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ABSTRACT

We use a unique design feature of a survey of Italian firms to study the causal effect of inflation expectations on firms' economic decisions. In the survey, a randomly chosen subset of firms is repeatedly treated with information about recent inflation (or the European Central Bank's inflation target) whereas other firms are not. This information treatment generates exogenous variation in inflation expectations. We find that higher inflation expectations on the part of firms leads them to raise their prices, increase their utilization of credit, and reduce their employment. However, when policy rates are constrained by the effective lower bound, demand effects are stronger, leading firms to raise their prices more and no longer reduce their employment.

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"With nominal short-term interest rates at or close to their effective lower bound in many countries, the broader question of how expectations are formed has taken on heightened importance. Under such circumstances, many central banks have sought additional ways to stimulate their economies, including adopting policies that are directly aimed at influencing expectations of future interest rates and inflation." Janet Yellen (2016)

"When we are at practically zero nominal rates, the real rates are being driven by the expectation of inflation. So lower expectations of inflation imply higher real rates… that's why we fight negative expectations of inflation." Mario Draghi (2015)

"The first element [of QE] was to dispel people's deflationary mindset and raise inflation expectations…" Haruhiko Kuroda (2014)

1 Introduction

Since the onset of the effective lower bound (ELB) on policy interest rates following the start of the Great Recession, there has been increasing interest among policy-makers and academics in policies that operate through expectations channels. Mainstream macroeconomic models, in particular, suggest that policies aimed at raising the inflation expectations of agents should lead to lower perceived real interest rates, thereby stimulating economic activity through increased demand for both durable and non-durable goods. Unconventional policies such as forward guidance and quantitative easing were in part motivated by the desire of central banks to raise inflation expectations. More generally, the fact that most economic decisions are forward-looking implies that changes in the expectations of households and firms about the future should exert immediate effects on their economic behavior. However, the endogeneity of economic expectations has made testing this channel a challenge.

In this paper, we report new empirical evidence on how changes in inflation expectations affect economic decisions using persistent and *exogenously* generated variation in the expectations of firms in Italy. In a quarterly survey of firms that has been running since 1999, the Bank of Italy introduced an information treatment in 2012 to a randomly selected subset of the panel of firms participating in the survey. These firms continued to receive this treatment for years thereafter. The treatment was to provide selected firms with recent and publicly available information about actual inflation in the Italian economy at the time of the survey, immediately prior to asking them about their inflation expectations. A control group was, in contrast, not provided with any information about recent inflation over the same time period. We show that this information treatment led to large and persistent differences in the inflation expectations of treated firms relative to those in the control group. These exogenous and time-varying differences in

expectations serve as a powerful instrument to characterize the effect of expectations on firms' decisions. Exploiting this instrumental variable strategy, we document that higher inflation expectations on the part of firms translate into their economic decisions. When using the full sample period we find that firms with higher inflation expectations raise their prices somewhat, increase their credit utilization and reduce their employment relative to firms with lower inflation expectations. The economic magnitudes involved for the employment decisions are large. When focusing solely on the ELB period, the effects of inflation expectations on prices and credit utilization are stronger, while the effects on employment disappear, consistent with firms perceiving a stronger demand-side channel of inflation at the ELB. This mechanism is in line with the predictions of New Keynesian models at the ELB (e.g. Woodford 2011).

Our results build on a growing literature studying how inflation expectations of economic agents relate to their decisions. Much of this work has focused on households, in part due to the greater availability of household surveys reporting inflation expectations. For example, Bachmann et al. (2015) find little correlation between households' inflation expectations and their desired consumption levels using the Michigan Survey of Consumers, but subsequent works have found stronger and positive correlations between expectations and consumption using the New York Fed's Survey of Consumer Expectations (Crump et al. 2015), a German survey of households (Dräger and Nghiem 2016), and a broader cross-section of European households (Duca et al. 2017).

This literature, however, has faced two sources of difficulty. One is the endogeneity of agents' economic expectations and the absence of clear sources of identifying variation to make causal statements.[1] The other is the lack of quantitative information on the macroeconomic expectations of firms, thereby restricting much of the literature to expectations of households.[2] Both issues are tackled in Coibion, Gorodnichenko and Kumar (2018, henceforth CGK), who use an experimental design in a quantitative survey of firms in New Zealand to assess how exogenous variation in inflation expectations of managers from an information treatment affects their subsequent choices over prices, wages, employment and investment. While closely related, the

[1] One notable exception to this in the literature on consumption and inflation expectations is D'Acunto et al. (2016). They exploit the rise in expected inflation associated with the anticipation of VAT changes in Germany as an exogenous source of variation in inflation expectations relative to households in neighboring countries that did not have this policy change.

[2] There are several notable papers on the expectations of firms. Gennaioli et al. (2015) show that CFOs' expectations of earnings growth are highly predictive of their firms' investment plans and ex-post investment levels. Frache and Lluberas (2017) study the quantitative inflation expectations of firms in Uruguay. Boneva et al. (2016) study firms' pricing expectations in the U.K.

approach taken in this paper has a number of important advantages relative to this prior work. First, the breadth and duration of the Italian survey and information treatment are significantly larger. Whereas CGK have a single information treatment and a single follow-up survey to measure ex-post outcomes, the quarterly survey in Italy has a large panel of firms to whom the treatment is *repeatedly* applied over the course of more than five years. Since the treatment varies over time due to changes in the level of actual inflation, this delivers much more powerful identification. [3] Second, we can characterize how expectations affect decisions over different time horizons and the results indicate that the effects of changing inflation expectations may take time to translate into economic decisions. Third, the Italian survey covers large firms (a quarter of firms in the survey have more than 500 employees) while CGK's survey in New Zealand had very few firms of more than 500 employees. Fourth, the Italian survey has questions about *why* firms plan to change their own prices which, when combined with questions about aggregate and firm-level economic outlooks, can help understand the channels underlying the causal effects of inflation expectations. Finally, New Zealand avoided deflation and the ELB on nominal policy rates and one may be concerned that the effects of firms' inflation expectations could be different at the ELB period. Because the sample period for the Italian survey includes an ELB period, we can provide much more direct answers as to how central banks' attempts to raise inflation expectations influence the behavior of firms and, more generally, the macroeconomy.

Our results speak directly to whether policies that operate primarily through expectations channels can be effective. Providing exogenous information to firms clearly induces changes in their economic behavior, which supports the idea that policy-makers can affect economic outcomes through shaping agents' expectations of the future. These expectations channels can be important not just for monetary policy (e.g. forward guidance) but also for fiscal policies, as exemplified in recent discussion of anticipated VAT changes (D'Acunto et al. (2016)). Furthermore, because the ECB was facing the effective lower bound on interest rates during a sub-

[3] The effects of this information treatment on the expectations of Italian firms is also studied in Bartiloro et al. (2017). There are several key differences between this work and our analysis. First, Bartiloro et al. work with aggregate time series constructed from the survey data while we utilize the cross-sectional and time-series variation. Second, the main identifying assumption in Bartiloro et al. is that expectations of the control group can be used as a proxy for the priors of the treatment group. We believe this assumption is likely violated because the treatment group experiences *repeated* interventions and, as we show below, these treatments are autocorrelated and have weakly persistent effects on inflation expectations of firms. Third, we use this treatment as an instrument to study how exogenous variation in firms' beliefs affect their economic decisions whereas they restrict their attention to the effect of the treatment on firms' inflation expectations.

period of our analysis, our results speak directly to the expectations channel precisely in the circumstances when that channel is expected to be most relevant for policymakers. In particular, we find that firms interpret higher inflation during the ELB as being associated with much stronger demand side effects than outside the ELB period and change their behavior outside and inside the ELB, much as standard models would predict when nominal interest rates do not offset changes in expected inflation (Woodford 2011).

The paper is organized as follows. Section 2 provides information about the survey. Section 3 describes the information treatment as well as how this treatment affects inflation expectations of firms. Section 4 characterizes how inflation expectations affect the economic outcomes of firms and explores the underlying heterogeneity in firm responses to inflation expectations, both in the cross-section and over time. Finally, section 5 concludes by discussing some implications of these results.

2 Survey Description

The Survey on Inflation and Growth Expectations (SIGE, henceforth) is a quarterly business survey run since December 1999 by the Bank of Italy in collaboration with the financial newspaper *Il Sole 24 Ore*. The reference universe consists of firms operating in industry excluding construction and non-financial private services[4] with administrative headquarters in Italy and employing 50 or more workers. Since the first quarter of 2013, construction firms with at least 50 employees have been added. The sample is stratified by sector of economic activity (industry, non-financial private services and construction), geographical area (North-West, North-East, Centre, South and Islands) and number of employees (50-199, 200-999, 1000 and over). In recent years, each wave has about 1,000 firms (400 in industry excluding construction, 400 in non-financial private services and 200 in construction). Over the years, about 2,000 firms have participated in the survey. The list of firms used to extract the sample is drawn from the Bureau Van Dijk's Aida database and is updated on average every five years. Sampling weights are provided to ensure that the distribution of firms (in terms of employment) in the sample represents the distribution of firms in the population.

The survey is carried out by a specialist firm that distributes the questionnaire to company managers who are best informed about the topics covered in the survey. About 90 percent of the data is collected through computer assisted web interviews in the form of an online questionnaire

[4] The following are excluded from the survey: financial intermediaries and insurance companies, general government and the educational and healthcare sectors as well as other community, social and personal services.

featuring a purpose-designed interface, while the remaining 10 percent are collected through computer assisted telephone interviews. Data are collected in the first three weeks of March, June, September and December. The response rate is about 45 percent on average.

The purpose of the survey is to obtain information on firms' expectations concerning inflation, the general economic situation, own-product prices and demand, investment and employment. Most of the data – with the exception of own-product prices changes (past and expected), inflation expectations and current number of employees – are qualitative and relate to firms' assessments about their own business activity as well as about macroeconomic matters in the reference quarter and looking ahead. The qualitative questions in the questionnaire typically have three or more possible answers (for example: worse, the same, better). Most of the questions are repeated throughout the various waves. On occasion, the survey contains questions on specific aspects of the economy that warrant further investigation. A typical questionnaire is presented in Appendix 1. More information about the survey is provided in Grasso and Ropele (2018). Definitions and descriptive statistics are provided in the Appendix.

3 Information Treatment and Inflation Expectations

A unique feature of this survey is the randomized treatment of firms in terms of the information about recent inflation with which they are provided. In this section, we first describe this information treatment and then present evidence on how this treatment feeds into the inflation expectations of firms, which provides the basis for our identification strategy to assess the causal effect of inflation expectations on firms' economic decisions.

3.1 The Information Treatment

Before 2012Q3, all firms in the survey received information about recent inflation dynamics before being asked about their economic expectations. In 2012Q3 the survey was redesigned and participating firms were randomly split into two groups that were sent two versions of the survey. One group, corresponding to about one-third of the sample, received the following question about inflation:

> "*What do you think consumer price inflation in Italy, measured by the 12-month change in the Harmonized Index of consumer prices, will be…*"

over three different horizons: 6-months ahead, one-year ahead, and 2 years ahead. We refer to this group of firms as the control group. Starting in 2014Q1, firms were also asked about their expectation of annual inflation at a two-year horizon two years ahead (that is, average annual inflation rate in three and four years from the date of the survey), which we refer to as the four-year time horizon. The inflation expectations question comes at the beginning of the survey, immediately after verifying their industry classification and asking for their number of employees and their share of exports in revenues.

The remaining two-thirds of panelists were instead asked the following question:

> "*In [previous month], consumer price inflation measured by the 12-month change in the Harmonized Index of Consumer Prices was [X.X]% in Italy and [Y.Y]% in the Euro area. What do you think it will be in Italy …*"

over the same horizons as asked in the other version of the question. All other questions in the survey are identical. The treatment therefore consists of giving firms additional but publicly available information about the most recent rate of inflation in both Italy and the Euro area.[5] Since the inflation rate varies over time, the size of the treatment varies as well. Assignment into treatment and control groups was randomly redrawn in 2012Q4 and stayed fixed until 2017Q2.

To verify that the selection of firms into treatment and control groups was actually random, we regress a dummy variable for whether a firm was treated on observable characteristics of each firm, including their size (log of number of employees), their export share (categorical variable with four groups: no export, export share in total sales is 1 to 33 percent, export share is 34 to 66 percent, export share is 67 or more percent), the average absolute size of their price changes in the previous 12-month (which are recorded over time in the survey), as well as industry and geographic fixed effects. The results are reported in Table 1. None of the observable characteristics are statistically significantly correlated with being treated. The only exception is a slight over-representation of firms in one area of the country (Center). Note that the constant term is 0.66-0.67 across specifications, confirming that two-thirds of firms are treated on average and that controlling for observables does

[5] The question provides potentially two different pieces of information: i) inflation rate in Italy and ii) inflation rate in the Euro area. However, the correlation between these two series in our sample is above 0.95 so we do not have enough variation to identify the effect of each inflation series separately.

not change this proportion. This indicates that the treatment of firms was randomly assigned in the proportions targeted in the survey.

Prior to 2012Q3, all firms were in the treatment group, meaning that all firms were receiving the information about most recent inflation in Italy and the Euro area. Our labeling of firms that receive the information as the treatment group therefore entails some abuse of terminology. However, because a second treatment was introduced in 2017Q2, we find it more intuitive to refer to those firms who received any information as treated firms and those who receive no information as the control group.

Starting in 2017Q2, the SIGE changed the treatment. Three-fifths of the sample was treated in the same way as described above. One-fifth of the sample was untreated. But one-fifth of the sample received a new information treatment in accordance with the following variation of the question regarding inflation expectations:

> "*The European Central Bank pursues the objective to maintain the 12-month change in the Harmonized Index of Consumer Prices in the Euro area below, but close to, 2 percent over the medium run. What do you think consumer price inflation in Italy, measured by the Harmonized Index of Consumer Prices, will be …*"

When this change in the treatment was applied, different firms were taken from the previous treatment/control groups and reassigned to one of the three groups above. In other words, some firms that had not been receiving information were assigned to each of the two treatment groups, and some firms that had been in the original treatment group moved to the control group (no information provided) while some moved to the new treatment group. Some firms stayed in their original classification. Note that this new treatment is only available for a much shorter period of time and a small subset of firms, and unlike the treatment with recent inflation, the information content is always the same over time. As a result, we generally focus only on the first treatment and omit firms in the second treatment group (that is, firms treated with the ECB inflation target), but we provide more limited results utilizing this second treatment.

3.2 Treatment with Past Inflation

To assess the extent to which the information treatment affects firms' inflation expectations, we first create a dummy variable equal to one if firms are treated and zero otherwise. We then multiply

that dummy by the level of past inflation associated with that treatment. This creates a time-varying measure of the treatment given to a firm each quarter, which we denote T_t^i with i and t indexing firms and time (survey waves).[6] To quantify the effect of this time-varying treatment on the reported inflation forecast of firm i at time t for horizon h (i.e., $F_t^i\pi^{(h)}$), we then regress their expectations that quarter on the treatment variable for that quarter:

$$F_t^i\pi^{(h)} = \alpha_h + \beta_h T_t^i + error_{t,h}^i. \quad (1)$$

We use Driscoll and Kraay (1998) standard errors to account for cross-sectional and time correlation in the errors and include seasonal fixed effects for each sector of economic activity.[7]

The results are presented in Table 2. Being provided with information about recent inflation has a significant and large effect on inflation expectations across horizons. We find that information about inflation being 1 percentage point higher raises the average forecast of firms by 0.62 percentage point at a six month horizon, 0.57 percentage point at a one-year horizon, with effects falling at longer horizons to a low of 0.35 percentage point at the four-year horizon. The large weight being assigned to this information is consistent with experimental evidence in CGK, documenting that firms place a lot of weight to information presented to them about recent inflation dynamics. More generally, the fact that inflation expectations respond less than one-for-one to inflation is consistent with the under-reaction of inflation expectations to aggregate information documented in the literature (e.g. Coibion and Gorodnichenko 2012, 2015, Bordalo et al. 2018). Also note that as the horizon of expectations increases, the R^2 declines, consistent with the view that it may be harder to move firms' longer-term inflation expectations. In short, these results show that expectations at longer horizons are affected as well, albeit to a smaller extent than at shorter horizons.

[6] There are alternative ways to define the treatment. For example, we can measure the information received by treated firms as the difference between recent inflation and the 2 percent target (or just below 2 percent) of the European Central Bank. Alternative definitions like this one yield almost identical results. Another possible way could be to use a simple 0-1 dummy variable (being zero for the uninformed firms and one for the informed ones) and include in the regression time fixed effects. Using such a specification for the treatment yields the result that, across forecasting horizons, informed firms report lower inflation expectations (on average by about 0.3 percentage points) compared with the uninformed firms (results are available upon request). This is in line with the patterns shown in Figure 3 Panel A.

[7] Note that while one could include firm fixed effects given the panel nature of the data, this would soak up all the variation from the control group and all identification would stem from time-variation of the signal provided to the treatment group.

Figure 1 plots the distribution of reported forecasts from the two groups for selected quarters. As can readily be seen, the distributions are quite different: beliefs are much more dispersed in the control group that receives no information, with much wider tails of very high or low forecasts of inflation. Figure 2 shows that this holds across forecasting horizons for a specific quarter. Consistent with the results presented in Table 2, these figures support the idea that information treatments have pronounced effects on the inflation forecasts of firms across horizons but the effect is strongest for short-term inflation expectations.

To get a better sense of the economic magnitudes involved, Panel A of Figure 3 plots the average 12-month ahead inflation forecasts of the control and treatment groups over time, along with the inflation rate in Italy. Prior to 2012, when all firms were receiving the information treatment, we can see that average forecasts tracked inflation closely through several swings. Then, as the inflation rate fell sharply from late 2012 through mid-2015 (from 2.5 percent per year to below zero), the average forecast of the treated group fell much more rapidly than that of the control group. Despite starting off with the same average forecast at the end of 2012, the average forecast of the treated group was 0.5 percentage point lower by the end of 2014 than the control group's. This pattern reversed itself when inflation rose sharply in 2017: the average forecast of the treatment group rose rapidly, by more than one percentage point, while the average forecast of the control group rose by about half a percentage point. Panel B of Figure 3 illustrates that the treatment also has a pronounced effect on the dispersion of beliefs: firms in the control group have systematically more dispersed expectations than those in the treatment group. This is consistent with Bartiloro et al. (2017), who similarly find that the provision of information through the SIGE affects the 12-month ahead inflation expectations of recipients and reduces the dispersion in their beliefs.

There is little evidence indicating that firms respond differently to the signals provided. Specifically, we reproduce estimates of equation (1) for different subsets of firms, breaking them into groups based on observable characteristics. Because information about firms in the survey is somewhat limited, we restrict our attention to four specific dimensions along which firms can differ: industry (manufacturing, services, construction), their size (based on average number of employees), their exposure to other economies (exports as a share of revenues), and their location (North vs Center vs South and Islands). The results are presented in Table 3. We find very little variation in how information treatments affect inflation expectations. Firms in construction adjust their inflation expectations slightly less than other firms when treated with news about inflation as do firms located

in the Center of the country. But the differences are very small in economic terms thus suggesting that information treatments have homogenous effects on different types of firms.

We can also use the survey data from SIGE to characterize the persistence of the treatment effect on expectations. Figure 3 indicates that treated firms have persistently different expectations than those in the control group. However, it is unclear whether this is because the information treatment has a persistent effect on beliefs or because the signals from recent inflation are themselves persistent. Since the signals received are time-varying due to changing level of the most recent inflation rate being reported to treated firms, we can differentiate between the persistent effects of a single signal and the persistence of the signals themselves by examining the effect of past information on current beliefs. Specifically, we estimate an expanded version of equation (1):

$$F_t^i \pi^{(h)} = \alpha_h + \beta_{h,0} T_t^i + \beta_{h,1} T_{t-1}^i + \beta_{h,2} T_{t-2}^i + \cdots + \beta_{h,q} T_{t-q}^i + error_{t,h}^i, \qquad (2)$$

which effectively estimates the dynamic response of expectations to signals (which are given by the coefficients $\beta_{h,0}, \beta_{h,1}, \ldots, \beta_{h,q}$). The results are reported in Table 4. While the effect of a contemporaneous treatment on inflation expectations is large ($\beta_{h,0}$), these effects seem to die out quickly, although the persistence and serial correlation in the treatments complicate interpretation of estimated duration effects.[8] The previous quarter's treatment has only a small effect on current expectations, and older treatments have no discernible effect on current expectations after conditioning on more recent treatments. Hence, the effect of information treatment on inflation expectations largely dissipates within six months.[9] This is also consistent with the results in CGK, finding that firms which were followed-up six months after being provided information did not have inflation expectations that were much different from firms in the control group. But unlike their evidence from a one-time experiment, our results follow from repeated treatment of a much larger

[8] If treatments were uncorrelated shocks, one could interpret equation (2) as estimating a moving average representation so that $\beta_{h,0}, \beta_{h,1}, \ldots, \beta_{h,q}$ would directly provide an impulse response to treatment. In practice, year-on-year inflation (the information treatment in the survey) is persistent and therefore $\beta_{h,0}, \beta_{h,1}, \ldots, \beta_{h,q}$ combine persistence of the response and the persistence of treatments. In an extreme case of treatment being a random walk, coefficients on lags of treatment may be small because firms need to know only the most recent value of the treatment.

[9] When estimating equation (2), we restrict the sample to include only firms that are consistently present for q waves. Because firms may not participate in each wave of the survey, the sample size shrinks as q increases. An alternative is to assume that firms are not treated in the quarters when they do not respond to a survey. We can implement this alternative approach by setting past treatments to be equal to zero for periods when firms did not participate in the survey. As documented in Appendix Table 2, the results under this alternative assumption are almost identical.

number of firms over the course of several years, yielding a much more precise identification of the dynamic effects on expectations of the provision of information to firms.

3.3 Treatment with the ECB's Inflation Target

In 2017Q2, the survey introduced an additional randomized treatment. As discussed in section 3.1, a randomly selected one-fifth of firms in the sample is told that the ECB targets an inflation rate below, but close to, 2 percent over the medium run. As a result, we can also utilize this treatment group to assess how information about the central bank's target affects inflation expectations.

To do so, we define the treatment for firms in this group as being a fixed value of 2 percent. We then regress firms' inflation expectations on whether they were in the control group or on this treatment. Given the short time-series dimension of this treatment, for this analysis the treatment group includes only firms that were in the control group before 2017Q2. For comparison, we reproduce our estimates of equation (1) using firms in the control group and the "past inflation" treatment group over this restricted sample. Results across horizons and for these two treatments are presented in Table 5.

We find almost identical results for the two treatments, although the estimates with the ECB treatment are noisier due to the smaller sample size. Being told about recent inflation or being told about the central bank's inflation target has the same quantitative effect on inflation expectations across horizons. Because actual inflation in Italy was running just below 2 percent in the period from 2017Q2 to 2018Q1, the quantitative magnitude of the treatment is directly comparable across the two. The fact that the estimated effects on inflation expectations are almost identical therefore suggests that firms place similar weight on information about recent inflation and the ECB's target across horizons. This is similar to the finding in CGK from a one-time experiment that the provision of information about recent inflation or about the central bank's inflation target have broadly comparable effects on inflation expectations. Our results not only confirm this finding but also indicate that it holds across horizons ranging from the very short (6-month ahead) to the very long (4-year ahead). The term structure of expectations thus responds similarly to news about recent inflation as it does to news about the central bank's long-run inflation target. Furthermore, the fact that the two information treatments have very similar effects implies that firms being told about recent inflation is not sufficient to fully reveal the state of the

economy to them. If this were the case, being told about the (constant) 2 percent inflation target should lead to different information revisions, which is not what we find in Table 5.

3.4 Recap and Discussion

The evidence provided so far relates directly to the ability of policymakers to alter firms' inflation expectations. First, our results suggest that conditional on firms being exposed to information about inflation, their inflation expectations respond strongly. Hence, there is room for policies to significantly affect agents' expectations, if information can be transmitted to them in a direct and transparent manner. Second, our results indicate that the persistence of information treatments on inflation expectations is quite low: the effects of information treatments are small after three months and gone after six. Hence, generating persistent changes in agents' economic expectations would likely require persistent communication strategies on the part of policymakers. One-time announcements are unlikely to deliver persistent changes in beliefs, at least about inflation.

4 Expectations and Economic Decisions

In this section, we consider the *causal* effect of firms' inflation expectations on their economic decisions – such as price-setting, hiring and credit demand – exploiting the random information treatment to generate exogenous variation in inflation expectations. We rely on the following empirical approach. Letting y_{t+k}^{i} be the outcome variable for firm i at time $t+k$, we regress economic outcomes on inflation expectations formulated at time $t-1$ ($F_{t-1}^{i}\pi^{(12m)}$):

$$y_{t+k}^{i} = \alpha_k + \gamma_k F_{t-1}^{i}\pi^{(12m)} + controls_{t-2}^{i} + error_{t-1,t+k}^{i}, \qquad (3)$$

where $controls$ is a vector of firm-level controls. The vector includes the expectations of other economic variables such as firm i's expectations about firm-specific business conditions over the next three months, firm-specific employment growth in the next three months, firm-specific expected liquidity in the next three months, perceptions about current Italy's general economic situation, and perceptions about the probability of improvement in Italy's general economic situation over the next three months. These variables help us control for firms' expectations so that the coefficient γ may be interpreted as a response of outcome variable y to a surprise movement in inflation expectations. Note that controls are taken from wave $t-2$. We use this timing of the

controls because these expectations and perceptions are elicited *after* the information treatment in each wave[10] and thus the contemporaneous expectations and perceptions can respond to changes in inflation expectations, which in turn react to the provided information. Because firms cannot change prices, employment or credit utilization contemporaneously in response to the information treatment, inflation expectations $F^i_{t-1}\pi^{(12m)}$ are taken from wave $t-1$ as we vary k from zero to horizon K. We instrument for the inflation expectations at time $t-1$ using the information treatment at time $t-1$, which is equal to zero for the control group and recent inflation for the treatment group. Our key identifying restriction is therefore that there are no channels through which the information treatment affects economic decisions other than inflation expectations (or the other expectations we control for). As in (1) we use Driscoll and Kraay (1998) standard errors to account for cross-sectional and time correlation in the errors and include seasonal fixed effects for each sector of economic activity. We first conduct our empirical analysis using the full sample length (2012Q3-2018Q1) and then in Section 4.5 we present the estimation results obtained using the post-2014Q3 data that cover the effective lower bound on policy rate period. Furthermore, in order to get an idea of the bias caused by the potential endogeneity of inflation expectations, we also show results for specification (3) estimated by OLS.

4.1 Effect on prices

We first turn to the effect of inflation expectations on firms' pricing decisions. To do so, we rely on survey questions that ask firms to report the percentage change in their prices over the last twelve months (dp^i_t) and use these responses at different horizons to characterize the evolution of price changes using equation (3).[11] We report results of these regressions in Panel A of Table 6.[12] The results point toward only small and relatively transitory effects on prices. An exogenous increase in inflation expectations of 1 percentage point leads firms to report annual price changes that are 0.2 percentage point higher after a quarter, but these effects die out over the subsequent

[10] In contrast, CGK elicit expectations before and after the treatment so that one can measure treatment effects directly in one wave.

[11] We verify the quality of responses about reported price changes in two ways. First, we compute the rate of inflation based on price changes reported in the survey. We find that the correlation between this measure of inflation and the official inflation rate is high (0.75). Second, we compare responses about past price changes with responses about future price changes. The correlation between these two measures is approximately 0.5, which points to strong consistency of responses over time.

[12] To preserve space, we report only estimates of γ in equation (3). The full sets of estimates are reported in Appendix Tables 3-11.

two quarters. One year later, there is no evidence that firms with higher inflation expectations raise their prices more than firms with lower expectations. Hence, these results point toward small effects of inflation expectations on price changes of firms. While the instrument stemming from the random of firms to treatment/control groups is very strong (F-statistics of over 100), we find little difference between IV and OLS estimates (reported in Panel B), indicating that the effects of potential endogeneity of inflation expectations with respect to firms' price setting decisions are limited. The absence of strong effects from inflation expectations on pricing decisions is also consistent with experimental results in CGK. They found that a 1 percentage point decrease in inflation expectations induced by an information treatment was followed by an approximately 0.1 percent decrease in prices after six months, broadly in line with the estimates found here albeit estimated less precisely and at a single time horizon.

4.2 Effect on Employment

Next, given that firms also report the number of their employees in each wave of the survey,[13] we can also assess whether inflation expectations affect firms' employment decisions. To do so, we use the log change in employment between time $t-1$ and time $t+k$ as dependent variable in equation (3). The results are presented in Panel C of Table 6, using the same instrumental variable strategy as before. Unlike the results with prices, we find large and statistically significant effects of inflation expectations on firms' employment decisions, especially at longer horizons. Firms with 1 percentage point higher inflation expectations reduce their employment by 0.5 percent after 6 months and by 1 percent after 12 months, with the effects continuing to rise thereafter. Unlike the results with prices, there is now a pronounced difference between OLS and IV estimates. With OLS (Panel D), inflation expectations appear much less correlated with employment decisions of firms. Only with our instrument we recover large economic effects of inflation expectations on employment decisions.

4.3 Effect on Credit Utilization

Finally, we turn to the effect of inflation expectations on firms' credit utilization. To this end, we rely on firm-level data outside the SIGE survey. In particular, we use quarterly information retrieved

[13] We find that aggregate employment growth based on responses in the survey is highly correlated (0.75) with aggregate employment growth reported in the official statistics.

from the Italian Credit Register maintained by the Bank of Italy to construct for each firm at each point in time the utilization rate of credit lines (i.e. the ratio of the amount of credit line drawn at *t* to the total amount of credit line available (drawn plus undrawn)).[14] We then use the change in the utilization rate between time $t-1$ and time $t+k$ as dependent variable in equation (3). The results are presented in Panel E of Table 6, using the same instrumental variable strategy as before.[15] We find large and statistically significant positive effects of inflation expectations on firms' credit utilization decisions, especially at longer horizons. Firms with 1 percentage point higher inflation expectations increase their credit utilization by 0.8 percentage points after 3 months and by nearly 2 percentage points after 12 months. Beyond this latter horizon, there is no evidence that firms with higher inflation expectations draw credit more intensively than firms with lower expectations. Like the results with employment, there is again a marked difference between OLS and IV estimates. With OLS (Panel F), inflation expectations appear disconnected from credit utilization decisions of firms. Only with our IV estimation strategy are we able to find large economic effects of inflation expectations on borrowing decisions.[16]

4.4 Inspecting the Mechanism

What drives firms' responses to higher inflation expectations? To shed light on the mechanisms behind firms' small and transitory price increases, long-lasting employment declines and persistent

[14] The Italian Credit Register contains monthly detailed information on all loans granted by banks operating in Italy to borrowers for which the overall exposure of the bank is above 75,000 euros (this threshold was lowered to 30,000 in 2009). Loans are divided into three broad categories: overdraft loans (uncommitted credit lines), term loans (these include leasing, mortgages and committed credit lines), loans backed by receivables. In the present analysis we focus on the utilization rate of overdraft loans as this category of loans should be less contaminated by supply-side variation. That said, banks can at any time revoke (totally or partially) the amount of credit lines granted to firms and typically do so when the borrowers' creditworthiness deteriorates. In Italy the share of firms whose credit line was totally or partially cancelled was about 8 percent each year in the period from 2012 to 2014. Then, it gradually declined reaching 5 percent in 2017 in line with the overall improvement the credit quality.

[15] In this case the sample size declines somewhat. This is mostly due to the fact that when merging the SIGE data with the Italian Credit Register using the identification key represented by the combination of firm fiscal code and time, there are some unmatched cases. To make sure that with this restricted sample the selection of firms into treatment and control groups remains random, we replicate Table 1 using only the observations for which we have information on credit. The results are reported in Appendix Table 14. None of the observable characteristics are statistically significantly correlated with being treated with the only exception being a slight over-representation of firms in the trading sector. The constant term is 0.67-0.69 across specifications, confirming that two-thirds of firms continue to be treated on average and that controlling for observables does not change this proportion.

[16] We also computed the causal effects of inflation expectations on firms' economic decisions using as instrument the 0-1 dummy variable (as outlined in footnote 5) and found very similar, if not somewhat stronger, results to the ones presented in the main text. A 1 percentage point in increase in inflation expectations leads firms to report annual price changes that are nearly 0.25 percentage points higher, to report quarterly employment changes that are about 0.15 percentage points lower and to report quarterly changes in the utilization rate of credit lines that are about 0.65 percentage points higher.

credit utilization increases when their inflation expectations rise, we utilize other survey questions from the SIGE that can help understand what underlies firms' responses. In our analysis, we use the following econometric specification:

$$F_t^i y = \alpha + \gamma F_{t-1}^i \pi^{(12m)} + error_t^i \quad (4)$$

where $F_t^i y$ is the forecast of firm i at time t for variable y. Similar to specification (3), we instrument inflation expectations $F_{t-1}^i \pi^{(12m)}$ with the treatment variable at time $t-1$.[17] Furthermore, as in (1) we use Driscoll and Kraay (1998) standard errors to account for cross-sectional and time correlation in the errors and include seasonal fixed effects for each sector of economic activity.

Perceptions and Expectations of Aggregate Conditions

In addition to questions about aggregate inflation, firms in the SIGE are asked about other aggregate economic outcomes. Previous work has documented correlations between individuals' outlooks for inflation and other economic variables. For example, Carvalho and Nechio (2014) find that households in the U.S. believe that inflation is associated with stronger economic outlooks, consistent with a movement along a Phillips curve, while Dräger and Lamla (2015) find that household expectations are consistent with a Taylor rule, such that higher inflation expectations are associated with even higher expectations of nominal interest rates. In the same spirit, the SIGE asks respondents about whether they think Italy's general economic situation is better, worse, or the same compared with the previous three months. We create a variable equal to one if firms choose "better", zero if "the same", and negative one if "worse". Respondents are also asked about the probability of an improvement in Italy's economic situation over the next three months. This question has 6 possible answers: zero, 1-25 percent, 26-50 percent, 51-75 percent, 76-99 percent and 100 percent. If respondents pick a bin with a range, we assign the midpoint of that range.

We characterize how these expectations change when firms change their inflation expectations by regressing these non-inflation beliefs on firms' 12-month ahead expectations,

[17] Appendix Tables 12 and 13 report the results obtained with a specification in which the regressors and the regressand are taken from the same wave, that is, we use $F_t^i \pi^{(12m)}$ rather than $F_{t-1}^i \pi^{(12m)}$ as the regressor. With this alternative timing, we allow beliefs about other variables to move immediately in response to informational treatments (questions about these variables appear in SIGE after expectation questions are asked). We find similar results.

again using the information treatment as an exogenous source of variation about inflation expectations. As documented in rows 1 and 2 of Table 7, we find that higher expectations of inflation lead firms to become more *pessimistic* about the economic outlook: firms with higher inflation expectations think Italy's economic situation is worse and perceive lower probabilities of an improvement in the economy over the next few months. This result differs not only from Carvalho and Nechio (2014) but also from CGK. These latter authors find that New Zealand firms who raise their inflation expectations following an information treatment do not change their expectations of real economic variables in an economically meaningful way. This association of higher inflation with worse expected economic outcomes on the part of Italian firms could therefore rationalize why employment responses are so sharply negative when firms expect higher inflation expectations and why firms raise the utilization degree of their credit lines.

Expectations for Firm's Outlook

Because the SIGE also includes questions about managers' expected outlook for their own firm, we can assess whether this increased pessimism about the aggregate economic outlook in the face of higher inflation expectations also translates into greater pessimism about the outlook for the firm. Specifically, the survey asks respondents whether they think business conditions for their company will be "much better", "better", "the same", "worse", or "much worse" over the next three months, for which we assign values ranging from 2 (for "much better") to -2 (for "much worse"). A second question asks them whether they expect the total demand for their products to improve, worsen or stay the same over the next three months. A third set of questions we consider asks firms to rate if their liquidity situation in three months will be insufficient (-1), sufficient (0), or more than sufficient (+1) and if they think their current access conditions to credit market are worse (-1), the same (0) or better (+1) compared with previous three months.

To assess whether changes in inflation expectations affects firms' other economic expectations, we again re-estimate equation (4) using responses to these other survey questions as the dependent variable, using the information treatment to identify exogenous changes in inflation expectations. As documented in rows 3 through 6 in Table 7, higher inflation expectations lead Italian firms to expect worsening business conditions for their company over the next 3 months including reduced demand as well as reduced liquidity and access to credit.

The response of firm-specific uncertainty to inflation expectations is also consistent with this interpretation (rows 7 and 8). Firms are asked to assign probabilities to three possible outcomes for their business conditions over both the next three months and the next three years: "better", "worse", and "the same". From this assignment of probabilities to these three bins (which are assigned outcome values of +1, -1 and 0, respectively), we compute the implied standard deviation for their perceived outlook for the firm over each of the two horizons. When we regress these measures of firm-specific uncertainty on inflation expectations, instrumenting with the treatment, we find that higher inflation expectations generate higher uncertainty about the outlook.

This worsened outlook for firms with higher inflation expectations is reflected in their planned actions. For example, firms are asked about their investment plans over the current or subsequent calendar year (relative to the previous year in the former case and the current year in the latter case).[18] Possible answers by firms are qualitative: "much higher", "a little higher", "about the same", "a little lower", and "much lower". We can use these quasi-year ahead forecasts in investment to assess whether and how inflation expectations affect investment plans using equation (4). We find (row 10 of Table 7) that higher inflation expectations (again instrumented with information treatments) are associated with plans for lower investment over a one-year horizon. While we cannot independently verify that actual investment is indeed lower in subsequent periods, these results suggest that, along with lower employment, higher inflation expectations on the part of firms lead to significantly lower investment in subsequent periods. Because investment decisions are inherently forward-looking, this reduced demand for investment on the part of firms with higher inflation expectations is also consistent with their picturing a dimmer outlook for the firm.

The qualitative nature of firms' responses to questions about future investment plans makes it difficult to interpret the quantitative magnitude of this channel directly. However, the survey also asks firms to provide qualitative forecasts about their expected changes in employment over the following three months (possible responses are "lower", "unchanged", "higher"). When we use the latter as dependent variables, we again find evidence that higher expected inflation reduces employment of firms (row 9 in Table 7), with estimated coefficients that are approximately half of

[18] Which horizon they are asked about depends on the quarter in which the survey is held. Generally, in the first two quarters of the calendar year, firms are asked about how investment in the current calendar year will compare to the previous calendar year while in the last two quarters of the year, firms are instead asked about how investment will compare in the subsequent calendar year relative to the current calendar year.

those found for investment plans across horizons. This suggests that the sensitivity of investment plans to inflation expectations in Italy was about twice that of employment across horizons.

In short, each of these results suggests that firms perceive higher inflation as associated not only with worse aggregate outcomes but also deteriorating conditions for their firms, which seemingly induce them to reduce their employment and investment.

Motivations for Price Changes

If firms perceive a diminished outlook for their business, why do they then tend to raise prices when their inflation expectations rise? Another useful dimension of the survey is that firms are asked about their expected price changes as well as the factors inducing them to either raise or lower prices. Specifically, in each wave, firms were asked to first predict their price changes over the next twelve months (with a quantitative answer in percent) then to characterize which forces were pushing them to change their prices. For the latter, firms were asked to indicate the direction and intensity through which the following four factors would affect their price-setting decisions over the following twelve months: total demand for their products, the price of raw materials, labor costs, and the pricing decisions of their competitors. Combining the qualitative answers for both the direction (up/down/no change) and intensity (low/average/high) allows us to apply a seven point scale (from -3 for a factor having a strong negative effect on prices to a 3 for a factor having a strong positive effect on prices) to their answers for each factor. In Figure 5 we report the time development of each factor together with the average expected price change over the next 12 months.

Using the expected change in prices and each of the factors accounting for price changes as dependent variables, in turn, in equation (4), we characterize in Table 7 to what extent and why higher inflation expectations on the part of firms lead them to change their expected path of futures prices.

First, we find a similar pattern of responses for the expected path of future prices as we did for actual prices: higher inflation expectations are initially associated with slightly higher expected prices on the part of firms (row 11 in Table 7). Second, firms with higher inflation expectations perceive a reduction in demand for their goods, which puts downward pressure on their prices (row 12). Competitors' pricing decisions also apply downward pressure to firms' prices when their inflation expectations are higher (row 15). These two forces are consistent with the fact that firms with higher inflation expectations anticipate a reduced level of economic activity (hence

competitors reducing their prices) as well as a worsened outlook for their own firm (the reduction in demand for their goods). There is little change in perceptions of how labor costs will affect price pressures (row 14), indicating that firms do not view higher inflation as translating in a significant way into higher wages.

However, higher inflation expectations are associated with higher expectations of prices for raw materials on impact (row 13). It is this higher expectation that appears to account for the fact that firms initially raise their prices. These expectations of higher raw material prices dissipate over several quarters, which likely accounts for why firms' prices do not appear to be persistently higher after an increase in their inflation expectations. Together, these findings indicate that Italian firms seem to interpret news about recent inflation as reflecting *supply-side* shocks: they anticipate higher raw material prices but lower demand for their products. Consistent with this interpretation, we observe a much stronger negative correlation between inflation and unemployment for New Zealand than for Italy.[19] Structural decompositions of output and inflation in Italy also suggest an important role for supply-side shocks. For example, Albonico et al. (2017) find that TFP and investment risk premium shocks have played a much larger role in accounting for economic dynamics in Italy prior to the Great Recession than in France, Germany or Spain.

4.5 The ELB Period

Our evidence suggests that Italian firms might have interpreted news about recent inflation as reflecting *supply-side* shocks, thus driving prices and employment in opposite directions. Theoretical work has shown however that at the effective lower bound (ELB) on policy rates, negative supply-side shocks can have expansionary effects: the higher expected inflation induced by a shock lowers the ex-ante real rate thus stimulating interest-sensitive sectors of the economy and possibly offsetting the usual recessionary effects of the shock.[20] More generally, the inability

[19] Between 1989 and 2007, the correlation between CPI inflation and the unemployment rate (both series are detrended with the Hodrick-Prescott filter) in New Zealand was -0.67 but was only -0.21 in Italy. Relatedly, when we regress CPI inflation on the unemployment rate, the R^2 is 0.45 for the New Zealand sample and 0.04 for the Italian sample. Both of these results are consistent with more supply-side shocks in Italy than in New Zealand.

[20] The evidence on whether negative supply-side shocks actually have expansionary effects at the ZLB is mixed. Wieland (forthcoming), for example, studies the Japanese earthquake of 2011 as well as oil price shocks during ELB episodes and finds no evidence of expansionary effects from negative supply shocks. In terms of the mechanism underlying the proposition, Bachmann et al. (2015) use the micro data from the Michigan Survey of Consumers conducted in the United States and document that the impact of expected inflation on the readiness to spend on durables is negative, small in absolute value, and statistically insignificant, regardless of whether the ELB binds or not. However, other evidence is more favorable to this hypothesis. For example, Ichiue and Nishiguchi (2015) use the micro data from the Opinion Survey on the General Public's Views and Behavior run by the Bank of Japan, which

or unwillingness of policy-makers to change nominal interest rates at the ELB means that increases in expectations of inflation lead to declines in the real interest rate, rather than increases as when the Taylor principle is satisfied. Inflationary shocks should therefore have stronger positive demand-side effects than they normally would (e.g. Woodford (2001) for fiscal shocks). More generally, constraints on policy-makers' ability or willingness to respond to shocks implies that economic dynamics can change at the ELB.

In light of these considerations, we consider to what extent our results change when we focus exclusively on the ELB period. While there is not a unique way to date the ELB in the Euro area, in what follows we let the ELB period begin in 2014Q4.[21] The smaller time sample means that weak instruments become an issue at longer horizons (since these further shorten the sample), so we restrict the set of horizons in our estimations to 3 quarters. The results are presented in Table 8, using the same instrumental variable strategy as before. Several remarks are in order. First, we find that the effects on firms' prices are *larger* and *more persistent* relative to the effects estimated on the full sample (Panel A). An exogenous increase in inflation expectations of one percentage point leads firms to report annual price changes that are 0.7 percentage points higher after a quarter as well as in the subsequent two quarters. As was the case over the entire sample, OLS and IV estimates of the effect on firms' prices are similar (Panel B). Second, turning to firms' employment decisions, the results now indicate the lack of a statistically significant relationship with inflation expectations (Panel C). This change in response to employment reflects the fact that point estimates are now small and positive, not an increase in standard errors. Finally, the effects of inflation expectations on firms' credit line utilization are even larger when the economy is at the ELB (Panel E). Specifically, firms with 1 percentage point higher inflation expectations increase their credit demand by 2.2 percentage points after 6 months and by nearly 3 percentage points after 9 months.[22] Consistent with earlier results, there is again a marked difference between OLS and IV estimates (Panel F).

covers a low interest rate environment for a longer period than the United States and find that higher inflation expectations lead to greater current spending. D'Acunto et al. (2016) find that the higher inflation expectations in Germany following an anticipated increase in the VAT during the ELB led to a rise in consumption, consistent with the underlying mechanism that delivers expansionary effects of negative supply-side shocks.

[21] In September 2014 the Governing Council of the ECB decreased the fixed rate on the main refinancing operations by 10 basis points to 0.05 per cent. At the press conference following this decision, Mario Draghi made clear that he viewed the ECB as having reached the ELB: "And now we are at the lower bound, where technical adjustments are not going to be possible any longer." Hence, we treat all subsequent quarters as being at the ELB.

[22] Similar results obtain when instrumenting firms' inflation expectations with a 0-1 dummy variable (and time fixed effects) to distinguish between uninformed and informed firms.

As done before, in order to shed light on the mechanisms behind firms' responses to higher inflation expectations during the ELB period, we regress firms' non-inflation beliefs on firms' inflation expectations (exploiting the information treatment as an exogenous source of variation about inflation expectations) for this period and report results in Table 9. Interestingly, rows 1 and 2 show that firms with higher inflation expectations now exhibit a more *optimistic* outlook on Italy's current economic and perceive higher probabilities of an improvement in the economy over the next few months (in this latter case though the effect is not statistically significant). This association of higher inflation with better macroeconomic economic outcomes could therefore rationalize why Italian firms do not cut back on their workforce and increase more significantly their credit utilization.

As reported in rows 3 through 6, firms' increased optimism about the aggregate economic outlook in the face of higher inflation expectations transmits to a more buoyant outlook for their firms' business conditions. Firms with higher inflation expectations anticipate improved business conditions for their company over the next 3 months, increased demand for their products and a better liquidity position. Perceived access to credit is expected to improve with higher inflation, although in this case the estimated coefficient on inflation expectation is not statistically significant.[23]

Firms' improved business and economic outlooks when they have higher inflation expectations seemingly translate into their planned actions during the ELB. Contrary to our findings over the entire sample, we now find that firms with higher inflation expectations (again instrumented with information treatments) plan higher investment expenditures over a one-year horizon and expect to expand their number of employees, consistent with them picturing a brighter outlook for the firm (rows 9 and 10).

Each of these results then points towards a stronger response for the expected path of future prices changes during the ELB period. And this is what we find (row 11): firms with 1 percentage point higher inflation expectations expect to raise their prices in the next 12 months by 0.4 percentage points more (compared to 0.1 percentage points more in the full sample). Furthermore, firms with higher inflation expectations now emphasize more than just raw materials prices as pushing them to

[23] The response of uncertainty to inflation expectations also differs from that in the full sample (rows 7 and 8). Whereas estimates in the full sample indicated that higher inflation expectations led to higher uncertainty in both in the short- and medium-term (with larger effects in the medium-term), during the ELB period we find instead that firms with higher inflation expectations only expect much higher uncertainty in the short-term (the coefficient becomes nearly five times larger) but expect no more uncertainty in the medium-term than firms with lower inflation expectations.

raise their prices: they now cite a perceived increase in the demand for their goods (row 12) and their competitors' pricing decisions (row 15), in addition to even higher expectations of prices for raw materials (row 13). The first two forces are consistent with the fact that firms with higher inflation expectations anticipate an increased level of economic activity as well as improved outlook for their own firm (the increase in demand for their goods). Again, there is little change in perceptions of how labor costs will affect price pressures (row 14), indicating that firms do not view higher inflation as translating in a significant way into higher wages either in or out of the ELB.

Overall, these findings indicate that in the period from 2014Q4 to 2018Q1 when the official policy rates were at the effective lower bound, Italian firms associated higher inflation to better aggregate outcomes and also improved conditions for their business, seemingly inducing them to plan higher investment expenditures and hiring over the future, along with more pronounced price increases than outside the ELB.

One interpretation of these results is that they confirm a central prediction of New Keynesian models, namely that the ELB leads to more positive demand-side effects of inflationary shocks since these are associated with declines rather than increases in the real interest rate, due to constraints on the central bank' interest rate setting. While most work has focused on the extent to which this applies for households, we provide new evidence that these differences extend to firms. However, this is not the only possible explanation. There could have been other factors changing since 2014 that could induce managers to respond differentially to news about inflation. For example, the ECB launched a Quantitative Easing program in 2015. More generally, if demand side shocks became more prevalent during the ELB period than previously, and if managers were aware of this and correctly incorporated this information into their forecasts and decisions, then we would expect to see a changing effect of inflation expectations on economic decisions of firms: information about higher inflation could reveal the presence of positive demand shocks during the ELB period rather than supply shocks prior to the ELB period, leading to differential effects on employment and investment decisions. Unfortunately, the available data does not allow us to decisively distinguish between these two possibilities.

4.6 Heterogeneity

While all of our results are obtained from utilizing the entire cross-section of firms, it could be that the response to information treatments or the effect of inflation expectations differs along a number

of observable characteristics of firms. As documented in section 3, the effect of the treatment on inflation expectations itself does not vary along any of the four observable dimensions (sector, size, geography, export share).

However, we find that stronger differences arise along these observable dimensions when we look at the effects of inflation expectations on actions. For ease of exposition, we focus on the specific horizon of price, employment and credit utilization responses six months after treatment. We re-estimate equation (3) on the same sub-groups of firms, again using the information treatment as an instrument for inflation expectations. Table 10 reports results for price, employment and credit utilization responses. While firms in service and manufacturing respond in approximately the same way for both prices and employment to changes in inflation expectations, firms in the construction sector are far more sensitive both in terms of pricing and employment decisions. Higher sensitivity for construction enterprises is also detected in terms of credit utilization. This could reflect the greater sensitivity of construction to real interest rates and also the willingness of these firms, generally perceived as more risky borrowers, to front load external financing in the advent of tighter credit conditions. We also find a much higher sensitivity of employment decisions to inflation expectations for firms that export little to none, which likely reflects the fact that exporters are less sensitive to business conditions in their home country since more of their revenues come from foreign sources. Finally, there is a striking difference in behavior of firms across regions: firms in the South of Italy are much more sensitive to inflation for their employment decisions than firms in the rest of the country, even after controlling for their sector, size and trade exposure. Economic and social differences between the South and North of Italy have long been identified in the literature (e.g., Tabellini 2010). These results present a new dimension along which economic behavior differs across these regions.

5 Conclusion

Using a unique experiment that generates exogenous variation in the inflation expectations of firms in Italy, we provide new evidence on the causal effect of inflation expectations on firms' economic decisions. These results are useful along several dimensions. First, they speak directly to the causal effects of inflation expectations on economic behavior. While previous work has largely focused on how inflation expectations of households relate to their consumption decisions, we show that firms' inflation expectations directly affect their economic decisions as well. This suggests that

communication policies of central banks may be able to directly affect firms' decisions through their inflation expectations, *if* these policies can reach firms (Coibion et al. 2018).

Second, our results support predictions of New Keynesian models in which higher inflation expectations have more positive effects on economic activity during periods of fixed nominal interest rates. We find that firms with higher inflation expectations during the ELB raise their prices more, hire more workers, utilize their credit lines more, and plan to do more investment than firms with higher inflation expectations outside the ELB, likely due to the fact that the former expect higher demand for their goods.

More generally, our results also speak to the broader success of central banks' communication strategies and the degree to which inflation targeting regimes have "anchored" inflation expectations. Providing firms in Italy with recent information about inflation has large effects on their forecasts and significantly reduces the disagreement in their beliefs, suggesting that they are largely unaware of recent inflation dynamics. Providing them with information about the central bank's inflation target similarly has large effects on their expectations. This does not speak highly of their prior knowledge of this readily-available information and suggests that central banks in general, and the ECB in particular in this case, have a lot of room to improve the way they communicate with the public. The transitory effects of information treatments on inflation expectations further suggest that a successful communication strategy must not only be able to reach decision-makers within firms but do so in a persistent way. How policy-makers should address this point remains an open question.

References

Albonico, Alice, Ludovic Cales, Roberta Cardeni, Olga Croitorov, Filippo Ferroni, Massimo Giovannini, Stefan Hohberger, Beatrice Pataracchia, Filippo Pericoli, Rafal Raciborski, Marco Ratto, Werner Roeger, and Lukas Vogel, 2017. "The Global Multi-Country Model (GM): An Estimated DSGE Model for the Euro Area Countries," JRC Working Papers in Economics and Finance 2017/10.

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

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

Bachmann, Rüdiger, Tim Berg, and Eric Sims. 2015. "Inflation Expectations and Readiness to Spend: Cross-Sectional Evidence." *American Economic Journal: Economic Policy* 7(1): 1-35.

Bartiloro, Laura, Marco Bottone and Alfonso Rosolia. 2017. "What does the heterogeneity of the inflation expectations of Italian firms tell us?" Banca d'Italia Working Paper Number 414, December 2017.

Binder, Carola, and Alex Rodrigue, 2017. "Household Informedness and Long-Run Inflation Expectations: Experimental Evidence." Manuscript. Available at SSRN: https://ssrn.com/abstract=3040706.

Boneva, Lena, James Cloyne, Martin Weale, and Tomasz Wieladek, 2016. "Firms' expectations and price-setting: evidence from micro data," Bank of England Discussion Paper No. 48.

Bordalo, Pedro, Nicola Gennaioli, Yueran Ma, and Andrei Shleifer, 2018. "Overreaction in Macroeconomic Expectations," NBER WP 24932.

Carvalho, Carlos, and Fernanda Nechio, 2014. "Do People Understand Monetary Policy?" *Journal of Monetary Economics* 66(1): 108-123.

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.

Coibion, Olivier, and Yuriy Gorodnichenko, 2012. "What Can Survey Forecasts Tell Us About Informational Rigidities?" *Journal of Political Economy* 120 (1): 116-159.

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

Coibion, Olivier, Yuriy Gorodnichenko, and Saten Kumar, forthcoming. "How Do Firms Form Their Expectations? New Survey Evidence," *American Economic Review*.

Coibion, Olivier, Yuriy Gorodnichenko, Saten Kumar, and Mathieu Pedemonte, 2018. "Inflation Expectations as a Policy Tool?" NBER Working Paper 24788.

Crump, Richard K., Stefano Eusepi, Andrea Tambalotti, and Giorgio Topa, 2015. "Subjective Intertemporal Substitution," Federal Reserve Bank of New York, Staff Paper Number 734.

D'Acunto, Francesco, Daniel Hoang , and Michael Weber, 2016. "The Effect of Unconventional Fiscal Policy on Consumption Expenditure," NBER Working Paper No. 22563.

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

Dräger, Lena, and Giang Nghiem, 2016. "Are Consumers' Spending Decisions in Line With an Euler Equation?," Working Papers 1802, Gutenberg School of Management and Economics, Johannes Gutenberg-Universität Mainz.

Dräger, Lena, and Michael J. Lamla, 2015. "Disagreement à la Taylor: Evidence from Survey Microdata," Macroeconomics and Finance Series 201503, University of Hamburg, Department of Socioeconomics.https://ideas.repec.org/p/hep/macppr/201503.html

Draghi, Mario, 2015. Press conference, October 22, 2015. Available at https://www.ecb.europa.eu/press/pressconf/2015/html/is151022.en.html.

Duca, Ioana A., Geoff Kenny, and Andreas Reuter, 2017. "Inflation Expectations, Consumption and the Lower Bound: Empirical Evidence from a Large Micro Panel." Manuscript.

Gennaioli, Nicola, Yueran Ma, and Andrei Shleifer, 2015. "Expectations and Investment," NBER Macroeconomic Annual 2015, University of Chicago Press, vol. 30(1), pages 379-431.

Grasso, Adriana, and Tiziano Ropele, 2018. "Firms' inflation expectations and investment plans," Bank of Italy Working Paper Series 1203.

Ichiue, Hibiki, and Shusaku Nishiguchi, 2015. "Inflation expectations and consumer spending at the zero bound: Micro evidence," *Economic Inquiry* 53(2): 1086–1107.

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

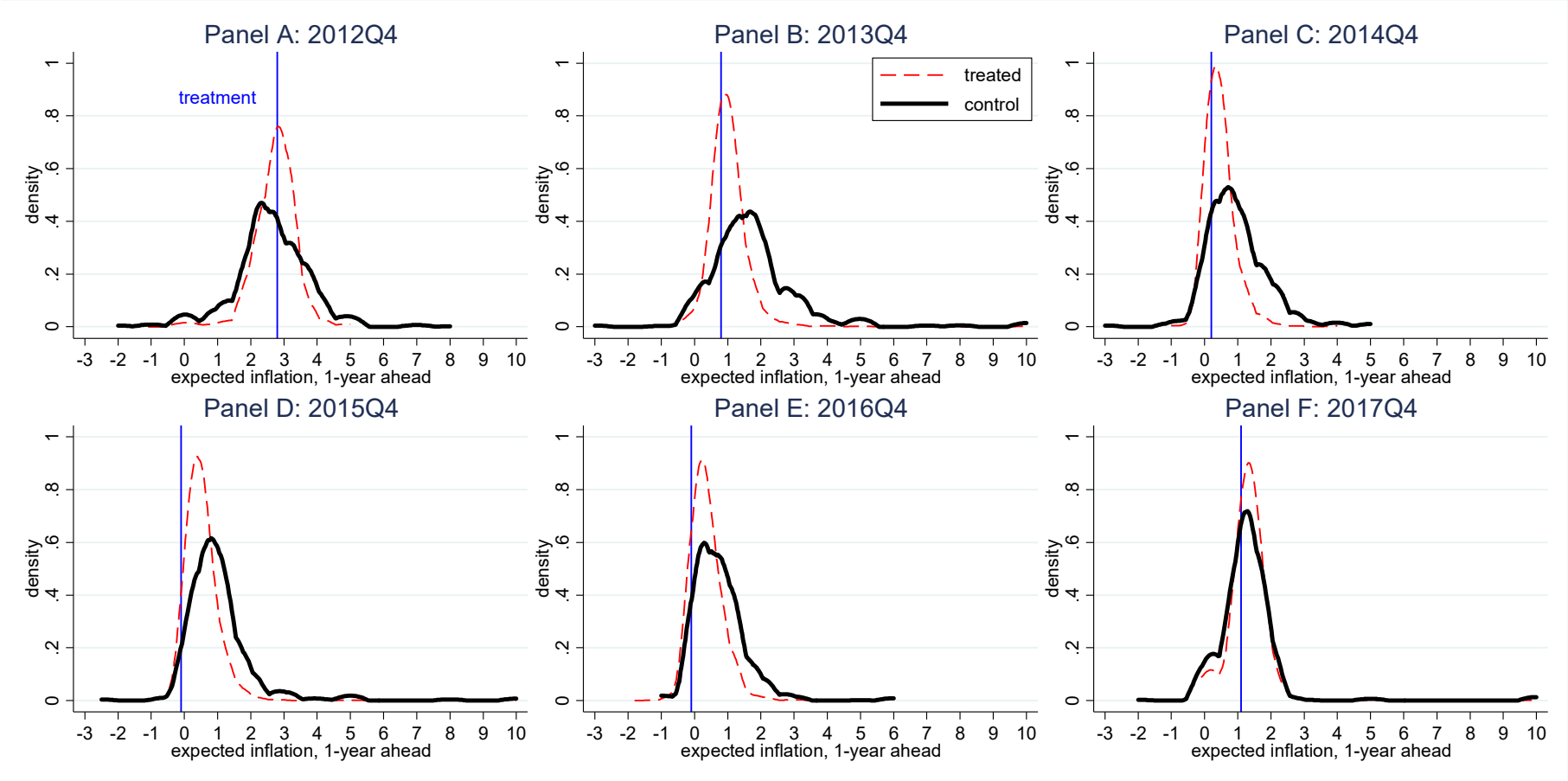
Kuroda, Haruhiko, 2014. "Japan's Economy: Achieving 2 Percent Inflation" Speech at a Meeting Held by the Naigai Josei Chosa Kai (Research Institute of Japan) in Tokyo, August 1, 2014. Available at: https://www.boj.or.jp/en/announcements/press/koen_2014/ko140801a.htm/.

Tabellini, Guido, 2010. "Culture and Institutions: Economic Development in the Regions of Europe," *Journal of the European Economic Association* 8(4), 677-716.

Woodford, Michael, 2011. "The Simple Analytics of the Fiscal Multiplier," *American Economic Journal: Macroeconomics* 3(1): 1-35.

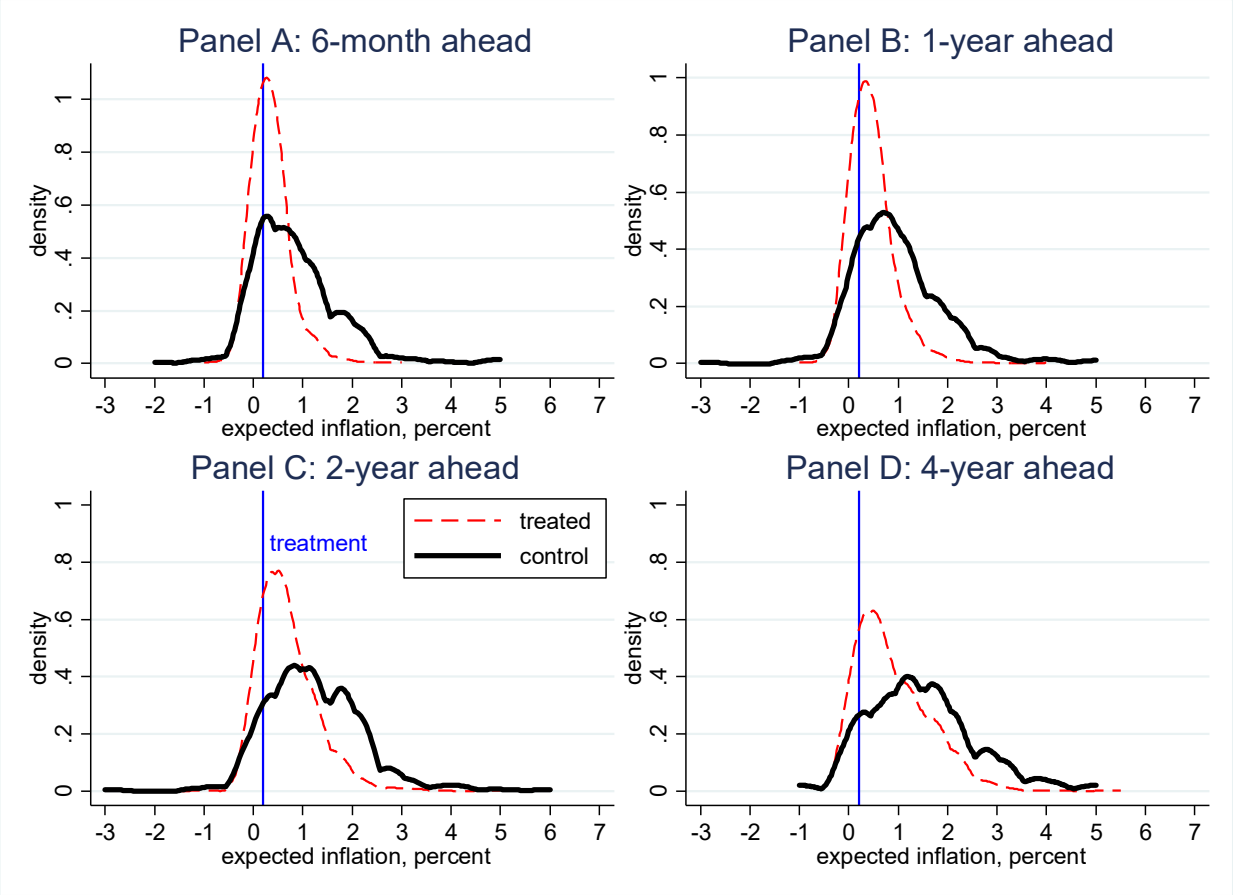
Yellen, Janet, 2016. "Macroeconomic Research After the Crisis," speech at "The Elusive 'Great' Recovery: Causes and Implications for Future Business Cycle Dynamics" 60th annual economic conference sponsored by the Federal Reserve Bank of Boston. Available at: https://www.federalreserve.gov/newsevents/speech/yellen20161014a.htm.

Figure 1. Distribution of inflation expectations for treated and control firms.



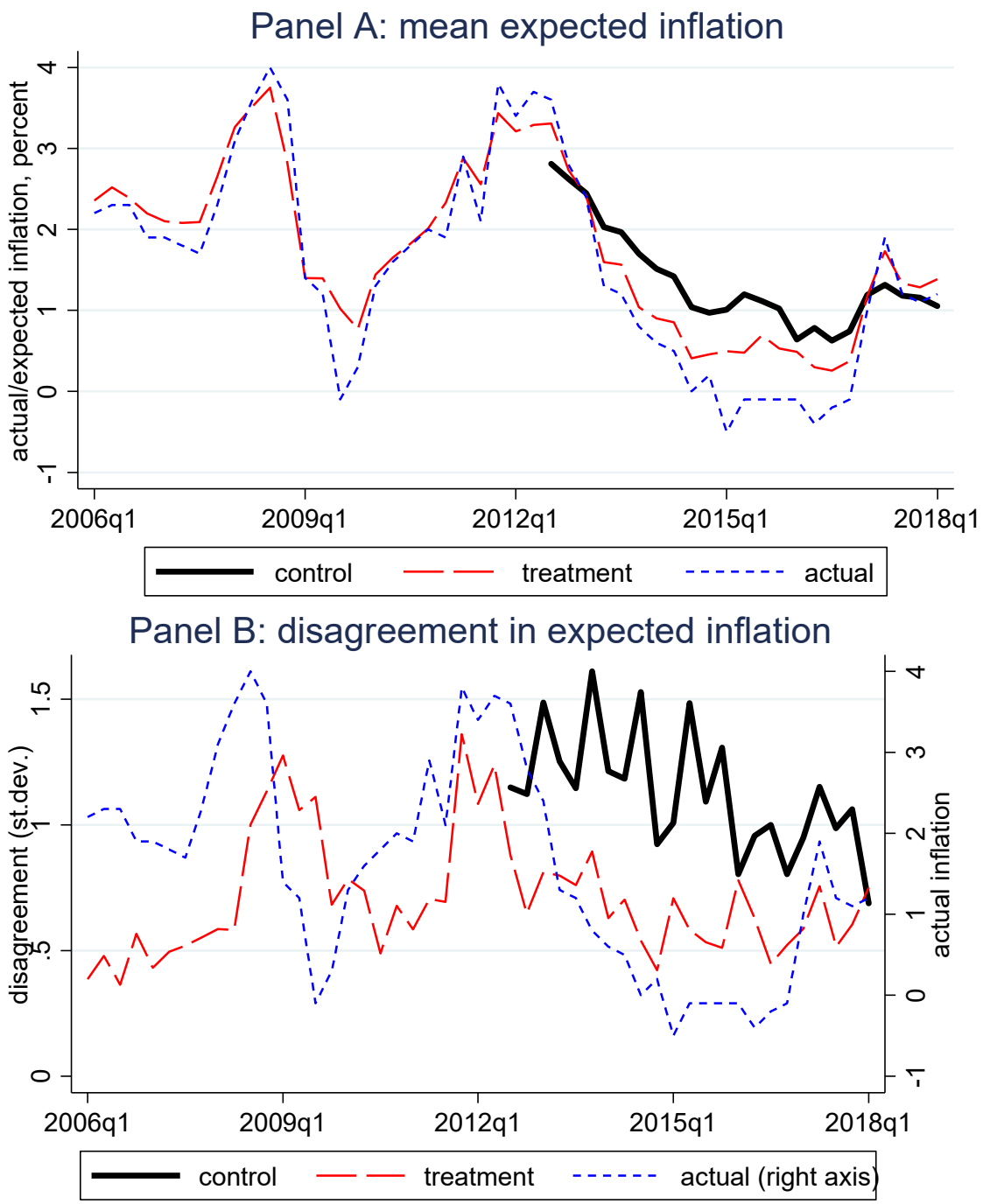
Notes: each panel plots kernel density of inflation expectations (one-year ahead) for treated and control firms in specific survey waves indicated in the title of each panel. Bandwidth is 0.2. The vertical, thin, blue line shows the inflation rate given to treated firms. To improve readability of the figure, we exclude a handful of firms reporting inflation expectations less than -3 percent.

Figure 2. Distribution of inflation expectations by horizon for treated and control firms, 2014Q4.



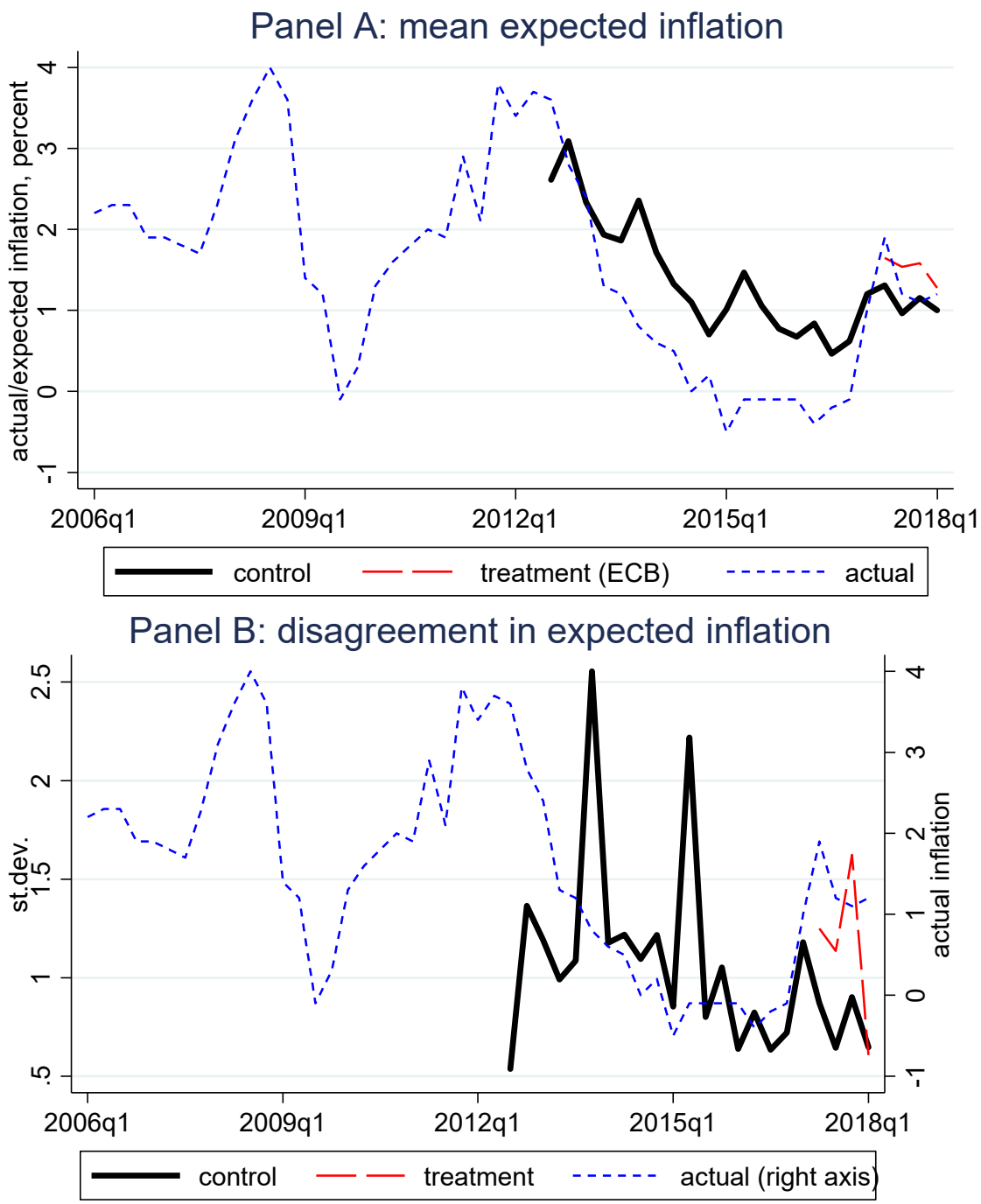
Notes: each panel plots kernel density of inflation expectations by forecast horizon (indicated in panel titles) for treated and control firms in the 2014Q4 wave of the survey. Bandwidth is 0.2. The vertical, thin, blue line shows the inflation rate given to treated firms.

Figure 3. Time series of inflation expectations for treatment (with past actual inflation) and control groups.



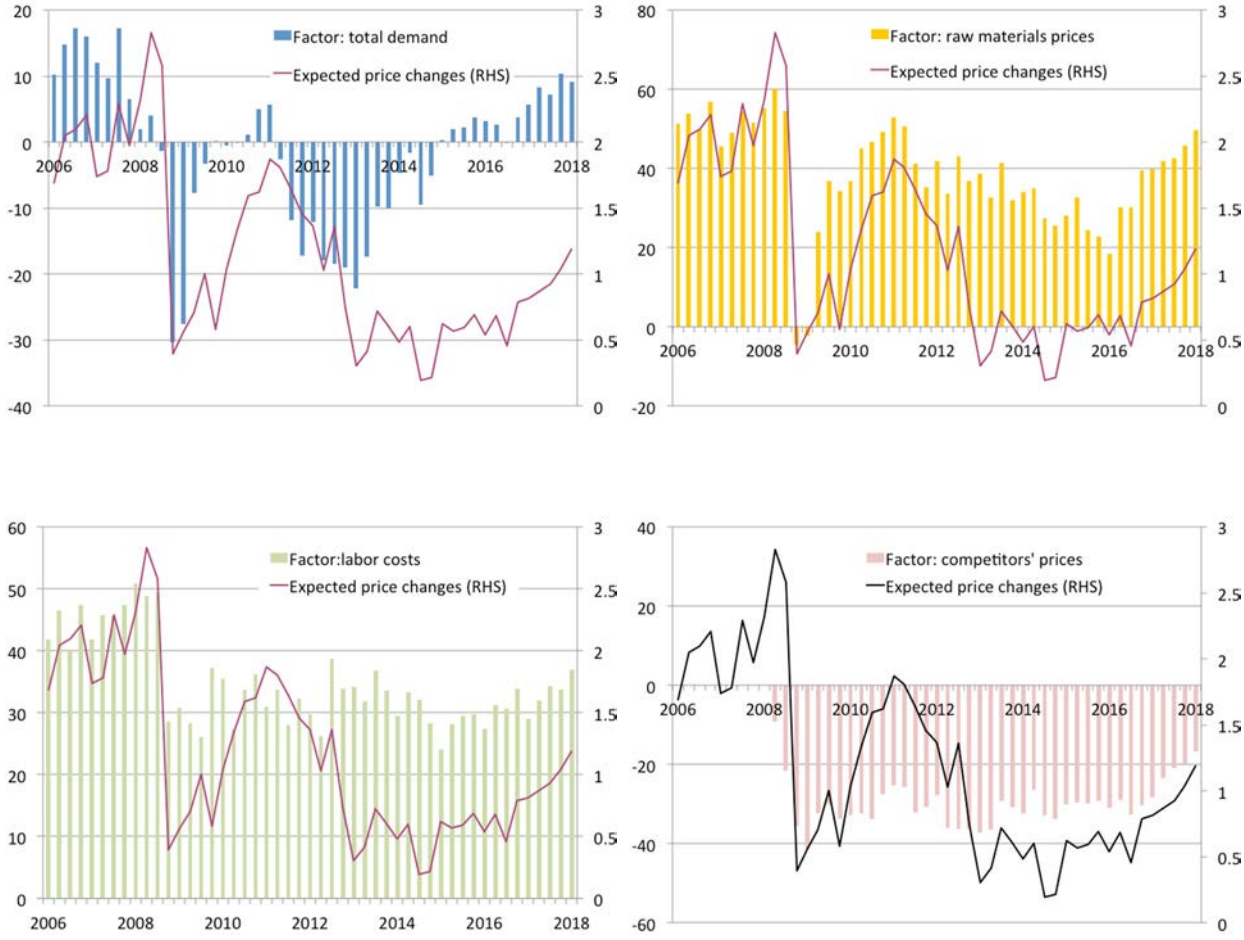
Notes: treated firms are presented with the most recent value of actual inflation, which is shown with blue, short-dash line.

Figure 4. Time series of inflation expectations for treatment (with ECB's inflation target) and control groups.



Notes: treated firms are presented with the inflation target of the European Central Bank (ECB). Actual inflation is shown with blue, short-dash line.

Figure 5. Underlying factors to expected price changes.



Notes: contributions of each underlying factor to firms' expected price changes are expressed in terms of the net percentage between firms that report an upward contribution and those that report a downward contribution. Values are in percentage terms.

Table 1. Assignment of Firms into Treatment and Control Groups.

	Dependent variable: Treatment dummy						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Number of employees (in logarithm)	0.000	0.000	0.000		-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)
Exports as a share of revenues		0.012	0.014			0.010	0.010
		(0.029)	(0.029)			(0.038)	(0.038)
Average absolute size of price changes			0.001				0.000
			(0.002)				(0.002)
Geographic area [omitted category "North-West"]							
North-East				0.014	0.014	0.014	0.014
				(0.022)	(0.022)	(0.022)	(0.022)
Centre				0.046*	0.045*	0.045*	0.045*
				(0.025)	(0.025)	(0.025)	(0.025)
South and Island				0.020	0.020	0.019	0.019
				(0.026)	(0.026)	(0.026)	(0.026)
Sector [omitted category "Manufacturing"]							
Other industry				0.012	0.013	0.011	0.011
				(0.034)	(0.034)	(0.034)	(0.034)
Trading				0.034	0.034	0.030	0.030
				(0.027)	(0.027)	(0.030)	(0.030)
Other services				0.005	0.005	0.001	0.001
				(0.024)	(0.024)	(0.029)	(0.029)
Construction				-0.023	-0.025	-0.029	-0.029
				(0.025)	(0.025)	(0.030)	(0.030)
Constant	0.685***	0.675***	0.675***	0.671***	0.686***	0.682***	0.681***
	(0.049)	(0.055)	(0.055)	(0.019)	(0.055)	(0.057)	(0.058)
Observations	2,251	2,251	2,251	2,165	2,165	2,165	2,165
R-squared	0.000	0.000	0.000	0.003	0.003	0.003	0.003
p-value (F stat)	1.000	1.000	1.000	0.600	0.656	0.704	0.749

Notes: the table reports results for the linear regression where the dependent variable is dichotomous and equal to one if a firm is treated and zero otherwise. Since assignment into treatment and control groups is fixed (that is, firms cannot be re-assigned from one group to another after initial assignment), all regressors are averages over the survey period. *p-value (F stat)* reports the probability value of all regressors (other than the constant) having zero coefficients. *Average absolute size of price changes* is the average absolute value of responses to the following question: "In the last 12 months, what has been the average change in your firm's prices?". Estimation sample is 2012Q3-2018Q1. ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Table 2. Effect of the Treatment with Past Inflation on Inflation Expectations.

	Dependent variable: Inflation expectations by horizon, $F_t^i\pi^{(h)}$			
	6 month ahead	1 year ahead	2 years ahead	4 years ahead
	(1)	(2)	(3)	(4)
Panel A: Longest available sample				
$Treatment_t^i$	0.617***	0.574***	0.490***	0.353***
	(0.060)	(0.057)	(0.051)	(0.059)
Observations	22,149	22,149	22,149	16,609
R-squared	0.259	0.226	0.166	0.049
Sample	2012Q3-2018Q1	2012Q3-2018Q1	2012Q3-2018Q1	2014Q1-2018Q1
Panel B: Consistent sample				
$Treatment_t^i$	0.544***	0.499***	0.431***	0.353***
	(0.063)	(0.062)	(0.061)	(0.059)
Observations	16,609	16,609	16,609	16,609
R-squared	0.131	0.111	0.077	0.049
Sample	2014Q1-2018Q1	2014Q1-2018Q1	2014Q1-2018Q1	2014Q1-2018Q1

Notes: i and t index firms and time (survey waves). $F_t^i\pi^{(h)}$ is *horizon*-ahead inflation expectation of firm i in wave t. $Treatment_t^i$ is equal to the most recent inflation rate presented to a firm for treated firms and zero for control firms. Seasonal dummies for each sector are included but not reported. Specification is given by equation (1). Standard errors reported in parentheses are as in Driscoll and Kraay (1998). ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Table 3. Heterogeneity in Effects of Information Treatment.

	Dependent variable: $F_t^i \pi^{(12m)}$		
	(1)	(2)	(3)
	Panel A. Sector		
	Manufacturing	Services	Construction
$Treatment_t^i$	0.613***	0.628***	0.483***
	(0.047)	(0.043)	(0.076)
Observations	9,547	9,845	4,360
R-squared	0.396	0.345	0.102
	Panel B. Number of employees		
	50-99	100-299	300 or more
$Treatment_t^i$	0.617***	0.611***	0.580***
	(0.055)	(0.041)	(0.044)
Observations	8,865	6,898	7,989
R-squared	0.305	0.377	0.402
	Panel C. Export share, percent		
	0	1-33	34 or more
	0.608***	0.637***	0.594***
	(0.051)	(0.049)	(0.044)
Observations	11,359	5,004	7,389
R-squared	0.316	0.381	0.346
	Panel D. Geography		
	North	Center	South
$Treatment_t^i$	0.617***	0.562***	0.639***
	(0.046)	(0.049)	(0.054)
Observations	13,567	5,044	5,141
R-squared	0.392	0.263	0.271

Notes: *i* and *t* index firms and time (survey waves). $F_t^i \pi^{(12m)}$ is one-year-ahead inflation expectation of firm *i* in wave t. $Treatment_t^i$ is equal to the most recent inflation rate presented to a firm for treated firms and zero for control firms. Seasonal dummies for each sector are included but not reported. Specification is given by equation (1). Sample period is 2012Q3-2018Q1. Standard errors reported in parentheses are as in Driscoll and Kraay (1998). ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Table 4. Duration of Effects of Signals on Inflation Expectations.

	$F_t^i\pi^{(12m)}$	$F_t^i\pi^{(12m)}$	$F_t^i\pi^{(12m)}$	$F_t^i\pi^{(12m)}$	$F_t^i\pi^{(12m)}$
	(1)	(2)	(3)	(4)	(5)
$Treatment_t^i$	0.613***	0.433***	0.358***	0.358***	0.438***
	(0.047)	(0.045)	(0.043)	(0.067)	(0.060)
$Treatment_{t-1}^i$		0.217***	0.143**	0.072	-0.029
		(0.066)	(0.061)	(0.055)	(0.089)
$Treatment_{t-2}^i$			0.162**	0.085	0.033
			(0.064)	(0.060)	(0.061)
$Treatment_{t-3}^i$				0.114*	0.057
				(0.063)	(0.052)
$Treatment_{t-4}^i$					0.088
					(0.068)
Observations	23,626	21,615	20,273	19,030	17,830
R-squared	0.341	0.311	0.261	0.199	0.159

Notes: *i* and *t* index firms and time (survey waves). $F_t^i\pi^{(12m)}$ is one-year-ahead inflation expectation of firm *i* in wave t. $Treatment$ is equal to the most recent inflation rate presented to a firm for treated firms and zero for control firms. Seasonal dummies for each sector are included but not reported. Specification is given by equation (2). Standard errors reported in parentheses are as in Driscoll and Kraay (1998). ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Table 5. Effect of the Treatment with ECB Inflation Target on Inflation Expectations.

	Dependent variable: Inflation expectations by horizon, $F_t^i\pi^{(horizon)}$			
	6 months ahead	1 year ahead	2 years ahead	4 years ahead
	(1)	(2)	(3)	(4)
Panel A: ECB inflation target treatment				
$Treatment_t^i$	0.213***	0.195**	0.181**	0.183**
	(0.071)	(0.075)	(0.083)	(0.091)
Observations	248	248	248	248
R-squared	0.046	0.037	0.025	0.024
Sample	2017Q2-2018Q1	2017Q2-2018Q1	2017Q2-2018Q1	2017Q2-2018Q1
Panel B: Past inflation treatment				
$Treatment_t^i$	0.219***	0.213***	0.210***	0.208***
	(0.044)	(0.048)	(0.052)	(0.056)
Observations	2,642	2,642	2,642	2,642
R-squared	0.033	0.028	0.024	0.019
Sample	2017Q2-2018Q1	2017Q2-2018Q1	2017Q2-2018Q1	2017Q2-2018Q1

Notes: i and t index firms and time (survey waves). $F_t^i\pi^{(horizon)}$ is *horizon*-ahead inflation expectation of firm i in wave t. Panel A: $Treatment_t^i$ is equal to the ECB's target inflation rate (2 percent per year) presented to a firm for treated firms and zero for control firms. Panel B: $Treatment_t^i$ is equal to the most recent inflation rate presented to a firm for treated firms and zero for control firms. Specification is given by equation (1). Standard errors reported in parentheses are clustered at the firm level. ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Table 6. Effects of Inflation Expectations on Prices, Employment and Credit.

	y_t^i	y_{t+1}^i	y_{t+2}^i	y_{t+3}^i	y_{t+4}^i	y_{t+5}^i
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Effect on Prices, IV Estimates						
$F_{t-1}^i \pi^{(12m)}$	0.182**	0.165*	0.028	-0.053	-0.048	-0.112
	(0.084)	(0.080)	(0.111)	(0.083)	(0.099)	(0.085)
Observations	14,127	12,013	11,238	10,496	9,743	8,970
R-squared	0.177	0.165	0.138	0.116	0.115	0.111
1st stage F stat	114.2	115.2	118.7	121.8	120.9	107.8
Panel B: Effect on Prices, OLS Estimates						
$F_{t-1}^i \pi^{(12m)}$	0.165***	0.119***	0.017	0.032	-0.033	-0.006
	(0.049)	(0.035)	(0.046)	(0.045)	(0.052)	(0.048)
Observations	13,950	11,818	11,048	10,310	9,626	8,841
R-squared	0.179	0.168	0.137	0.116	0.112	0.113
Panel C: Effect on Employment, IV Estimates						
$F_{t-1}^i \pi^{(12m)}$	-0.089	-0.337***	-0.480***	-0.810***	-0.866***	-1.137***
	(0.071)	(0.108)	(0.096)	(0.107)	(0.158)	(0.163)
Observations	14,127	12,013	11,238	10,496	9,743	8,970
R-squared	0.022	0.028	0.037	0.055	0.053	0.051
1st stage F stat	114.2	115.2	118.7	121.8	120.9	107.8
Panel D: Effect on Employment, OLS Estimates						
$F_{t-1}^i \pi^{(12m)}$	-0.063	-0.052	-0.134	-0.247**	-0.323**	-0.350**
	(0.040)	(0.061)	(0.085)	(0.086)	(0.113)	(0.122)
Observations	14,014	11,912	11,155	10,408	9,743	8,970
R-squared	0.022	0.031	0.040	0.059	0.056	0.055
Panel E: Effect on Credit, IV Estimates						
$F_{t-1}^i \pi^{(12m)}$	0.118	0.843*	0.390	1.010**	2.095***	0.706
	(0.224)	(0.469)	(0.478)	(0.461)	(0.518)	(0.525)
Observations	11,773	9,977	9,307	8,682	8,035	7,360
R-squared	0.018	0.014	0.017	0.008	0.009	0.009
1st stage F stat	111.1	113.3	111.8	116.7	115.3	105.2
Panel F: Effect on Credit, OLS Estimates						
$F_{t-1}^i \pi^{(12m)}$	0.077	0.077	-0.048	0.147	0.180	-0.166
	(0.153)	(0.274)	(0.296)	(0.349)	(0.433)	(0.452)
Observations	11,676	9,889	9,234	8,606	8,035	7,36
R-squared	0.018	0.016	0.018	0.010	0.016	0.011

Notes: *i* and *t* index firms and time (survey waves). $F_{t-1}^i \pi^{(12m)}$ is one-year-ahead inflation expectation of firm *i* in wave $t-1$. In Panels A and B, the dependent variable is $y_{t+k}^i \equiv dp_{i,t+k}$ where $dp_{i,t+k}$ is the average change in firm *i*'s prices over the previous 12 months in period $t+k$. In Panels C and D, the dependent variable is $y_{t+k}^i \equiv \log\left(\frac{L_{i,t+4}}{L_{i,t-1}}\right)$ where L_{it} is the number of employees in firm *i* at time t. In Panels E and F, the dependent variable is $y_{t+k}^i \equiv u_{i,t+k} - u_{i,t-1}$ where u_{it} is the utilization rate of credit lines by firm *i* at time *t*. Specification is given by equation (3). Seasonal dummies for each sector are included but not reported. Other controls are included but not reported. Estimates for other controls are reported in Appendix Tables 3-11. Estimation sample is 2012Q3-2018Q1. Standard errors reported in parentheses are as in Driscoll and Kraay (1998). ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Table 7. Effects of Inflation Expectations on Other Expectations and Plans.

Row	Outcome variable	Coef. on $F_{t-1}^{i}\pi^{(12m)}$ (std. err.)	Obs.	R^2	1st stage F-stat
		(1)	(2)	(3)	(4)
	Macroeconomic conditions				
(1)	General economic situation relative to 3 months ago	-0.232*** (0.042)	17,735	-0.011	159.9
(2)	Probability of improved situation in the next 3 months	-2.257*** (0.592)	17,889	0.004	161.4
	Firm-specific conditions				
(3)	Expected business conditions for company, next 3 months	-0.165*** (0.022)	17,892	0.003	162.8
(4)	Expected demand for products, next 3 months	-0.106*** (0.029)	16,513	0.005	102.9
(5)	Expected liquidity for company, next 3 months	-0.082*** (0.015)	17,656	0.035	163.6
(6)	Access condition to credit relative to 3 months ago	-0.123*** (0.012)	17,560	0.010	161.6
	Uncertainty				
(7)	3-month ahead	0.005* (0.003)	17,606	0.014	161.6
(8)	3-year ahead	0.008*** (0.002)	17,613	0.010	164.3
(9)	Expected employment change, next 3 months	-0.076*** (0.011)	17,843	0.014	160.4
(10)	Expected investment change, next calendar year	-0.130*** (0.044)	15,753	0.002	134.7
(11)	Expected price change, next 12 months	0.105* (0.059)	17,964	0.020	162.8
	Factors affecting future price changes				
(12)	Expected change in demand	-0.135*** (0.018)	17,456	0.005	163.4
(13)	Expected raw material prices	0.085*** (0.021)	17,400	0.019	164.4
(14)	Expected labor costs	0.021 (0.013)	17,426	0.006	162.6
(15)	Expected prices of competitors	-0.037** (0.017)	17,384	0.004	163.5

Notes: *i* and *t* index firms and time (survey waves). Specification is given by equation (4). $F_{t-1}^{i}\pi^{(12m)}$ is one-year-ahead inflation expectation of firm *i* in wave $t-1$. The right column reports the dependent variables. $F_{t-1}^{i}\pi^{(12m)}$ is instrumented with the treatment variable lagged by one quarter. Seasonal dummies for each sector are included but not reported. Estimation sample is 2012Q3-2018Q1. Standard errors reported in parentheses are as in Driscoll and Kraay (1998). ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Table 8. The ELB Period: Effects of Inflation Expectations on Prices, Employment and Credit

	y_t^i	y_{t+1}^i	y_{t+2}^i
	(1)	(2)	(3)
Panel A: Effect on Prices, IV Estimates			
$F_{t-1}^i \pi^{(12m)}$	0.682***	0.648***	0.655***
	(0.170)	(0.097)	(0.200)
Observations	8,938	7,459	6,800
R-squared	0.154	0.138	0.105
1st stage F stat	111.1	83.56	64.21
Panel B: Effect on Prices, OLS Estimates			
$F_{t-1}^i \pi^{(12m)}$	0.340***	0.228***	0.158**
	(0.041)	(0.074)	(0.054)
Observations	8,825	7,358	6,717
R-squared	0.166	0.155	0.125
Panel C: Effect on Employment, IV Estimates			
$F_{t-1}^i \pi^{(12m)}$	0.266	0.270	-0.162
	(0.190)	(0.223)	(0.151)
Observations	8,938	7,459	6,800
R-squared	0.017	0.026	0.034
1st stage F stat	111.1	83.56	64.21
Panel D: Effect on Employment, OLS Estimates			
$F_{t-1}^i \pi^{(12m)}$	-0.022	0.100	0.122
	(0.069)	(0.091)	(0.122)
Observations	8,825	7,358	6,717
R-squared	0.020	0.027	0.036
Panel E: Effect on Credit, IV Estimates			
$F_{t-1}^i \pi^{(12m)}$	0.200	2.230*	2.889*
	(1.023)	(1.164)	(1.309)
Observations	7,450	6,205	5,642
R-squared	0.025	0.019	0.008
1st stage F stat	107.1	82. 42	59.46
Panel F: Effect on Credit, OLS Estimates			
$F_{t-1}^i \pi^{(12m)}$	-0.026	0.172	-0.015
	(0.201)	(0.388)	(0.569)
Observations	7,353	6,117	5,569
R-squared	0.025	0.025	0.020

Notes: *i* and *t* index firms and time (survey waves). $F_{t-1}^i \pi^{(12m)}$ is one-year-ahead inflation expectation of firm *i* in wave $t-1$. In Panels A and B, the dependent variable is $y_{t+k}^i \equiv dp_{i,t+k}$ is the average change in firm *i*'s prices over the previous 12 months in period $t+k$. In Panels C and D, the dependent variable is $y_{t+k}^i \equiv \log\left(\frac{L_{i,t+4}}{L_{i,t-1}}\right)$ where L_{it} is the number of employees in firm *i* at time t. In Panels E and F, the dependent variable is $y_{t+k}^i \equiv u_{i,t+k} - u_{i,t-1}$ where u_{it} is the utilization rate of credit lines by firm *i* at time *t*. Specification is given by equation (3). Seasonal dummies for each sector are included but not reported. Other controls are included but not reported. Estimates for other controls are reported in Appendix Tables 15-23. Estimation sample is 2014Q4-2018Q1. Standard errors reported in parentheses are as in Driscoll and Kraay (1998). ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Table 9. The ELB Period: Effects of Inflation Expectations on Other Expectations and Plans.

Row	Outcome variable	Coef. on $F^i_{t-1}\pi^{(12m)}$ (std. err.)	Obs.	R^2	1st stage F-stat
		(1)	(2)	(3)	(4)
	Macroeconomic conditions				
(1)	General economic situation relative to 3 months ago	0.176**	11,441	-0.023	78.68
		(0.081)			
(2)	Probability of improved situation in the next 3 months	2.594	11,572	0.021	76.73
		(1.553)			
	Firm-specific conditions				
(3)	Expected business conditions for company, next 3 months	0.097**	11,563	-0.005	76.89
		(0.041)			
(4)	Expected demand for products, next 3 months	0.055**	11,421	0.012	74.18
		(0.021)			
(5)	Expected liquidity for company, next 3 months	0.101**	11,430	0.025	77.22
		(0.044)			
(6)	Access condition to credit relative to 3 months ago	0.009	11,359	0.015	79.35
		(0.021)			
	Uncertainty				
(7)	3-month ahead	0.023***	11,345	0.018	76.02
		(0.005)			
(8)	3-year ahead	0.000	11,362	0.013	77.04
		(0.006)			
(9)	Expected employment change, next 3 months	0.087***	11,548	0.006	77.05
		(0.029)			
(10)	Expected investment change, next calendar year	0.115**	11,451	0.006	78.50
		(0.043)			
(11)	Expected price change, next 12 months	0.420***	11,612	0.028	77.95
		(0.098)			
	Factors affecting future price changes				
(12)	Expected change in demand	0.106*	11,259	0.005	76.34
		(0.054)			
(13)	Expected raw material prices	0.249***	11,228	-0.004	76.84
		(0.067)			
(14)	Expected labor costs	-0.021	11,239	0.005	75.02
		(0.050)			
(15)	Expected prices of competitors	0.185***	11,204	-0.007	78.36
		(0.043)			

Notes: i and t index firms and time (survey waves). Specification is given by equation (4). $F^i_{t-1}\pi^{(12m)}$ is one-year-ahead inflation expectation of firm i in wave $t-1$. The right column indicates the dependent variables. $F^i_{t-1}\pi^{(12m)}$ is instrumented with the treatment variable lagged 1-quarter. Seasonal dummies for each sector are included but not reported. Estimation sample is 2014Q4-2018Q1. Standard errors reported in parentheses are as in Driscoll and Kraay (1998). ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Table 10. Heterogeneity in Effects of Inflation Expectations on Prices, Employment and Credit.

	Dependent variable: $dp_{i,t+1}$			Dependent variable: $\log\left(\frac{L_{i,t+1}}{L_{i,t-1}}\right)$			Dependent variable: $u_{i,t+1}-u_{i,t-1}$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Panel A. Sector								
	Manufacturing	Services	Construction	Manufacturing	Services	Construction	Manufacturing	Services	Construction
$F^i_{t-1}\pi^{(12m)}$	0.132	0.167**	0.472**	-0.447***	-0.436**	-1.274**	1.143**	-0.206	7.051**
	(0.119)	(0.077)	(0.214)	(0.129)	(0.183)	(0.576)	(0.519)	(0.755)	-2.535
Observations	4,988	4,945	1,979	4,988	4,945	1,979	4,200	4,004	1,773
R-squared	0.099	0.141	0.214	0.036	0.033	-0.001	0.019	0.013	-0.010
1st stage F stat	107.8	125.9	37.35	107.8	125.9	37.35	107.6	134.5	34.55
	Panel B. Number of employees								
	50-99	100-299	300 or more	50-99	100-299	300 or more	50-99	100-299	300 or more
$F^i_{t-1}\pi^{(12m)}$	0.109	0.125*	0.224**	-0.564***	-0.460*	-0.521***	0.541	1.060**	0.935
	(0.119)	(0.066)	(0.096)	(0.147)	(0.245)	(0.170)	(0.988)	(0.483)	(0.625)
Observations	4,070	3,548	4,294	4,070	3,548	4,294	3,393	3,156	3,428
R-squared	0.171	0.154	0.211	0.016	0.051	0.044	0.021	0.024	0.017
1st stage F stat	97.45	135.6	119.7	97.45	135.6	119.7	97.76	123.8	131.7
	Panel C. Export share, percent								
	0	1-33	34 or more	0	1-33	34 or more	0	1-33	34 or more
$F^i_{t-1}\pi^{(12m)}$	0.107	0.119	0.212	-0.710***	-0.513**	-0.263*	0.248	2.237***	0.374
	(0.097)	(0.087)	(0.143)	(0.235)	(0.193)	(0.139)	(0.816)	(0.607)	(0.632)
Observations	5,454	2,500	3,958	5,454	2,500	3,958	4,506	2,132	3,339
R-squared	0.176	0.228	0.137	0.023	0.045	0.039	0.020	0.029	0.021
1st stage F stat	108.4	107.3	108.3	108.4	107.3	108.3	96.30	112.0	111.5
	Panel D. Geography								
	North	Center	South	North	Center	South	North	Center	South
$F^i_{t-1}\pi^{(12m)}$	0.128	0.075	0.309**	-0.328**	-0.281	-1.509***	0.741	0.841	0.981
	(0.077)	(0.154)	(0.117)	(0.131)	(0.214)	(0.370)	(0.815)	(0.595)	(0.582)
Observations	6,938	2,578	2,396	6,938	2,578	2,396	2,813	3,051	4,113
R-squared	0.194	0.206	0.102	0.048	0.037	0.009	0.023	0.035	0.012
1st stage F stat	111.7	105.7	104.9	111.7	105.7	104.9	125.5	100.4	101

Notes: i and t index firms and time (survey waves). $F^i_{t-1}\pi^{(12m)}$ is one-year-ahead inflation expectation of firm i in wave t. Treatment is equal to the most recent inflation rate presented to a firm for treated firms and zero for control firms. Seasonal dummies for each sector are included but not reported. Other controls from Table 6 are included but not reported. Estimation sample is 2012Q3-2018Q1. Standard errors reported in parentheses are as in Driscoll and Kraay (1998). ***, **, * denote statistical significance at 1, 5 and 10 percent level.

ONLINE APPENDIX

Appendix Table 1. Descriptive statistics

Variable	N obs.	Mean	St.dev.
Employment	24,404	277.44	2109.09
Export share	24,404	0.52	0.32
Inflation expectations			
6-month ahead	24,377	1.19	1.25
12-month ahead	24,377	1.31	1.22
24-month ahead	24,377	1.45	1.21
48-month ahead	17,301	1.28	1.06
Percent change of prices over the last 12 months	24,404	0.05	3.76
Percent change of employment over the previous 3 months	18,936	-0.18	5.09
Macroeconomic expectations			
General economic situation now relative to 3 moths ago	24,078	-0.11	0.60
Probability of improved situation in the next 3 month	24,281	13.42	17.17
Expectations about firm-specific conditions			
Expected demand for products, next 3 months	21,804	0.11	0.60
Expected employment change, next 3 months	24,217	-0.05	0.57
Expected liquidity for company, next 3 months	24,006	-0.05	0.62
Expected business conditions for company, next 3 months	24,304	-0.08	0.58
Uncertainty			
3-month ahead	23,855	0.36	0.28
3-year ahead	23,848	0.51	0.27
Expected price change, next 12 months	24,404	0.70	3.15
Factors affecting future price changes			
Expected change in demand	23,674	-0.07	1.03
Expected raw material prices	23,604	0.58	1.14
Expected labor costs	23,636	0.53	1.06
Expected prices of competitors	23,569	-0.53	1.19
Sector			
Manufacturing	24,404	0.42	0.49
Services	24,404	0.40	0.49
Construction	24,404	0.18	0.39
Geography			
North-West	24,404	0.38	0.48
North-East	24,404	0.27	0.45
Centre	24,404	0.18	0.39
South and Island	24,404	0.17	0.37

Notes: descriptive statistics are reported for 2012Q3-2018Q1 sample. All statistics are computed with sampling weights.

Appendix Table 2. Dynamic effects of treatment on inflation expectations, treatment with "imputation"

	$F_t^i\pi^{(12m)}$	$F_t^i\pi^{(12m)}$	$F_t^i\pi^{(12m)}$	$F_t^i\pi^{(12m)}$	$F_t^i\pi^{(12m)}$
	(1)	(2)	(3)	(4)	(5)
$Treatment_{i,t}$	0.671***	0.482***	0.392***	0.395***	0.480***
	(0.053)	(0.053)	(0.048)	(0.071)	(0.069)
$Treatment_{i,t-1}$		0.230***	0.144**	0.066	-0.042
		(0.068)	(0.062)	(0.055)	(0.092)
$Treatment_{i,t-2}$			0.174**	0.090	0.034
			(0.067)	(0.063)	(0.065)
$Treatment_{i,t-3}$				0.125*	0.074
				(0.069)	(0.061)
$Treatment_{i,t-4}$					0.088
					(0.068)
Observations	23,626	21,615	20,273	19,030	17,830
R-squared	0.390	0.359	0.296	0.227	0.181

Notes: i and t index firms and time (survey waves). $F_t^i\pi^{(12m)}$ is one-year-ahead inflation of firm i in wave t. $Treatment$ is equal to the most recent inflation rate presented to a firm for treated firms and zero for control firms. Seasonal dummies for each sector are included but not reported. Treatment with "imputation" is implemented as follows: if a firm does not participate in a given wave, impute "no treatment" for this firm even if this firm was assigned to the treatment group. Note that irrespective of whether we impute treatment or not, we use only actual (not imputed) values of inflation expectations. Estimation sample is 2012Q3-2018Q1. Standard errors reported in parentheses are as in Driscoll and Kraay (1998). ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Appendix Table 3. Effect of inflation expectations on firms' price changes, IV estimates.

	dp_{it}	$dp_{i,t+1}$	$dp_{i,t+2}$	$dp_{i,t+3}$	$dp_{i,t+4}$	$dp_{i,t+5}$
	(1)	(2)	(3)	(4)	(5)	(6)
Controls from wave $t-1$						
$F^i_{t-1}\pi^{(12m)}$	0.182**	0.165*	0.028	-0.053	-0.048	-0.112
	(0.084)	(0.080)	(0.111)	(0.083)	(0.099)	(0.085)
Controls from wave $t-2$						
$F^i_{t-2}dp^{12m}_i$	0.412***	0.392***	0.354***	0.308***	0.311***	0.296***
	(0.031)	(0.026)	(0.024)	(0.024)	(0.019)	(0.022)
Business conditions for your company next 3 months [omitted category "Much worse"]						
Worse	0.659*	0.697**	0.303	0.649**	0.364	0.057
	(0.361)	(0.248)	(0.338)	(0.268)	(0.293)	(0.155)
Same	0.934***	0.978***	0.579	0.926***	0.499	0.278*
	(0.311)	(0.280)	(0.377)	(0.243)	(0.380)	(0.155)
Better	1.086***	1.165***	0.673*	1.136***	0.535	0.095
	(0.339)	(0.301)	(0.389)	(0.277)	(0.379)	(0.183)
Much better	0.254	0.354	0.264	0.497	0.019	0.484
	(0.720)	(0.657)	(0.482)	(0.364)	(0.665)	(0.849)
Number of employees in the next 3 months [omitted category "Lower"]						
Same	0.118	0.106	0.073	0.069	0.082	-0.048
	(0.100)	(0.090)	(0.094)	(0.125)	(0.118)	(0.108)
Higher	0.184	0.269*	0.304*	0.265**	0.313*	0.124
	(0.131)	(0.134)	(0.155)	(0.112)	(0.175)	(0.160)
Italy's general economic situation now relative to 3 months ago [omitted category "Worse"]						
Same	0.112	0.024	0.166	0.113	0.152	0.189
	(0.137)	(0.129)	(0.134)	(0.107)	(0.112)	(0.121)
Better	-0.103	-0.260	-0.153	-0.173	0.082	0.152
	(0.158)	(0.166)	(0.145)	(0.160)	(0.103)	(0.174)
Probability of an improvement in Italy's general economic situation in next 3 months [omitted category "Zero"]						
1-25 %	-0.162	-0.082	-0.021	-0.099	-0.041	-0.059
	(0.116)	(0.113)	(0.118)	(0.092)	(0.105)	(0.105)
26-50 %	0.016	-0.105	0.053	-0.151	-0.106	-0.090
	(0.110)	(0.088)	(0.076)	(0.113)	(0.124)	(0.136)
51-75 %	-0.062	-0.090	0.056	0.142	0.157	0.187
	(0.113)	(0.173)	(0.135)	(0.170)	(0.153)	(0.172)
75-99 %	-0.104	-0.167	-0.142	-0.206	-0.063	0.756*
	(0.205)	(0.285)	(0.249)	(0.291)	(0.360)	(0.373)
Liquidity position for your firm in the next 3 months [omitted category "insufficient"]						
Sufficient	0.204**	0.275***	0.139	0.212**	0.111	0.146*
	(0.081)	(0.094)	(0.092)	(0.097)	(0.079)	(0.082)
More than sufficient	0.021	0.068	-0.125	-0.044	-0.150	-0.123
	(0.128)	(0.151)	(0.155)	(0.133)	(0.151)	(0.150)
Observations	14,127	12,013	11,238	10,496	9,743	8,970
R-squared	0.177	0.165	0.138	0.116	0.115	0.111
1st stage F stat	114.2	115.2	118.7	121.8	120.9	107.8

Notes: *i* and *t* index firms and time (survey waves). $F^i_{t-1}\pi^{(12m)}$ is one-year-ahead inflation of firm *i* in wave $t-1$. dp_{it} is the average change in firm *i*'s prices over the previous 12 months. $F^i_{t-2}dp^{(12m)}$ is the expected price changes of firm *i*'s over the next 12 months. Seasonal dummies for each sector are included but not reported. Estimation sample is 2012Q3-2018Q1. Standard errors reported in parentheses are as in Driscoll and Kraay (1998). ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Appendix Table 4. Effect of inflation expectations on firms' price changes, first-stage regression.

	$F^i_{t-1}\pi^{(12m)}$	$F^i_{t-1}\pi^{(12m)}$	$F^i_{t-1}\pi^{(12m)}$	$F^i_{t-1}\pi^{(12m)}$	$F^i_{t-1}\pi^{(12m)}$	$F^i_{t-1}\pi^{(12m)}$
	(1)	(2)	(3)	(4)	(5)	(6)
Controls from wave $t-1$						
$Treatment_{i,t-1}$	0.561***	0.573***	0.569***	0.583***	0.590***	0.575***
	(0.053)	(0.053)	(0.052)	(0.053)	(0.054)	(0.055)
Controls from wave $t-2$						
$F^i_{t-2}dp^{12m}_i$	0.020***	0.023***	0.020***	0.021***	0.022***	0.022***
	(0.005)	(0.006)	(0.006)	(0.007)	(0.005)	(0.004)
Business conditions for your company next 3 months [omitted category "Much worse"]						
Worse	-0.041	-0.067	-0.109	-0.104	-0.120	-0.098
	(0.092)	(0.116)	(0.119)	(0.110)	(0.115)	(0.127)
Same	-0.198	-0.234	-0.280*	-0.268*	-0.294*	-0.250
	(0.121)	(0.140)	(0.149)	(0.136)	(0.146)	(0.144)
Better	-0.200	-0.264*	-0.289*	-0.279*	-0.297**	-0.247*
	(0.127)	(0.148)	(0.155)	(0.138)	(0.141)	(0.138)
Much better	-0.320	-0.236	-0.290	-0.354	-0.022	-0.129
	(0.238)	(0.227)	(0.237)	(0.258)	(0.229)	(0.241)
Number of employees in the next 3 months [omitted category "Lower"]						
Same	-0.027	-0.036	-0.026	-0.033	-0.016	-0.048
	(0.022)	(0.028)	(0.023)	(0.025)	(0.025)	(0.030)
Higher	-0.002	-0.004	-0.013	-0.035	-0.032	-0.060
	(0.030)	(0.033)	(0.040)	(0.036)	(0.037)	(0.042)
Italy's general economic situation now relative to 3 months ago [omitted category "Worse"]						
Same	-0.192**	-0.197**	-0.180**	-0.192**	-0.171*	-0.172*
	(0.081)	(0.077)	(0.082)	(0.087)	(0.088)	(0.092)
Better	-0.195**	-0.183**	-0.166*	-0.170*	-0.137*	-0.135
	(0.082)	(0.079)	(0.080)	(0.089)	(0.078)	(0.090)
Probability of an improvement in Italy's general economic situation in next 3 months [omitted category "Zero"]						
1-25 %	0.011	0.011	0.013	0.017	-0.002	0.010
	(0.040)	(0.043)	(0.040)	(0.045)	(0.052)	(0.051)
26-50 %	0.069	0.036	0.032	0.016	0.007	0.004
	(0.056)	(0.053)	(0.055)	(0.055)	(0.056)	(0.057)
51-75 %	0.182***	0.151***	0.141***	0.124**	0.106*	0.098*
	(0.048)	(0.049)	(0.041)	(0.046)	(0.056)	(0.047)
75-99 %	0.067	0.044	0.014	0.012	-0.098	-0.093
	(0.098)	(0.109)	(0.111)	(0.127)	(0.129)	(0.136)
Liquidity position for your firm in the next 3 months [omitted category "insufficient"]						
Sufficient	-0.013	0.015	0.007	0.019	0.027	-0.001
	(0.019)	(0.021)	(0.026)	(0.022)	(0.031)	(0.023)
More than sufficient	-0.035	-0.007	-0.012	0.011	-0.010	-0.021
	(0.043)	(0.047)	(0.048)	(0.047)	(0.048)	(0.048)
Observations	14,127	12,013	11,238	10,496	9,743	8,970
R-squared	0.320	0.341	0.329	0.343	0.364	0.357

Notes: *i* and *t* index firms and time (survey waves). $F^i_{t-1}\pi^{(12m)}$ is one-year-ahead inflation of firm *i* in wave $t-1$. $F^i_{t-2}dp^{(12m)}$ is the expected price changes of firm *i*'s over the next 12 months. $Treatment_{i,t-1}$ is equal to the most recent inflation rate presented to a firm for treated firms and zero for control firms. Seasonal dummies for each sector are included but not reported. Estimation sample is 2012Q3-2018Q1. Standard errors reported in parentheses are as in Driscoll and Kraay (1998). ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Appendix Table 5. Effect of inflation expectations on firms' price changes, OLS estimates.

	dp_{it}	$dp_{i,t+1}$	$dp_{i,t+2}$	$dp_{i,t+3}$	$dp_{i,t+4}$	$dp_{i,t+5}$
	(1)	(2)	(3)	(4)	(5)	(6)
Controls from wave $t-1$						
$F^i_{t-1}\pi^{(12m)}$	0.165***	0.119***	0.017	0.032	-0.033	-0.006
	(0.049)	(0.035)	(0.046)	(0.045)	(0.052)	(0.048)
Controls from wave $t-2$						
$F^i_{t-2}dp^{12m}_i$	0.416***	0.398***	0.357***	0.306***	0.311***	0.293***
	(0.032)	(0.028)	(0.025)	(0.023)	(0.018)	(0.021)
Business conditions for your company next 3 months [omitted category "Much worse"]						
Worse	0.653*	0.692**	0.298	0.669**	0.368	0.082
	(0.364)	(0.246)	(0.338)	(0.267)	(0.293)	(0.153)
Same	0.923***	0.973***	0.576	0.973***	0.507	0.334**
	(0.312)	(0.270)	(0.366)	(0.234)	(0.383)	(0.148)
Better	1.055***	1.137***	0.654	1.181***	0.544	0.157
	(0.352)	(0.303)	(0.385)	(0.275)	(0.383)	(0.183)
Much better	0.237	0.352	0.268	0.553	0.025	0.539
	(0.719)	(0.657)	(0.477)	(0.366)	(0.674)	(0.825)
Number of employees in the next 3 months [omitted category "Lower"]						
Same	0.111	0.114	0.069	0.061	0.083	-0.039
	(0.098)	(0.093)	(0.096)	(0.125)	(0.117)	(0.107)
Higher	0.175	0.260*	0.282*	0.270**	0.314*	0.137
	(0.128)	(0.133)	(0.153)	(0.115)	(0.173)	(0.158)
Italy's general economic situation now relative to 3 months ago [omitted category "Worse"]						
Same	0.094	-0.021	0.155	0.152	0.159	0.244
	(0.135)	(0.116)	(0.125)	(0.109)	(0.119)	(0.141)
Better	-0.104	-0.294*	-0.165	-0.136	0.089	0.200
	(0.150)	(0.154)	(0.135)	(0.159)	(0.112)	(0.194)
Probability of an improvement in Italy's general economic situation in next 3 months [omitted category "Zero"]						
1-25 %	-0.153	-0.076	-0.020	-0.103	-0.040	-0.056
	(0.118)	(0.115)	(0.119)	(0.090)	(0.105)	(0.102)
26-50 %	0.003	-0.101	0.033	-0.174	-0.106	-0.092
	(0.110)	(0.087)	(0.086)	(0.109)	(0.124)	(0.136)
51-75 %	-0.062	-0.078	0.061	0.132	0.155	0.173
	(0.109)	(0.172)	(0.133)	(0.171)	(0.155)	(0.177)
75-99 %	-0.089	-0.143	-0.125	-0.210	-0.063	0.757*
	(0.207)	(0.291)	(0.242)	(0.295)	(0.361)	(0.380)
Liquidity position for your firm in the next 3 months [omitted category "insufficient"]						
Sufficient	0.197**	0.244**	0.133	0.210**	0.111	0.148*
	(0.082)	(0.088)	(0.091)	(0.098)	(0.079)	(0.082)
More than sufficient	0.019	0.038	-0.131	-0.043	-0.148	-0.109
	(0.130)	(0.145)	(0.154)	(0.136)	(0.155)	(0.151)
Observations	14,014	11,912	11,155	10,408	9,743	8,970
R-squared	0.179	0.168	0.140	0.118	0.115	0.113

Notes: *i* and *t* index firms and time (survey waves). $F^i_{t-1}\pi^{(12m)}$ is one-year-ahead inflation of firm *i* in wave $t-1$. dp_{it} is the average change in firm *i*'s prices over the previous 12 months. $F^i_{t-2}dp^{(12m)}$ is the expected price changes of firm *i*'s over the next 12 months. Seasonal dummies for each sector are included but not reported. Estimation sample is 2012Q3-2018Q1. Standard errors reported in parentheses are as in Driscoll and Kraay (1998). ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Appendix Table 6. Effect of inflation expectations on firms' employment growth, IV estimates.

	$\log\left(\frac{L_{it}}{L_{i,t-1}}\right)$	$\log\left(\frac{L_{i,t+1}}{L_{i,t-1}}\right)$	$\log\left(\frac{L_{i,t+2}}{L_{i,t-1}}\right)$	$\log\left(\frac{L_{i,t+3}}{L_{i,t-1}}\right)$	$\log\left(\frac{L_{i,t+4}}{L_{i,t-1}}\right)$	$\log\left(\frac{L_{i,t+5}}{L_{i,t-1}}\right)$
	(1)	(2)	(3)	(4)	(5)	(6)
Controls from wave $t-1$						
$F^i_{t-1}\pi^{(12m)}$	-0.089	-0.337***	-0.480***	-0.810***	-0.866***	-1.137***
	(0.071)	(0.108)	(0.096)	(0.107)	(0.158)	(0.163)
Controls from wave $t-2$						
$F^i_{t-2}dp^{12m}_i$	-0.000	0.023	-0.024	-0.055*	-0.054	-0.010
	(0.015)	(0.017)	(0.026)	(0.027)	(0.035)	(0.040)
Business conditions for your company next 3 months [omitted category "Much worse"]						
Worse	-0.135	0.010	-0.867*	-1.126***	-0.766	-1.188
	(0.291)	(0.530)	(0.472)	(0.391)	(0.975)	(1.150)
Same	-0.377	-0.631	-1.362***	-1.896***	-1.522*	-2.105*
	(0.323)	(0.477)	(0.294)	(0.413)	(0.858)	(1.032)
Better	0.173	0.426	-0.328	-0.581	-0.160	-0.002
	(0.370)	(0.522)	(0.550)	(0.505)	(1.082)	(1.325)
Much better	0.432	-0.161	-2.416	-5.785**	-9.652**	-4.071*
	(1.942)	(2.075)	(1.828)	(2.146)	(4.050)	(2.108)
Number of employees in the next 3 months [omitted category "Lower"]						
Same	1.060***	1.516***	2.382***	3.605***	4.065***	4.312***
	(0.142)	(0.144)	(0.284)	(0.291)	(0.302)	(0.456)
Higher	2.064***	3.182***	5.006***	7.681***	8.759***	9.285***
	(0.282)	(0.388)	(0.531)	(0.629)	(0.699)	(0.833)
Italy's general economic situation now relative to 3 months ago [omitted category "Worse"]						
Same	0.012	-0.077	-0.091	-0.132	-0.075	-0.434
	(0.136)	(0.182)	(0.260)	(0.231)	(0.346)	(0.388)
Better	-0.241	-0.389	-0.205	-0.311	-0.259	-0.766
	(0.200)	(0.335)	(0.409)	(0.445)	(0.686)	(0.792)
Probability of an improvement in Italy's general economic situation in next 3 months [omitted category "Zero"]						
1-25 %	0.089	0.182	-0.051	-0.045	-0.291	-0.472*
	(0.081)	(0.112)	(0.154)	(0.229)	(0.257)	(0.252)
26-50 %	0.079	0.139	-0.228	-0.175	-0.045	-0.375
	(0.113)	(0.225)	(0.245)	(0.305)	(0.422)	(0.469)
51-75 %	0.280	0.646**	0.430	0.320	-0.080	0.069
	(0.245)	(0.294)	(0.320)	(0.415)	(0.455)	(0.695)
75-99 %	0.004	0.809*	1.230	0.709	0.299	-0.116
	(0.423)	(0.436)	(0.736)	(0.932)	(1.018)	(1.317)
Liquidity position for your firm in the next 3 months [omitted category "insufficient"]						
Sufficient	0.435***	0.897***	1.287***	1.632***	1.877***	2.613***
	(0.097)	(0.161)	(0.199)	(0.318)	(0.379)	(0.268)
More than sufficient	0.331**	0.839***	1.247***	1.762***	2.321***	3.219***
	(0.134)	(0.236)	(0.175)	(0.309)	(0.359)	(0.390)
Observations	14,127	12,013	11,238	10,496	9,743	8,970
R-squared	0.022	0.028	0.037	0.055	0.053	0.051
1st stage F stat	114.2	115.2	118.7	121.8	120.9	107.8

Notes: *i* and *t* index firms and time (survey waves). $F^i_{t-1}\pi^{(12m)}$ is one-year-ahead inflation of firm *i* in wave $t-1$. L_{it} is the number of employees in firm *i* at time t. $F^i_{t-2}dp^{(12m)}$ is the expected price changes of firm *i*'s over the next 12 months. Seasonal dummies for each sector are included but not reported. Estimation sample is 2012Q3-2018Q1. Standard errors reported in parentheses are as in Driscoll and Kraay (1998). ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Appendix Table 7. Effect of inflation expectations on firms' employment growth, first-stage regression.

	$E_{i,t-1}\pi^{(12m)}$	$E_{i,t-1}\pi^{(12m)}$	$E_{i,t-1}\pi^{(12m)}$	$E_{i,t-1}\pi^{(12m)}$	$E_{i,t-1}\pi^{(12m)}$	$E_{i,t-1}\pi^{(12m)}$
	(1)	(2)	(3)	(4)	(5)	(6)
Controls from wave $t-1$						
$Treatment_{i,t-1}$	0.561***	0.573***	0.569***	0.583***	0.590***	0.575***
	(0.053)	(0.053)	(0.052)	(0.053)	(0.054)	(0.055)
Controls from wave $t-2$						
$F^i_{t-2}dp^{12m}_i$	0.020***	0.023***	0.020***	0.021***	0.022***	0.022***
	(0.005)	(0.006)	(0.006)	(0.007)	(0.005)	(0.004)
Business conditions for your company next 3 months [omitted category "Much worse"]						
Worse	-0.041	-0.067	-0.109	-0.104	-0.120	-0.098
	(0.092)	(0.116)	(0.119)	(0.110)	(0.115)	(0.127)
Same	-0.198	-0.234	-0.280*	-0.268*	-0.294*	-0.250
	(0.121)	(0.140)	(0.149)	(0.136)	(0.146)	(0.144)
Better	-0.200	-0.264*	-0.289*	-0.279*	-0.297**	-0.247*
	(0.127)	(0.148)	(0.155)	(0.138)	(0.141)	(0.138)
Much better	-0.320	-0.236	-0.290	-0.354	-0.022	-0.129
	(0.238)	(0.227)	(0.237)	(0.258)	(0.229)	(0.241)
Number of employees in the next 3 months [omitted category "Lower"]						
Same	-0.027	-0.036	-0.026	-0.033	-0.016	-0.048
	(0.022)	(0.028)	(0.023)	(0.025)	(0.025)	(0.030)
Higher	-0.002	-0.004	-0.013	-0.035	-0.032	-0.060
	(0.030)	(0.033)	(0.040)	(0.036)	(0.037)	(0.042)
Italy's general economic situation now relative to 3 months ago [omitted category "Worse"]						
Same	-0.192**	-0.197**	-0.180**	-0.192**	-0.171*	-0.172*
	(0.081)	(0.077)	(0.082)	(0.087)	(0.088)	(0.092)
Better	-0.195**	-0.183**	-0.166*	-0.170*	-0.137*	-0.135
	(0.082)	(0.079)	(0.080)	(0.089)	(0.078)	(0.090)
Probability of an improvement in Italy's general economic situation in next 3 months [omitted category "Zero"]						
1-25 %	0.011	0.011	0.013	0.017	-0.002	0.010
	(0.040)	(0.043)	(0.040)	(0.045)	(0.052)	(0.051)
26-50 %	0.069	0.036	0.032	0.016	0.007	0.004
	(0.056)	(0.053)	(0.055)	(0.055)	(0.056)	(0.057)
51-75 %	0.182***	0.151***	0.141***	0.124**	0.106*	0.098*
	(0.048)	(0.049)	(0.041)	(0.046)	(0.056)	(0.047)
75-99 %	0.067	0.044	0.014	0.012	-0.098	-0.093
	(0.098)	(0.109)	(0.111)	(0.127)	(0.129)	(0.136)
Liquidity position for your firm in the next 3 months [omitted category "insufficient"]						
Sufficient	-0.013	0.015	0.007	0.019	0.027	-0.001
	(0.019)	(0.021)	(0.026)	(0.022)	(0.031)	(0.023)
More than sufficient	-0.035	-0.007	-0.012	0.011	-0.010	-0.021
	(0.043)	(0.047)	(0.048)	(0.047)	(0.048)	(0.048)
Observations	14,127	12,013	11,238	10,496	9,743	8,970
R-squared	0.320	0.341	0.329	0.343	0.364	0.357

Notes: i and t index firms and time (survey waves). $E_{i,t-1}\pi^{(12m)}$ is one-year-ahead inflation of firm i in wave $t-1$. L_{it} is the number of employees in firm i at time t. $Treatment_{i,t-1}$ is equal to the most recent inflation rate presented to a firm for treated firms and zero for control firms. $F^i_{t-2}dp^{(12m)}$ is the expected price changes of firm i's over the next 12 months. Seasonal dummies for each sector are included but not reported. Estimation sample is 2012Q3-2018Q1. Standard errors reported in parentheses are as in Driscoll and Kraay (1998). ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Appendix Table 8. Effect of inflation expectations on firms' employment growth, OLS estimates.

	$\log\left(\frac{L_{it}}{L_{i,t-1}}\right)$	$\log\left(\frac{L_{i,t+1}}{L_{i,t-1}}\right)$	$\log\left(\frac{L_{i,t+2}}{L_{i,t-1}}\right)$	$\log\left(\frac{L_{i,t+3}}{L_{i,t-1}}\right)$	$\log\left(\frac{L_{i,t+4}}{L_{i,t-1}}\right)$	$\log\left(\frac{L_{i,t+5}}{L_{i,t-1}}\right)$
	(1)	(2)	(3)	(4)	(5)	(6)
Controls from wave $t-1$						
$F^i_{t-1}\pi^{(12m)}$	-0.063	-0.052	-0.134	-0.247**	-0.323**	-0.350**
	(0.040)	(0.061)	(0.085)	(0.086)	(0.113)	(0.122)
Controls from wave $t-2$						
$F^i_{t-2}dp^{12m}_i$	-0.003	0.011	-0.036	-0.074***	-0.073**	-0.038
	(0.015)	(0.015)	(0.025)	(0.025)	(0.033)	(0.041)
Business conditions for your company next 3 months [omitted category "Much worse"]						
Worse	-0.142	0.039	-0.810*	-1.022**	-0.632	-1.002
	(0.293)	(0.517)	(0.467)	(0.389)	(0.948)	(1.104)
Same	-0.372	-0.520	-1.219***	-1.631***	-1.222	-1.686
	(0.331)	(0.473)	(0.290)	(0.429)	(0.815)	(0.982)
Better	0.164	0.562	-0.135	-0.250	0.171	0.456
	(0.382)	(0.518)	(0.549)	(0.522)	(1.050)	(1.299)
Much better	0.420	-0.009	-2.210	-5.418**	-9.437**	-3.664*
	(1.940)	(2.096)	(1.834)	(2.199)	(4.144)	(2.090)
Number of employees in the next 3 months [omitted category "Lower"]						
Same	1.052***	1.537***	2.391***	3.634***	4.093***	4.377***
	(0.142)	(0.147)	(0.289)	(0.302)	(0.307)	(0.474)
Higher	2.092***	3.193***	5.029***	7.763***	8.809***	9.386***
	(0.289)	(0.390)	(0.530)	(0.625)	(0.700)	(0.835)
Italy's general economic situation now relative to 3 months ago [omitted category "Worse"]						
Same	0.029	0.070	0.074	0.168	0.215	-0.023
	(0.127)	(0.162)	(0.246)	(0.238)	(0.326)	(0.356)
Better	-0.213	-0.288	-0.089	-0.102	0.001	-0.410
	(0.190)	(0.303)	(0.412)	(0.432)	(0.714)	(0.783)
Probability of an improvement in Italy's general economic situation in next 3 months [omitted category "Zero"]						
1-25 %	0.078	0.185	-0.050	-0.054	-0.272	-0.450*
	(0.078)	(0.110)	(0.153)	(0.225)	(0.251)	(0.235)
26-50 %	0.087	0.173	-0.207	-0.156	-0.061	-0.391
	(0.111)	(0.225)	(0.251)	(0.320)	(0.430)	(0.463)
51-75 %	0.271	0.645**	0.408	0.291	-0.144	-0.036
	(0.249)	(0.284)	(0.318)	(0.405)	(0.484)	(0.688)
75-99 %	-0.030	0.786*	1.237	0.665	0.295	-0.112
	(0.421)	(0.444)	(0.747)	(0.944)	(1.022)	(1.317)
Liquidity position for your firm in the next 3 months [omitted category "insufficient"]						
Sufficient	0.448***	0.910***	1.316***	1.645***	1.872***	2.633***
	(0.099)	(0.167)	(0.197)	(0.322)	(0.384)	(0.263)
More than sufficient	0.347**	0.883***	1.306***	1.788***	2.386***	3.326***
	(0.141)	(0.248)	(0.193)	(0.303)	(0.369)	(0.405)
Observations	14,014	11,912	11,155	10,408	9,743	8,970
R-squared	0.022	0.031	0.040	0.059	0.056	0.055

Notes: *i* and *t* index firms and time (survey waves). $F^i_{t-1}\pi^{(12m)}$ is one-year-ahead inflation of firm *i* in wave $t-1$. L_{it} is the number of employees in firm *i* at time t. $F^i_{t-2}dp^{(12m)}$ is the expected price changes of firm *i*'s over the next 12 months. Seasonal dummies for each sector are included but not reported. Estimation sample is 2012Q3-2018Q1. Standard errors reported in parentheses are as in Driscoll and Kraay (1998). ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Appendix Table 9. Effect of inflation expectations on firms' credit demand, IV estimates.

	$u_{it} - u_{it-1}$	$u_{it+1} - u_{it-1}$	$u_{it+2} - u_{it-1}$	$u_{it+3} - u_{it-1}$	$u_{it+4} - u_{it-1}$	$u_{it+5} - u_{it-1}$
	(1)	(2)	(3)	(4)	(5)	(6)
Controls from wave $t-1$						
$F^i_{t-1}\pi^{(12m)}$	0.118	0.843*	0.390	1.010**	2.095***	0.706
	(0.224)	(0.469)	(0.478)	(0.461)	(0.518)	(0.525)
Controls from wave $t-2$						
$F^i_{t-2}dp^{12m}_i$	0.033	-0.040	-0.054	-0.033	-0.083	-0.060
	(0.069)	(0.123)	(0.130)	(0.110)	(0.091)	(0.134)
Business conditions for your company next 3 months [omitted category "Much worse"]						
Worse	-1.896	-3.296	-5.020	-6.524	-6.848	-6.125
	(1.724)	(3.358)	(4.189)	(3.887)	(4.175)	(5.629)
Same	-2.090	-3.701	-6.602*	-7.978**	-8.818**	-8.022
	(1.804)	(3.028)	(3.765)	(3.604)	(3.800)	(5.018)
Better	-0.545	-1.339	-4.139	-5.427	-7.101*	-7.382
	(1.620)	(2.997)	(3.752)	(3.568)	(3.618)	(5.281)
Much better	-4.649	-9.992	-9.418*	-21.976**	-24.289*	-20.403
	(4.437)	(6.567)	(5.255)	(8.435)	(11.778)	(14.228)
Number of employees in the next 3 months [omitted category "Lower"]						
Same	-0.557	-0.828	-0.666	-0.831	0.127	-0.857
	(0.555)	(1.132)	(1.092)	(0.937)	(0.909)	(1.373)
Higher	-0.822	0.176	0.405	0.570	2.064*	2.487
	(0.694)	(0.948)	(1.122)	(1.164)	(1.102)	(1.600)
Italy's general economic situation now relative to 3 months ago [omitted category "Worse"]						
Same	-0.601	-0.874	0.492	0.252	0.448	-0.124
	(0.531)	(0.768)	(0.796)	(0.649)	(0.771)	(0.998)
Better	-0.379	1.351	0.949	1.135	0.762	-0.277
	(0.836)	(1.572)	(1.604)	(1.133)	(1.254)	(1.410)
Probability of an improvement in Italy's general economic situation in next 3 months [omitted category "Zero"]						
1-25 %	0.516	0.076	-1.036	0.353	1.056	1.016
	(0.362)	(0.686)	(0.728)	(0.634)	(0.760)	(0.731)
26-50 %	-0.576	-0.460	-1.667	-2.156*	-0.814	-0.798
	(0.675)	(1.183)	(1.089)	(1.140)	(1.021)	(1.249)
51-75 %	1.246	0.226	-0.297	1.097	1.884	2.073
	(1.067)	(1.639)	(1.698)	(1.689)	(1.790)	(1.419)
75-99 %	1.015	-0.189	4.156	6.243*	5.522*	3.984
	(2.127)	(3.475)	(3.863)	(3.539)	(3.107)	(4.064)
Liquidity position for your firm in the next 3 months [omitted category "insufficient"]						
Sufficient	-1.423*	-3.132***	-3.239***	-1.389	-1.342	-0.872
	(0.733)	(0.877)	(0.880)	(0.809)	(1.252)	(1.302)
More than sufficient	-1.588*	-3.207**	-3.681***	-1.301	-0.225	-0.135
	(0.890)	(1.137)	(1.135)	(0.943)	(1.379)	(1.277)
Observations	11,773	9,977	9,307	8,682	8,035	7,360
R-squared	0.018	0.014	0.017	0.008	0.009	0.009
1st stage F stat	111.1	113.3	111.8	116.7	115.3	105.2

Notes: *i* and *t* index firms and time (survey waves). $F^i_{t-1}\pi^{(12m)}$ is one-year-ahead inflation expectation of firm *i* in wave $t-1$. u_{it} is the utilization rate of credit lines of firm *i* in period *t*. $F^i_{t-2}dp^{(12m)}$ is the expected price changes of firm *i*'s over the next 12 months. Seasonal dummies for each sector are included but not reported. Estimation sample is 2012Q3-2018Q1. Standard errors reported in parentheses are as in Driscoll and Kraay (1998). ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Appendix Table 10. Effect of inflation expectations on firms' credit demand, first-stage regression.

	$F^i_{t-1}\pi^{(12m)}$	$F^i_{t-1}\pi^{(12m)}$	$F^i_{t-1}\pi^{(12m)}$	$F^i_{t-1}\pi^{(12m)}$	$F^i_{t-1}\pi^{(12m)}$	$F^i_{t-1}\pi^{(12m)}$
	(1)	(2)	(3)	(4)	(5)	(6)
Controls from wave $t-1$						
$Treatment^i_{t-1}$	0.562***	0.574***	0.567***	0.581***	0.589***	0.573***
	(0.053)	(0.054)	(0.054)	(0.054)	(0.055)	(0.056)
Controls from wave $t-2$						
$F^i_{t-2}dp^{12m}_i$	0.024***	0.030***	0.028***	0.029***	0.027***	0.028***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)
Business conditions for your company next 3 months [omitted category "Much worse"]						
Worse	-0.020	-0.065	-0.106	-0.142	-0.128	-0.158
	(0.095)	(0.123)	(0.119)	(0.117)	(0.129)	(0.158)
Same	-0.200	-0.249*	-0.294*	-0.319**	-0.311*	-0.323*
	(0.121)	(0.144)	(0.144)	(0.138)	(0.161)	(0.177)
Better	-0.179	-0.260*	-0.264*	-0.299**	-0.290*	-0.303*
	(0.129)	(0.150)	(0.149)	(0.140)	(0.154)	(0.167)
Much better	-0.309	-0.220	-0.257	-0.556**	-0.215	-0.437**
	(0.241)	(0.214)	(0.215)	(0.231)	(0.226)	(0.202)
Number of employees in the next 3 months [omitted category "Lower"]						
Same	-0.024	-0.037	-0.028	-0.024	-0.015	-0.047
	(0.024)	(0.028)	(0.021)	(0.024)	(0.030)	(0.033)
Higher	0.018	0.022	-0.000	-0.010	-0.015	-0.048
	(0.040)	(0.038)	(0.053)	(0.047)	(0.051)	(0.052)
Italy's general economic situation now relative to 3 months ago [omitted category "Worse"]						
Same	-0.162**	-0.178**	-0.152*	-0.171**	-0.156*	-0.145*
	(0.072)	(0.065)	(0.074)	(0.078)	(0.077)	(0.079)
Better	-0.167**	-0.162**	-0.144*	-0.146*	-0.116	-0.119
	(0.073)	(0.073)	(0.074)	(0.079)	(0.068)	(0.077)
Probability of an improvement in Italy's general economic situation in next 3 months [omitted category "Zero"]						
1-25 %	-0.014	-0.014	-0.010	-0.006	-0.020	-0.003
	(0.043)	(0.044)	(0.045)	(0.049)	(0.055)	(0.056)
26-50 %	0.024	-0.023	-0.012	-0.027	-0.033	-0.022
	(0.064)	(0.056)	(0.065)	(0.055)	(0.058)	(0.059)
51-75 %	0.156***	0.145***	0.162***	0.148***	0.132**	0.141**
	(0.040)	(0.051)	(0.041)	(0.047)	(0.060)	(0.054)
75-99 %	0.052	0.030	-0.011	-0.008	-0.134	-0.081
	(0.097)	(0.106)	(0.118)	(0.130)	(0.140)	(0.148)
Liquidity position for your firm in the next 3 months [omitted category "insufficient"]						
Sufficient	0.025	0.053**	0.041	0.060**	0.067*	0.037
	(0.021)	(0.022)	(0.029)	(0.027)	(0.036)	(0.030)
More than sufficient	-0.031	-0.012	-0.027	0.004	-0.007	-0.026
	(0.040)	(0.046)	(0.047)	(0.047)	(0.053)	(0.048)
Observations	11,773	9,977	9,307	8,682	8,035	7,360
R-squared	0.320	0.346	0.328	0.341	0.360	0.353

Notes: *i* and *t* index firms and time (survey waves). $F^i_{t-1}\pi^{(12m)}$ is one-year-ahead inflation of firm *i* in wave $t-1$. $F^i_{t-2}dp^{(12m)}$ is the expected price changes of firm *i*'s over the next 12 months. $Treatment^i_{t-1}$ is equal to the most recent inflation rate presented to a firm for treated firms and zero for control firms. Seasonal dummies for each sector are included but not reported. Estimation sample is 2012Q3-2018Q1. Standard errors reported in parentheses are as in Driscoll and Kraay (1998). ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Appendix Table 11. Effect of inflation expectations on firms' credit demand, OLS estimates.

	$u_{it} - u_{it-1}$	$u_{it+1} - u_{it-1}$	$u_{it+2} - u_{it-1}$	$u_{it+3} - u_{it-1}$	$u_{it+4} - u_{it-1}$	$u_{it+5} - u_{it-1}$
	(1)	(2)	(3)	(4)	(5)	(6)
Controls from wave $t-1$						
$F^i_{t-1}\pi^{(12m)}$	0.077	0.077	-0.048	0.147	0.180	-0.166
	(0.153)	(0.274)	(0.296)	(0.349)	(0.433)	(0.452)
Controls from wave $t-2$						
$F^i_{t-2}dp^{12m}_i$	0.042	-0.003	-0.031	0.005	-0.006	-0.024
	(0.067)	(0.124)	(0.133)	(0.112)	(0.091)	(0.126)
Business conditions for your company next 3 months [omitted category "Much worse"]						
Worse	-1.914	-3.365	-5.066	-6.708	-7.336*	-6.409
	(1.726)	(3.408)	(4.209)	(3.891)	(4.203)	(5.711)
Same	-2.150	-4.009	-6.793*	-8.467**	-9.910**	-8.569
	(1.815)	(3.112)	(3.761)	(3.565)	(3.882)	(5.183)
Better	-0.570	-1.599	-4.253	-5.862	-8.273**	-7.959
	(1.634)	(3.088)	(3.744)	(3.541)	(3.737)	(5.456)
Much better	-4.665	-10.237	-9.514*	-22.621**	-25.434**	-21.142
	(4.470)	(6.588)	(5.227)	(8.437)	(11.579)	(14.281)
Number of employees in the next 3 months [omitted category "Lower"]						
Same	-0.635	-0.916	-0.719	-0.837	0.021	-0.931
	(0.541)	(1.133)	(1.103)	(0.937)	(0.906)	(1.397)
Higher	-0.917	-0.059	0.190	0.425	1.912	2.382
	(0.674)	(0.955)	(1.145)	(1.218)	(1.116)	(1.619)
Italy's general economic situation now relative to 3 months ago [omitted category "Worse"]						
Same	-0.589	-1.247*	0.271	-0.182	-0.521	-0.546
	(0.466)	(0.694)	(0.790)	(0.673)	(0.790)	(0.971)
Better	-0.406	1.034	0.703	0.777	-0.082	-0.648
	(0.796)	(1.545)	(1.562)	(1.143)	(1.286)	(1.514)
Probability of an improvement in Italy's general economic situation in next 3 months [omitted category "Zero"]						
1-25 %	0.571	0.043	-1.074	0.298	0.941	0.973
	(0.347)	(0.662)	(0.746)	(0.638)	(0.724)	(0.723)
26-50 %	-0.492	-0.353	-1.541	-2.138*	-0.859	-0.819
	(0.668)	(1.153)	(1.088)	(1.157)	(1.025)	(1.247)
51-75 %	1.159	0.223	-0.213	1.126	2.186	2.241
	(1.064)	(1.638)	(1.671)	(1.665)	(1.834)	(1.464)
75-99 %	1.078	-0.147	4.223	6.250*	5.363	3.933
	(2.130)	(3.451)	(3.835)	(3.531)	(3.103)	(4.049)
Liquidity position for your firm in the next 3 months [omitted category "insufficient"]						
Sufficient	-1.433*	-3.175***	-3.287***	-1.365	-1.241	-0.859
	(0.738)	(0.858)	(0.900)	(0.807)	(1.276)	(1.314)
More than sufficient	-1.570*	-3.286***	-3.772***	-1.449	-0.462	-0.268
	(0.898)	(1.126)	(1.129)	(0.977)	(1.430)	(1.306)
Observations	11,676	9,889	9,234	8,606	8,035	7,360
R-squared	0.018	0.016	0.018	0.010	0.016	0.011

Notes: *i* and *t* index firms and time (survey waves). $F^i_{t-1}\pi^{(12m)}$ is one-year-ahead inflation of firm *i* in wave $t-1$. u_{it} is the utilization rate of credit lines of firm *i* in period *t*. $F^i_{t-2}dp^{(12m)}$ is the expected price changes of firm *i*'s over the next 12 months. Seasonal dummies for each sector are included but not reported. Estimation sample is 2012Q3-2018Q1. Standard errors reported in parentheses are as in Driscoll and Kraay (1998). ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Appendix Table 12. Effects of Inflation Expectations on Other Expectations and Plans: Using Contemporaneous Inflation

Row	Outcome variable	Coef. on $F_t^i\pi^{(12m)}$ (std. err.)	Obs.	R^2	1st stage F-stat
		(1)	(2)	(3)	(4)
	Macroeconomic expectations				
(1)	General economic situation relative to 3 months ago	-0.204***	23,309	-0.005	168.5
		(0.040)			
(2)	Probability of improved situation in the next 3 months	-1.844**	23,508	0.001	168.8
		(0.666)			
	Expectations about firm-specific conditions				
(3)	Expected business conditions for company, next 3 months	-0.151***	23,527	0.012	168.3
		(0.023)			
(4)	Expected demand for products, next 3 months	-0.108**	21,035	0.004	74.5
		(0.048)			
(5)	Expected liquidity for company, next 3 months	-0.077***	23,231	0.035	169.7
		(0.014)			
(6)	Expected employment change, next 3 months	-0.069***	23,444	0.014	171.0
		(0.013)			
(7)	Expected investment change, next calendar year	-0.132*	20,063	0.003	81.6
		(0.071)			
	Uncertainty				
(8)	3-month ahead	0.011***	23,094	0.013	168.2
		(0.003)			
(9)	3-year ahead	0.015***	23,087	0.012	170.8
		(0.002)			
(10)	Expected price change, next 12 months	0.180***	23,626	0.022	169.5
		(0.049)			
	Factors affecting future price changes				
(11)	Expected change in demand	-0.107***	22,906	0.007	169.5
		(0.021)			
(12)	Expected raw material prices	0.102***	22,843	0.023	168.5
		(0.024)			
(13)	Expected labor costs	0.017	22,872	0.004	167.7
		(0.014)			
(14)	Expected prices of competitors	-0.029	22,811	0.004	167.2
		(0.018)			

Notes: i and t index firms and time (survey waves). Specification is given by equation (4). $F_t^i\pi^{(12m)}$ is one-year-ahead inflation expectation of firm i in wave t. The right column indicates the dependent variables. $F_t^i\pi^{(12m)}$ is instrumented with the treatment variable. Seasonal dummies for each sector are included but not reported. Estimation sample is 2012Q3-2018Q1. Standard errors reported in parentheses are as in Driscoll and Kraay (1998). ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Appendix Table 13. Effects of Inflation Expectations on Other Expectations and Plans: Using Contemporaneous Inflation on ELB period

Row	Outcome variable	Coef. on $F_t^i\pi^{(12m)}$ (std. err.)	Obs.	R^2	1st stage F-stat
		(1)	(2)	(3)	(4)
	Macroeconomic expectations				
(1)	General economic situation relative to 3 months ago	0.116	15,301	0.014	94.42
		(0.082)			
(2)	Probability of improved situation in the next 3 months	1.394	15,479	0.024	93.12
		(1.579)			
	Expectations about firm-specific conditions				
(3)	Expected business conditions for company, next 3 months	0.076**	15,476	0.003	92.15
		(0.033)			
(4)	Expected demand for products, next 3 months	0.048**	15,280	0.012	89.78
		(0.017)			
(5)	Expected liquidity for company, next 3 months	0.084**	15,304	0.035	94.0
		(0.037)			
(6)	Expected employment change, next 3 months	0.063*	15,445	0.009	92.88
		(0.031)			
(7)	Expected investment change, next calendar year	0.082	15,313	0.010	92.86
		(0.053)			
	Uncertainty				
(8)	3-month ahead	0.022***	15,143	0.019	86.92
		(0.004)			
(9)	3-year ahead	-0.000	15,154	0.011	86.54
		(0.006)			
(10)	Expected price change, next 12 months	0.338***	15,544	0.026	92.63
		(0.093)			
	Factors affecting future price changes				
(11)	Expected change in demand	0.144***	15,050	0.003	90.37
		(0.048)			
(12)	Expected raw material prices	0.267***	15,012	0.001	88.21
		(0.055)			
(13)	Expected labor costs	-0.002	15,025	0.005	88.33
		(0.040)			
(14)	Expected prices of competitors	0.173***	14,974	-0.010	90.75
		(0.057)			

Notes: i and t index firms and time (survey waves). Specification is given by equation (4). $F_t^i\pi^{(12m)}$ is one-year-ahead inflation expectation of firm i in wave t. The right column indicates the dependent variables. $F_t^i\pi^{(12m)}$ is instrumented with the treatment variable. Seasonal dummies for each sector are included but not reported. Estimation sample is 2014Q4-2018Q1. Standard errors reported in parentheses are as in Driscoll and Kraay (1998). ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Appendix Table 11. Assignment of Firms into Treatment and Control Groups: Restricted Sample.

	Dependent variable: Treatment dummy						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Number of employees (in logarithm)	0.000	0.000	0.000		-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)
Exports as a share of revenues		0.019	0.020			0.001	0.001
		(0.031)	(0.031)			(0.040)	(0.040)
Average absolute size of price changes			0.000				-0.000
			(0.002)				(0.002)
Geographic area [omitted category "North-West"]							
North-East				0.008	0.008	0.008	0.008
				(0.024)	(0.024)	(0.024)	(0.024)
Centre				0.039	0.039	0.039	0.039
				(0.027)	(0.027)	(0.027)	(0.027)
South and Island				-0.001	-0.001	-0.001	-0.001
				(0.027)	(0.027)	(0.028)	(0.028)
Sector [omitted category "Manufacturing"]							
Other industry				0.021	0.021	0.021	0.021
				(0.036)	(0.036)	(0.037)	(0.037)
Trading				0.061**	0.061**	0.060*	0.060*
				(0.028)	(0.028)	(0.032)	(0.032)
Other services				0.031	0.031	0.031	0.030
				(0.026)	(0.026)	(0.031)	(0.031)
Construction				-0.013	-0.015	-0.015	-0.015
				(0.026)	(0.027)	(0.032)	(0.032)
Constant	0.687***	0.670***	0.670***	0.666***	0.687***	0.686***	0.687***
	(0.053)	(0.060)	(0.060)	(0.020)	(0.060)	(0.062)	(0.062)
Observations	1.973	1.973	1.973	1.895	1.895	1.895	1.895
R-squared	0.000	0.000	0.000	0.005	0.005	0.005	0.005
p-value (F stat)	1.000	0.998	1.000	0.472	0.525	0.578	0.626

Notes: the table reports results for the linear regression where the dependent variable is dichotomous and equal to one if a firm is treated and zero otherwise. Since assignment into treatment and control groups is fixed (that is, firms cannot be re-assigned from one group to another after initial assignment), all regressors are averages over the survey period. The sample is restricted to observations for which the utilization rate is not missing. *p-value (F stat)* reports the probability value of all regressors (other than the constant) having zero coefficients. *Average absolute size of price changes* is the average absolute value of responses to the following question: "In the last 12 months, what has been the average change in your firm's prices?". Estimation sample is 2012Q3-2018Q1. ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Appendix Table 15. The ELB Period: Effect of inflation expectations on firms' price changes, IV estimates.

	dp_{it}	$dp_{i,t+1}$	$dp_{i,t+2}$
	(1)	(2)	(3)
Controls from wave $t-1$			
$F^i_{t-1}\pi^{(12m)}$	0.682***	0.648***	0.655***
	(0.170)	(0.097)	(0.200)
Controls from wave $t-2$			
$F^i_{t-2}dp^{12m}_i$	0.388***	0.368***	0.324***
	(0.041)	(0.041)	(0.042)
Business conditions for your company next 3 months [omitted category "Much worse"]			
Worse	0.218	0.383	-0.186
	(0.400)	(0.588)	(0.800)
Same	0.482	0.760	0.122
	(0.435)	(0.610)	(0.783)
Better	0.522	0.845	0.078
	(0.504)	(0.666)	(0.763)
Much better	0.267	0.754	0.026
	(0.678)	(0.619)	(0.743)
Number of employees in the next 3 months [omitted category "Lower"]			
Same	0.227	0.026	-0.052
	(0.143)	(0.086)	(0.092)
Higher	0.392**	0.297**	0.262
	(0.156)	(0.128)	(0.208)
Italy's general economic situation now relative to 3 months ago [omitted category "Worse"]			
Same	0.138	0.115	0.209
	(0.189)	(0.170)	(0.189)
Better	-0.030	-0.185	-0.059
	(0.174)	(0.165)	(0.131)
Probability of an improvement in Italy's general economic situation in next 3 months [omitted category "Zero"]			
1-25 %	-0.186	-0.025	-0.019
	(0.122)	(0.128)	(0.101)
26-50 %	-0.219*	-0.176	-0.029
	(0.119)	(0.123)	(0.095)
51-75 %	-0.188	-0.073	0.122
	(0.124)	(0.153)	(0.122)
75-99 %	-0.343	-0.230	-0.470
	(0.198)	(0.279)	(0.289)
Liquidity position for your firm in the next 3 months [omitted category "insufficient"]			
Sufficient	0.185	0.206*	0.155**
	(0.106)	(0.105)	(0.053)
More than sufficient	-0.109	-0.129	-0.170
	(0.139)	(0.160)	(0.201)
Observations	8.938	7.459	6.800
R-squared	0.154	0.138	0.105
1st stage F stat	111.1	83.56	64.21

Notes: *i* and *t* index firms and time (survey waves). $F^i_{t-1}\pi^{(12m)}$ is one-year-ahead inflation of firm *i* in wave $t-1$. dp_{it} is the average change in firm *i*'s prices over the previous 12 months. $F^i_{t-2}dp^{(12m)}$ is the expected price changes of firm *i*'s over the next 12 months. Seasonal dummies for each sector are included but not reported. Estimation sample is 2014Q4-2018Q1. Standard errors reported in parentheses are as in Driscoll and Kraay (1998). ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Appendix Table 16. The ELB Period: Effect of inflation expectations on firms' price changes, first-stage regression.

	$F^i_{t-1}\pi^{(12m)}$	$F^i_{t-1}\pi^{(12m)}$	$F^i_{t-1}\pi^{(12m)}$
	(1)	(2)	(3)
Controls from wave $t-1$			
$Treatment_{i,t-1}$	0.525***	0.532***	0.518***
	(0.050)	(0.058)	(0.065)
Controls from wave $t-2$			
$F^i_{t-2}dp^{12m}_i$	0.027***	0.033***	0.031***
	(0.004)	(0.003)	(0.003)
Business conditions for your company next 3 months [omitted category "Much worse"]			
Worse	0.227*	0.265	0.305**
	(0.118)	(0.161)	(0.132)
Same	0.188	0.212	0.256*
	(0.111)	(0.154)	(0.118)
Better	0.206*	0.192	0.262*
	(0.109)	(0.155)	(0.120)
Much better	0.039	0.149	0.219
	(0.204)	(0.242)	(0.217)
Number of employees in the next 3 months [omitted category "Lower"]			
Same	-0.019	-0.040	-0.031
	(0.022)	(0.026)	(0.032)
Higher	0.018	0.000	0.006
	(0.029)	(0.036)	(0.040)
Italy's general economic situation now relative to 3 months ago [omitted category "Worse"]			
Same	0.092*	0.073	0.068
	(0.051)	(0.052)	(0.052)
Better	0.122**	0.121**	0.102*
	(0.046)	(0.053)	(0.055)
Probability of an improvement in Italy's general economic situation in next 3 months [omitted category "Zero"]			
1-25 %	0.102***	0.112***	0.108***
	(0.022)	(0.024)	(0.027)
26-50 %	0.168***	0.135***	0.145***
	(0.045)	(0.043)	(0.044)
51-75 %	0.250***	0.222***	0.201***
	(0.050)	(0.032)	(0.038)
75-99 %	0.181**	0.175**	0.140*
	(0.078)	(0.080)	(0.073)
Liquidity position for your firm in the next 3 months [omitted category "insufficient"]			
Sufficient	-0.049*	-0.011	-0.041
	(0.028)	(0.030)	(0.027)
More than sufficient	-0.078*	-0.046	-0.074*
	(0.037)	(0.041)	(0.039)
Observations	8.938	7.459	6.800
R-squared	0.138	0.141	0.118

Notes: *i* and *t* index firms and time (survey waves). $F^i_{t-1}\pi^{(12m)}$ is one-year-ahead inflation of firm *i* in wave $t-1$. $F^i_{t-2}dp^{(12m)}$ is the expected price changes of firm *i*'s over the next 12 months. $Treatment_{i,t-1}$ is equal to the most recent inflation rate presented to a firm for treated firms and zero for control firms. Seasonal dummies for each sector are included but not reported. Estimation sample is 2014Q4-2018Q1. Standard errors reported in parentheses are as in Driscoll and Kraay (1998). ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Appendix Table 17. The ELB Period: Effect of inflation expectations on firms' price changes, OLS estimates.

	dp_{it}	$dp_{i,t+1}$	$dp_{i,t+2}$
	(1)	(2)	(3)
Controls from wave $t-1$			
$F^i_{t-1}\pi^{(12m)}$	0.340***	0.228***	0.158**
	(0.041)	(0.074)	(0.054)
Controls from wave $t-2$			
$F^i_{t-2}dp^{12m}_i$	0.405***	0.389***	0.344***
	(0.043)	(0.043)	(0.043)
Business conditions for your company next 3 months [omitted category "Much worse"]			
Worse	0.251	0.448	-0.090
	(0.456)	(0.651)	(0.834)
Same	0.512	0.844	0.221
	(0.476)	(0.643)	(0.804)
Better	0.534	0.901	0.156
	(0.558)	(0.716)	(0.802)
Much better	0.268	0.828	0.137
	(0.703)	(0.658)	(0.794)
Number of employees in the next 3 months [omitted category "Lower"]			
Same	0.216	0.031	-0.074
	(0.139)	(0.095)	(0.099)
Higher	0.396**	0.298**	0.237
	(0.153)	(0.129)	(0.195)
Italy's general economic situation now relative to 3 months ago [omitted category "Worse"]			
Same	0.157	0.094	0.233
	(0.164)	(0.141)	(0.182)
Better	0.027	-0.176	-0.022
	(0.158)	(0.175)	(0.122)
Probability of an improvement in Italy's general economic situation in next 3 months [omitted category "Zero"]			
1-25 %	-0.142	0.030	0.029
	(0.125)	(0.124)	(0.110)
26-50 %	-0.191	-0.122	0.006
	(0.110)	(0.118)	(0.114)
51-75 %	-0.123	0.012	0.215*
	(0.106)	(0.148)	(0.105)
75-99 %	-0.280	-0.136	-0.398
	(0.209)	(0.295)	(0.271)
Liquidity position for your firm in the next 3 months [omitted category "insufficient"]			
Sufficient	0.168	0.161	0.135**
	(0.110)	(0.099)	(0.054)
More than sufficient	-0.124	-0.180	-0.203
	(0.147)	(0.150)	(0.203)
Observations	8.825	7.358	6.717
R-squared	0.166	0.155	0.126

Notes: *i* and *t* index firms and time (survey waves). $F^i_{t-1}\pi^{(12m)}$ is one-year-ahead inflation of firm *i* in wave $t-1$. dp_{it} is the average change in firm *i*'s prices over the previous 12 months. $F^i_{t-2}dp^{(12m)}$ is the expected price changes of firm *i*'s over the next 12 months. Seasonal dummies for each sector are included but not reported. Estimation sample is 2014Q4-2018Q1. Standard errors reported in parentheses are as in Driscoll and Kraay (1998). ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Appendix Table 18. The ELB Period: Effect of inflation expectations on firms' employment growth, IV estimates.

	$\log\left(\frac{L_{it}}{L_{i,t-1}}\right)$	$\log\left(\frac{L_{i,t+1}}{L_{i,t-1}}\right)$	$\log\left(\frac{L_{i,t+2}}{L_{i,t-1}}\right)$
	(1)	(2)	(3)
Controls from wave $t-1$			
$F^i_{t-1}\pi^{(12m)}$	0.266	0.270	-0.162
	(0.190)	(0.223)	(0.151)
Controls from wave $t-2$			
$F^i_{t-2}dp^{12m}_i$	-0.008	0.022	-0.038
	(0.019)	(0.023)	(0.031)
Business conditions for your company next 3 months [omitted category "Much worse"]			
Worse	0.401	-0.516	-0.593
	(0.563)	(0.660)	(0.863)
Same	0.043	-1.076	-1.517**
	(0.680)	(0.708)	(0.521)
Better	0.543	-0.060	-0.218
	(0.745)	(0.694)	(0.636)
Much better	1.223	0.324	-2.194
	(2.257)	(2.051)	(1.862)
Number of employees in the next 3 months [omitted category "Lower"]			
Same	0.978***	1.202***	1.745***
	(0.195)	(0.134)	(0.223)
Higher	1.821***	2.591***	4.354***
	(0.352)	(0.389)	(0.661)
Italy's general economic situation now relative to 3 months ago [omitted category "Worse"]			
Same	-0.255	-0.138	0.333
	(0.217)	(0.224)	(0.264)
Better	-0.403	-0.174	0.438
	(0.247)	(0.433)	(0.403)
Probability of an improvement in Italy's general economic situation in next 3 months [omitted category "Zero"]			
1-25 %	0.163*	0.241**	0.077
	(0.082)	(0.110)	(0.128)
26-50 %	0.037	0.076	-0.363
	(0.169)	(0.245)	(0.342)
51-75 %	0.263	0.543*	0.226
	(0.310)	(0.304)	(0.432)
75-99 %	0.007	0.550	0.528
	(0.489)	(0.503)	(0.883)
Liquidity position for your firm in the next 3 months [omitted category "insufficient"]			
Sufficient	0.490***	0.972***	1.115***
	(0.123)	(0.132)	(0.285)
More than sufficient	0.412**	0.902***	1.124***
	(0.162)	(0.286)	(0.251)
Observations	8,938	7,459	6,800
R-squared	0.017	0.026	0.034
1st stage F stat	111.1	83.56	64.21

Notes: *i* and *t* index firms and time (survey waves). $F^i_{t-1}\pi^{(12m)}$ is one-year-ahead inflation of firm *i* in wave $t-1$. L_{it} is the number of employees in firm *i* at time t. $F^i_{t-2}dp^{(12m)}$ is the expected price changes of firm *i*'s over the next 12 months. Seasonal dummies for each sector are included but not reported. Estimation sample is 2014Q4-2018Q1. Standard errors reported in parentheses are as in Driscoll and Kraay (1998). ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Appendix Table 19. The ELB Period: Effect of inflation expectations on firms' employment growth, first-stage regression.

	$E_{i,t-1}\pi^{(12m)}$	$E_{i,t-1}\pi^{(12m)}$	$E_{i,t-1}\pi^{(12m)}$
	(1)	(2)	(3)
Controls from wave $t-1$			
$Treatment_{i,t-1}$	0.525***	0.532***	0.518***
	(0.050)	(0.058)	(0.065)
Controls from wave $t-2$			
$F^i_{t-2}dp^{12m}_i$	0.027***	0.033***	0.031***
	(0.004)	(0.003)	(0.003)
Business conditions for your company next 3 months [omitted category "Much worse"]			
Worse	0.227*	0.265	0.305**
	(0.118)	(0.161)	(0.132)
Same	0.188	0.212	0.256*
	(0.111)	(0.154)	(0.118)
Better	0.206*	0.192	0.262*
	(0.109)	(0.155)	(0.120)
Much better	0.039	0.149	0.219
	(0.204)	(0.242)	(0.217)
Number of employees in the next 3 months [omitted category "Lower"]			
Same	-0.019	-0.040	-0.031
	(0.022)	(0.026)	(0.032)
Higher	0.018	0.000	0.006
	(0.029)	(0.036)	(0.040)
Italy's general economic situation now relative to 3 months ago [omitted category "Worse"]			
Same	0.092*	0.073	0.068
	(0.051)	(0.052)	(0.052)
Better	0.122**	0.121**	0.102*
	(0.046)	(0.053)	(0.055)
Probability of an improvement in Italy's general economic situation in next 3 months [omitted category "Zero"]			
1-25 %	0.102***	0.112***	0.108***
	(0.022)	(0.024)	(0.027)
26-50 %	0.168***	0.135***	0.145***
	(0.045)	(0.043)	(0.044)
51-75 %	0.250***	0.222***	0.201***
	(0.050)	(0.032)	(0.038)
75-99 %	0.181**	0.175**	0.140*
	(0.078)	(0.080)	(0.073)
Liquidity position for your firm in the next 3 months [omitted category "insufficient"]			
Sufficient	-0.049*	-0.011	-0.041
	(0.028)	(0.030)	(0.027)
More than sufficient	-0.078*	-0.046	-0.074*
	(0.037)	(0.041)	(0.039)
Observations	8,938	7,459	6,800
R-squared	0.138	0.141	0.118

Notes: i and t index firms and time (survey waves). $E_{i,t-1}\pi^{(12m)}$ is one-year-ahead inflation of firm i in wave $t-1$. L_{it} is the number of employees in firm i at time t. $Treatment_{i,t-1}$ is equal to the most recent inflation rate presented to a firm for treated firms and zero for control firms. $F^i_{t-2}dp^{(12m)}$ is the expected price changes of firm i's over the next 12 months. Seasonal dummies for each sector are included but not reported. Estimation sample is 2014Q4-2018Q1. Standard errors reported in parentheses are as in Driscoll and Kraay (1998). ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Appendix Table 20. The ELB Period: Effect of inflation expectations on firms' employment growth, OLS estimates.

	$\log\left(\frac{L_{it}}{L_{i,t-1}}\right)$	$\log\left(\frac{L_{i,t+1}}{L_{i,t-1}}\right)$	$\log\left(\frac{L_{i,t+2}}{L_{i,t-1}}\right)$
	(1)	(2)	(3)
Controls from wave $t-1$			
$F^i_{t-1}\pi^{(12m)}$	-0.022	0.100	0.122
	(0.069)	(0.091)	(0.122)
Controls from wave $t-2$			
$F^i_{t-2}dp^{12m}_i$	-0.002	0.023	-0.049
	(0.019)	(0.022)	(0.030)
Business conditions for your company next 3 months [omitted category "Much worse"]			
Worse	0.398	-0.524	-0.664
	(0.597)	(0.655)	(0.910)
Same	0.050	-1.085	-1.611**
	(0.713)	(0.720)	(0.543)
Better	0.544	-0.059	-0.265
	(0.784)	(0.702)	(0.686)
Much better	1.189	0.332	-2.239
	(2.219)	(2.042)	(1.881)
Number of employees in the next 3 months [omitted category "Lower"]			
Same	0.962***	1.206***	1.736***
	(0.193)	(0.140)	(0.239)
Higher	1.862***	2.580***	4.344***
	0.962***	1.206***	1.736***
Italy's general economic situation now relative to 3 months ago [omitted category "Worse"]			
Same	-0.209	-0.113	0.315
	(0.219)	(0.215)	(0.272)
Better	-0.328	-0.180	0.365
	(0.266)	(0.410)	(0.405)
Probability of an improvement in Italy's general economic situation in next 3 months [omitted category "Zero"]			
1-25 %	0.171**	0.257*	0.043
	(0.073)	(0.121)	(0.136)
26-50 %	0.091	0.158	-0.360
	(0.153)	(0.251)	(0.353)
51-75 %	0.313	0.634**	0.205
	(0.315)	(0.277)	(0.430)
75-99 %	-0.001	0.567	0.523
	(0.467)	(0.503)	(0.879)
Liquidity position for your firm in the next 3 months [omitted category "insufficient"]			
Sufficient	0.507***	1.004***	1.171***
	(0.129)	(0.151)	(0.285)
More than sufficient	0.425**	0.936**	1.190***
	(0.181)	(0.317)	(0.283)
Observations	8,825	7,358	6,717
R-squared	0.020	0.027	0.036

Notes: *i* and *t* index firms and time (survey waves). $F^i_{t-1}\pi^{(12m)}$ is one-year-ahead inflation of firm *i* in wave $t-1$. L_{it} is the number of employees in firm *i* at time t. $F^i_{t-2}dp^{(12m)}$ is the expected price changes of firm *i*'s over the next 12 months. Seasonal dummies for each sector are included but not reported. Estimation sample is 2014Q4-2018Q1. Standard errors reported in parentheses are as in Driscoll and Kraay (1998). ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Appendix Table 21. The ELB Period: Effect of inflation expectations on firms' credit demand, IV estimates.

	$u_{it} - u_{it-1}$	$u_{it+1} - u_{it-1}$	$u_{it+2} - u_{it-1}$
	(1)	(2)	(3)
Controls from wave $t-1$			
$F^i_{t-1}\pi^{(12m)}$	0.200	2.230*	2.889**
	(1.032)	(1.164)	(1.309)
Controls from wave $t-2$			
$F^i_{t-2}dp^{12m}_i$	-0.087	-0.266*	-0.371***
	(0.054)	(0.125)	(0.073)
Business conditions for your company next 3 months [omitted category "Much worse"]			
Worse	-1.812	-0.947	-9.015
	(3.248)	(3.836)	(7.756)
Same	-1.286	-0.329	-10.053
	(3.343)	(3.502)	(6.565)
Better	0.195	1.416	-7.960
	(3.266)	(3.342)	(6.922)
Much better	-6.295	-8.059	-15.714*
	(4.968)	(8.784)	(7.338)
Number of employees in the next 3 months [omitted category "Lower"]			
Same	-0.808	-1.088	-0.698
	(0.904)	(1.258)	(1.101)
Higher	-1.222	-0.305	-0.202
	(1.103)	(1.185)	(1.599)
Italy's general economic situation now relative to 3 months ago [omitted category "Worse"]			
Same	-0.263	-1.441*	1.769**
	(0.657)	(0.760)	(0.767)
Better	0.539	1.569	3.205*
	(0.785)	(1.624)	(1.744)
Probability of an improvement in Italy's general economic situation in next 3 months [omitted category "Zero"]			
1-25 %	-0.206	-1.238**	-2.091***
	(0.277)	(0.529)	(0.521)
26-50 %	-1.301	-1.984*	-3.361**
	(0.823)	(1.113)	(1.139)
51-75 %	0.404	0.098	-1.446
	(1.342)	(2.261)	(2.350)
75-99 %	-1.125	-4.424	2.232
	(2.159)	(2.744)	(2.814)
Liquidity position for your firm in the next 3 months [omitted category "insufficient"]			
Sufficient	-0.861	-2.582*	-2.593*
	(0.608)	(1.303)	(1.370)
More than sufficient	-0.897	-2.892	-2.838*
	(1.016)	(1.661)	(1.541)
Observations	7,450	6,205	5,642
R-squared	0.025	0.019	0.008
1st stage F stat	107.1	82.24	59.46

Notes: *i* and *t* index firms and time (survey waves). $F^i_{t-1}\pi^{(12m)}$ is one-year-ahead inflation expectation of firm *i* in wave $t-1$. u_{it} is the utilization rate of credit lines of firm *i* in period *t*. $F^i_{t-2}dp^{(12m)}$ is the expected price changes of firm *i*'s over the next 12 months. Seasonal dummies for each sector are included but not reported. Estimation sample is 2014Q4-2018Q1. Standard errors reported in parentheses are as in Driscoll and Kraay (1998). ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Appendix Table 22. The ELB Period: Effect of inflation expectations on firms' credit demand, first-stage regression.

	$F^i_{t-1}\pi^{(12m)}$	$F^i_{t-1}\pi^{(12m)}$	$F^i_{t-1}\pi^{(12m)}$
	(1)	(2)	(3)
Controls from wave $t-1$			
$Treatment^i_{t-1}$	0.529***	0.529***	0.511***
	(0.051)	(0.058)	(0.066)
Controls from wave $t-2$			
$F^i_{t-2}dp^{12m}_i$	0.030***	0.039***	0.037***
	(0.004)	(0.003)	(0.003)
Business conditions for your company next 3 months [omitted category "Much worse"]			
Worse	0.286*	0.289*	0.328*
	(0.142)	(0.158)	(0.150)
Same	0.249*	0.232	0.289*
	(0.137)	(0.155)	(0.138)
Better	0.286**	0.229	0.327**
	(0.125)	(0.146)	(0.126)
Much better	0.104	0.200	0.292
	(0.216)	(0.200)	(0.190)
Number of employees in the next 3 months [omitted category "Lower"]			
Same	0.009	-0.014	0.002
	(0.020)	(0.022)	(0.020)
Higher	0.064*	0.053	0.055
	(0.032)	(0.036)	(0.042)
Italy's general economic situation now relative to 3 months ago [omitted category "Worse"]			
Same	0.061	0.043	0.034
	(0.054)	(0.056)	(0.056)
Better	0.088	0.093	0.055
	(0.052)	(0.060)	(0.059)
Probability of an improvement in Italy's general economic situation in next 3 months [omitted category "Zero"]			
1-25 %	0.089***	0.092***	0.099***
	(0.017)	(0.019)	(0.022)
26-50 %	0.123*	0.072	0.108
	(0.058)	(0.048)	(0.062)
51-75 %	0.215***	0.209***	0.223***
	(0.032)	(0.034)	(0.034)
75-99 %	0.178**	0.155*	0.126
	(0.078)	(0.082)	(0.079)
Liquidity position for your firm in the next 3 months [omitted category "insufficient"]			
Sufficient	-0.028	0.012	-0.031
	(0.025)	(0.032)	(0.028)
More than sufficient	-0.064*	-0.036	-0.081*
	(0.036)	(0.045)	(0.040)
Observations	7,450	6,205	5,642
R-squared	0.138	0.145	0.116

Notes: *i* and *t* index firms and time (survey waves). $F^i_{t-1}\pi^{(12m)}$ is one-year-ahead inflation of firm *i* in wave $t-1$. $F^i_{t-2}dp^{(12m)}$ is the expected price changes of firm *i*'s over the next 12 months. $Treatment^i_{t-1}$ is equal to the most recent inflation rate presented to a firm for treated firms and zero for control firms. Seasonal dummies for each sector are included but not reported. Estimation sample is 2014Q4-2018Q1. Standard errors reported in parentheses are as in Driscoll and Kraay (1998). ***, **, * denote statistical significance at 1, 5 and 10 percent level.

Appendix Table 23. The ELB Period: Effect of inflation expectations on firms' credit demand, OLS estimates.

	$u_{it} - u_{it-1}$	$u_{it+1} - u_{it-1}$	$u_{it+2} - u_{it-1}$
	(1)	(2)	(3)
Controls from wave $t-1$			
$F^i_{t-1}\pi^{(12m)}$	-0.026	0.172	-0.015
	(0.201)	(0.388)	(0.569)
Controls from wave $t-2$			
$F^i_{t-2}dp^{12m}_i$	-0.067	-0.173	-0.252**
	(0.054)	(0.121)	(0.096)
Business conditions for your company next 3 months [omitted category "Much worse"]			
Worse	-1.799	-0.523	-8.305
	(3.172)	(3.684)	(7.553)
Same	-1.324	0.019	-9.401
	(3.276)	(3.378)	(6.364)
Better	0.220	1.912	-7.097
	(3.160)	(3.205)	(6.767)
Much better	-6.282	-7.652	-14.928*
	(4.932)	(8.657)	(7.055)
Number of employees in the next 3 months [omitted category "Lower"]			
Same	-0.952	-1.181	-0.746
	(0.860)	(1.283)	(1.151)
Higher	-1.371	-0.500	-0.316
	(1.057)	(1.210)	(1.585)
Italy's general economic situation now relative to 3 months ago [omitted category "Worse"]			
Same	-0.155	-1.399	1.806*
	(0.651)	(0.821)	(0.848)
Better	0.607	1.725	3.222
	(0.813)	(1.703)	(1.859)
Probability of an improvement in Italy's general economic situation in next 3 months [omitted category "Zero"]			
1-25 %	-0.107	-1.086*	-1.894***
	(0.233)	(0.574)	(0.554)
26-50 %	-1.155	-1.699	-2.906**
	(0.814)	(1.089)	(1.228)
51-75 %	0.299	0.275	-0.858
	(1.304)	(2.233)	(2.307)
75-99 %	-1.018	-4.102	2.608
	(2.092)	(2.653)	(2.649)
Liquidity position for your firm in the next 3 months [omitted category "insufficient"]			
Sufficient	-0.871	-2.630*	-2.728*
	(0.611)	(1.235)	(1.423)
More than sufficient	-0.857	-2.898*	-3.053*
	(1.030)	(1.624)	(1.572)
Observations	7,353	6,117	5,569
R-squared	0.025	0.025	0.020

Notes: *i* and *t* index firms and time (survey waves). $F^i_{t-1}\pi^{(12m)}$ is one-year-ahead inflation of firm *i* in wave $t-1$. u_{it} is the utilization rate of credit lines of firm *i* in period *t*. $F^i_{t-2}dp^{(12m)}$ is the expected price changes of firm *i*'s over the next 12 months. Seasonal dummies for each sector are included but not reported. Estimation sample is 2014Q4-2018Q1. Standard errors reported in parentheses are as in Driscoll and Kraay (1998). ***, **, * denote statistical significance at 1, 5 and 10 percent level.