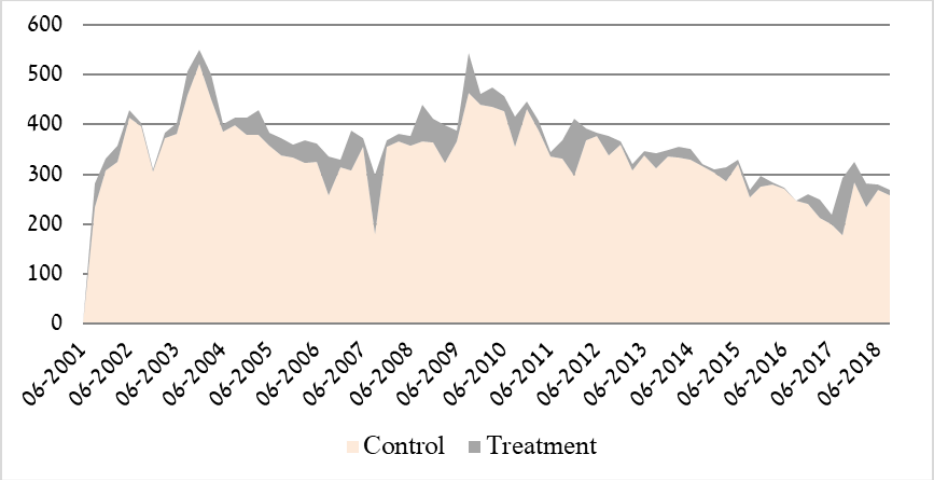
Notes: This figure presents the cumulate response rate over the course of the quarter (average 2001Q3-2018Q3), and the dates of publication of macroeconomic news whose effect is examined in the study. The last month in the quarter is represented by March; accordingly, April and May represent the two following months. In each period the percentages were calculated for the sub-sample of firms for which a reporting date exists. Before the third quarter of 2001, the date that the firm responded to the survey was not documented.

Figure 12. Control and Treatment Groups (Number of Firms) (Quarterly data, 2001Q3-2018Q3)

Panel A. "CPI surprise" in the second month of the quarter



Panel B. "CPI surprise" in the third month of the quarter



Panel C. "Interest rate surprise"

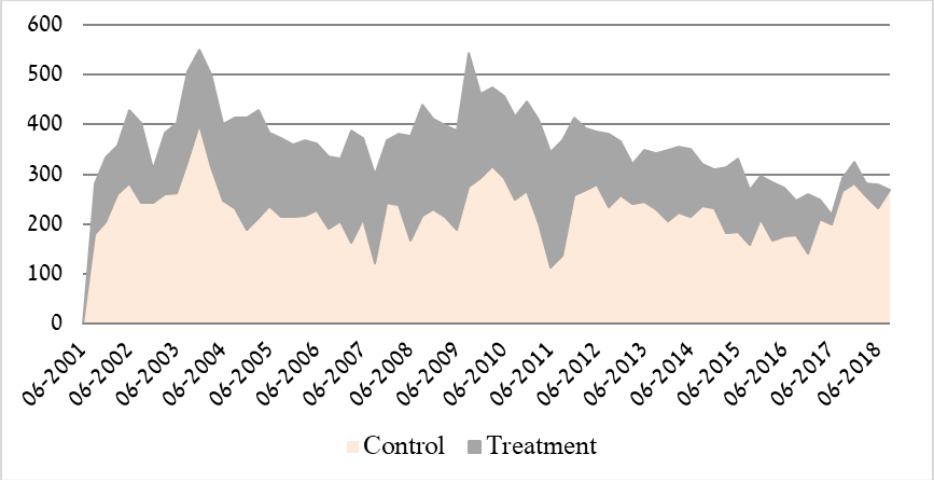


Figure 13. Second and third monthly "CPI surprises" of the quarter (quarterly data, 2001Q3-2018Q3, percentage points)

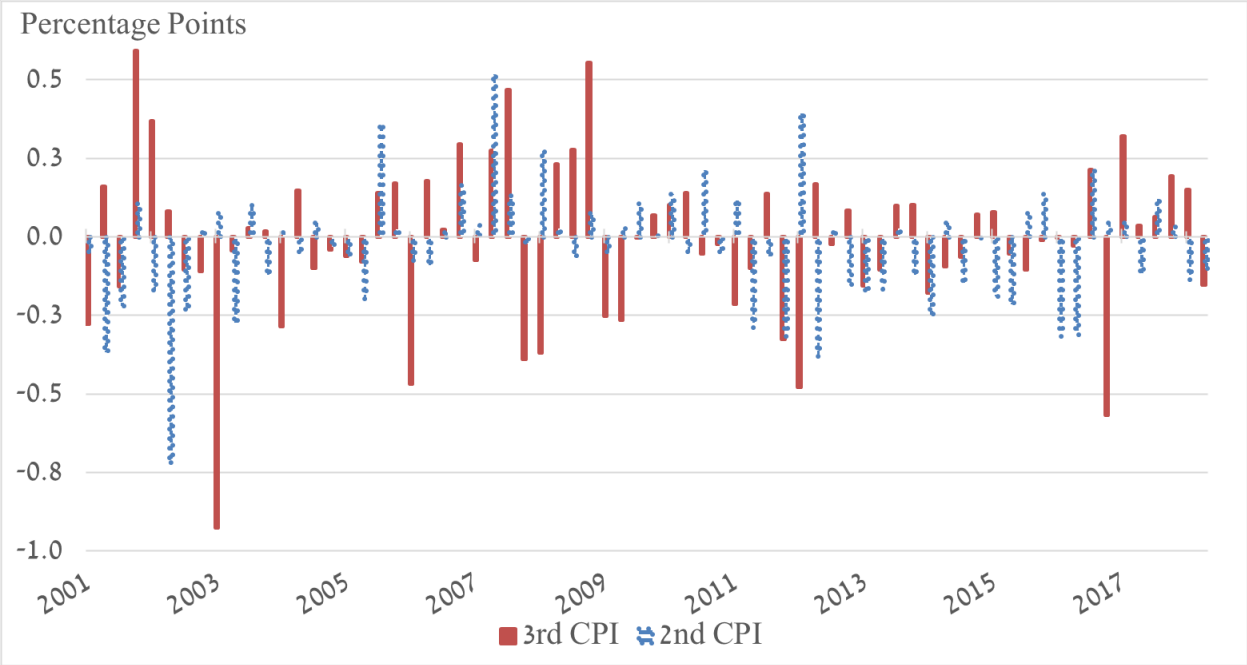


Figure 14. Interest rate surprises (Quarterly data, 2001Q3-2018Q3, percentage points)

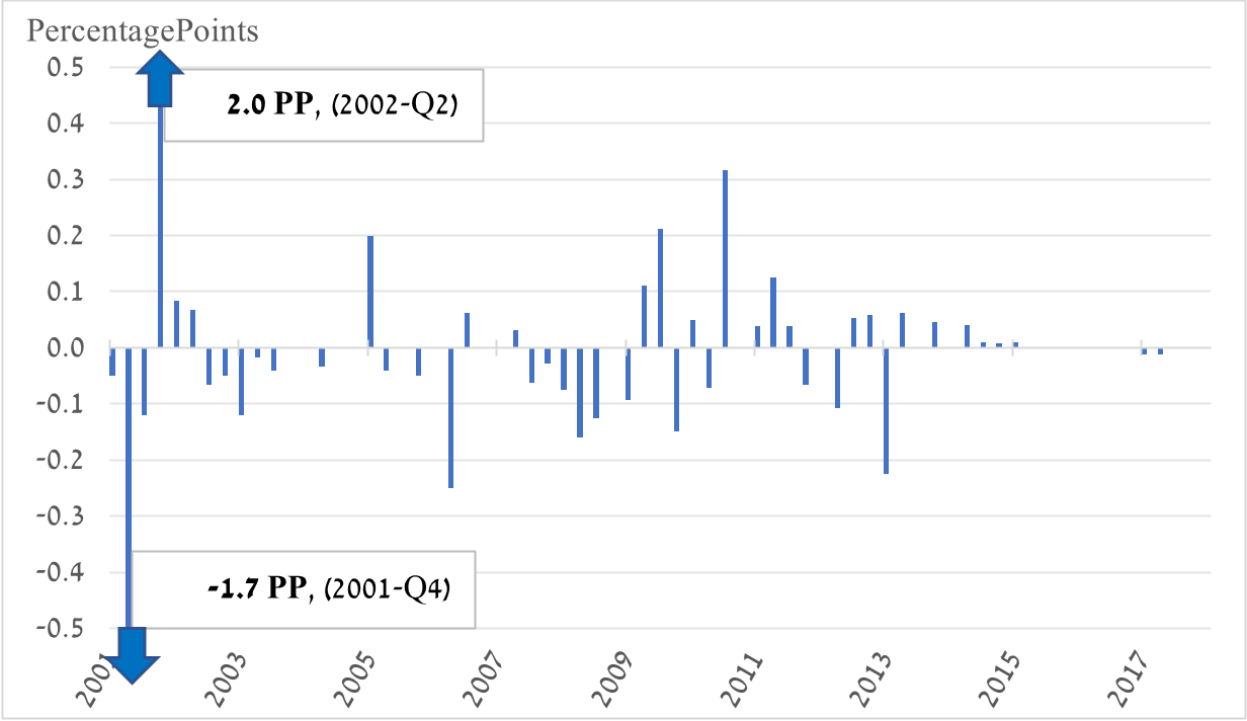


Table 1. Inflation expectations from different sources – descriptive statistics (percentages)

Panel A: 2001Q3 – 2018Q3					
Source	Average	Median	Max	Min	S.D.
Firms' Survey	2.34	2.38	6.07	1.03	0.91
Capital Market	1.57	1.59	3.52	-1.27	0.95
Professional Forecasters	1.81	1.98	3.14	0.35	0.79
Panel B: 2011Q1 – 2018Q3					
	Average	Median	Max	Min	S.D.
Firms' Survey	1.83	1.60	3.10	1.03	0.61
Capital Market	1.16	1.28	2.96	-0.16	0.85
Professional Forecasters	1.36	1.11	3.14	0.37	0.80
Commercial Banks	1.07	0.84	3.40	-0.01	0.91
Households	3.02	2.70	6.80	1.20	1.39

Notes: This table presents descriptive statistics of the average quarterly inflation expectations from the firms' survey, professional forecasters, households, and commercial banks, as well as expectations from the capital market (break-even). For further details see Appendix B.

Table 2. Average annual inflation expectations by industry (quarterly data, 1999Q3-2018Q3)

	Average	Median	Max	Minimum	.S.D	Number of Firms**
Commerce	2.39	2.31	5.82	0.97	0.96	45
Construction	2.42	2.37	6.27	1.01	0.98	31
Hotels	2.58	2.37	6.92	0.49	1.16	28
Manufacturing	2.44	2.44	6.02	1.00	0.97	207
Services	2.44	2.40	6.01	1.15	0.94	135
Transportation and Communications	2.32	2.30	5.80	0.79	0.98	22

Notes: This table presents descriptive statistics of the average industries annual inflation expectations from the firms' survey.

Table 3. Annual Inflation expectations and firm characteristics – cross-sectional variation (Quarterly data, 2001Q3-2018Q3)

Variable	(1) Number of Employees	(2) Industry	(3) Geographical Area	(4) All Characteristics
Large Firm (+100)	-0.043			-0.053
	(0.036)			(0.036)
Small Firm (0-19)	0.014			0.012
	(0.054)			(0.055)
Commerce Sector		-0.122**		-0.086
		(0.053)		(0.056)
Construction Sector		-0.058		-0.042
		(0.080)		(0.080)
Hotel Sector		0.190**		0.197**
		(0.077)		(0.078)
Services Sector		-0.003		0.014
		(0.039)		(0.046)
Transportation and Communications Sector		-0.156***		-0.125**
		(0.058)		(0.062)
Haifa and the North			0.061	0.059
			(0.040)	(0.042)
Jerusalem and Surroundings			0.066	0.037
			(0.070)	(0.071)
The Southern Region			0.084	0.087
			(0.062)	(0.063)
"The Entire Country"			-0.048	-0.021
			(0.040)	(0.042)
Quarter F.E.	+	+	+	+
N obs	18,753	18,753	18,753	18,753
$\mathbf{R^2}$	0.488	0.491	0.489	0.492

Notes: This table presents the results of a panel regression of annual inflation expectations for dummy variables of firm characteristics: number of employees (column 1), industry (column 2), geographical area (column 3), and all characteristics (panel 4), including time fixed effects. The sample period is 2001Q3-2018Q3 and relates to firms for whom there is a reporting date and who also responded to the annual inflation expectations question in the survey one quarter later – the main sub-sample in this study. The comparative group in the analysis is medium-sized firms (20-99 employees) from the manufacturing sector that operates in Tel Aviv and the center. The standard errors that were calculated are clustered at the firm level.

Table 4. Allocation of firms into periods.

	Exposed to Interest rate Surprise	Exposed to Second Monthly CPI release	Exposed to Third Monthly CPI Surprise
	(1)	(2)	(3)
Large Firms (+100)	0.041***	-0.004	0.017***
	(0.014)	(0.008)	(0.005)
Small Firms (0-19)	-0.003	-0.002	0.01
	(0.016)	(0.010)	(0.007)
Commerce Branch	-0.003	0.007	-0.015**
	(0.023)	(0.014)	(0.008)
Construction Branch	-0.034	-0.028	-0.011
	(0.028)	(0.020)	(0.010)
Hotel Branch	0.090*	0.032*	0.033*
	(0.047)	(0.017)	(0.019)
Services Branch	-0.006	-0.007	-0.005
	(0.015)	(0.010)	(0.007)
Transportation and Communications Branch	0.016	0.015	0.014
	(0.030)	(0.013)	(0.013)
Haifa and the North	0.018	0.015	0.004
	(0.017)	(0.010)	(0.007)
Jerusalem and Surroundings	-0.033	0.016	-0.011
	(0.027)	(0.014)	(0.010)
The South	0.013	0.015	-0.012
	(0.020)	(0.013)	(0.009)
"The Entire Country"	0.016	0.029***	-0.001
	(0.015)	(0.010)	(0.006)
Quarter F.E.	+	+	+
N obs	18753	18740	18740
R^2	0.08	0.27	0.08

* This table presents the regression panel results of firm characteristics (size, industry, and geographic region) on belonging to the treatment group – interest rate surprise D_i (column 1), second monthly CPI surprise D_{m2} (column 3) and third monthly CPI surprise - D_{m3} (column 5). The regressions include control for time fixed effect (quarter FE). The sample is for the period 2001Q3-2018Q3 and focuses on firms for whom there is a reporting date and who responded to the question on the 1-year inflation expectations, both for the current quarter and the previous quarter (our main sample). The comparison groups in the analysis are medium-sized firms (20-99 employees) from the manufacturing sector who work in Tel Aviv and the center. The standard errors that were calculated are White and clustered at the firm level.

Table 5. Average Inflation expectations by period (Quarterly data, 2001Q3-2018Q3, percentages)

	Period 1	Period 2	Period 3	Period 0
Average	2.52	2.34	2.26	2.44
Median	2.51	2.31	2.23	2.43
Max	4.02	4.60	3.94	4.48
Minimum	0.98	0.30	0.80	0.49
.S.D	0.87	0.87	0.83	0.92
Responses (total)	3,765	19,287	2,135	6,308

Notes: This table presents the average, median, Max, minimum, and the average S.D. of the annual inflation expectation variable (without outliers) across the sample period, and the total expectations. For example, period 1's median is the sample average of each quarter's median. Namely, we calculated the median expectation separately as in each period 1's quarter, and afterward, we averaged across the whole sample period (2001Q3-2018Q3).

Table 6. Inflation and interest rate surprises (Quarterly data, 2001Q3-2018Q3)

	Average	Median	Max	Minimum	.S.D
Inflation Surprise – Second Month	-0.04	-0.02	0.52	-0.72	0.19
Inflation Surprise – Third Month	-0.01	0.00	0.59	-0.93	0.25
Interest rate Surprise	0.00	0.00	1.95	-1.72	0.33

Table 7. The quarterly inflation and interest rate surprises (Quarterly data, 2001Q3-2018Q3, percentage points)

	Average	Median	Max	Minimum	.S.D
Inflation Surprise (sum)	-0.03	-0.06	1.17	-1.13	0.39
Interest rate Surprise (sum)	-0.05	0.00	2.19	-1.81	0.41

Table 8. Dynamic effect of interest rate and inflation surprises on output

	Quarter 0	Quarter 1	Quarter 2	Quarter 3	Quarter 4
	(1)	(2)	(3)	(4)	(5)
Panel A: Dependent variable is output					
$surprise_{i_{total}}$	0.094***	0.084***	-0.061***	-0.128***	0.071***
	(0.018)	(0.019)	(0.020)	(0.020)	(0.020)
$surprise_{\pi_{total}}$	-0.001	0.02	-0.080***	-0.079***	-0.104***
	(0.019)	(0.020)	(0.021)	(0.020)	(0.021)
$Output_{t-1}$	0.165***	0.059***	0.029***	0.116***	-0.047***
	(0.012)	(0.013)	(0.009)	(0.012)	(0.008)
Firm F.E.	+	+	+	+	+
Year F.E.	+	+	+	+	+
Quarters	69	68	67	66	65
N obs	29,144	27,759	26,521	25,295	24,270
R^2	0.24	0.22	0.22	0.23	0.22
Panel B: Dependent variable is employment					
$surprise_{t,i\_total}$	0.075***	0.057***	-0.039***	-0.042***	0.016
	(0.014)	(0.014)	(0.015)	(0.015)	(0.014)
$surprise_{t,\pi\_total}$	0.012	-0.006	-0.032**	-0.040***	-0.027**
	(0.013)	(0.014)	(0.015)	(0.015)	(0.014)
$empl_{t-1}$	0.279***	0.108***	0.080***	0.083***	-0.002
	(0.012)	(0.015)	(0.010)	(0.013)	(0.010)
Firm F.E.	+	+	+	+	+
Year F.E.	+	+	+	+	+
Quarters	69	68	67	66	65
N obs	24,121	22,930	21,842	20,800	19,893
R^2	0.30	0.25	0.25	0.25	0.24
*** p<0.01, ** p<0.05, * p<0.1					

Notes: The table presents the result of the dynamic estimation of the correlation between inflation and monetary surprises on the qualitative indicator for firm output (Panel A) and employment (Panel B): increase (+1), decrease (-1), or no change (0), as detailed in equation 2. The table shows the simultaneous correlation, the current quarter (column 1), between surprises and firm's output and the correlation up to four quarters ahead (columns 2-5), for the full sample period (2001Q3-2018Q3). The standard errors that were calculated are clustered at the firm level.

Table 9. The effect of CPI and interest rate surprises on inflation expectations

Variable	Expectations for the Next Year		Expectations for the Next Quarter	
	2001Q3-2018Q3	2002Q3-2018Q3	2001Q3-2018Q3	2002Q3-2018Q3
	(1)	(2)	(3)	(4)
D^I	0.024	0.028*	0.012	0.012
	(0.016)	(0.016)	(0.008)	(0.008)
D^{m_2}	-0.068***	-0.060***	-0.031***	-0.029***
	(0.019)	(0.019)	(0.011)	(0.011)
D^{m_3}	-0.032	-0.018	-0.016	-0.014
	(0.027)	(0.026)	(0.014)	(0.015)
$D^I \cdot surprise^{\mathrm{I}}$	-0.343***	0.124	-0.128***	0.136*
	(0.073)	(0.140)	(0.031)	(0.075)
$D^{m_2} \cdot surprise^{m_2}$	0.467***	0.379***	0.124**	0.135**
	(0.092)	(0.094)	(0.053)	(0.056)
$D^{m_3} \cdot surprise^{m_3}$	0.700***	0.822***	0.287***	0.320***
	(0.106)	(0.100)	(0.053)	(0.056)
$\pi_{t-1}^{e,h}$	0.229***	0.235***	0.123***	0.117***
	(0.012)	(0.013)	(0.010)	(0.010)
Firm F.E.	+	+	+	+
Quarter F.E.	+	+	+	+
Quarters	68	64	68	64
Expectations	18,551	17,546	18,763	17,743
R^2	0.668	0.639	0.448	0.408
F-statistic	23.31	20.226	9.367	7.814
*** p<0.01, ** p<0.05, * p<0.1				

* Columns 1 and 3 present the effect of CPI and interest rate surprises on the 1-year and 1-quarter inflation expectations, respectively (Equation 1), for the full sample period (2001Q3-2018Q3). Columns 2 and 4 present the results of a shorter sample period, 2002Q3-2018Q3, which does not include significant interest rate shocks from the beginning of the sample. The standard errors that were calculated are White and clustered at the firm level.

Table 10. Effect of interest rate and CPI surprises on inflation expectations over time.

Sub-sample	Variable	Expectations for the Year Ahead	Expectations for the Quarter Ahead
		2001Q3-2018Q3	2001Q3-2018Q3
		(1)	(2)
Until 2010	$D^{I} \cdot surprise^{\mathrm{I}}$	-0.362***	-0.138***
		(0.078)	-0.033
	$D^{m_2} \cdot surprise^{m_2}$	0.493***	0.014
		(0.148)	-0.074
	$D^{m_3} \cdot surprise^{m_3}$	0.692***	0.263***
		(0.135)	-0.072
After 2010	$D^{I} \cdot surprise^{\mathrm{I}}$	0.019	0.133
		(0.173)	-0.104
	$D^{m_2} \cdot surprise^{m_2}$	0.405***	0.234***
		(0.127)	-0.078
	$D^{m_3} \cdot surprise^{m_3}$	0.737***	0.356***
		(0.134)	-0.08
	$\pi_{t-1}^{e,h}$	0.229***	0.123***
		-0.012	(0.010)
	Firm F.E	+	+
	Quarter F.E.	+	+
	Quarters	68	68
	N obs	18,538	18,754
	R^2	0.67	0.45
*** p<0.01, ** p<0.05, * p<0.1			

Notes: Columns 1 and 2 present the effect of interest rate and CPI surprises on 1-year and 1-quarter inflation expectations, respectively, for the full sample period (2001Q3-2018Q3) allowing the effects to change over time, before and after 2010. The standard errors that were calculated are White and clustered at the firm level. Additional results about the dummy variable associated with the treatment group are not detailed and can be obtained from the authors.

Table 11. Effect of interest rate and CPI surprises on inflation expectations by firm size.

Firm Size	Variable	Expectations for the Year Ahead		Expectations for the Quarter Ahead	
		2001Q3-2018Q3	2002Q3-2018Q3	2001Q3-2018Q3	2002Q3-2018Q3
		(1)	(2)	(3)	(4)
Small	$D^{I} \cdot surprise^{\mathrm{I}}$	0.203	0.298	-0.036	0.140
		(0.203)	(0.307)	(0.085)	(0.149)
	$D^{m_2} \cdot surprise^{m_2}$	0.300**	0.262*	0.059	0.081
		(0.132)	(0.135)	(0.074)	(0.076)
	$D^{m_3} \cdot surprise^{m_3}$	1.226***	1.227***	0.208*	0.214
		(0.255)	(0.252)	(0.126)	(0.141)
Medium	$D^{I} \cdot surprise^{\mathrm{I}}$	-0.451***	0.307	-0.169***	0.134
		(0.117)	(0.224)	(0.048)	(0.124)
	$D^{m_2} \cdot surprise^{m_2}$	0.462***	0.316**	0.128*	0.130*
		(0.121)	(0.125)	(0.066)	(0.067)
	$D^{m_3} \cdot surprise^{m_3}$	0.440**	0.579***	0.176	0.193
		(0.189)	(0.188)	(0.123)	(0.131)
Large	$D^{I} \cdot surprise^{\mathrm{I}}$	-0.429***	-0.022	-0.131***	0.133
		(0.077)	(0.168)	(0.037)	(0.091)
	$D^{m_2} \cdot surprise^{m_2}$	0.527***	0.442***	0.150***	0.159***
		(0.099)	(0.102)	(0.055)	(0.058)
	$D^{m_3} \cdot surprise^{m_3}$	0.706***	0.831***	0.356***	0.407***
		(0.132)	(0.124)	(0.073)	(0.075)
	$\pi_{t-1}^{e,h}$	0.229***	0.235***	0.123***	0.117***
	Firm F.E	+	+	+	+
	Quarter F.E.	+	+	+	+
	Quarters	68	64	68	64
	N obs	18,538	17,534	18,754	17,734
	R^2	0.67	0.64	0.45	0.41
*** p<0.01, ** p<0.05, * p<0.1					

Notes: Columns 1 and 3 present the effect of interest rate and CPI surprises on 1-year and 1-quarter inflation expectations, respectively (equation 3), for the full sample period (2001Q3-2018Q3). Columns 2 and 4 present the results of a shorter sample period, 2002Q3-2018Q3, which does not include significant interest rate shocks from the beginning of the sample. The standard errors that were calculated are White and clustered at the firm level. Additional results about the dummy variable associated with the treatment group are not detailed and can be obtained from the authors.

Table 12. Effect of interest rate and CPI surprises on inflation expectations by sector.

		Expectations for the Following Year		Expectations for the Following Quarter	
		2001Q3-2018Q3	2002Q3-2018Q3	2001Q3-2018Q3	2002Q3-2018Q3
		(1)	(2)	(3)	(4)
Commerce	$D^{I} \cdot surprise^{I}$	-0.319	-0.131	-0.186***	-0.101
		(0.219)	(0.333)	(0.069)	(0.205)
	$D^{m_2} \cdot surprise^{m_2}$	0.572***	0.496***	0.107	0.132
		(0.169)	(0.169)	(0.091)	(0.089)
	$D^{m_3} \cdot surprise^{m_3}$	0.842	1.143***	0.743***	0.911***
		(0.515)	(0.429)	(0.184)	(0.159)
Construction	$D^{I} \cdot surprise^{I}$	-0.396**	-0.364	-0.174*	-0.058
		(0.165)	(0.538)	(0.094)	(0.280)
	$D^{m_2} \cdot surprise^{m_2}$	0.430**	0.345	0.166	0.159
		(0.206)	(0.213)	(0.110)	(0.113)
	$D^{m_3} \cdot surprise^{m_3}$	0.619**	0.637**	0.410***	0.358***
		(0.296)	(0.321)	(0.120)	(0.121)
Hotels	$D^{I} \cdot surprise^{I}$	-0.170	0.225	-0.088	0.320
		(0.229)	(0.456)	(0.158)	(0.221)
	$D^{m_2} \cdot surprise^{m_2}$	0.349*	0.133	0.203*	0.160
		(0.180)	(0.194)	(0.116)	(0.120)
	$D^{m_3} \cdot surprise^{m_3}$	1.321***	1.350***	0.481*	0.486*
		(0.262)	(0.249)	(0.252)	(0.251)
Transportation and Communication	$D^{I} \cdot surprise^{I}$	-0.459*	0.450	-0.030	0.883***
		(0.273)	(0.422)	(0.185)	(0.264)
	$D^{m_2} \cdot surprise^{m_2}$	0.567***	0.461**	0.219**	0.232**
		(0.192)	(0.203)	(0.097)	(0.104)
	$D^{m_3} \cdot surprise^{m_3}$	0.791**	0.925***	0.211	0.353
		(0.396)	(0.234)	(0.239)	(0.399)
Services	$D^{I} \cdot surprise^{I}$	-0.091	0.147	-0.083*	0.122
		(0.139)	(0.218)	(0.049)	(0.122)
	$D^{m_2} \cdot surprise^{m_2}$	0.480***	0.379***	0.109*	0.111*
		(0.115)	(0.117)	(0.064)	(0.065)
	$D^{m_3} \cdot surprise^{m_3}$	0.922***	0.923***	0.409***	0.414***
		(0.165)	(0.166)	(0.093)	(0.095)
Manufacturing	$D^{I} \cdot surprise^{I}$	-0.444***	0.178	-0.131***	0.111
		(0.093)	(0.197)	(0.039)	(0.094)
	$D^{m_2} \cdot surprise^{m_2}$	0.439***	0.372***	0.106*	0.134**
		(0.106)	(0.110)	(0.057)	(0.060)
	$D^{m_3} \cdot surprise^{m_3}$	0.464***	0.642***	0.101	0.148
		(0.155)	(0.151)	(0.086)	(0.091)
	$\pi_{t-1}^{e,h}$	0.229***	0.234***	0.124***	0.117***
	Firm F.E.	+	+	+	+
	Quarter F.E.	+	+	+	+
	Quarters	68	64	68	64
	N obs	18,538	17,534	18,754	17,734
	R^2	0.67	0.64	0.45	0.41

Notes: Columns 1 and 3 present the effect of CPI and interest rate surprises on 1-year and 1-quarter inflation expectations, respectively (equation 3) for the full sample period (2001Q3-2018Q3). Columns 2 and 4 present the results for a shorter sample period, 2002Q3-2018Q3, which does not include significant interest rate shocks from the beginning of the sample. The standard errors that were calculated are clustered at the firm level.

Online Appendix

Appendix A – Sample Survey – 2016Q1 – Manufacturing Sector .1

Please compare the data for the current quarter with the previous quarter	Significant Increase	Moderate Increase	No Change	Moderate Decline	Significant Decline
1. Output					
2. Sales					
3. Sales in the local market					
4. Finished Goods Inventory					
5. Raw Materials Inventory					
6. Utilization rate of machinery and equipment					
7. Number of employees					
8. Orders for the local market in the coming quarter					
9. Actual exports					
10. Orders for exports for the coming quarter					

Restrictions on implementing activities that were planned for the current quarter (mark X on the chosen restriction)	No Restrictions	Light Restrictions	Moderate Restrictions	Severe Restrictions	Especially Severe Restrictions
Shortage of professional workers					
Scope of overseas orders					
Shortage of equipment and machinery					
Scope of local orders					
Financing difficulties					

12. Number of workers in the current quarter: 0-19/20-99/over 100

13. Your expectations for the dollar rate: On 30.6.2016 XXX shekels to the dollar. On 31.03.2017 XXX shekels to the dollar.

14. Your expectations for the changes that will accumulate in the CPI (in percentages): A – Over the coming three months (April to June 2016). B – over the coming 12 months (April 2016 to March 2017).

15. Please note your email address.

16. Please note where most of your firm's activities take place: Haifa and the North/Tel Aviv and the Center/Jerusalem and Surroundings/The South/The Entire Country

Appendix B – Additional Tables and Figures

Figure B1 – The proportion of the foreign exchange nominated, or foreign currency linked saving plans and deposits held by the Israeli public (quarterly averages, 1990Q1-2018Q3)

The figure shows the ratio of foreign exchange nominated or foreign currency linked saving plans and deposits (short and long-term) held by the Israeli public, excluding financial institutes. The numerator represents the total value of these saving plans and deposits, and the denominator represents the total saving plans and deposits in the economy.

Figure B2 – The number of firms who responded to the survey, according to period (number of firms, quarterly data, 2001Q3-2018Q3)

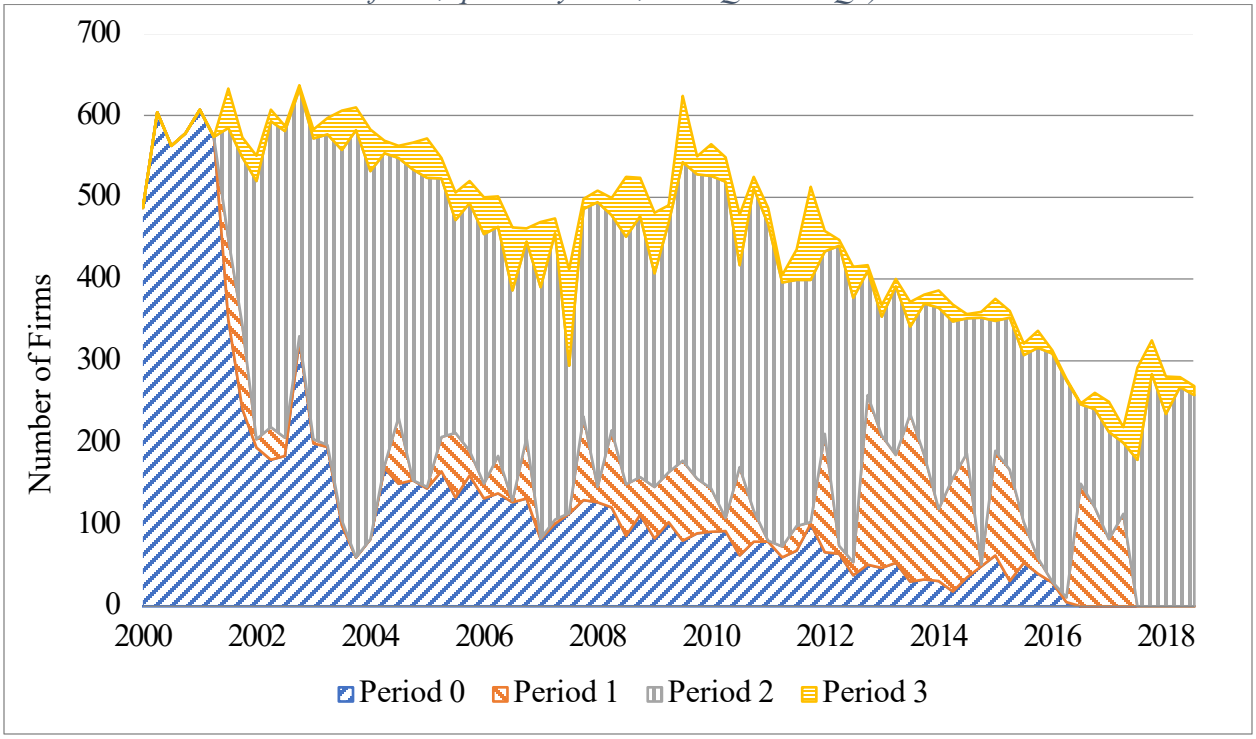


Figure B3 – Average annual inflation expectations, according to period (Quarterly data, 2001Q3-2018Q3, percent)

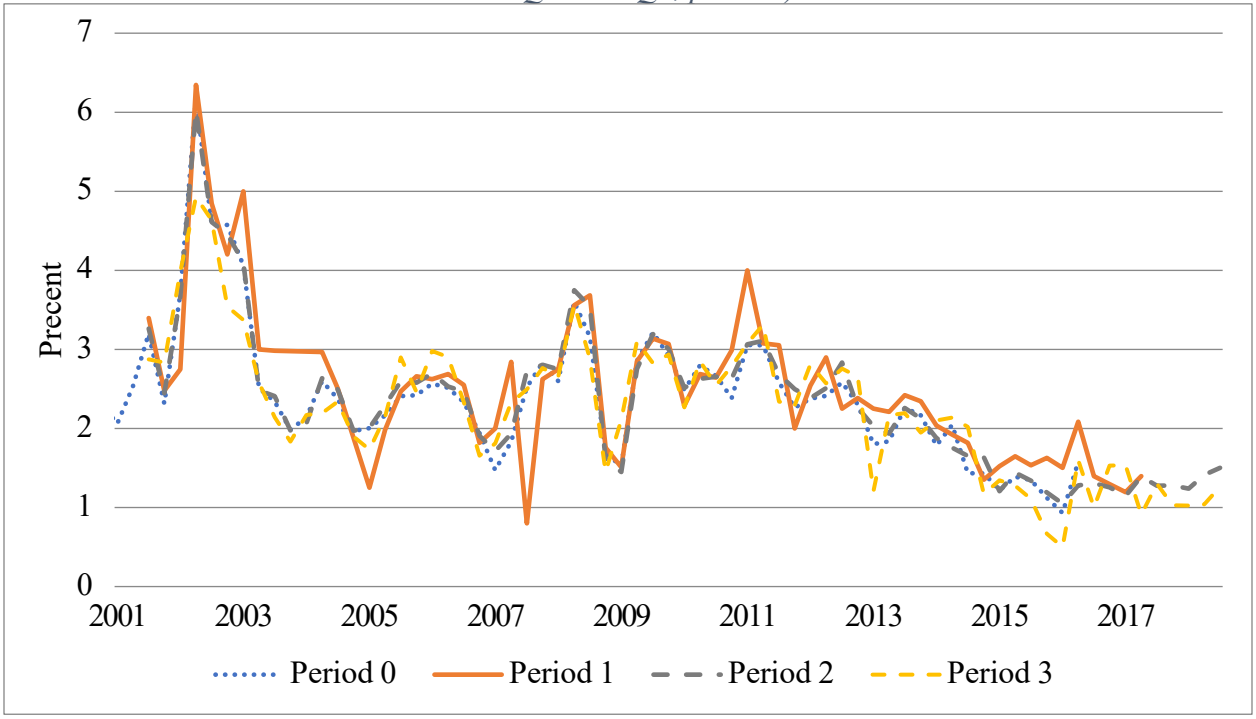


Table B1. Correlation between inflation expectations from different sources

Panel A: 2001Q3 – 2018Q3					
	Firms' survey	Capital Market	Professional Forecasters		
Firms' survey	1.00				
Capital Market	0.77	1.00			
Professional Forecasters	0.74	0.91	1.00		
Panel B: 2011Q1 – 2018Q3					
	Firms survey	Capital Market	Professional Forecasters	Commercial Banks	Households
Firms' survey	1.00				
Capital Market	0.93	1.00			
Professional Forecasters	0.96	0.94	1.00		
Commercial Banks	0.96	0.96	0.99	1.00	
Households	0.49	0.49	0.50	0.49	1.00

* This table presents the correlation between the quarterly expectations average from the firms' survey(without outliers), the professional forecasters, households, and commercial banks, and the capital market expectations (break-even). For more details see Appendix B.

Table B2 – Correlation between Average 1-year inflation expectations, by industries Quarterly data, 1999Q3-2018Q3)

	Commerce	Construction	Hotels	Manufacturing	Services	Transportation and Communication
Commerce	1					
Construction	0.98	1.00				
Hotels	0.96	0.95	1.00			
Manufacturing	0.99	0.98	0.96	1.00		
Services	0.99	0.98	0.96	0.99	1.00	
Transportation and Communication	1	0.96	0.95	0.97	0.97	1.00

* This table presents the correlations matrix of cross-sectional S.D. of 1-year inflation expectations, from the firms' survey, divided according to industry, without outliers.

Tables B3 and B4 present descriptive statistics and a correlation matrix of cross-sectional standard deviations over, by industry of the variable of 1-year inflation expectations. The standard deviation is a proxy of the level of consensus between the firms.

Table B3 – Cross-Sectional Standard deviation of 1-year inflation expectations, divided by industry, descriptive statistics (Quarterly data, 199Q3-2018Q3, percentage)

	Average	Median	Max	Minimum	S.D.	Number of Firms**
Commerce	0.87	0.80	1.93	0.52	0.24	45
Construction	0.89	0.85	1.94	0.48	0.26	31
Hotels	0.88	0.87	1.90	0.34	0.32	28
Manufacturing	0.88	0.82	1.82	0.57	0.22	207
Services	0.92	0.84	2.27	0.60	0.26	135
Transportation and Communication	0.79	0.77	1.66	0.40	0.23	22

* This table presents descriptive statistics of cross-sectional S.D.s of yearly inflation expectations from the firms' survey, by industry, without outliers.

** The average number of firms in the industry who reported their inflation expectations.

Table B4 – Correlation between standard deviations of 1-year inflation expectations, by industries Quarterly data, 1999Q3-2018Q3)

	Commerce	Construction	Hotels	Manufacturing	Services	Transportation and Communication
Commerce	1.00					
Construction	0.85	1.00				
Hotels	0.79	0.63	1.00			
Manufacturing	0.94	0.87	0.80	1.00		
Services	0.93	0.86	0.81	0.96	1.00	
Transportation and Communication	0.76	0.76	0.61	0.79	0.78	1.00

* This table presents the correlations matrix of cross-sectional S.D. of 1-year inflation expectations, from the firms' survey, divided according to industry, without outliers.

Table B5. Placebo test, Effect of interest rate and CPI surprises on inflation expectations in quarter $t-1$.

Variable	Expectations for the Year Ahead at Quarter $t-1$	Expectations for the Quarter Ahead at Quarter $t-1$
	2001Q3-2018Q3	2001Q3-2018Q3
	(1)	(2)
D^I	0.014 (0.018)	-0.006 (0.009)
D^{m_2}	-0.03 (0.022)	-0.006 (0.012)
D^{m_3}	0.002 (0.032)	-0.015 (0.017)
$D^I \cdot surprise^{\mathrm{I}}$	0.062 (0.061)	0.008 (0.029)
$D^{m_2} \cdot surprise^{m_2}$	-0.051 (0.105)	-0.06 (0.063)
$D^{m_3} \cdot surprise^{m_3}$	-0.187 (0.120)	-0.066 (0.065)
$\pi_{t-2}^{e,h}$	0.212*** (0.013)	0.117*** (0.011)
Firm F.E	+	+
Quarter F.E.	+	+
Quarters	68	68
N obs	15,709	15,859
R^2	0.67	0.46
*** p<0.01, ** p<0.05, * p<0.1		

Notes: Columns 1 and 2 present the effect of interest rate and CPI surprises on 1-year and 1-quarter inflation expectations at quarter $t-1$, respectively, for the full sample period (2001Q3-2018Q3). The standard errors that were calculated are White and clustered at the firm level. Additional results about the dummy variable associated with the treatment group are not detailed and can be obtained from the authors.