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# FIRMS' INFLATION EXPECTATIONS AND INVESTMENT PLANS

by Adriana Grasso* and Tiziano Ropele**

## Abstract

In past years there have been suggestions for monetary policy to engineer higher inflation expectations to stimulate spending. We examine the relationship between the inflation expectations of firms and their investment plans using Italian business survey data over the period 2012-2016. We show that higher expected inflation is positively correlated with firms' willingness to invest. In our baseline specification, a one percentage point rise in expected inflation is associated with a higher probability of reporting higher investment plans by 4.0 percentage points. This expansionary effect operates through the standard interest rate channel and its magnitude is positively correlated with firms' liquidity and debt position.

**JEL Classification**: E22, E31, E58.
**Keywords**: investment expenditure, inflation expectations, survey data.

## Contents



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*"Inflation means distribution of buying power, credit expansion, rising prices, restoration of markets, increased business turnover. But its benefits will not be distributed equally. Inflation will mean most to the business man who meets it half way, who increases his business pace to keep up with the accelerated dollar, who unleashes his jealously guarded cash reserves and credit [...]."*
Business Week, May 10, 1933

## 1 Introduction[1]

It is widely acknowledged that persistently low inflation developments pose substantial macro-economic risks especially when the monetary policy is constrained by the effective lower bound (ELB) on nominal interest rates. The main danger is that if a low inflation outlook becomes entrenched in the private sector's expectations then firms and households will perceive a higher real interest rate and reduce spending. This in turn may give rise to a spiral of lower demand and lower prices, entangling the economy in a deflation trap. To avoid these risks and shore up the economic activity many economists and policymakers have suggested the adoption of policies to engineer higher inflation expectations.[2] Yet, beyond the interest rate channel, higher anticipated inflation may activate other mechanisms whose ultimate effects on agents' economic decisions are theoretically ambiguous. For example, higher expected inflation can depress spending because it acts as an implicit tax on liquid assets (*negative* wealth effect) and could portend future higher interest rates.[3] Conversely, expansionary effects from higher inflation expectation may result from the additional borrowing capacity created by the erosion of nominal debt burden (*positive* wealth effect) or because of a Tobin effect whereby agents substitute away liquid assets with durable goods or other fixed assets.

In this paper, we provide new econometric evidence on both the sign and the magnitude of the relationship between inflation expectations of firms in Italy and their investment expenditure plans. For this purpose we use a novel dataset that we construct by merging firm-level data coming from three distinct sources: the Italian Survey of Inflation and Growth

[1] Acknowledgments. We are grateful to seminar participants at LUISS University, University of Milano-Bicocca, Einaudi Institute for Economics and Finance and Bank of Italy and participants at the 7th Ifo Conference on "Macroeconomics and Survey Data". We wish to thank Davide Arnaudo, Rudi Bachmann, Pierpaolo Benigno, Robert Chirinko, Olivier Coibion, Jean-Paul L'Huillier, Francesco Lippi, Stefano Neri, Juan Passadore, Facundo Piguillem, Massimiliano Rigon, Paola Rossi, Alessandro Secchi, Eric Sims, Andrea Stella, Patrizio Tirelli and Michael Weber for helpful comments and suggestions. The views expressed here should not be interpreted as representing the views of the Bank of Italy.
[2] E.g. Krugman (1998), Eggertsson and Woodford (2003) and Eggertsson (2008).
[3] Higher inflation expectations can also lead to higher macroeconomic uncertainty in response to which agents increase precautionary savings thus reducing spending.

Expectations (SIGE), the Italian Credit Register and the Company Accounts Data System. In particular, every quarter SIGE collects *quantitative* inflation expectations over various forecasting horizons and *qualitative* measures of the expected annual change in investment expenditure. The latter are gathered from the responses to a question that admits five ordered options from "much lower" to "much higher". SIGE also contains a rich set of information on idiosyncratic and aggregate evaluations that we control for in our empirical analysis to cope with the endogeneity problem of inflation expectations and thus ensure that the identifying variation in expected inflation is as much as possible not related to other factors that impact on firm investment plans. Estimating a battery of ordered probit regressions on pooled data over the period from 2012Q4 to 2016Q4 we find robust evidence indicating a highly significant and positive relationship between inflation expectation of firms and their investment expenditure plans. In the baseline estimates, a one percentage point increase in the 6-month ahead inflation expectations is associated with a higher predicted probability to report higher investment expenditure plans by 4.3 percentage points and by 3.8 percentage points when using the 12-month ahead inflation expectations. With longer-term expectations the effects remain significant albeit the magnitude decreases somewhat.

Once established the existence of a significant and positive nexus between inflation expectations of firms and their investment attitude, we use the information from the Italian Credit Register, specifically the firm-level nominal interest rate on loans, and the information from the Company Accounts Data System, specifically an indicator of firm default risk (which we use as a proxy for the nominal borrowing cost), the cash ratio (sum of cash and marketable securities to current liabilities) and the debt ratio (current liabilities to total assets), to shed light on the channels through which inflation expectations may affect the investment plans of firms. In this regards, we find evidence supporting the real interest rate channel. The effect of the real interest rate on investment expenditure plans is significant and displays, as predicted by the theory, the negative sign. Similarly, including in the specification the nominal interest rate (or its proxy) and the inflation expectation as separate regressors we still obtain effects that are statistically significant and that confirm the expansionary effects of higher expected inflation. Furthermore, we find that the magnitude of the relationship between inflation expectations and investment plans vary positively with the levels of liquidity and debt of firms. A one percentage point increase in the 6-month ahead inflation expectations is associated with a higher predicted

probability to report higher investment expenditure plans by 4.0 and 5.9 percentage points when the cash ratio is 5 and 60 percent, respectively. The estimated coefficient of expected inflation rises from 3.0 to 7.1 percent when the level of the debt ratio is 20 or 80 percent, respectively. Similar estimated coefficients are obtained when the estimation is carried out using the 12-month ahead inflation expectations.

Overall, these results bear important policy implications. The robust finding that higher inflationary expectations exert expansionary effects on business investment decisions lends support to the policy measures that operate primarily through the expectations channels as means to effectively stimulate the economy. Furthermore, the evidence according to which the magnitude of the effects of higher inflation expectations varies in relation with the liquidity and debt position of firms suggests a potential synergy between policies aimed at engineering higher inflation expectations (like for instance monetary or fiscal forward guidance announcements) and policies meant to facilitate the channeling funds to firms (like for instance the targeted longer-term refinancing operations launched by the European Central Bank in the past few years or any other measure meant to ease the condition of access to credit).

These policy implications must be taken with some caution for at least two reasons. First, we provide reduced-form estimates and thus our findings may be subject to the Lucas critique. Second, our empirical analysis covers a specific sample period, which includes part of the sovereign debt crisis, historically very low levels of the policy rates and the presence of extraordinary interventions of monetary policy. This is to say that our results may not hold in other phases of the business cycles or under other economic circumstances.

Our paper is related to the growing empirical literature that studies how inflation expectations of economic agents relate to their economic decisions. So far, much of this work has focused on households, in part due to the greater availability of household surveys of inflation expectations. Bachmann et al. (2015) using the Michigan Survey of Consumers find that the effects of higher inflation expectations on consumers' readiness to spend are generally small and statistically insignificant, and significantly negative when the economy is at the effective lower bound. Burke and Ozdagli (2013) find similar results using data from the New York Fed/ RAND-American Life Panel household expectations survey. Subsequent works have found instead 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; D'Acunto et al., 2018), a broader cross-section of European households (Duca et al., 2017) and a Japanese survey of households (Ichiue and Nishiguchi, 2015).

Fewer studies have examined the effects of inflation expectations of firms on economic decisions.[4] Coibion, Gorodnichenko, Kumar and Pedemonte (2018) 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. Similarly, Coibion, Gorodnichenko and Ropele (2018) exploit a unique design feature of SIGE (consisting in the fact that since September 2012 a randomly chosen subset of firms has been repeatedly "treated" with information about recent inflation whereas other firms have been not) to study the causal effect of inflation expectations on firms' economic decisions and forecasts. Ropele (2018) is another recent study to use SIGE to examine the nexus between inflation expectations and the expected price-setting behavior of firms while Cloyne et al. (2016) conduct a similar investigation using survey data for UK manufacturing firms. Our empirical analysis complements these empirical studies by providing new evidence on the relationship between inflation expectations of firms and their investment expenditure plans, which represent a fundamental determinant of business cycle fluctuations, and on the channels through which such effects occur.

The paper is organized as follows. Section 2 provides information about the survey and other data sources. Section 3 presents basic descriptive statistics of the key variables to our analysis. Section 4 discusses the econometric strategy we employ to study the effects of firms' inflation expectations, while sections 5 and 6 present basic estimation results and robustness checks. Section 7 reports the estimation results regarding the transmission channels of inflation expectations. Finally, section 7 concludes.

## 2 Description of Data Sources

Firm-level data used in this paper come from three sources: (*i*) the SIGE, (*ii*) the Italian Credit Register and (*iii*) the Company Accounts Data System.

[4] Other studies have analyzed the formation of inflation expectations of firms (e.g. Richards and Verstraete 2016 using Canadian survey data; Bryan et al. 2015 using data for firms in southeastern United States; Bartiloro et al. 2017 and Conflitti and Zizza 2018 survey data from SIGE) or the anchoring of inflation expectations (e.g. Kumar et al. 2015 using New Zeland survey data).

## 2.1 The SIGE

The SIGE 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 survey covers a sample of about 1,000 Italian firms with at least 50 employees, which is stratified by sector of economic activity (industrial, non-financial private services and construction[5]), geographical area (North-West, North-East, Centre, South & Islands) and number of employees (50-199, 200-999, 1000 and over). 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.

The survey is conducted 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 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 on average 45 percent.

The purpose of the survey is to obtain current or prospective information on firms' assessments of macroeconomic matters as well as various aspects of their business activity. Most of the data is qualitative and typically admits three or more possible answers (for example: worse, the same, better).

*Investment expenditure expectations*

Since December 2012 firms are asked the expected change in their investment expenditure. In the survey waves of March, June and September the question is formulated as follows:

> *What do you expect will be the nominal expenditure on (tangible and intangible) fixed investment in the current year compared with that of last year? ☐much lower; ☐a little lower; ☐about the same; ☐a little higher; ☐much higher.*

In the survey wave of December it reads as:

> *What do you expect will be the nominal expenditure on (tangible and intangible) fixed investment next year compared with that in the current year?*
> *☐much lower; ☐a little lower; ☐about the same; ☐a little higher; ☐much higher.*

[5] Construction firms have been included in the survey since March 2013.

Several remarks are in order. First, in both formulations firms are asked to indicate the expected change in fixed investment expenditure on an annual basis but over the current calendar year relative to the previous year in the former case and over the subsequent calendar year in the latter case. Hence, the *actual* forecasting horizon varies throughout the survey waves between 3- to 12-month ahead. Second, firms answer this question by choosing among five ordered qualitative categories and a footnote added to the question (not reported above) invites the respondent to use the categories "much higher" and "much lower" if in any of the two periods investment expenditure is zero. Third, the question asks the expected change in investment expenditure in *nominal terms*. Needless to say, we are interested in studying the effects of inflation expectations of firms on their expected investment expenditure in real terms. Unfortunately, with the available information in SIGE we cannot directly address this problem. Yet, we argue that this concern should not represent an issue in this analysis for the following considerations. First, using the annual firm-level data from the Survey of Industrial and Service Firms, which is another business survey conducted by the Bank of Italy, over the period from 2012 to 2016 firms on average expected the price of investment goods in the next 12 months to grow in the range 1.1-2.2 percent. Furthermore, focusing on the subset of firms that predicted to reduce in the next 12 months the nominal investment expenditure, the expected change was on average equal to -45 per cent.[6] These results indicate that the expected change in investment expenditure was essentially driven by actual purchase of investment goods rather than their price dynamics. A similar conclusion can be drawn from panel F of Figure 1 where it is shown that the actual growth rates of non-residential investment expenditure in Italy in nominal *vis-à-vis* real terms track each other pretty closely.

*Consumer price inflation expectations*

Since the inception of SIGE firms have been asked to report a quantitative forecast of the Italian Harmonized Index of Consumer Price in terms of its 12-month ahead annual percentage change. Later on, the question on inflation expectations has been enriched to consider other

[6] The time development of the first decile of the empirical distribution of the decline rate of firms' expected nominal investment expenditure is larger in absolute value than the expected growth rate in the price of investment goods.

forecasting horizons: 6-month ahead, 2-year ahead and 2-year ahead from 2 years. For example, in survey wave of December 2015 the question was formulated as follows:

> *In October consumer price inflation, measured by the 12-month change in the harmonized index of consumer prices was 0.3 per cent in Italy and 0.1 per cent in the euro area. What do you think it will be in Italy in: June 2016? _ _ . _ %; December 2016? _ _ . _ %; December 2017? _ _ . _ %; on average between December 2018 and December 2020? _ _ . _ %.*

The first thing to note here is that firms provide numerical point forecasts with one decimal digit of precision. As discussed in Coibion, Gorodnichenko, Kumar and Pedemonte (2018), this feature of the survey design is desirable as it allows respondents to freely choose their inflation expectation.[7] At the same time, to channel firms' responses towards plausible figures the question provides a nominal anchor in the form of the latest official inflation rates for Italy and for the Euro Area. To ensure a uniform informational framework, interviews are started just after the announcement of the latest provisional inflation figure referred to the preceding month. Since September 2012 the question has been slightly modified to evaluate the effects of presenting firms the nominal anchor. The sample of firms has been randomly split in two groups with two thirds of firms receiving the information treatment and the remaining one third being instead uninformed. In the present study we only consider the responses by informed firms, which constitute the largest sub-group.

*Other information from SIGE*

As discussed earlier, SIGE asks firms many other questions that cover matters related to firm activity (e.g. the conditions of access to credit, the expected labor demand, the own-product expected demand or own-product expected price change) or the general economic situation in Italy. The list of all these questions that we later use in the empirical analysis is reported in Table 1. Furthermore, SIGE asks firms to report several structural characteristics regarding the number of employees, the sector of economic activity (industry, non-financial private services and construction), the geographical location of the firm (North-West, North-East, Centre, South & Islands) and the share of sales from exports (no export, export share in total sales is 1 to 33

[7] In other business surveys firms are allowed to provide only a qualitative forecast or select their answer choosing from a set of quantitative ranges.

percent, export share is 34 to 66 percent, export share is 67 percent or more). Also these demographic characteristics will be used in the empirical investigation.

### 2.2 The Italian Credit Register

The second source of firm-level data is the subsection TAXIA of the Italian Central Credit Register, which contains detailed quarterly information on loans provided by a representative sample of financial intermediaries (about 200 Italian banks and 10 branches and subsidiaries of foreign banks).[8] Using the individual data from TAXIA we compute the firm-level nominal borrowing cost (inclusive of fees and commissions) on new term loans obtained in the quarter. We focus on new term loans for two reasons. First, term loans represent the technical form most commonly used to finance investment projects. Second, the cost of new loans obtained in each quarter represents an accurate measure of the financing condition in that specific point in time and possibly a good proxy for the financing condition prevailing in the near future. That said, this data choice comes with the inconvenience of generating a large number of missing observations as in practice firms neither demand nor obtain loans in every period. To tackle this issue, in the empirical part of this paper we also provide estimation results obtained by proxying the nominal borrowing cost with a measure of firm default risk.

### 2.3 The Company Accounts Data System

The third source of firm-level data is the Company Accounts Data System (CADS), which is administered by Cerved Group and includes balance sheet information for all Italian limited liability companies. From CADS we obtain three annual indicators.

The first one is an indicator of the risk profile or default risk of each firm (which we refer to as the *score*). The *score* is computed annually by Cerved Group using discriminant analysis based on a series of balance sheet indicators (assets, rate of return, debts etc.) according to the methodology described in Altman (1968) and Altman et al. (1994) and takes integer values from 1 (when a firm is classified as "very sound") to 9 (when a firm is classified as "very high risk").[9] As discussed in Panetta et al. (2009), although the *score* indicator becomes available with a delay of about 15 months it is nonetheless widely used by Italian banks to assess firm default risk and

[8] Only firms whose total lending from a single bank exceeds 30,000 euro are reported in TAXIA.
[9] The other values in the scale are: 2 = "sound", 3 = "above average solvency", 4 = "solvent", 5 = "vulnerable", 6 = "high vulnerability", 7 = "risky" and 8 = "high risk".

price loans. In light of this consideration and also to maintain the largest number of SIGE observations, in several econometric specifications we replace the quarterly nominal borrowing cost with the annual *score* (lagged one year).

Using the balance sheet data from CADS we also construct two ratios to gauge the short-term liquidity position and the short-term debt position of firms. The short-term liquidity is measured as the ratio of the sum of cash and marketable securities to current liabilities, i.e. debts that are due to be paid within one year. This ratio is commonly known as the *cash ratio*. The short-run debt position is instead measured as the ratio of current liabilities to total assets. We will use these ratios in Section 7 to investigate to what extent the effects of inflation expectations on investment expenditure plans of firms depend on these balance sheet characteristics.

## 3 Basic descriptive statistics

In Table 2 we report basic descriptive statistics of selected variables computed by pooling the data from 2012Q4 to 2016Q4.[10] As shown in row (1), over the sample period nearly half of firms reported not to expect changes in their investment expenditure while 40 percent of the respondents indicated little changes (24.5 and 15.5 percent of respondents expected a little higher or a little lower investment plans, respectively). Few firms responded choosing the boundary categories much lower and much higher. As illustrated in Figure 1 (panels A-E), in contrast to the little time variation in the share of firms expecting no change in their investment plans, which remained in the range 40-50 percent, the quota of those that indicated a little lower or higher investment progressively decreased in the former case (from about 25 to 10 percent) and rose in the latter (from about 20 to 30%). The frequency of firms that reported much lower investment expenditure stayed at about 15 percent until the second quarter of 2013 and halved thereafter while the share of firms that expected much higher investment represented was negligible (about 4 percent).[11]

The gradual shift towards firms with more positive investment plans is also depicted in panel F of Figure 1, which reports the net percentage of firms expecting higher investment

[10] As already discussed, in 2013Q3 the question on expected investment expenditure was not presented to firms. For this reason, all descriptive statistics are computed without taking into account this survey wave.

[11] Given the small number of responses falling in the boundary categories, we make the question on expected investment expenditure trichotomous by merging the categories "much lower" and "a little lower" in "lower" and similarly "much higher" and "a little higher" in "higher". We return to the original formulation in Section 6 when we conduct some robustness checks.

expenditure. In the same panel we also report the actual annual growth rates of non-residential investment expenditure in Italy in real as well as nominal terms. It is worth noting that in either case the net percentage tracks fairly closely the observed investment dynamics.

Turning to firms' inflation expectations, as shown in rows 10 and 11 of Table 1, over the sample period firms expected the aggregate prices to increase by 0.84 percent in the next 12 months and 0.71 percent in the next 6 months. The degree of disagreement in inflation expectations among firms, measured by the standard deviation or the interquartile range, does not reveal substantial differences between the two forecasting horizons. In the top panels of Figure 2 we report the time evolution of the average and standard deviation of firms' inflation expectations. Until 2014Q4 firms expected prices in Italy to gradually decelerate and then virtually stabilize. Likewise, the degree of disagreement across firms declined in the first part of the sample period and then flattened out (except for the spike recorded in 2015Q1).

Once discussed separately the basic descriptive statistics for investment and inflation expectations, we now turn to provide a preliminary assessment of the relationship between these two variables. In the bottom panels of Figure 2 we compare the average inflation expectation for firms that expected to lower investment and with that of firms that reported higher expected investment. More clearly since 2013Q4, there appears a positive relationship between inflation and investment expectations suggesting that firms that expected higher inflation also planned higher investment expenditure. As reported in Appendix Table 1, over the sample period the average inflation expectation formulated by firms that expected to increase investment is about 10 basis points higher than for firms that planned to reduce it.[12]

## 4 Econometric strategy

In order to examine the relationship between of the inflation expectations of firms and the categorical variable that defines their investment expenditure plans we estimate a series of ordered probit regressions. We assume the existence of an unobserved continuous measure of firms' investment expectation ( $\text{INVEST}_t^{i,*}$ ) for which we only observe discrete outcomes

[12] In Appendix Table 1 we show basic descriptive statistics to illustrate the correlation between the expected investment plans of firms and other firm variables. It turns out that on average firms that predict "higher" investment plans also indicate a more favorable idiosyncratic as well as macroeconomic outlook. Furthermore, they pay a lower nominal interest rate and expect a lower real interest rate compared to firms that predict to reduce investment. Finally, they relatively more liquid and less indebted.

represented by the response categories to the survey question on investment expenditure. In its simplest format, the latent regression is given by

$$\text{INVEST}_t^{i,*} = \beta \text{INFL}_t^{i,h} + \boldsymbol{\gamma} \mathbf{X}_t^i + \text{error}_t^i \quad (1)$$

where $\text{INFL}_t^{i,h}$ represents the inflation expectation of firm *i* at horizon *h* formulated in period *t*, $\mathbf{X}_t^i$ represents a vector of firm-specific and aggregate controls which we discuss in more detail below and $\beta$ and $\boldsymbol{\gamma}$ are coefficients to be estimated.

Building our econometric analysis on a regression specification like (1) exposes us to two potential dangers. The first one regards the problem of reverse causality between investment expenditure plans and inflation expectations of firms. It is true that from a macroeconomic perspective investment and inflation expectations are determined simultaneously thus making hard to establish a direction of causality. That said, in the present context this danger should not represent a concern as here we relate the expectations of firms on a macroeconomic matter (i.e. the expected growth rate of the consumer price index in Italy) with their expectations on a microeconomic matter (i.e. the expected change of their investment expenditure). We believe highly unlikely that individually firms may think that their investment plans can materially affect the consumer price index. This consideration is reinforced by the fact that the Italian production structure is largely characterized by small and medium-sized firms.

The second danger regards the endogeneity of inflation expectations. If firms' inflation expectations are influenced by variables that are not included in the regression specification than the estimate of the effect of inflation expectations will be biased. Therefore, in order to avoid as much as possible this problem we need to control for determinants of investment that may be correlated with inflation expectations.[13] These variables can be cross-sectional or aggregate in nature.

Fortunately, SIGE contains a rich set of information on expectations and evaluations of firms for which we can control in our regression specifications. In order to capture movements along or shifts of the "perceived" Phillips curve that can give rise to changes in inflation

[13] A similar empirical strategy to address the endogeneity problem of inflation expectations, based on the inclusion of numerous control variables in the regression specification, is pursued in Bachmann et al. (2015). Another way to proceed would be to exploit a source of exogenous variation in the inflation expectations of agents. This route is for instance followed in Coibion, Gorodnichenko and Ropele (2018) and D'Acunto et al. (2018).

expectations of firms we consider the following set of control variables. We include the (qualitative) assessment of firms regarding the current macroeconomic outlook in Italy compared with previous 3 months ("worse", "the same", "better"). We include the (qualitative) assessment of firms regarding the direction and intensity that several factors exert on their expected price-setting behavior in the next 12 months. In particular we focus on two factors: the cost of labor and the price of raw materials. As reported in Table 1, firms respond by choosing among seven options, ranging from "downward, high" to "upward, high".

As documented in various studies, the expectations of agents may display systematic errors and be biased towards optimism or pessimism (e.g. Bachmann and Elstner, 2015). A positive correlation between investment expenditure plans and inflation expectations could be the result of firms being optimistic or pessimistic by nature. Not controlling for this attitude of firms would tend to induce a positive or a negative correlation between expected inflation and the error term. We address the "optimist/pessimist" problem by including in our vector of controls the (qualitative) assessment of firms about the current conditions to invest compared with previous 3 months ("worse", "the same", "better") and the evaluation of firms regarding the probability of an improvement of the macroeconomic outlook in Italy in the next 3 months ("zero", "1-25 percent", "26-50 percent", "51-75 percent", "76-99 percent" and "100 percent").

The control vector also needs to account for purely aggregate covariates (such as shocks, trends and even the provision of the nominal anchor to firms). Similarly to the logic discussed above, a strong economy may be positively correlated with investment expenditure plans but also with inflation expectations of firms. To this end, we also include time fixed effects.

Beyond the controls just described above, we exploit other information from SIGE that regard the idiosyncratic situation of firms. We include the evaluation on the current conditions of access to credit compared with previous 3 months ("worse", "unchanged", "better"), the evaluation on expected demand of labor in the next 3 months ("lower", "unchanged", "higher"), the evaluation on the expected demand in the next 3 months ("lower", "unchanged", "higher") and the expected price-setting behavior in the next 12 months (firms provide a quantitative forecast of the expected percentage change in selling price). Finally, we also include several demographic characteristics of firms (size, sector, area and openness to exports).

## 5 Baseline estimation results

In this section we present the baseline estimation results from ordered probit regressions as laid out in the previous section. For our baseline specifications we focus on the effects of inflation expectations of firms over a 6-month and 12-month ahead horizons. Unless otherwise specified, the marginal effects are evaluated at the sample mean values for the continuous regressors and at the sample modal categories for the qualitative regressors.

Table 3 shows the estimated coefficients as well as the marginal effects of inflation expectations. The marginal effects of the other control variables (except for the time fixed effects are shown in Appendix Tables 2 and 3).[14] The marginal effects have the economic interpretation as the change in the predicted probability of reporting any of the three response categories ("lower", "about the same", "higher") for a one percentage point increase in expected inflation.

We find a positive and statistically significant coefficient on inflation expectations ($\beta = 0.116$ in the case of 12-month ahead expectations and $\beta = 0.131$ in the case of 6-month ahead expectations), suggesting that higher inflation expectations are associated with firms being more willing to raise their investment expenditure plans. These results are confirmed by the estimated marginal effects of inflation expectations on the predicted probability to report "lower" or "higher" investment expenditure plans. Specifically, a one percentage point increase in the 12-month ahead inflation expectations is associated with a lower (higher) predicted probability of reporting lower (higher) investment expenditure by about 3.3 (3.8) percentage points. The marginal effects are somewhat larger when using the 6-month ahead inflation expectations. Finally, higher expected inflation also appears negatively related (with a statistically significant at 5 percent) with the probability of reporting no change in investment expenditure. In this case, thought, the effects are quantitatively small.

In Section 3 we showed that in the sample period under consideration the cross-sectional mean of inflation expectations initially declined and then stabilized at very low levels. Though the range of variation in the mean expected inflation is not particularly wide, the evaluation of the marginal effects at the sample mean of inflation expectations could be too restrictive. We

[14] As shown in Appendix Tables 2 and 3, the marginal effects of most control variables are significant and display plausible signs, which makes us confident that the information in SIGE do indeed measure the underlying economic variables of interest reasonably well. As one would expect, firms that expect to expand the workforce or that predict an increase in demand or that forecast to raise prices are more likely to report higher expected investment plans. Similarly, firms that perceive better current conditions of access to credit or better current conditions to invest are more likely to indicate higher investment expenditure plans. The marginal effects of the assessment of the current macroeconomic outlook in Italy or of the probability of an improvement are insignificant.

thus re-calculate the marginal effects changing the values of inflation expectations in the range from −0.2 to 2.8 percent (values that correspond to the 5$^{th}$ and 95$^{th}$ percentiles of the empirical distributions of inflation expectations of firms) while keeping the other controls at their baseline levels. The results shown in Appendix Table 4 indicate, perhaps not surprisingly, that the marginal effects of inflation expectations stay significant and virtually unaffected by the changing level of inflation expectations.

Another exercise we do is to assess the sensitivity of the marginal effects of inflation expectations when varying the evaluation levels of some other control variables, namely: the forecast of the expected labor demand in the next 3 months, the assessment of the current conditions of access to credit compared with previous 3 months, the assessment of the current conditions to invest compared with previous 3 months and the evaluation of the current economic outlook in Italy with respect to previous 3 months. We discussed earlier that these variables are trichotomous and typically the response categories depict worsening, stable or improving evaluations. Hence, we compute the marginal effects in three hypothetical cases obtained by evaluating the above set of variables *simultaneously* at the worse, neutral or better category and by also varying the evaluation level of inflation expectations in the coarser grid -0.2, 0.0, 0.5, 0.9, 1.5 and 2.8 percent. The other explanatory variables are kept at the benchmark levels. Results are shown in Table 4.

Several remarks are in order. In all three cases, the marginal effects of inflation expectations on the predicted probability of expecting lower or higher investment expenditure plans are highly significant and display the same signs as in the baseline estimation. For any given level of expected inflation, the size of the marginal effects varies in the three scenarios. Let us consider first the scenario "Worsening assessment of idiosyncratic and macro situation" shown in Panel A. In this case, the marginal effects of inflation expectations are in absolute terms three to five times larger for the response category "lower" compared with the response category "higher". For instance, when expected inflation is evaluated at 0.9 percent the marginal effects of 12-month ahead inflation expectations on the predicted probabilities of reporting lower or higher investment expenditure plans are -0.045 and 0.014, respectively. They become -0.051 and 0.017 when using the 6-month ahead inflation expectations. Reversed results arise in the scenario "Improving assessment of idiosyncratic and macro situation" shown in Panel B. In this case, higher inflation expectations have larger effects on the response category "higher".

It is also interesting to consider the marginal effect of inflation expectations on the *net probability* of reporting higher investment expenditure plans, which we simply compute is as the difference between the marginal effects on the predicted probabilities of reporting higher and lower plans. Using the entries shown in Table 4, we find that the marginal effects of inflation expectations on the net probability attain the largest values in the stable scenario (about 0.07) and the smallest values in the improving scenario. Hence, these results point toward the existence of contingent effects of inflation expectations on the evaluation that firms have on their current and prospective economic situation. Furthermore, the fact that these effects are larger when firms perceive a worsening outlook than when they have a more buoyant evaluation means that the effectiveness of this expectations channel may be greater when a policy intervention is more needed.

## 6 Robustness checks

In this section we present the results of some robustness checks.

*Original 5-category investment question*

The first robustness check we conduct is to re-estimate the baseline specification (1) using the original formulation of the question on expected investment expenditure plans that admits five response categories. The estimation results shown in Panel A of Table 5 confirm all our previous findings. Regardless of the forecasting horizon, the marginal effects of inflation expectation on the predicted probability of reporting "much lower", "a little lower", "a little higher" or "much higher" expected investment plans are highly significant. In absolute terms, the effects are larger for the categories "a little lower" and "a little higher" compared with the respective boundary categories. The marginal effects on the category "about the same" are again weakly significant and negative. Quantitatively, though, these effects are very small.

*Forecasting horizons of inflation expectations*

Firms in SIGE report inflation expectations at horizons longer than one year ahead. Because investment decisions made today can have an impact on firm business over many years, it is worthy to assess to what extent longer-term inflation expectations affect the investment expenditure plans of firms. To this end, we re-estimate the baseline specification (1) using in turn the 2-year ahead inflation expectations and the 2-year ahead from 2 years inflation expectations

and also using the 5-category dependent variable. The results are reported in Panel B of Table 5. Also in these cases, all our previous results are largely confirmed. The only notable difference regards the size of the marginal effects, which tend to become smaller with longer-term inflation expectations.

*Time-varying estimation*

As a further robustness check, we assess the time stability of the marginal effects of inflation expectations. To this end, we re-estimate the specification (1) augmented with interaction terms between the explanatory variables and the time fixed effects. Then, we evaluate the marginal effects at each point in time. The estimated marginal effects on the predicted probability of reporting lower or higher expected investment together with the 90 percent confidence interval (gray area) are presented in Figure 3. We find that the marginal effects of inflation expectations evaluated in the first three quarters of the sample period (until 2013Q2) are in general statistically insignificant and change signs compared with our previous results. In particular, in 2013Q1 and 2013Q2 firms with higher inflation expectations were more likely to lower their expected investment expenditure. This finding could then be rationalized with firms perceiving higher inflation expectations driven by a negative supply-shock. Since 2013Q4 the marginal effects of inflation expectations display the negative (or positive) sign for the predicted probability of reporting lower (or higher) investment expenditure and are in general statistically significant and rather stable over time. These results are consistent with firms considering higher inflation expectations to be driven by a positive demand shock or alternatively with the transmission of shocks when the economy is stuck at the effective lower bound. Theoretical work has shown that when at the effective lower bound (ELB) on policy rates the effect of demand shocks can be amplified, as shown for the case of fiscal shocks in Woodford (2011). Also a negative supply-side shock can have expansionary effects as the higher expected inflation induced by the 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 (Wieland, 2015).

*Firm demographic characteristics*

So far, all estimated marginal effects have been evaluated at the modal categories of the demographic characteristics of firms regarding the sector of economic activity, the geographical location and the degree of openness. Looking at the entries in Table 2 (rows (10)-(12)), this

means that we have computed the marginal effects of inflation expectations for a hypothetical firm that operates in the *industrial sector*, that is located in the North-West area of the country and that *does not export*. Yet, it could be that the effects of inflation expectations might differ along these observable characteristics of firms. Hence, we re-estimate specification (1) on sub-groups of firms. In order to maintain a sufficiently large sample size (say at least 2,000 observations) in the case of the geographical location and degree of openness we combine together the response categories "*Centre*" and "*South & Islands*" as well as the categories "*34-66 percent*" and "*67-100 percent*". The estimation results are shown in Table 6. In most cases, the marginal effects are significant and display the same signs as in the benchmark cases. By sectors of economic activity, we find that the marginal effects of inflation expectations are relatively larger for services firms than for industrial firms. Inflation expectations are positively related with the investment plans of construction firms but in this case the marginal effects are not significant. This later finding might depend on the small sample size used in the estimation. When looking at the geographical location of firms, we find that the largest marginal effects occur for firms that operate in the northern areas of Italy. Economic and social differences between the South and North of Italy have long been identified in the literature (Guiso et al., 2006). We also find smaller and less significant marginal effects of inflation expectations for firms that sell their products abroad, which likely reflects the fact that these exporters are less sensitive to business conditions in their home country since more of their revenues come from foreign sources.

## 7 Inspecting the channels

In previous sections we found robust evidence of a positive relationship between the inflation expectations of firms and their expected investment expenditure. But why do firms with higher inflation expectations raise more their investment expenditure plans? And are there firm characteristics that can affect such a relationship? To answer these questions we inspect three potential channels.

A fundamental tenet in modern investment theory posits that firms' investment expenditure is negatively related to the ex-ante real interest rate. *Ceteris paribus*, a firm that expects a higher inflation rate perceives a lower *ex-ante* real interest rate and thus has an incentive to increase investment expenditure. To investigate the relevance of this *interest rate*

*channel* we modify the baseline latent specification (1) in three ways. In one case, we replace the inflation expectation of firms at horizon *h* with the firm-level *ex-ante* real interest rate at the same horizon ($\text{RINT}_t^{i,h}$) that is:

$$\text{INVEST}_t^{i,*} = \beta \text{RINT}_t^{i,h} + \gamma \mathbf{X}_t^i + \text{error}_t^i. \tag{2}$$

Note that in specification (2) we are implicitly restricting the coefficient on the nominal interest rate and the coefficient on inflation expectation to sum to zero. There are reasons to believe that this restriction might be violated if, for example, firms are allowed to fiscally deduct the nominal interest payments or if there are mechanisms beyond the interest rate channel through which inflation expectations affect the willingness to invest of firms. Furthermore, estimation of a latent specification like (2) does not allow us to single out the effects of inflation expectations.

These considerations lead us to consider an alternative specification in which the inflation expectations of firms and the nominal interest rate ($\text{NINT}_t^i$) enter the regression as separate covariates, that is

$$\text{INVEST}_t^{i,*} = \beta_1 \text{INFL}_t^{i,h} + \beta_2 \text{NINT}_t^i + \gamma \mathbf{X}_t^i + \text{error}_t^i. \tag{3}$$

Unfortunately, both regression specifications (2) and (3) share a common drawback that has to do with the fact that when using the nominal interest rate on new term loans we obtain a large number of missing observations. As shown in Table 2, the number of observations of the nominal rate is about 3,400 and remains virtually unaffected when constructing the ex-ante real interest rates. Hence, to maximize the sample size we further modify the latent specification by replacing the firm-level *quarterly* nominal interest rate with the firm-level *annual* score lagged by one year ($\text{SCORE}_{t-4}^i$), that is

$$\text{INVEST}_t^{i,*} = \beta_1 \text{INFL}_t^{i,h} + \beta_2 \text{SCORE}_{t-4}^i + \gamma \mathbf{X}_t^i + \text{error}_t^i. \tag{4}$$

Two remarks regarding the above specification are in order. First, we use the score lagged by one year to capture the fact that in reality this indicator is made available with a delay of about 15

months. Thus, in the four quarters of each year we repeat the value of the score referred to the previous year. Second, the inclusion of the score in the specification is specifically meant to track the component of the nominal borrowing cost related to the default risk of firm.[15] The other main component of the nominal borrowing cost, being the market risk-free rate, is indirectly accounted for by the time fixed effects.

Beyond the traditional interest rate channel, expected inflation can affect the willingness of firms to invest by interacting with their balance sheet characteristics. As discussed in the Introduction, on the one hand higher expected inflation can erode the expected real value of liquid assets generating a *negative* wealth effect that in turn may discourage investment expenditure. On the other hand, higher inflation expectations may induce firms to adjust the composition of their assets substituting away from liquid assets into capital goods, generating in this way a Tobin effect.

Anticipated inflation can also interact with the liabilities of firms giving rise to opposing effects. On the one hand, higher expected inflation generates a *positive* wealth effect on firms as it erodes the expected nominal value of outstanding debt. This, in turn, may create additional borrowing capacity and lead firms to raise their investment expenditure. On the other hand, if higher future inflation is accompanied by future higher nominal interest rates than highly indebted firms might have to pay higher interest rate expenses and thus be discouraged from undertaking investment expenditure plans.

To assess whether the liquidity and debt positions of firms alter the effects of inflation expectations we modify the latent specification (4) as follows:

$$\begin{aligned} \mathrm{INVEST}_t^{i,*} = \mathrm{INFL}_t^{i,h}\left(\beta_{1p} + \beta_{2p}\mathrm{Z}_{t-4}^{i}\right) + \mathrm{SCORE}_{t-4}^{i}\left(\beta_{1s} + \beta_{2s}\mathrm{Z}_{t-4}^{i}\right) + \\ + \mathbf{X}_t^{i}\left(\beta_{1x} + \beta_{2x}\mathrm{Z}_{t-4}^{i}\right) + \beta_3\mathrm{Z}_{t-4}^{i} + \mathrm{error}_t^{i}, \end{aligned} \tag{5}$$

where $\mathrm{Z}_{t-4}^{i}$ represents either the annual cash ratio ($\mathrm{CASH}_{t-4}^{i}$) or debt ratio ($\mathrm{DEBT}_{t-4}^{i}$) of firm lagged by one year. As with score, in the four quarters of each year we use the values of the cash and debt ratios recorded in the previous year. Furthermore, we use the one-year lagged values of

[15] Note that types of risk premia possibly related to the economic sectors in which firms operate or the geographical areas in which they are located are accounted for by the inclusion of firm demographic characteristics.

the ratios to overcome the endogeneity problem between the inflation expectations of firms and their decisions to adjust the balance-sheet composition.

Note that we let the balance-sheet ratios enter the specification as individual regressors and also interacted with *all* control variables (except for the time fixed effects). In particular, it is thanks to the term of interaction between expected inflation and the balance-sheet ratio that we can trace the effect of inflation expectation for different values of firm liquidity or debt. The partial effect of higher inflation expectation on the investment expenditure plans of firms is given by $\beta_{1p} + \beta_{2p} Z_{t-4}^{i}$.

### 7.1 Results

In this section we present the estimation results obtained from the specifications (2)-(5). We report the estimated coefficients as well as the marginal effects on the predicted probability to expect lower or higher investment expenditure plans only for a subset of regressors, namely the inflation expectation, the nominal interest rate, the score, the cash ratio, the debt ratio and the interaction terms if included in the specification.

*The interest rate channel*

The estimation results for the investigation of the interest rate channel are reported in Table 7.[16] To begin with, in columns (1), (5) and (6) we show the estimation results of specification (2) and find evidence of a highly significant and contractionary effect of the *ex-ante* real interest rate. Thus, consistent with the theory, a higher real interest rate increases (decreases) the probability that firms indicate lower (higher) investment expenditure plans. Quantitatively, the marginal effects are rather small (about 0.01 and -0.01, respectively). In columns (2), (7) and (8) we report the estimation results obtained using specification (3), in which inflation expectation and the nominal borrowing cost are treated as separate regressors. In this case, once controlling for the nominal borrowing cost, the effects of inflation expectations are (weakly) significant and display the expected signs, confirming that inflation expectations of firms are positively related with their willingness toward investment expenditure. Using the 12-month ahead inflation expectations the marginal effects on the predicted probability of reporting lower

[16] In Appendix Tables 9 and 10 we report the estimated marginal effects of all the control variables, except for the sector and time fixed effects (that are available upon request).

or higher investment expenditure plans are -0.024 and 0.030, respectively. The effects are somewhat larger when we use the 6-month ahead expectations.

Next, in columns (3), (9) and (10) we show the estimation results obtained using specification (4), which features the score in place of the nominal borrowing cost, and the same set of observations as in the previous two cases.[17] Interestingly, the estimated coefficient of the score is highly significant and displays the expected signs. Furthermore, the marginal effects of inflation expectations are virtually unchanged compared with the results shown in columns (3) and (4). Finally, in columns (4), (11) and (12) we report the results obtained re-estimating specification (4) using all the available observations (the sample rises from about 4,300 to 9,300 observations). It is worth noting that also in this case all previous findings are confirmed and moreover the marginal effects of inflation expectations return to be highly significant.

*The cash channel*

We now turn to the cash channel through which inflation expectations may affect firm economic behavior. The estimated coefficients results obtained using specification (5) are reported in Panel A of Table 8 while the marginal effects are shown in Table 9. The latter are calculated for different levels of the cash ratio ranging zero to 60 percent (values that correspond to the $10^{th}$ and $90^{th}$ percentile of the full-sample empirical distribution of cash ratio).

Several results are worth noting. We find that the estimated coefficients of inflation expectation remain highly significant and positive, with magnitudes that are virtually identical to those reported in Table 7. More interestingly, though, the estimated coefficient of the interaction term between inflation expectation and the cash ratio is positive (at most weakly significant with the 6-month ahead inflation expectation) indicating larger expansionary effects of inflation expectation for more liquid firms. As shown in Table 9, these results are confirmed when we calculate the marginal effects, which remain highly significant and more importantly exhibit (in absolute terms) an increasing relationship with the evaluation levels of the cash ratio. For example, the marginal effect of the 12-month ahead inflation expectation on the predicted probability of reporting higher investment is 0.035 when the cash ratio is set at 5 percent and increases to 0.056 when the cash ratio is at 60 percent. Somewhat weaker marginal effects are

[17] For simplicity, we treat the score as if it were a continuous variable. Estimation results do not change if we treat it as a 9-category ordered qualitative variable (results are available upon request).

obtained on the predicted probability of reporting lower investment expenditure plans. The estimated marginal effects are relatively stronger when using the 6-month ahead inflation expectations. In sum, these findings reveal that the expansionary effects of higher expected inflation are larger for firms that hold a great amount of liquid assets.

Further interesting results emerge with reference to the other selected variables. As shown in Table 8, we find that the highly statistically significant negative effect of the score (roughly equal to -0.05) is attenuated by the cash ratio as indicated by the estimated coefficient of the interaction term between the score and the cash ratio that is positive and significant at 5 percent. The marginal effects of the score confirm this finding thus suggesting that the contractionary effects of the score on firm investment expenditure plans lessens for higher levels of the cash ratio. When the value of the cash ratio is equal to 60 percent the marginal effect of the score becomes statistically insignificant. These results can be explained by the fact that firms with a large amount of liquid assets can more easily finance investment expenditure with internal resources, thereby being less sensitive to the interest rate (Sharpe and Suarez, 2013). Lastly, the marginal effects of the cash ratio display the correct signs, i.e. higher level of firm liquidity is associated with a decrease (increase) in the predicted probability of reporting lower (higher) expected investment, and are in general statistically significant.

*The debt channel*

To assess the debt channel we report the estimation results obtained using specification (5) in panel B of Table 8 and in Table 10. We calculate the marginal effects letting the levels of the debt ratio range between 20 to 80 percent (values that correspond to the $10^{th}$ and $90^{th}$ percentile of the full-sample empirical distribution of the debt ratio).

Also in this case several interesting results emerge. Looking at the entries shown in panel B of Table 8, we find that the estimated coefficients of inflation expectation are not statistically insignificant whereas the estimated coefficients of the interaction terms between the inflation expectation and the debt ratio are significant and positive. This result suggests two things. The first one is that the magnitude of estimated coefficient of inflation expectation on firm investment plans magnitude is increasing in the level of the debt ratio thus providing support to the fact that higher expected inflation may create a positive wealth effect and generate additional borrowing capacity. The second thing, though, is that for low levels of the debt ratio the overall

estimated coefficient of inflation expectation might become statistically insignificant. In this case, the positive wealth effects induced by expected inflation are small and likely offset by the recessionary effects that higher inflation expectations may bring about. Interestingly, the marginal effects of inflation expectations reported in Table 10 confirm all these results. For instance, the marginal effect of the 12-month ahead inflation expectations on the predicted probability of reporting higher investment expenditure plans nearly triplicates (from 0.028 to 0.074) when the debt ratio rises from 30 to 80 percent. Yet, the marginal effect becomes statistically insignificant (though still displaying a positive sign) when the debt ratio is set to 20 percent. When using the 6-month ahead inflation expectations, we find similar results with the only difference that the marginal effect of inflation expectation remains significant also for the lowest level of the debt ratio.

Finally, turning to the other regressors we find that the estimated coefficient of the score is statistically significant and negative (about -0.045) while that of the interaction term between the score and the debt ratio is statistically insignificant suggesting the lack of any relationship with the debt ratio. This evidence is also confirmed by the marginal effects of the score that in all cases appear virtually unaffected by the values of firm indebtedness. Finally, the estimated coefficients and the marginal effects of the debt ratio are statistically insignificant.

*Recap of results*

The results presented in this section indicate that firms' inflation expectations are positively related with their investment expenditure plans through multiple channels. First of all, we document the working of the conventional *ex-ante* real interest rate channel. Once we control for the firm-level nominal borrowing cost (directly measured by the nominal interest rate charged on new term loans or proxied by the default risk score) we find that firms that expect higher inflation, and thus a lower ex-ante real interest rate, are more likely to raise or reduce less their investment expenditure plans. Beyond this, the positive relationship between inflation expectations and firm investment expenditure plans also depends on the levels of liquidity and debt of firms. In particular, the estimated marginal effects of inflation expectations are stronger for more liquid or more indebted firms. This is consistent with the view that higher expected inflation generates two effects: 1) it make firms more willing to spend (invest) their cash holding to escape the negative wealth effect on assets and 2) it erodes the nominal value of outstanding

debt thus creating additional borrowing capacity. That said, we also find that the expansionary effects of inflation expectations may vanish (become statistically insignificant) for low enough levels of the debt ratio.

## 8 Conclusions

In this paper we use Italian survey data to provide new evidence on the nexus between the inflation expectations of firms and their willingness to invest. Estimating a series of order probit regressions over the period 2012Q4-2016Q4, we find that such a relationship exists and is positive, suggesting that higher expected inflation is associated with a larger willingness towards investment expenditure. To investigate the channels through which inflation expectations may affect firm economic decisions we merge the survey data with two other data sources to obtain information on the nominal borrowing cost of firms and some balance sheet characteristics. Using this information we document several relevant results. First, we provide empirical support to the working of the standard interest rate channel according to which higher expected inflation lowers the *ex-ante* real interest rate and thus stimulates investment expenditure. Second, we find significant interactions between the inflation expectations of firms and their balance sheet characteristics, namely the liquidity and debt position. Our results indicate that the magnitude of the expansionary effects of higher expected inflation becomes larger when firms hold a large amount of liquid assets and/or are more indebted.

In general, these results lend support to the policy measures adopted in the aftermath of the Great Recession by central banks that operating through the expectations channels were aimed at engineering higher inflation expectations to stimulate the economy. Furthermore, the fact that the effects of higher inflation expectations appear to vary with the liquidity and debt position of firms suggests the existence of synergic forces that policy-makers might exploit when engineering policies aimed at increasing inflation expectations (like for instance the forward guidance announcements) and policies aimed at channeling funds to firms (like for instance the targeted longer-term refinancing operations adopted by the European Central Bank). The potential benefits from the expectations channel can be large, it remains an open question how policy-makers could effectively drive agents' inflation expectations.

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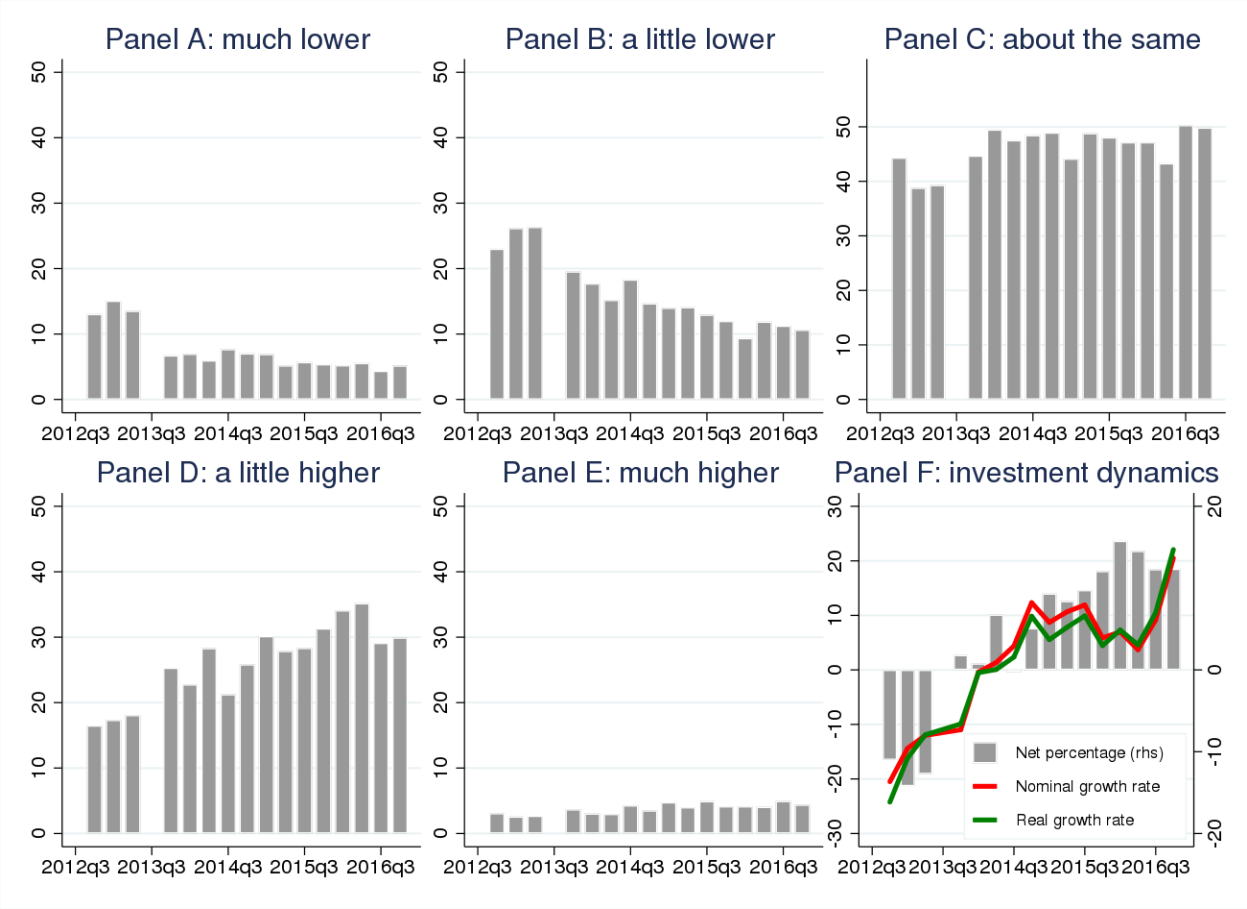
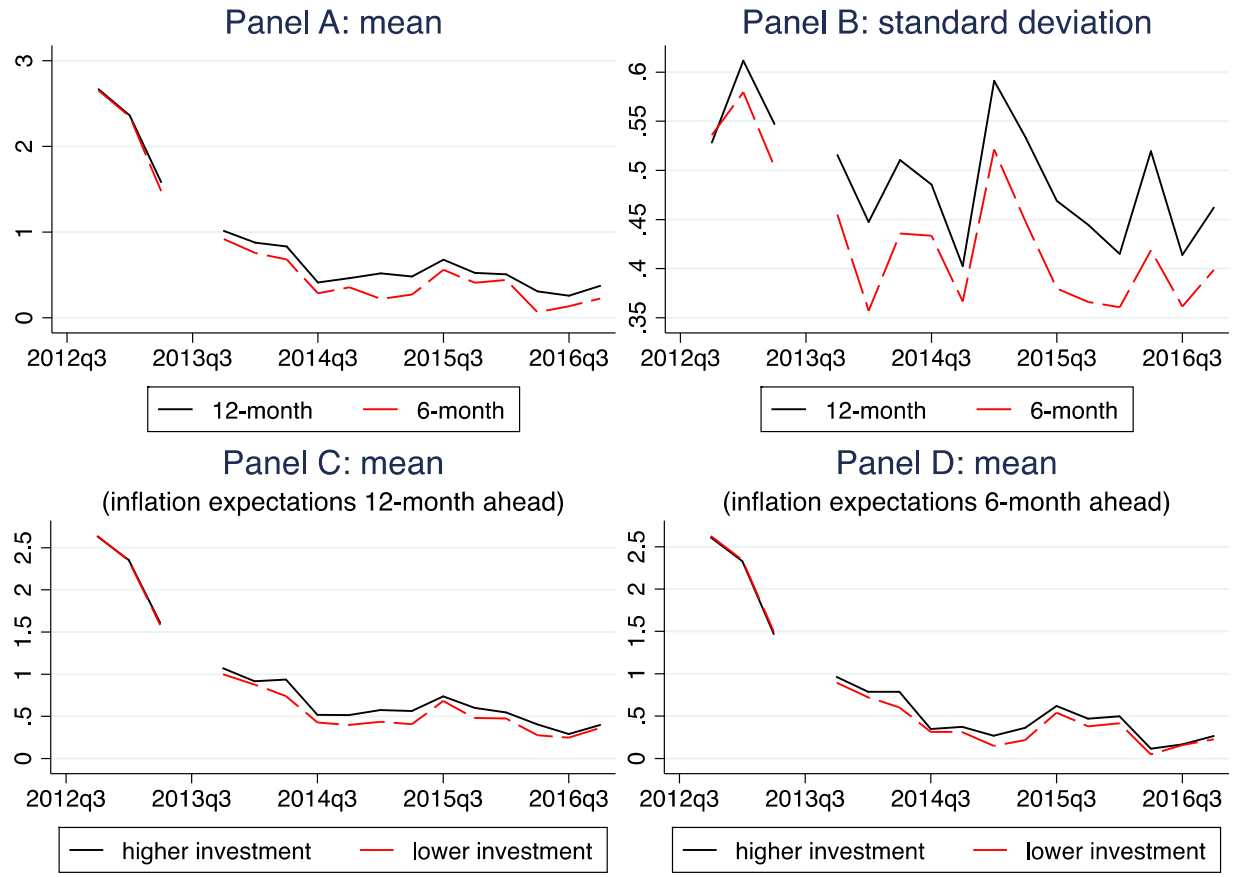
## Figures and Tables

*Figure 1. Expected Investment: Frequencies of Response Over Time.*



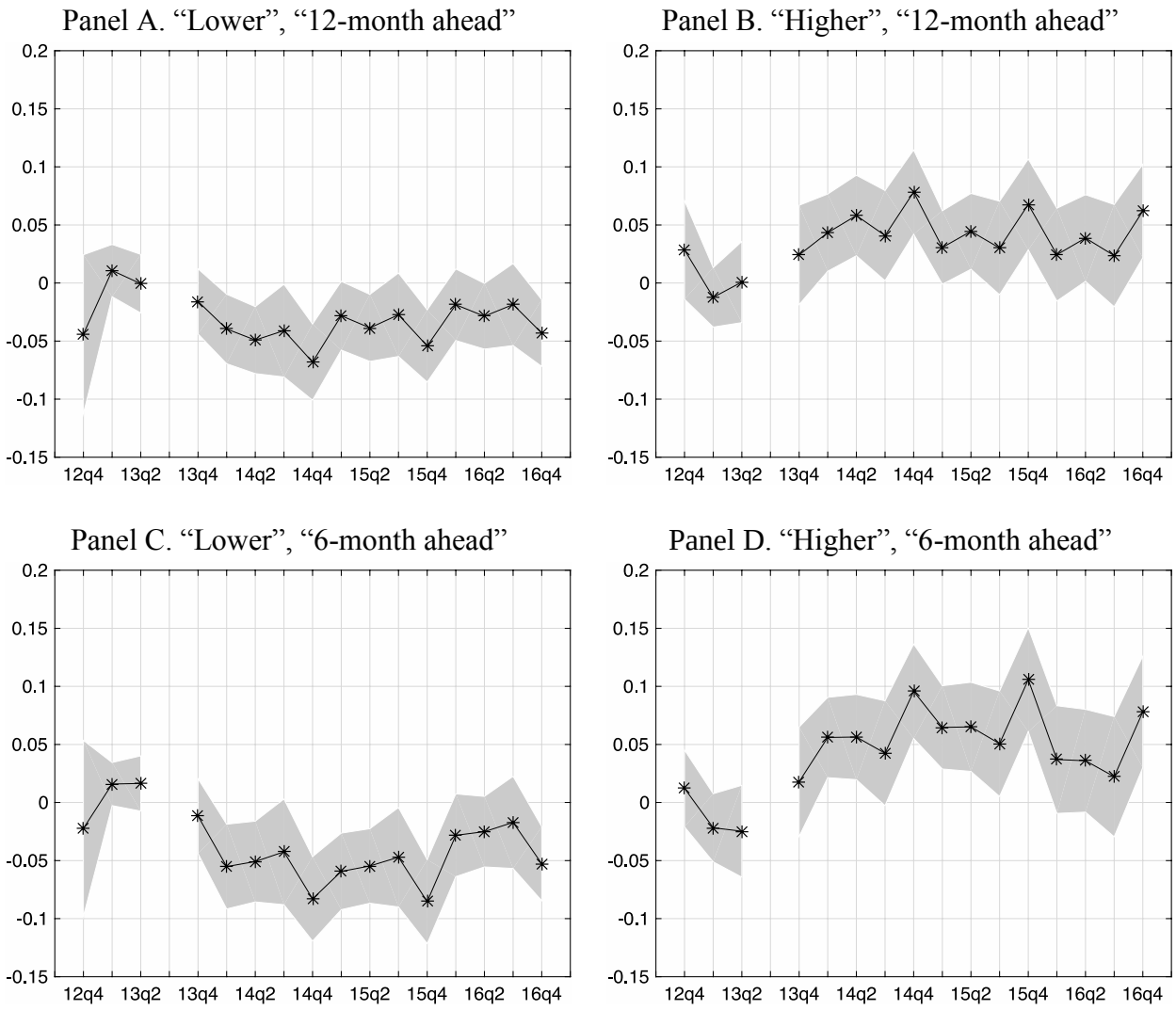

*Notes*. In panels A to E we show the time development of the relative frequency of responses (5 categories) to the SIGE question that asks firms about their expected investment expenditure. In Panel F we show the net percentage of higher expected investment expenditure (calculated as the difference between the sum of relative frequencies of responses "much higher" and "a little higher" and the sum of relative frequency of responses "much lower" and "a little lower") together with the actual (annual) growth rates of non-residential investment expenditure in Italy in nominal terms (red line) and real terms (green line). In correspondence to 2013Q3 the histogram is left blank as in that survey wave the question on expected investment expenditure was not presented to firms. All statistics are computed with sampling weights. Values are expressed in percentage.

*Figure 2. Inflation Expectations: Developments Over Time.*




*Notes*. In panels A and B we plot the time development of the mean value and standard deviation of firms' inflation expectations (12-month and 6-month ahead). In panels C and D we plot the mean values of firms' inflation expectations (12-month and 6-month ahead) distinguishing between firms that reported to expect lower or higher investment expenditure. In correspondence to the third quarter of 2013 the histogram is left blank as in that survey wave the question on expected investment expenditure was not presented to firms. All statistics are calculated using sampling weights. Values are expressed in percentages.

*Figure 3. Time-varying Estimation of Marginal effects of Inflation Expectations*




*Notes*. In panels A and B we plot the time-varying marginal effects of firms' inflation expectations (12-month and 6-month ahead) on the predicted probability to report lower or higher expected investment expenditure. The grey areas represent the 90 percent confidence band. In correspondence to the third quarter of 2013 the marginal effect is left blank as in that survey wave the question on expected investment was not presented to firms.

*Table 1. Formulation of Selected SIGE Questions*

| Question | Response |
|---|---|
| Your firm's total number of employees in the next 3 months will be… | Lower, Unchanged, Higher |
| How will the total demand for your products vary in the next 3 months? | Decrease, No change, Increase |
| For the next 12 months, what do you expect will be the average change in your firm's prices? | Percentage points with one decimal digit |
| Please indicate direction and intensity of the following factors as they will affect your firm's selling prices in the next 12 months:<br>- raw material prices<br>- labor cost | Downward high, Downward average, Downward low, Neutral, Upward low, Upward average, Upward high |
| Compared with 3 month ago, do you think conditions for investment are? | Worse, The Same, Better |
| Compared with three months ago, are credit conditions for your company? | Worse, Unchanged, Better |
| Compared with 3 months ago, do you consider Italy's general economic situation is? | Worse, The same, Better |
| What do you think is the probability of an improvement in Italy's general economic situation in the next 3 months? | Zero, 1-25%, 26-50%, 51-75%, 76-99% |

*Table 2. Basic Descriptive Statistics Of Selected SIGE Variables.*

| Row | Qualitative variables | Obs. | Relative frequency of each response category (percentage values) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | (a) | (b) | (c) | (d) | (e) | (f) | (g) |
| ((1) | Expected investment expenditure | 10,563 | 8.3 | 15.5 | 48.0 | 24.5 | 3.7 | -- | -- |
| (2) | Own-product expected demand | 10,436 | 13.7 | 63.9 | 22.4 | -- | -- | -- | -- |
| (3) | Expected employment | 10,486 | 19.5 | 68.5 | 12.0 | -- | -- | -- | -- |
| (4) | Labor cost for expected price change | 10,284 | 0.8 | 1.8 | 2.9 | 58.2 | 16.5 | 14.2 | 5.5 |
| (5) | Price of raw materials for exp. price change | 10,286 | 1.0 | 3.1 | 5.4 | 50.1 | 19.7 | 16.0 | 4,7 |
| (6) | Current conditions to invest | 10,457 | 19.0 | 70.2 | 10.8 | -- | -- | -- | -- |
| (7) | Access conditions to credit | 10,370 | 15.7 | 76.6 | 7.7 | -- | -- | -- | -- |
| (8) | Italy's macroeconomic outlook | 10,432 | 24.9 | 63.9 | 11.2 | -- | -- | -- | -- |
| (9) | Prob. of improvement of Italy's outlook | 10,513 | 36.2 | 47.5 | 10.7 | 5.0 | 0.6 | -- | -- |
| (10) | Sector of economic activity | 10,563 | 41.6 | 38.7 | 19.8 | -- | -- | -- | -- |
| (11) | Geographical area | 10,563 | 37.5 | 26.4 | 18.5 | 17.7 | -- | -- | -- |
| (12) | Share of revenues from exports | 10,563 | 46.6 | 22.6 | 17.7 | 13.1 | -- | -- | -- |

| Row | Quantitative variables | Obs. | Mean | Std. Dev. | p10 | p25 | p50 | p75 | p90 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | (percentage values) | | | | |
| (13) | Number of employees (in log) | 10,563 | 4.71 | 0.88 | 3.91 | 3.93 | 4.51 | 5.12 | 5.87 |
| (14) | Inflation expectation (12m) | 10,475 | 0.84 | 0.84 | 0.00 | 0.20 | 0.60 | 1.10 | 2.20 |
| (15) | Inflation expectation (6m) | 10,475 | 0.71 | 0.85 | 0.00 | 0.10 | 0.50 | 1.00 | 2.20 |
| (16) | Own-price expected growth rate | 10,563 | 0.42 | 5.20 | -2.00 | 0.00 | 0.00 | 1.50 | 3.00 |
| | Interest rate on new term loans: | | | | | | | | |
| (17) | Nominal | 3,407 | 3.62 | 2.20 | 1.05 | 1.94 | 3.25 | 4.98 | 6.71 |
| (18) | Ex-ante real (12m) | 3,384 | 2.79 | 2.22 | 0.27 | 1.16 | 2.39 | 4.11 | 5.84 |
| (19) | Ex-ante real (6m) | 3,384 | 2.91 | 2.21 | 0.42 | 1.28 | 2.53 | 4.23 | 5.97 |
| (20) | Cash ratio | 7,733 | 19.7 | 32.9 | 0.20 | 1.10 | 5.40 | 23.5 | 57.8 |
| (21) | Debt ratio | 7,688 | 50.1 | 22.3 | 20.2 | 32.3 | 48.8 | 67.6 | 79.0 |

*Notes*. In this table we report basic descriptive statistics of selected SIGE variables. Statistics are computed on pooled data over the period from 2012Q4 to 2016Q4 using sampling weights. For the qualitative variables we report the number of observations and the relative frequency of response categories, which are: (1)-(a) "much lower", (1)-(b) "a little lower", (1)-(c) "about the same", (1)-(d) "a little higher", (1)-(e) "much higher"; (2)-(a) "decrease", (2)-(b) "no change", (2)-(c) "increase"; (3)-(a) "lower", (3)-(b) "unchanged", (3)-(c) "higher"; (4)-(a) "downward high", (4)-(b) "downward average", (4)-(c) "downward low", (4)-(d) "neutral", (4)-(e) "upward low", (4)-(f) "upward average", (4)-(g) "upward high"; (5)-(a) "downward high", (5)-(b) "downward average", (5)-(c) "downward low", (5)-(d) "neutral", (5)-(e) "upward low", (5)-(f) "upward average", (5)-(g) "upward high"; (6)-(a) "worse", (6)-(b) "the same", (6)-(c) "better"; (7)-(a) "worse", (7)-(b) "unchanged", (7)-(c) "better"; (8)-(a) "worse", (8)-(b) "the same", (8)-(c) "better"; (9)-(a) "zero", (9)-(b) "1-25%", (9)-(c) "26-50%", (9)-(d) "51-75%", (9)-(e) "76-99%"; (10)-(a) "industry", (10)-(b) "services", (10)-(c) "construction"; (11)-(a) "North-West", (11)-(b) "North-East", (11)-(c) "Centre", (11)-(d) "South & Islands"; (12)-(a) "zero", (12)-(b) "1-33 percent", (12)-(c) "34-66 percent", (12)-(d) "67-100 percent". For the quantitative variables we report the number of observations, the mean, the standard deviation and the $10^{th}$, $25^{th}$, $50^{th}$ and $75^{th}$ and $90^{th}$ percentiles. Firm-level ex-ante real interest rates are calculated as the difference between the nominal interest rate and expected inflation. The cash ratio is calculated as the sum of cash and marketable securities over current liabilities (i.e. debts due within one year) while the debt ratio is the amount of current liabilities over total assets. All statistics are calculated using sampling weights.

*Table 3. Effects of Inflation Expectations on Investment Expenditure Plans: Baseline Results*

| Selected regressor | Ordered probit estimation | | | |
|---|---|---|---|---|
| | Estimated coefficient | Marginal effects on predicted probability to invest | | |
| | | lower | about the same | higher |
| | (1) | (2) | (3) | (4) |
| **Panel A.** | | | | |
| Inflation expectations (12-month ahead) | 0.116*** | -0.033*** | -0.006** | 0.038*** |
| | (0.028) | (0.008) | (0.003) | (0.009) |
| Observations | 9,615 | | | |
| Pseudo R-square | 0.083 | | | |
| **Panel B.** | | | | |
| Inflation expectations (6-month ahead) | 0.131*** | -0.037*** | -0.006** | 0.043*** |
| | (0.032) | (0.009) | (0.003) | (0.011) |
| Observations | 9,615 | | | |
| Pseudo R-square | 0.083 | | | |

*Notes*. In this table we report the estimation results of specification (1) to study the effects of inflation expectations of firms on their investment expenditure plans. We only report the estimated coefficient (column (1)) as well as the estimated marginal effects (columns (2)-(3)) of inflation expectations. The marginal effects are computed using the sample mean values for the continuous explanatory variables and the sample modal categories for the qualitative explanatory variables. Estimates of the other controls (except for the time fixed effects) are reported in Appendix Tables 2 and 3. ***, **, * denote statistical significance at 1, 5 and 10 percent level. Robust standard errors are in parentheses.

*Table 4. Marginal Effects of Inflation Expectations on Predicted Probability to Invest: Changing Evaluation Levels of Selected Controls*

| | Evaluation levels of inflation expectations and response categories to question on investment expenditure plans | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | -0.2 percent | | 0.0 percent | | 0.5 percent | | 0.9 percent | | 1.5 percent | | 2.8 percent | |
| Regressor | lower | higher | lower | higher | lower | higher | lower | higher | lower | higher | lower | higher |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| | **Panel A**. Worsening assessment of idiosyncratic and macro situation | | | | | | | | | | | |
| $INFL^{e,12m}$ | -0.044*** | 0.012*** | -0.044*** | 0.012*** | -0.045*** | 0.013*** | -0.045*** | 0.014*** | -0.045*** | 0.016*** | -0.045*** | 0.019*** |
| | (0.010) | (0.003) | (0.010) | (0.003) | (0.011) | (0.003) | (0.011) | (0.004) | (0.011) | (0.005) | (0.010) | (0.006) |
| $INFL^{e,6m}$ | -0.050*** | 0.013*** | -0.050*** | 0.014*** | -0.051*** | 0.015*** | -0.051*** | 0.017*** | -0.051*** | 0.019*** | -0.051*** | 0.023*** |
| | (0.012) | (0.003) | (0.012) | (0.003) | (0.012) | (0.004) | (0.012) | (0.005) | (0.012) | (0.006) | (0.012) | (0.008) |
| | **Panel B**. Improving assessment of idiosyncratic and macro situation | | | | | | | | | | | |
| $INFL^{e,12m}$ | -0.010*** | 0.043*** | -0.010*** | 0.042*** | -0.009*** | 0.042*** | -0.008*** | 0.041*** | -0.007*** | 0.039*** | -0.005*** | 0.036*** |
| | (0.003) | (0.011) | (0.003) | (0.010) | (0.003) | (0.010) | (0.002) | (0.010) | (0.002) | (0.009) | (0.001) | (0.007) |
| $INFL^{e,6m}$ | -0.011*** | 0.048*** | -0.011*** | 0.048*** | -0.010*** | 0.047*** | -0.009*** | 0.046*** | -0.008*** | 0.044*** | -0.005*** | 0.040*** |
| | (0.004) | (0.012) | (0.004) | (0.012) | (0.003) | (0.011) | (0.003) | (0.011) | (0.002) | (0.010) | (0.001) | (0.008) |
| | **Panel C**. Stable assessment of idiosyncratic and macro situation | | | | | | | | | | | |
| $INFL^{e,12m}$ | -0.035*** | 0.035*** | -0.035*** | 0.036*** | -0.033*** | 0.037*** | -0.032*** | 0.038*** | -0.030*** | 0.040*** | -0.026*** | 0.042*** |
| | (0.009) | (0.008) | (0.009) | (0.008) | (0.008) | (0.009) | (0.008) | (0.009) | (0.007) | (0.010) | (0.005) | (0.011) |
| $INFL^{e,6m}$ | -0.040*** | 0.040*** | -0.039*** | 0.041*** | -0.037*** | 0.042*** | -0.036*** | 0.044*** | -0.034*** | 0.045*** | -0.028*** | 0.049*** |
| | (0.011) | (0.009) | (0.010) | (0.009) | (0.009) | (0.010) | (0.009) | (0.011) | (0.007) | (0.012) | (0.005) | (0.013) |

*Notes*. In this table we report the marginal effects of inflation expectations of firms on the predicted probability of reporting lower or higher investment expenditure plans. The marginal effects are obtained using specification (1) and evaluated for different levels of inflation expectations in the grid -0.2, 0.0, 0.5, 0.9, 1,5 and 2.8 percent. Furthermore, in Panel A "Worsening assessment of idiosyncratic and macro situation" the marginal effects are calculated assuming that firms expect in the next 3 months a lower labor demand and that with respect to the previous 3 months indicate worse current conditions of access to credit, worse conditions to invest and a worse evaluation of Italy's economic outlook. In Panel B "Improving assessment of idiosyncratic and macro situation" the marginal effects are calculated assuming that firms expect in the next 3 months a higher labor demand and that with respect to the previous 3 months indicate better current conditions of access to credit, better conditions to invest and a better evaluation of Italy's economic outlook. Finally, in Panel C "Stable assessment of idiosyncratic and macro situation" the marginal effects are calculated assuming that firms expect in the next 3 months a stable labor demand and that with respect to the previous 3 months indicate stable current conditions of access to credit, stable conditions to invest and a stable evaluation of Italy's economic outlook. All the other regressors (expect for inflation expectations) are evaluated at benchmark levels as in Tables 2 and 3. *, **, and *** denote statistical significance at the 10%, 5% and 1% critical level, respectively. Robust standard errors are in parenthesis.

*Table 5. Robustness Check: Five-Category Dependent Variable and Forecasting Horizons*

| | Marginal effects of on predicted probability to invest | | | | | Obs. | Pseudo R-square |
|---|---|---|---|---|---|---|---|
| | much lower | a little lower | about the same | a little higher | much higher | | |
| Regressors | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| **Panel A.** | | | | | | | |
| Inflation expectations 6-month ahead | -0.013*** | -0.019*** | -0.007** | 0.030*** | 0.008*** | 9,615 | 0.070 |
| | (0.003) | (0.005) | (0.003) | (0.008) | (0.002) | | |
| Inflation expectations 12-month ahead | -0.010*** | -0.016*** | -0.006** | 0.025*** | 0.007*** | 9,615 | 0.070 |
| | (0.003) | (0.004) | (0.002) | (0.007) | (0.002) | | |
| **Panel B.** | | | | | | | |
| Inflation expectations 2-year ahead | -0.008*** | -0.012*** | -0.004** | 0.019*** | 0.005*** | 9,615 | 0.070 |
| | (0.002) | (0.003) | (0.002) | (0.005) | (0.001) | | |
| Inflation expectations 2-year ahead from 2 years | -0.006*** | -0.009*** | -0.005** | 0.016*** | 0.004*** | 7,332 | 0.064 |
| | (0.002) | (0.003) | (0.002) | (0.005) | (0.001) | | |

*Notes*. In this table we report the marginal effects of inflation expectations on the predicted probability of reporting one of the five categories for expected investment expenditure using specification (1). In Panel A we use in turn the 12-month and the 6-month ahead inflation expectations while in Panel B we use longer-term inflation expectations. The marginal effects are computed using the full-sample mean values for the continuous explanatory variables and the full-sample mode categories for the qualitative explanatory variables. Estimates for the other controls are reported in Appendix Tables 5-8. ***, **, * denote statistical significance at 1, 5 and 10 percent level. Robust standard errors are in parentheses.

*Table 6. Robustness Check: Demographic Characteristics of Firms*

| | Marginal effects of on predicted probability to invest | | | Obs. | Pseudo R-square |
|---|---|---|---|---|---|
| | lower | about the same | higher | | |
| | (1) | (2) | (3) | (6) | (7) |
| **Panel A.** Sector of economic activity | | | | | |
| *"Industry"* | | | | | |
| Inflation expectations 6-month ahead | -0.030** | -0.010* | 0.040** | 3,924 | 0.108 |
| | (0.013) | (0.005) | (0.017) | | |
| Inflation expectations 12-month ahead | -0.024** | -0.008* | 0.033** | 3,924 | 0.108 |
| | (0.011) | (0.005) | (0.015) | | |
| *"Services"* | | | | | |
| Inflation expectations 6-month ahead | -0.058*** | -0.003 | 0.061*** | 3,878 | 0.054 |
| | (0.016) | (0.004) | (0.018) | | |
| Inflation expectations 12-month ahead | -0.052*** | -0.002 | 0.054*** | 3,878 | 0.054 |
| | (0.014) | (0.004) | (0.015) | | |
| *"Construction"* | | | | | |
| Inflation expectations 6-month ahead | -0.012 | -0.006 | 0.018 | 1,813 | 0.121 |
| | (0.014) | (0.007) | (0.021) | | |
| Inflation expectations 12-month ahead | -0.011 | -0.006 | 0.017 | 1,813 | 0.121 |
| | (0.012) | (0.006) | (0.018) | | |
| **Panel B.** Geographical location | | | | | |
| *"North-West"* | | | | | |
| Inflation expectations 6-month ahead | -0.037** | -0.005 | 0.042* | 2,744 | 0.315 |
| | (0.019) | (0.004) | (0.022) | | |
| Inflation expectations 12-month ahead | -0.032** | -0.004 | 0.037** | 2,744 | 0.315 |
| | (0.016) | (0.003) | (0.018) | | |
| *"North-East"* | | | | | |
| Inflation expectations 6-month ahead | -0.050*** | -0.006 | 0.057*** | 2,661 | 0.056 |
| | (0.018) | (0.004) | (0.020) | | |
| Inflation expectations 12-month ahead | -0.037** | -0.005 | 0.041** | 2,661 | 0.055 |
| | (0.015) | (0.003) | (0.018) | | |
| *"Centre and South & Islands"* | | | | | |
| Inflation expectations 6-month ahead | -0.023** | -0.002* | 0.025** | 4,210 | -0.123 |
| | (0.012) | (0.001) | (0.013) | | |
| Inflation expectations 12-month ahead | -0.025** | -0.002* | 0.027** | 4,210 | -0.123 |
| | (0.010) | (0.001) | (0.011) | | |
| **Panel C.** Share of revenues from exports | | | | | |
| *"Zero"* | | | | | |
| Inflation expectations 6-month ahead | -0.042*** | -0.006** | 0.048*** | 4,498 | 0.074 |
| | (0.013) | (0.003) | (0.015) | | |
| Inflation expectations 12-month ahead | -0.036*** | -0.005** | 0.041*** | 4,498 | 0. 074 |
| | (0.011) | (0.002) | (0.013) | | |
| *"1-33 percent"* | | | | | |
| Inflation expectations 6-month ahead | -0.019 | -0.006 | 0.025 | 2,083 | 0.118 |
| | (0.018) | (0.006) | (0.023) | | |
| Inflation expectations 12-month ahead | -0.018 | -0.006 | 0.023 | 2,083 | 0.118 |
| | (0.016) | (0.005) | (0.021) | | |

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| | | | | | |
|---|---|---|---|---|---|
| "*34-100 percent*" | | | | | |
| Inflation expectations 6-month ahead | -0.036** | -0.008** | 0.044** | 3,034 | 0.087 |
| | (0.015) | (0.004) | (0.018) | | |
| Inflation expectations 12-month ahead | -0.030** | -0.007** | 0.036** | 3,034 | 0.087 |
| | (0.013) | (0.003) | (0.016) | | |

*Notes*. In ***, **, * denote statistical significance at 1, 5 and 10 percent level. Robust standard errors are in parentheses.

*Table 7. Exploring the Interest Rate Channel*

| | Ordered Probit Model | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Estimated coefficients | | | | Marginal effects of inflation expectations on predicted probability to invest | | | | | | | |
| Selected regressors | | | | | lower | higher | lower | higher | lower | higher | lower | higher |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| | **Panel A**. Using 12-month ahead inflation expectations | | | | | | | | | | | |
| Real interest rate | -0.037*** | | | | 0.009*** | -0.011*** | | | | | | |
| | (0.013) | | | | (0.003) | (0.004) | | | | | | |
| Nominal interest rate | | -0.034** | | | | | 0.008** | -0.010** | | | | |
| | | (0.013) | | | | | (0.003) | (0.004) | | | | |
| Inflation expectation | | 0.084* | 0.078* | 0.114*** | | | -0.024* | 0.030* | -0.024* | 0.027* | -0.033*** | 0.038*** |
| | | (0.051) | (0.043) | (0.029) | | | (0.014) | (0.017) | (0.012) | (0.014) | (0.008) | (0.009) |
| Score | | | -0.055*** | -0.039*** | | | | | 0.016*** | -0.018*** | 0.011*** | -0.013*** |
| | | | (0.013) | (0.008) | | | | | (0.004) | (0.004) | (0.002) | (0.003) |
| Obs. | 3,137 | 3,137 | 3,080 | 8,946 | 3,137 | | 3,137 | | 3,080 | | 8,946 | |
| Pseudo $R^2$ | 0.036 | 0.036 | 0.096 | 0.080 | 0.036 | | 0.036 | | 0.096 | | 0.080 | |
| | **Panel B**. Using 6-month ahead inflation expectations | | | | | | | | | | | |
| Real interest rate | -0.037*** | | | | 0.009*** | -0.012*** | | | | | | |
| | (0.013) | | | | (0.003) | (0.004) | | | | | | |
| Nominal interest rate | | -0.033** | | | | | 0.008** | -0.010** | | | | |
| | | (0.013) | | | | | (0.003) | (0.004) | | | | |
| Inflation expectation | | 0.116** | 0.108* | 0.135*** | | | -0.031* | 0.038** | -0.029* | 0.035* | -0.038*** | 0.045*** |
| | | (0.058) | (0.059) | (0.033) | | | (0.016) | (0.020) | (0.016) | (0.019) | (0.009) | (0.011) |
| Score | | | -0.071*** | -0.038*** | | | | | 0.019*** | -0.023*** | 0.011*** | -0.012*** |
| | | | (0.016) | (0.008) | | | | | (0.005) | (0.005) | (0.002) | (0.003) |
| Obs. | 3,137 | 3,137 | 3,080 | 8,946 | 3,137 | | 3,137 | | 3,080 | | 8,946 | |
| Pseudo $R^2$ | 0.036 | 0.037 | 0.039 | 0.080 | 0.036 | | 0.037 | | 0.039 | | 0.080 | |

*Notes*. In this table we report the estimated coefficients and the marginal effects on the predicted probability of reporting lower or higher investment expenditure of selected explanatory variables (real interest rate, nominal interest rate, inflation expectation and score). In columns (1), (5) and (6) the results are obtained using specification (2); in columns (2), (7) and (8) the results are obtained using specification (3); in columns (3), (4), (9), (10), (11), (12) and (13) the results are obtained using specification (4). The marginal effects are computed using the sample mean values for the continuous explanatory variables and the sample model categories for the qualitative explanatory variables. The marginal effects of the other controls are reported in Appendix Tables 9 and 10 (the estimated coefficients of the other controls are available upon request). ***, **, * denote statistical significance at 1, 5 and 10 percent level. Robust standard errors are in parentheses.

*Table 8. Exploring the Cash and Debt Channel: Estimated Coefficients*

| Selected regressors | Using 12-month ahead inflation expectations | Using 6-month ahead inflation expectations |
|---|---|---|
| | (1) | (2) |
| | **Panel A**. Cash channel | |
| Inflation expectation | 0.105*** | 0.133*** |
| | (0.036) | (0.041) |
| Inflation expectation × Cash ratio | 0.117 | 0.152* |
| | (0.078) | (0.082) |
| Score | -0.051*** | -0.051*** |
| | (0.011) | (0.011) |
| Score × Cash ratio | 0.071** | 0.072** |
| | (0.035) | (0.035) |
| Cash ratio | -0.261 | -0.282 |
| | (0.421) | (0.419) |
| Obs. | 6,895 | 6,895 |
| Pseudo $R^2$ | 0.061 | 0.062 |
| | **Panel B**. Debt channel | |
| Inflation expectation | -0.015 | 0.061 |
| | (0.066) | (0.069) |
| Inflation expectation × Debt ratio | 0.300*** | 0.208* |
| | (0.107) | (0.109) |
| Score | -0.046** | -0.047** |
| | (0.020) | (0.020) |
| Score × Debt ratio | 0.008 | 0.010 |
| | (0.040) | (0.040) |
| Debt ratio | -0.407 | -0.359 |
| | (0.531) | (0.531) |
| Obs. | 6,835 | 6,835 |
| Pseudo $R^2$ | 0.066 | 0.066 |

*Notes*. In this table we report the estimated coefficients of selected explanatory variables using specification (5). The estimated coefficients for the other controls are not reported but available upon request. ***, **, * denote statistical significance at 1, 5 and 10 percent level. Robust standard errors are in parentheses.

*Table 9. Exploring the Cash Channel*

| | Marginal effects of inflation expectations on predicted probability to invest (in square brackets the evaluation levels for the cash ratio) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Lower | | | | | Higher | | | | |
| | [0%] | [2%] | [5%] | [25%] | [60%] | [0%] | [2%] | [5%] | [25%] | [60%] |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| **Panel A**. Using 12-month ahead inflation expectations (Obs. 6,895 and Pseudo $R^2$=0.061) | | | | | | | | | | |
| Inflation Expectation | -0.028*** | -0.028*** | -0.029*** | -0.034*** | -0.043*** | 0.033*** | 0.033*** | 0.035*** | 0.042*** | 0.056*** |
| | (0.011) | (0.011) | (0.010) | (0.010) | (0.013) | (0.010) | (0.010) | (0.010) | (0.010) | (0.014) |
| Score | 0.014*** | 0.013*** | 0.013*** | 0.009*** | 0.003 | -0.016*** | -0.016*** | -0.015*** | -0.011*** | -0.003 |
| | (0.003) | (0.003) | (0.003) | (0.003) | (0.004) | (0.004) | (0.004) | (0.003) | (0.003) | (0.006) |
| Cash Ratio | -0.059** | -0.058** | -0.056** | -0.048** | -0.031 | 0.046* | 0.046* | 0.048* | 0.054** | 0.063** |
| | (0.025) | (0.024) | (0.024) | (0.023) | (0.020) | (0.025) | (0.025) | (0.026) | (0.027) | (0.028) |
| **Panel B**. Using 6-month ahead inflation expectations (Obs. 6,895 and Pseudo $R^2$=0.062) | | | | | | | | | | |
| Inflation Expectation | -0.037*** | -0.037*** | -0.039*** | -0.045*** | -0.054*** | 0.044*** | 0.044*** | 0.047*** | 0.057*** | 0.077*** |
| | (0.014) | (0.014) | (0.013) | (0.014) | (0.016) | (0.012) | (0.012) | (0.012) | (0.012) | (0.017) |
| Score | 0.014*** | 0.014*** | 0.013*** | 0.009*** | 0.002 | -0.017*** | -0.017*** | -0.016*** | -0.012*** | -0.003 |
| | (0.003) | (0.003) | (0.003) | (0.003) | (0.004) | (0.004) | (0.004) | (0.004) | (0.004) | (0.006) |
| Cash Ratio | -0.080** | -0.080** | -0.077** | -0.064** | -0.041* | 0.080** | 0.081** | 0.084** | 0.093** | 0.103*** |
| | (0.032) | (0.032) | (0.032) | (0.028) | (0.023) | (0.034) | (0.034) | (0.034) | (0.037) | (0.038) |

*Notes*. In this table we report the marginal of effects selected explanatory variables (inflation expectation, score and cash ratio) on the predicted probability of reporting lower or higher investment expenditure using specification (5). The marginal effects are computed for different values of the cash ratio and using the sample mean values for the continuous explanatory variables and the sample model categories for the qualitative explanatory variables. Estimates for the other controls are not reported but available upon request. ***, **, * denote statistical significance at 1, 5 and 10 percent level. Robust standard errors are in parentheses.

*Table 10. Exploring the Channels: Role of the Debt Ratio*

| | Marginal effects of inflation expectations on predicted probability to invest (in square brackets the evaluation levels for the debt ratio) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Lower | | | | | Higher | | | | |
| | [20%] | [30%] | [50%] | [70%] | [80%] | [20%] | [30%] | [50%] | [70%] | [80%] |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| | **Panel A**. Using 12-month ahead inflation expectations (Obs. 6,835 and Pseudo $R^2$=0.066) | | | | | | | | | |
| Inflation Expectation | -0.013 | -0.023* | -0.036*** | -0.052*** | -0.061*** | 0.015 | 0.028** | 0.044*** | 0.063*** | 0.074*** |
| | (0.014) | (0.012) | (0.011) | (0.013) | (0.015) | (0.016) | (0.013) | (0.010) | (0.011) | (0.013) |
| Score | 0.012*** | 0.012*** | 0.012*** | 0.011*** | 0.011** | -0.015*** | -0.015*** | -0.014*** | -0.014*** | -0.013** |
| | (0.004) | (0.003) | (0.003) | (0.004) | (0.005) | (0.005) | (0.004) | (0.003) | (0.005) | (0.006) |
| Debt Ratio | -0.012 | -0.007 | -0.000 | 0.008 | 0.013 | -0.016 | -0.012 | -0.006 | 0.001 | 0.006 |
| | (0.033) | (0.033) | (0.033) | (0.033) | (0.033) | (0.039) | (0.039) | (0.039) | (0.039) | (0.039) |
| | **Panel B**. Using 6-month ahead inflation expectations (Obs. 6,835 and Pseudo $R^2$=0.066) | | | | | | | | | |
| Inflation Expectation | -0.028* | -0.035** | -0.044*** | -0.055*** | -0.062*** | 0.034** | 0.043*** | 0.054*** | 0.067*** | 0.075*** |
| | (0.015) | (0.014) | (0.013) | (0.015) | (0.017) | (0.017) | (0.014) | (0.011) | (0.012) | (0.014) |
| Score | 0.012*** | 0.012*** | 0.011*** | 0.011*** | 0.011** | -0.015*** | -0.015*** | -0.014*** | -0.013*** | -0.013** |
| | (0.004) | (0.003) | (0.003) | (0.004) | (0.005) | (0.005) | (0.004) | (0.003) | (0.005) | (0.006) |
| Debt Ratio | -0.009 | -0.004 | 0.002 | 0.010 | 0.015 | -0.018 | -0.014 | -0.009 | -0.002 | 0.002 |
| | (0.033) | (0.033) | (0.033) | (0.033) | (0.033) | (0.039) | (0.039) | (0.039) | (0.039) | (0.039) |

*Notes*. In this table we report the marginal of effects selected explanatory variables (inflation expectation, score and debt ratio) on the predicted probability of reporting lower or higher investment expenditure using specification (5). The marginal effects are computed for different values of the debt ratio and using the sample mean values for the continuous explanatory variables and the sample model categories for the qualitative explanatory variables. Estimates for the other controls are not reported but available upon request. ***, **, * denote statistical significance at 1, 5 and 10 percent level. Robust standard errors are in parentheses.

# ONLINE APPENDIX

## *FIRM INFLATION EXPECTATIONS*

## *AND INVESTMENT PLANS*

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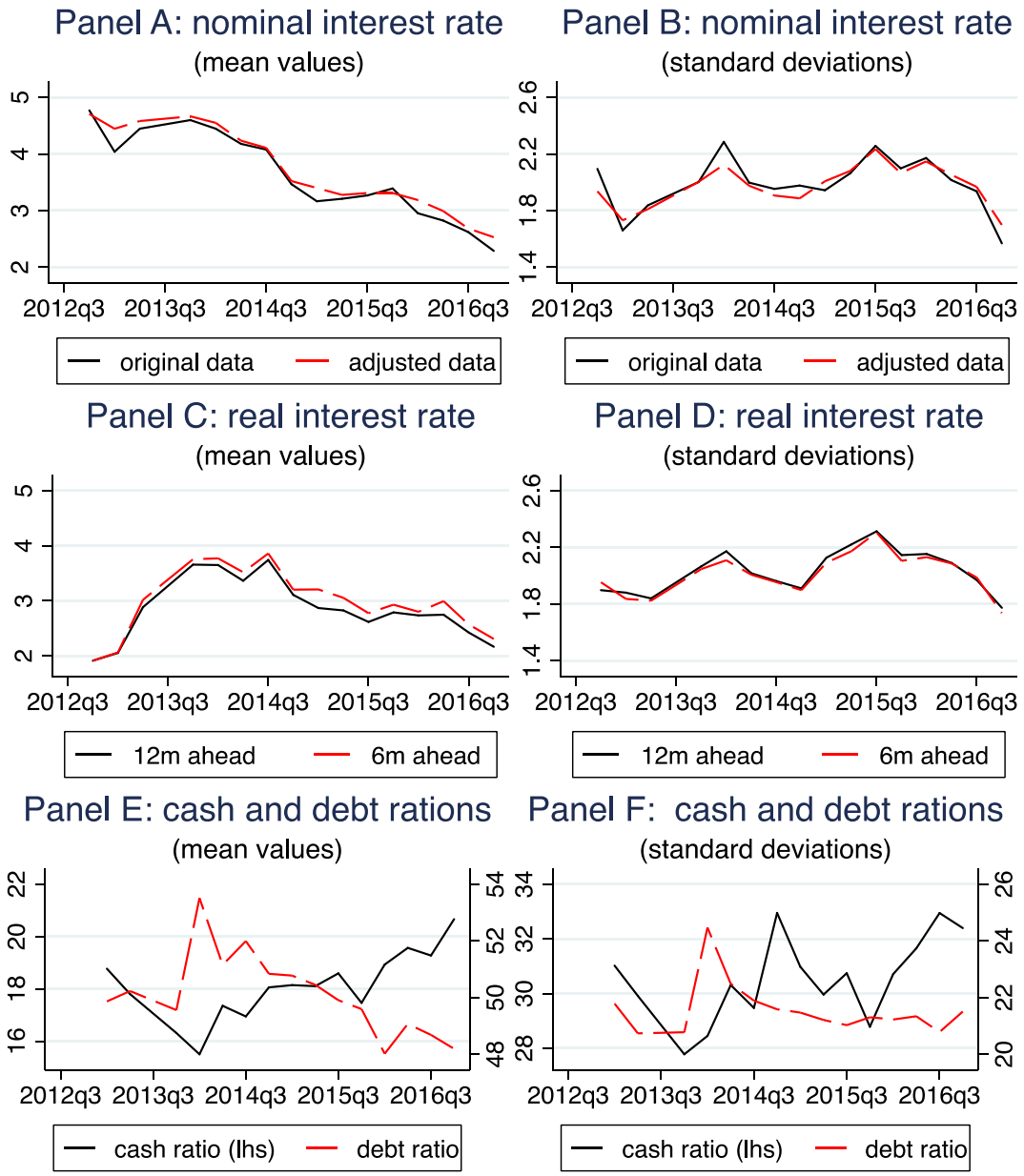
Bank of Italy

*Appendix Figure 1. Mean Values and Standard Deviation of Selected Variables: Developments Over Time.*




*Notes*. In this table we report the time developments of the cross-sectional mean values and standard deviation of selected variables. Statistics are calculated using sampling weights and are expressed in percentages. In top panels, we report statistics for the nominal interest rates on new term loans calculated using the original data as well as the adjusted data. "Adjusted" interest rates refer to the interest rates obtained with the imputation method for missing values described in Section 2.3. In middle panels, we report statistics for the (ex-ante) real interest rates, calculated as the difference between the nominal interest rate and inflation expectations. In bottom panels, we report statistics for the cash ratio (the sum of cash and marketable securities over current liabilities, i.e. debts due within one year) and the debt ratio (amount of current liabilities over total assets).

*Appendix Table 1. Relationship Between Business Investment Plans And Selected Variables.*

| Row | *Qualitative* variables | Mean values of *qualitative v*ariables by response category of expected investment expenditure | | |
|---|---|---|---|---|
| | | lower | about the same | higher |
| (1) | Own-product expected demand | -0.13 | 0.10 | 0.25 |
| (2) | Expected employment | -0.29 | -0.09 | 0.12 |
| (3) | Labor cost for expected price change | 0.28 | 0.31 | 0.33 |
| (4) | Price of raw materials for expected price change | 0.29 | 0.31 | 0.32 |
| (5) | Current conditions to invest | -0.32 | -0.07 | 0.09 |
| (6) | Access conditions to credit | -0.26 | -0.06 | 0.05 |
| (7) | Italy's macroeconomic outlook | -0.36 | -0.11 | 0.01 |
| (8) | Probability of improvement of Italy's outlook | -0.85 | -0.82 | -0.72 |
| Row | *Quantitative* variables | Mean values of *quantitative v*ariables by response category of expected investment expenditure | | |
| | | lower | about the same | higher |
| (9) | Number of employees (in log) | 4.70 | 4.64 | 4.84 |
| (10) | Own-price expected growth rate | -0.21 | 0.37 | 1.03 |
| (11) | Inflation expectation (12m) | -0.04 | -0.04 | 0.03 |
| (12) | Inflation expectation (6m) | -0.03 | -0.03 | 0.03 |
| | Interest rate on new term loans: | | | |
| (13) | Nominal | 0.50 | 0.31 | -0.09 |
| (14) | Ex-ante real (12m) | 0.51 | 0.27 | -0.18 |
| (15) | Ex-ante real (6m) | 0.50 | 0.25 | -0.18 |
| (16) | Cash ratio | 18.52 | 18.90 | 21.92 |
| (17) | Debt ratio | 51.87 | 50.20 | 48.51 |

*Notes*. In this table we report the mean values of selected qualitative and quantitative variables distinguishing by the response categories to the question that asks firms whether they expect their investment expenditure to be "lower", "about the same" or "higher". Statistics are computed on pooled data over the period 2012Q4 to 2016Q4 using sampling weights. The 3-category *qualitative* variables reported in rows (1), (2), (5), (6) and (7) (see Table 1 in the paper) are coded as "-1", "0", "+1". The 7-category *qualitative* variables reported in rows (3) and (4) are coded as "-3", "-2", "-1", "0", "+1", "+2", "+3". Finally, the 5-category qualitative variable reported in row (8) is coded as "-2", "-1", "0", "+1", "+2". For the 12-month and 6-month ahead inflation expectations (rows (11) and (12)) and the interest rates on new term loans (rows (13)-(15)) the mean values are computed on year-quarter demeaned data. The cash ratio is calculated as the sum of cash and marketable securities over current liabilities (i.e. debts due within one year) while the debt ratio is the amount of current liabilities over total assets.

*Appendix Table 2. Effects of 12-Month Ahead Inflation Expectations on Expected Investment Expenditure*

| Selected regressors | Ordered probit estimation | | | |
|---|---|---|---|---|
| | Marginal effects on predicted probability to invest | | | Coefficient |
| | lower | about the same | higher | |
| | (1) | (2) | (3) | (4) |
| Inflation expectations 12 months ahead | -0.033*** | -0.006** | 0.038*** | 0.116*** |
| | (0.008) | (0.003) | (0.009) | (0.028) |
| Expected labor demand in next 3 months (omitted category "*unchanged*") | | | | |
| *Lower* | 0.116*** | -0.010 | -0.106*** | -0.362*** |
| | (0.013) | (0.007) | (0.010) | (0.037) |
| *Higher* | -0.092*** | -0.049*** | 0.141*** | 0.390*** |
| | (0.010) | (0.011) | (0.019) | (0.048) |
| Expected total demand in next 3 months (omitted category "*unchanged*") | | | | |
| *Lower* | 0.071*** | -0.000 | -0.071*** | -0.232*** |
| | (0.016) | (0.005) | (0.014) | (0.049) |
| *Higher* | -0.039*** | -0.012** | 0.050*** | 0.147*** |
| | (0.009) | (0.005) | (0.013) | (0.036) |
| Expected price change in next 12 months | -0.003*** | -0.001** | 0.003*** | 0.010*** |
| | (0.001) | (0.000) | (0.001) | (0.003) |
| Factors affecting expected price change in next 12 months: | | | | |
| Cost of labor | -0.011*** | -0.002* | 0.013*** | 0.039*** |
| | (0.004) | (0.001) | (0.005) | (0.015) |
| Price of raw materials | 0.002 | 0.000 | -0.003 | -0.008 |
| | (0.004) | (0.001) | (0.005) | (0.014) |
| Current conditions to invest compared with previous 3 months (omitted category "*unchanged*") | | | | |
| *Worse* | 0.091*** | -0.004 | -0.087*** | -0.290*** |
| | (0.016) | (0.006) | (0.013) | (0.047) |
| *Better* | -0.084*** | -0.042*** | 0.127*** | 0.352*** |
| | (0.011) | (0.011) | (0.020) | (0.052) |
| Current access conditions to credit compared with previous 3 months (omitted category "*unchanged*") | | | | |
| *Worse* | 0.079*** | -0.001 | -0.078*** | -0.256*** |
| | (0.015) | (0.006) | (0.013) | (0.045) |
| *Better* | -0.060*** | -0.023*** | 0.083*** | 0.237*** |
| | (0.013) | (0.009) | (0.020) | (0.054) |
| Number of employees (in natural logarithm) | -0.003 | -0.001 | 0.004 | 0.012 |
| | (0.004) | (0.001) | (0.004) | (0.013) |
| Italy's current economic outlook compared with previous 3 months (omitted category "*unchanged*") | | | | |
| *Worse* | 0.015 | 0.002 | -0.017 | -0.051 |
| | (0.012) | (0.002) | (0.014) | (0.042) |
| *Better* | -0.022* | -0.005 | 0.027 | 0.081 |
| | (0.013) | (0.004) | (0.017) | (0.049) |

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| | | | | |
|---|---|---|---|---|
| Probability of an improvement in Italy's general economic situation in next 3 months (omitted category "*Zero*"): | | | | |
| *1-25 percent* | -0.011 | -0.002 | 0.013 | 0.039 |
| | (0.009) | (0.002) | (0.011) | (0.032) |
| *26-50 percent* | -0.011 | -0.002 | 0.013 | 0.040 |
| | (0.015) | (0.003) | (0.018) | (0.053) |
| *51-75 percent* | 0.015 | 0.002 | -0.017 | -0.052 |
| | (0.022) | (0.002) | (0.023) | (0.074) |
| *75-99 percent* | 0.013 | 0.001 | -0.014 | -0.044 |
| | (0.063) | (0.005) | (0.068) | (0.213) |
| Share of revenues from exports (omitted category "*0 percent*"): | | | | |
| *0-33 percent* | -0.011 | -0.002 | 0.014 | 0.041 |
| | (0.011) | (0.002) | (0.013) | (0.038) |
| *33-66 percent* | 0.010 | 0.001 | -0.011 | -0.033 |
| | (0.013) | (0.002) | (0.015) | (0.045) |
| *66 percent and over* | -0.033** | -0.009** | 0.042** | 0.123** |
| | (0.013) | (0.004) | (0.017) | (0.049) |
| Geographical area (omitted category "*North-West*") | | | | |
| *North-East* | -0.003 | -0.000 | 0.003 | 0.010 |
| | (0.010) | (0.002) | (0.012) | (0.036) |
| *Centre* | 0.010 | 0.002 | -0.012 | -0.036 |
| | (0.011) | (0.002) | (0.013) | (0.038) |
| *South and Islands* | -0.018* | -0.004 | 0.022* | 0.066* |
| | (0.010) | (0.003) | (0.013) | (0.038) |
| Observations = 9615 | | | | |
| Pseudo R-square = 0.083 | | | | |

Notes. In this table we report the baseline estimates of specification (1) to study the effects of firms' 12-month ahead inflation expectations on their expected investment expenditure. We report the estimated marginal effects (columns (1)-(3)) as well as the estimated coefficient (column (4)) of the main regressors. The marginal effects are computed using the full-sample mean values for the continuous explanatory variables and the full-sample mode categories for the qualitative explanatory variables. Estimates of sector and time fixed effects are not reported. ***, **, * denote statistical significance at 1, 5 and 10 percent level. Robust standard errors are in parentheses.

*Appendix Table 3. Effects of 6-Month Ahead Inflation Expectations on Expected Investment Expenditure*

| Regressors | Ordered probit estimation | | | |
|---|---|---|---|---|
| | Marginal effects on predicted probability to invest | | | Coefficient |
| | lower | about the same | higher | |
| | (1) | (2) | (3) | (4) |
| Inflation expectations 6 months ahead | -0.037*** | -0.006** | 0.043*** | 0.131*** |
| | (0.009) | (0.003) | (0.011) | (0.032) |
| Expected labor demand in next 3 months (omitted category "*unchanged*") | | | | |
| *Lower* | 0.115*** | -0.010 | -0.105*** | -0.361*** |
| | (0.013) | (0.007) | (0.010) | (0.037) |
| *Higher* | -0.092*** | -0.049*** | 0.140*** | 0.388*** |
| | (0.010) | (0.011) | (0.019) | (0.048) |
| Expected total demand in next 3 months (omitted category "*unchanged*") | | | | |
| *Lower* | 0.071*** | -0.000 | -0.071*** | -0.233*** |
| | (0.016) | (0.005) | (0.014) | (0.049) |
| *Higher* | -0.039*** | -0.012** | 0.050*** | 0.147*** |
| | (0.009) | (0.005) | (0.013) | (0.036) |
| Expected price change in next 12 months | -0.003*** | -0.001** | 0.003*** | 0.010*** |
| | (0.001) | (0.000) | (0.001) | (0.003) |
| Factors affecting expected price change in next 12 months: | | | | |
| Cost of labor | -0.011** | -0.002* | 0.013** | 0.039** |
| | (0.004) | (0.001) | (0.005) | (0.015) |
| Price of raw materials | 0.002 | 0.000 | -0.002 | -0.007 |
| | (0.004) | (0.001) | (0.005) | (0.014) |
| Current conditions to invest compared with previous 3 months (omitted category "*unchanged*") | | | | |
| *Worse* | 0.090*** | -0.004 | -0.087*** | -0.289*** |
| | (0.016) | (0.006) | (0.013) | (0.047) |
| *Better* | -0.084*** | -0.042*** | 0.126*** | 0.351*** |
| | (0.011) | (0.011) | (0.020) | (0.052) |
| Current access conditions to credit compared with previous 3 months (omitted category "*unchanged*") | | | | |
| *Worse* | 0.079*** | -0.002 | -0.078*** | -0.257*** |
| | (0.015) | (0.006) | (0.013) | (0.045) |
| *Better* | -0.060*** | -0.023*** | 0.084*** | 0.238*** |
| | (0.013) | (0.009) | (0.020) | (0.055) |
| Number of employees (in natural logarithm) | -0.004 | -0.001 | 0.004 | 0.013 |
| | (0.004) | (0.001) | (0.004) | (0.012) |
| Italy's current economic outlook compared with previous 3 months (omitted category "*unchanged*") | | | | |
| *Worse* | 0.015 | 0.002 | -0.017 | -0.051 |
| | (0.012) | (0.002) | (0.014) | (0.042) |
| *Better* | -0.022* | -0.005 | 0.027 | 0.080 |
| | (0.013) | (0.004) | (0.017) | (0.049) |

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| | | | | |
|---|---|---|---|---|
| Probability of an improvement in Italy's general economic situation in next 3 months (omitted category "*Zero*"): | | | | |
| *1-25 percent* | -0.012 | -0.002 | 0.014 | 0.042 |
| | (0.009) | (0.002) | (0.010) | (0.032) |
| *26-50 percent* | -0.013 | -0.002 | 0.016 | 0.047 |
| | (0.015) | (0.003) | (0.018) | (0.053) |
| *51-75 percent* | 0.012 | 0.001 | -0.013 | -0.040 |
| | (0.022) | (0.002) | (0.023) | (0.074) |
| *75-99 percent* | 0.011 | 0.001 | -0.012 | -0.037 |
| | (0.063) | (0.005) | (0.068) | (0.213) |
| Share of revenues from exports (omitted category "*0 percent*"): | | | | |
| *0-33 percent* | -0.011 | -0.002 | 0.014 | 0.041 |
| | (0.011) | (0.002) | (0.013) | (0.038) |
| *33-66 percent* | 0.008 | 0.001 | -0.009 | -0.029 |
| | (0.013) | (0.002) | (0.015) | (0.045) |
| *66 percent and over* | -0.033** | -0.009** | 0.042** | 0.124** |
| | (0.013) | (0.004) | (0.017) | (0.049) |
| Geographical area (omitted category "*North-West*") | | | | |
| *North-East* | -0.003 | -0.001 | 0.004 | 0.012 |
| | (0.010) | (0.002) | (0.012) | (0.036) |
| *Centre* | 0.011 | 0.002 | -0.012 | -0.038 |
| | (0.011) | (0.002) | (0.013) | (0.038) |
| *South and Islands* | -0.018* | -0.004 | 0.022* | 0.065* |
| | (0.010) | (0.003) | (0.013) | (0.038) |
| Observations = 9,615 | | | | |
| Pseudo R-square = 0.083 | | | | |

Notes. In this table we report the baseline estimates of specification (1) to study the effects of firms' 6-month ahead inflation expectations on their expected investment expenditure. We report the estimated marginal effects (columns (1)-(3)) as well as the estimated coefficient (column (4)) of the main regressors. The marginal effects are computed using the full-sample mean values for the continuous explanatory variables and the full-sample mode categories for the qualitative explanatory variables. Estimates of sector and time fixed effects are not reported. ***, **, * denote statistical significance at 1, 5 and 10 percent level. Robust standard errors are in parentheses.

*Appendix Table 4. Marginal Effects of Inflation Expectations on Business Investment Plans Evaluated At Different Values of Inflation Expectations*

| Evaluation point for inflation expectation | Marginal effect of 12-month ahead inflation expectation on predicted probability to invest | | Marginal effect of 6-month ahead inflation expectation on predicted probability to invest | |
|---|---|---|---|---|
| | Lower | Higher | Lower | Higher |
| | (1) | (2) | (3) | (4) |
| -0.2% (≅ p5) | -0.034*** | 0.034*** | -0.039*** | 0.039*** |
| | (0.009) | (0.008) | (0.010) | (0.009) |
| 0.0% | -0.034*** | 0.035*** | -0.038*** | 0.040*** |
| | (0.009) | (0.008) | (0.010) | (0.009) |
| 0.2% | -0.033*** | 0.035*** | -0.038*** | 0.040*** |
| | (0.009) | (0.008) | (0.010) | (0.010) |
| 0.4% | -0.033*** | 0.036*** | -0.037*** | 0.041*** |
| | (0.008) | (0.009) | (0.009) | (0.010) |
| 0.6% | -0.032*** | 0.036*** | -0.036*** | 0.042*** |
| | (0.008) | (0.009) | (0.009) | (0.010) |
| 0.8% | -0.031*** | 0.037*** | -0.035*** | 0.042*** |
| | (0.008) | (0.009) | (0.009) | (0.011) |
| 1.0% | -0.031*** | 0.037*** | -0.035*** | 0.043*** |
| | (0.008) | (0.009) | (0.008) | (0.011) |
| 1.2% | -0.030*** | 0.038*** | -0.034*** | 0.044*** |
| | (0.007) | (0.010) | (0.008) | (0.011) |
| 1.4% | -0.030*** | 0.038*** | -0.033*** | 0.044*** |
| | (0.007) | (0.010) | (0.008) | (0.012) |
| 1.6% | -0.029*** | 0.039*** | -0.033*** | 0.045*** |
| | (0.007) | (0.010) | (0.007) | (0.012) |
| 1.8% | -0.029*** | 0.039*** | -0.032*** | 0.045*** |
| | (0.006) | (0.010) | (0.007) | (0.012) |
| 2.0% | -0.028*** | 0.039*** | -0.031*** | 0.046*** |
| | (0.006) | (0.010) | (0.007) | (0.012) |
| 2.2% | -0.027*** | 0.040*** | -0.030*** | 0.046*** |
| | (0.006) | (0.010) | (0.006) | (0.012) |
| 2.4% | -0.027*** | 0.040*** | -0.029*** | 0.047*** |
| | (0.006) | (0.011) | (0.006) | (0.013) |
| 2.6% | -0.026*** | 0.040*** | -0.029*** | 0.047*** |
| | (0.005) | (0.011) | (0.005) | (0.013) |
| 2.8% (≅ p95) | -0.026*** | 0.041*** | -0.028*** | 0.047*** |
| | (0.005) | (0.011) | (0.005) | (0.013) |

*Notes.* In this table we report the marginal effects of firms' inflation expectations on the predicted probability of reporting "lower" or "higher" expected investment evaluated. The marginal effects are obtained using the baseline specification and evaluated for different values of inflation expectations in the range from -0.2 to 2.8 percent, corresponding approximately to the 1st and 99th percentile of the empirical distribution of inflation expectations. The other regressors are evaluated at benchmark values as in Tables A2 and A3. **, and *** denote statistical significance at the 5% and 1% critical level, respectively. Robust standard errors are in parenthesis.

*Appendix Table 5. Robustness: Effects of 6-Month Ahead Inflation Expectations on Expected Investment Expenditure (Coded As 5-Category Dependent Variable)*

| | Ordered probit estimation | | | | | |
|---|---|---|---|---|---|---|
| | Marginal effects on predicted probability to invest | | | | | Coefficient |
| Regressors | much lower | A little lower | About the same | A little higher | Much higher | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Inflation expectations 6 months ahead | -0.013*** | -0.019*** | -0.007** | 0.030*** | 0.008*** | 0.114*** |
| | (0.003) | (0.005) | (0.003) | (0.008) | (0.002) | (0.030) |
| Expected labor demand in next 3 months (omitted category "*unchanged*") | | | | | | |
| *Lower* | 0.054*** | 0.063*** | -0.007 | -0.091*** | -0.019*** | -0.372*** |
| | (0.007) | (0.006) | (0.007) | (0.009) | (0.002) | (0.036) |
| *Higher* | -0.030*** | -0.054*** | -0.045*** | 0.094*** | 0.034*** | 0.355*** |
| | (0.004) | (0.006) | (0.010) | (0.012) | (0.006) | (0.045) |
| Expected total demand in next 3 months (omitted category "*unchanged*") | | | | | | |
| *Lower* | 0.028*** | 0.038*** | 0.002 | -0.056*** | -0.012*** | -0.218*** |
| | (0.007) | (0.008) | (0.004) | (0.012) | (0.002) | (0.048) |
| *Higher* | -0.014*** | -0.024*** | -0.013*** | 0.039*** | 0.011*** | 0.146*** |
| | (0.003) | (0.005) | (0.004) | (0.009) | (0.003) | (0.033) |
| Expected price change in next 12 months | -0.001*** | -0.002*** | -0.001*** | 0.003*** | 0.001*** | 0.010*** |
| | (0.000) | (0.000) | (0.000) | (0.001) | (0.000) | (0.003) |
| Factors affecting expected price change in next 12 months: | | | | | | |
| Cost of labor | -0.005*** | -0.007*** | -0.003** | 0.011*** | 0.003*** | 0.043*** |
| | (0.002) | (0.002) | (0.001) | (0.004) | (0.001) | (0.014) |
| Price of raw materials | 0.001 | 0.002 | 0.001 | -0.003 | -0.001 | -0.011 |
| | (0.002) | (0.002) | (0.001) | (0.004) | (0.001) | (0.014) |
| Current conditions to invest compared with previous 3 months (omitted category "*unchanged*") | | | | | | |
| *Worse* | 0.034*** | 0.043*** | 0.001 | -0.063*** | -0.014*** | -0.251*** |
| | (0.007) | (0.008) | (0.005) | (0.011) | (0.002) | (0.046) |
| *Better* | -0.028*** | -0.049*** | -0.039*** | 0.086*** | 0.030*** | 0.323*** |
| | (0.004) | (0.007) | (0.009) | (0.012) | (0.006) | (0.046) |
| Current access conditions to credit compared with previous 3 months (omitted category "*unchanged*") | | | | | | |
| *Worse* | 0.043*** | 0.053*** | -0.002 | -0.077*** | -0.016*** | -0.311*** |
| | (0.008) | (0.008) | (0.006) | (0.010) | (0.002) | (0.044) |
| *Better* | -0.021*** | -0.036*** | -0.023*** | 0.060*** | 0.019*** | 0.226*** |
| | (0.004) | (0.007) | (0.008) | (0.013) | (0.005) | (0.050) |
| Number of employees (in natural log) | -0.003** | -0.004** | -0.001* | 0.007** | 0.002** | 0.026** |
| | (0.001) | (0.002) | (0.001) | (0.003) | (0.001) | (0.012) |
| Italy's current economic outlook compared with previous 3 months (omitted category "*unchanged*") | | | | | | |
| *Worse* | 0.006 | 0.009 | 0.003 | -0.015 | -0.004 | -0.056 |
| | (0.005) | (0.007) | (0.002) | (0.011) | (0.003) | (0.042) |
| *Better* | -0.007* | -0.011 | -0.005 | 0.018 | 0.005 | 0.069 |
| | (0.004) | (0.007) | (0.004) | (0.012) | (0.003) | (0.043) |

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|---|---|---|---|---|---|---|
| Probability of an improvement in Italy's general economic situation in next 3 months (omitted category "*Zero*"): | | | | | | |
| *1-25 percent* | -0.004 | -0.006 | -0.002 | 0.010 | 0.003 | 0.038 |
| | (0.003) | (0.005) | (0.002) | (0.008) | (0.002) | (0.030) |
| *26-50 percent* | -0.007 | -0.010 | -0.004 | 0.016 | 0.004 | 0.060 |
| | (0.005) | (0.008) | (0.003) | (0.013) | (0.004) | (0.049) |
| *51-75 percent* | 0.001 | 0.002 | 0.000 | -0.002 | -0.001 | -0.009 |
| | (0.008) | (0.011) | (0.003) | (0.018) | (0.004) | (0.067) |
| *75-99 percent* | -0.001 | -0.001 | -0.000 | 0.002 | 0.000 | 0.007 |
| | (0.019) | (0.028) | (0.009) | (0.045) | (0.012) | (0.171) |
| Share of revenues from exports (omitted category "*0 percent*") | | | | | | |
| *0-33 percent* | -0.008** | -0.012** | -0.005* | 0.020** | 0.006** | 0.075** |
| | (0.004) | (0.006) | (0.003) | (0.009) | (0.003) | (0.036) |
| *33-66 percent* | 0.003 | 0.005 | 0.001 | -0.007 | -0.002 | -0.028 |
| | (0.005) | (0.007) | (0.002) | (0.011) | (0.003) | (0.042) |
| *66 percent and over* | -0.011** | -0.017** | -0.008** | 0.028** | 0.008** | 0.106** |
| | (0.005) | (0.007) | (0.004) | (0.012) | (0.004) | (0.046) |
| Geographical area (omitted category "*North-West*") | | | | | | |
| *North-East* | -0.000 | -0.001 | -0.000 | 0.001 | 0.000 | 0.003 |
| | (0.004) | (0.006) | (0.002) | (0.009) | (0.002) | (0.034) |
| *Centre* | 0.004 | 0.005 | 0.002 | -0.008 | -0.002 | -0.031 |
| | (0.004) | (0.006) | (0.002) | (0.010) | (0.003) | (0.037) |
| *South and Islands* | -0.004 | -0.006 | -0.002 | 0.009 | 0.003 | 0.035 |
| | (0.004) | (0.006) | (0.002) | (0.009) | (0.003) | (0.035) |
| Observations = 9,615 | | | | | | |
| Pseudo R-square = 0.070 | | | | | | |

*Notes*. In this table we report the baseline estimates of specification (1) to study the effects of firms' 6-month ahead inflation expectations on their expected investment expenditure. We report the estimated marginal effects (columns (1)-(3)) as well as the estimated coefficient (column (4)) of the main regressors. The marginal effects are computed using the full-sample mean values for the continuous explanatory variables and the full-sample mode categories for the qualitative explanatory variables. Estimates of sector and time fixed effects are not reported (available upon request). ***, **, * denote statistical significance at 1, 5 and 10 percent level. Robust standard errors are in parentheses.

*Appendix Table 6. Robustness: Effects of 12-Month Ahead Inflation Expectations on Expected Investment Expenditure (Coded As 5-Category Dependent Variable)*

| | Ordered probit estimation | | | | | |
|---|---|---|---|---|---|---|
| | Marginal effects on predicted probability to invest | | | | | Coefficient |
| Regressors | much lower | A little lower | About the same | A little higher | Much higher | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Inflation expectations 12 months ahead | -0.010*** | -0.016*** | -0.006** | 0.025*** | 0.007*** | 0.095*** |
| | (0.003) | (0.004) | (0.002) | (0.007) | (0.002) | (0.026) |
| Expected labor demand in next 3 months (omitted category "*unchanged*") | | | | | | |
| *Lower* | 0.054*** | 0.063*** | -0.008 | -0.091*** | -0.019*** | -0.372*** |
| | (0.007) | (0.006) | (0.007) | (0.009) | (0.002) | (0.036) |
| *Higher* | -0.030*** | -0.054*** | -0.045*** | 0.095*** | 0.034*** | 0.356*** |
| | (0.004) | (0.006) | (0.010) | (0.012) | (0.006) | (0.045) |
| Expected total demand in next 3 months (omitted category "*unchanged*") | | | | | | |
| *Lower* | 0.028*** | 0.037*** | 0.002 | -0.056*** | -0.012*** | -0.217*** |
| | (0.007) | (0.008) | (0.004) | (0.012) | (0.002) | (0.048) |
| *Higher* | -0.014*** | -0.024*** | -0.013*** | 0.039*** | 0.011*** | 0.146*** |
| | (0.003) | (0.005) | (0.004) | (0.009) | (0.003) | (0.033) |
| Expected price change in next 12 months | -0.001*** | -0.002*** | -0.001*** | 0.003*** | 0.001*** | 0.010*** |
| | (0.000) | (0.000) | (0.000) | (0.001) | (0.000) | (0.003) |
| Factors affecting expected price change in next 12 months: | | | | | | |
| Cost of labor | -0.005*** | -0.007*** | -0.003** | 0.012*** | 0.003*** | 0.044*** |
| | (0.002) | (0.002) | (0.001) | (0.004) | (0.001) | (0.014) |
| Price of raw materials | 0.001 | 0.002 | 0.001 | -0.003 | -0.001 | -0.012 |
| | (0.002) | (0.002) | (0.001) | (0.004) | (0.001) | (0.014) |
| Current conditions to invest compared with previous 3 months (omitted category "*unchanged*") | | | | | | |
| *Worse* | 0.034*** | 0.043*** | 0.001 | -0.064*** | -0.014*** | -0.252*** |
| | (0.007) | (0.008) | (0.005) | (0.011) | (0.002) | (0.046) |
| *Better* | -0.028*** | -0.050*** | -0.039*** | 0.086*** | 0.030*** | 0.324*** |
| | (0.004) | (0.007) | (0.010) | (0.012) | (0.006) | (0.046) |
| Current access conditions to credit compared with previous 3 months (omitted category "*unchanged*") | | | | | | |
| *Worse* | 0.043*** | 0.053*** | -0.002 | -0.077*** | -0.016*** | -0.310*** |
| | (0.008) | (0.008) | (0.006) | (0.010) | (0.002) | (0.044) |
| *Better* | -0.021*** | -0.035*** | -0.023*** | 0.060*** | 0.019*** | 0.225*** |
| | (0.004) | (0.008) | (0.008) | (0.013) | (0.005) | (0.050) |
| Number of employees (in natural log) | -0.003** | -0.004** | -0.001* | 0.007** | 0.002** | 0.025** |
| | (0.001) | (0.002) | (0.001) | (0.003) | (0.001) | (0.012) |
| Italy's current economic outlook compared with previous 3 months (omitted category "*unchanged*") | | | | | | |
| *Worse* | 0.006 | 0.009 | 0.003 | -0.015 | -0.004 | -0.056 |
| | (0.005) | (0.007) | (0.002) | (0.011) | (0.003) | (0.042) |
| *Better* | -0.007* | -0.011 | -0.005 | 0.018 | 0.005 | 0.070 |
| | (0.004) | (0.007) | (0.004) | (0.012) | (0.003) | (0.043) |

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|---|---|---|---|---|---|---|
| Probability of an improvement in Italy's general economic situation in next 3 months (omitted category "*Zero*"): | | | | | | |
| *1-25 percent* | -0.004 | -0.006 | -0.002 | 0.009 | 0.002 | 0.036 |
| | (0.003) | (0.005) | (0.002) | (0.008) | (0.002) | (0.030) |
| *26-50 percent* | -0.006 | -0.009 | -0.003 | 0.014 | 0.004 | 0.054 |
| | (0.005) | (0.008) | (0.003) | (0.013) | (0.004) | (0.049) |
| *51-75 percent* | 0.002 | 0.003 | 0.001 | -0.005 | -0.001 | -0.019 |
| | (0.008) | (0.011) | (0.003) | (0.018) | (0.004) | (0.067) |
| *75-99 percent* | -0.000 | -0.000 | -0.000 | 0.000 | 0.000 | 0.001 |
| | (0.019) | (0.029) | (0.009) | (0.045) | (0.012) | (0.171) |
| Share of revenues from exports (omitted category "*0 percent*") | | | | | | |
| *0-33 percent* | -0.008** | -0.012** | -0.006* | 0.020** | 0.006** | 0.076** |
| | (0.004) | (0.006) | (0.003) | (0.010) | (0.003) | (0.036) |
| *33-66 percent* | 0.003 | 0.005 | 0.002 | -0.008 | -0.002 | -0.031 |
| | (0.005) | (0.007) | (0.002) | (0.011) | (0.003) | (0.042) |
| *66 percent and over* | -0.011** | -0.017** | -0.008** | 0.028** | 0.008** | 0.106** |
| | (0.005) | (0.007) | (0.004) | (0.012) | (0.004) | (0.046) |
| Geographical area (omitted category "*North-West*") | | | | | | |
| *North-East* | -0.000 | -0.000 | -0.000 | 0.000 | 0.000 | 0.001 |
| | (0.004) | (0.006) | (0.002) | (0.009) | (0.002) | (0.034) |
| *Centre* | 0.003 | 0.005 | 0.002 | -0.008 | -0.002 | -0.031 |
| | (0.004) | (0.006) | (0.002) | (0.010) | (0.003) | (0.037) |
| *South and Islands* | -0.004 | -0.006 | -0.002 | 0.009 | 0.003 | 0.036 |
| | (0.004) | (0.006) | (0.002) | (0.009) | (0.003) | (0.035) |
| Observations = 9,615 | | | | | | |
| Pseudo R-square = 0.070 | | | | | | |

*Notes*. In this table we report the baseline estimates of specification (1) to study the effects of firms' 6-month ahead inflation expectations on their expected investment expenditure. We report the estimated marginal effects (columns (1)-(3)) as well as the estimated coefficient (column (4)) of the main regressors. The marginal effects are computed using the full-sample mean values for the continuous explanatory variables and the full-sample mode categories for the qualitative explanatory variables. Estimates of sector and time fixed effects are not reported (available upon request). ***, **, * denote statistical significance at 1, 5 and 10 percent level. Robust standard errors are in parentheses.

*Appendix Table 7. Robustness: Effects of 2-Year Ahead Inflation Expectations on Expected Investment Expenditure (Coded As 5-Category Dependent Variable)*

| | Ordered probit estimation | | | | | |
|---|---|---|---|---|---|---|
| | Marginal effects on predicted probability to invest | | | | | Coefficient |
| Regressors | much lower | A little lower | About the same | A little higher | Much higher | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Inflation expectations 2 years ahead | -0.008*** | -0.012*** | -0.004** | 0.019*** | 0.005*** | 0.072*** |
| | (0.002) | (0.003) | (0.002) | (0.005) | (0.001) | (0.019) |
| Expected labor demand in next 3 months (omitted category "*unchanged*") | | | | | | |
| *Lower* | 0.054*** | 0.063*** | -0.007 | -0.092*** | -0.018*** | -0.372*** |
| | (0.007) | (0.006) | (0.007) | (0.009) | (0.002) | (0.036) |
| *Higher* | -0.029*** | -0.054*** | -0.045*** | 0.095*** | 0.034*** | 0.355*** |
| | (0.004) | (0.006) | (0.010) | (0.012) | (0.006) | (0.045) |
| Expected total demand in next 3 months (omitted category "*unchanged*") | | | | | | |
| *Lower* | 0.028*** | 0.038*** | 0.002 | -0.056*** | -0.012*** | -0.217*** |
| | (0.007) | (0.008) | (0.004) | (0.012) | (0.002) | (0.047) |
| *Higher* | -0.014*** | -0.024*** | -0.013*** | 0.040*** | 0.011*** | 0.147*** |
| | (0.003) | (0.005) | (0.004) | (0.009) | (0.003) | (0.033) |
| Expected price change in next 12 months | -0.001*** | -0.002*** | -0.001*** | 0.003*** | 0.001*** | 0.010*** |
| | (0.000) | (0.000) | (0.000) | (0.001) | (0.000) | (0.003) |
| Factors affecting expected price change in next 12 months: | | | | | | |
| Cost of labor | -0.005*** | -0.007*** | -0.003** | 0.011*** | 0.003*** | 0.043*** |
| | (0.002) | (0.002) | (0.001) | (0.004) | (0.001) | (0.014) |
| Price of raw materials | 0.001 | 0.002 | 0.001 | -0.003 | -0.001 | -0.011 |
| | (0.002) | (0.002) | (0.001) | (0.004) | (0.001) | (0.014) |
| Current conditions to invest compared with previous 3 months (omitted category "*unchanged*") | | | | | | |
| *Worse* | 0.033*** | 0.043*** | 0.001 | -0.064*** | -0.014*** | -0.251*** |
| | (0.007) | (0.008) | (0.005) | (0.011) | (0.002) | (0.046) |
| *Better* | -0.027*** | -0.050*** | -0.039*** | 0.086*** | 0.030*** | 0.322*** |
| | (0.004) | (0.007) | (0.010) | (0.012) | (0.006) | (0.046) |
| Current access conditions to credit compared with previous 3 months (omitted category "*unchanged*") | | | | | | |
| *Worse* | 0.044*** | 0.053*** | -0.002 | -0.078*** | -0.016*** | -0.313*** |
| | (0.008) | (0.008) | (0.006) | (0.010) | (0.002) | (0.044) |
| *Better* | -0.021*** | -0.036*** | -0.023*** | 0.061*** | 0.019*** | 0.226*** |
| | (0.004) | (0.008) | (0.008) | (0.013) | (0.005) | (0.050) |
| Number of employees (in natural log) | -0.003** | -0.004** | -0.001* | 0.007** | 0.002** | 0.025** |
| | (0.001) | (0.002) | (0.001) | (0.003) | (0.001) | (0.012) |
| Italy's current economic outlook compared with previous 3 months (omitted category "*unchanged*") | | | | | | |
| *Worse* | 0.006 | 0.009 | 0.003 | -0.015 | -0.004 | -0.056 |
| | (0.005) | (0.007) | (0.002) | (0.011) | (0.003) | (0.042) |
| *Better* | -0.007* | -0.011 | -0.005 | 0.019 | 0.005 | 0.070 |
| | (0.004) | (0.007) | (0.004) | (0.012) | (0.003) | (0.043) |

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| | | | | | | |
|---|---|---|---|---|---|---|
| Probability of an improvement in Italy's general economic situation in next 3 months (omitted category "*Zero*") | | | | | | |
| *1-25 percent* | -0.004 | -0.006 | -0.002 | 0.009 | 0.002 | 0.035 |
| | (0.003) | (0.005) | (0.002) | (0.008) | (0.002) | (0.030) |
| *26-50 percent* | -0.006 | -0.008 | -0.003 | 0.013 | 0.004 | 0.051 |
| | (0.005) | (0.008) | (0.003) | (0.013) | (0.004) | (0.049) |
| *51-75 percent* | 0.003 | 0.004 | 0.001 | -0.006 | -0.001 | -0.022 |
| | (0.008) | (0.011) | (0.003) | (0.018) | (0.004) | (0.067) |
| *75-99 percent* | 0.000 | 0.000 | 0.000 | -0.000 | -0.000 | -0.001 |
| | (0.019) | (0.029) | (0.009) | (0.045) | (0.011) | (0.171) |
| Share of revenues from exports (omitted category "*0 percent*") | | | | | | |
| *0-33 percent* | -0.008** | -0.012** | -0.006* | 0.020** | 0.006** | 0.074** |
| | (0.004) | (0.006) | (0.003) | (0.010) | (0.003) | (0.036) |
| *33-66 percent* | 0.004 | 0.006 | 0.002 | -0.009 | -0.002 | -0.035 |
| | (0.005) | (0.007) | (0.002) | (0.011) | (0.003) | (0.042) |
| *66 percent and over* | -0.010** | -0.017** | -0.008** | 0.027** | 0.008** | 0.102** |
| | (0.005) | (0.007) | (0.004) | (0.012) | (0.004) | (0.046) |
| Geographical area (omitted category "*North-West*") | | | | | | |
| *North-East* | 0.000 | 0.000 | 0.000 | -0.000 | -0.000 | -0.000 |
| | (0.004) | (0.006) | (0.002) | (0.009) | (0.002) | (0.034) |
| *Centre* | 0.003 | 0.005 | 0.002 | -0.008 | -0.002 | -0.030 |
| | (0.004) | (0.006) | (0.002) | (0.010) | (0.003) | (0.037) |
| *South and Islands* | -0.004 | -0.006 | -0.003 | 0.010 | 0.003 | 0.039 |
| | (0.004) | (0.006) | (0.002) | (0.009) | (0.003) | (0.035) |
| Observations = 9,615 | | | | | | |
| Pseudo R-square = 0.070 | | | | | | |

*Notes*. In this table we report the baseline estimates of specification (1) to study the effects of firms' 6-month ahead inflation expectations on their expected investment expenditure. We report the estimated marginal effects (columns (1)-(3)) as well as the estimated coefficient (column (4)) of the main regressors. The marginal effects are computed using the full-sample mean values for the continuous explanatory variables and the full-sample mode categories for the qualitative explanatory variables. Estimates of sector and time are not reported (available upon request). ***, **, * denote statistical significance at 1, 5 and 10 percent level. Robust standard errors are in parentheses.

*Appendix Table 8. Robustness: Effects of 2-Year Ahead From 2 Years Inflation Expectations on Expected Investment Expenditure (Coded As 5-Category Dependent Variable)*

| Regressors | Ordered probit estimation | | | | | |
|---|---|---|---|---|---|---|
| | Marginal effects on predicted probability to invest | | | | | Coefficient |
| | much lower | A little lower | About the same | A little higher | Much higher | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Inflation expectations 2 years ahead from | -0.006*** | -0.009*** | -0.005** | 0.016*** | 0.004*** | 0.058*** |
| 2 years | (0.002) | (0.003) | (0.002) | (0.005) | (0.001) | (0.018) |
| Expected labor demand in next 3 months (omitted category "*unchanged*") | | | | | | |
| *Lower* | 0.043*** | 0.054*** | 0.006 | -0.085*** | -0.017*** | -0.329*** |
| | (0.007) | (0.007) | (0.007) | (0.011) | (0.003) | (0.043) |
| *Higher* | -0.027*** | -0.051*** | -0.058*** | 0.100*** | 0.035*** | 0.367*** |
| | (0.004) | (0.006) | (0.012) | (0.013) | (0.007) | (0.050) |
| Expected total demand in next 3 months (omitted category "*unchanged*") | | | | | | |
| *Lower* | 0.032*** | 0.044*** | 0.008 | -0.070*** | -0.014*** | -0.266*** |
| | (0.009) | (0.010) | (0.006) | (0.015) | (0.003) | (0.060) |
| *Higher* | -0.010*** | -0.016*** | -0.012** | 0.030*** | 0.008*** | 0.106*** |
| | (0.003) | (0.006) | (0.005) | (0.010) | (0.003) | (0.037) |
| Expected price change in next 12 months | -0.001*** | -0.001*** | -0.001** | 0.002*** | 0.001*** | 0.009*** |
| | (0.000) | (0.000) | (0.000) | (0.001) | (0.000) | (0.003) |
| Factors affecting expected price change in next 12 months: | | | | | | |
| Cost of labor | -0.004*** | -0.007*** | -0.004** | 0.012*** | 0.003*** | 0.044*** |
| | (0.002) | (0.002) | (0.002) | (0.004) | (0.001) | (0.016) |
| Price of raw materials | -0.001 | -0.001 | -0.001 | 0.002 | 0.001 | 0.008 |
| | (0.002) | (0.003) | (0.001) | (0.004) | (0.001) | (0.016) |
| Current conditions to invest compared with previous 3 months (omitted category "*unchanged*") | | | | | | |
| *Worse* | 0.044*** | 0.055*** | 0.005 | -0.087*** | -0.017*** | -0.337*** |
| | (0.010) | (0.011) | (0.008) | (0.015) | (0.003) | (0.062) |
| *Better* | -0.025*** | -0.047*** | -0.051*** | 0.092*** | 0.031*** | 0.334*** |
| | (0.004) | (0.007) | (0.012) | (0.014) | (0.006) | (0.050) |
| Current access conditions to credit compared with previous 3 months (omitted category "*unchanged*") | | | | | | |
| *Worse* | 0.030*** | 0.040*** | 0.009* | -0.065*** | -0.014*** | -0.248*** |
| | (0.008) | (0.009) | (0.005) | (0.014) | (0.003) | (0.056) |
| *Better* | -0.020*** | -0.035*** | -0.033*** | 0.066*** | 0.021*** | 0.241*** |
| | (0.004) | (0.007) | (0.011) | (0.015) | (0.006) | (0.054) |
| Number of employees (in natural log) | -0.003** | -0.004** | -0.002* | 0.008** | 0.002** | 0.028** |
| | (0.001) | (0.002) | (0.001) | (0.004) | (0.001) | (0.013) |
| Italy's current economic outlook compared with previous 3 months (omitted category "*unchanged*") | | | | | | |
| *Worse* | 0.009 | 0.014 | 0.006* | -0.024* | -0.006* | -0.089 |
| | (0.006) | (0.009) | (0.003) | (0.015) | (0.003) | (0.054) |
| *Better* | -0.005 | -0.007 | -0.005 | 0.013 | 0.004 | 0.049 |
| | (0.004) | (0.007) | (0.005) | (0.013) | (0.004) | (0.047) |

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|---|---|---|---|---|---|---|
| Probability of an improvement in Italy's general economic situation in next 3 months (omitted category "*Zero*") | | | | | | |
| *1-25 percent* | -0.004 | -0.007 | -0.004 | 0.012 | 0.003 | 0.043 |
| | (0.004) | (0.006) | (0.003) | (0.010) | (0.002) | (0.036) |
| *26-50 percent* | -0.007 | -0.011 | -0.006 | 0.019 | 0.005 | 0.071 |
| | (0.006) | (0.009) | (0.006) | (0.016) | (0.004) | (0.057) |
| *51-75 percent* | -0.003 | -0.004 | -0.002 | 0.008 | 0.002 | 0.027 |
| | (0.008) | (0.012) | (0.006) | (0.021) | (0.005) | (0.075) |
| *75-99 percent* | -0.010 | -0.015 | -0.010 | 0.028 | 0.007 | 0.100 |
| | (0.016) | (0.028) | (0.021) | (0.051) | (0.014) | (0.184) |
| Share of revenues from exports (omitted category "*0 percent*") | | | | | | |
| *0-33 percent* | -0.004 | -0.007 | -0.004 | 0.012 | 0.003 | 0.044 |
| | (0.004) | (0.006) | (0.004) | (0.011) | (0.003) | (0.042) |
| *33-66 percent* | 0.009* | 0.014* | 0.006 | -0.023* | -0.005* | -0.086* |
| | (0.005) | (0.008) | (0.004) | (0.013) | (0.003) | (0.049) |
| *66 percent and over* | -0.008 | -0.012 | -0.009 | 0.023 | 0.006 | 0.082 |
| | (0.005) | (0.008) | (0.006) | (0.014) | (0.004) | (0.052) |
| Geographical area (omitted category "*North-West*") | | | | | | |
| *North-East* | 0.001 | 0.002 | 0.001 | -0.004 | -0.001 | -0.014 |
| | (0.004) | (0.006) | (0.003) | (0.011) | (0.003) | (0.039) |
| *Centre* | 0.003 | 0.005 | 0.003 | -0.009 | -0.002 | -0.033 |
| | (0.004) | (0.007) | (0.003) | (0.012) | (0.003) | (0.043) |
| *South and Islands* | -0.003 | -0.004 | -0.003 | 0.008 | 0.002 | 0.029 |
| | (0.004) | (0.006) | (0.004) | (0.011) | (0.003) | (0.040) |
| Observations = 7,332 | | | | | | |
| Pseudo R-square = 0.064 | | | | | | |

*Notes*. In this table we report the baseline estimates of specification (1) to study the effects of firms' 6-month ahead inflation expectations on their expected investment expenditure. We report the estimated marginal effects (columns (1)-(3)) as well as the estimated coefficient (column (4)) of the main regressors. The marginal effects are computed using the full-sample mean values for the continuous explanatory variables and the full-sample mode categories for the qualitative explanatory variables. Estimates of sector and time fixed effects are not reported (available upon request). ***, **, * denote statistical significance at 1, 5 and 10 percent level. Robust standard errors are in parentheses.

*Appendix Table 9. Exploring the Channels: Role of the Interest Rate*

| Regressors | Marginal effects of 12-month inflation expectations on predicted probability to invest | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Lower (1) | Higher (2) | Lower (3) | Higher (4) | Lower (5) | Higher (6) | Lower (7) | Higher (8) |
| Real interest rate | 0.009*** | -0.011*** | | | | | | |
| | (0.003) | (0.004) | | | | | | |
| Nominal interest rate | | | 0.008** | -0.010** | | | | |
| | | | (0.003) | (0.004) | | | | |
| Inflation expectation | | | -0.024* | 0.030* | -0.024* | 0.027* | -0.033*** | 0.038*** |
| | | | (0.014) | (0.017) | (0.012) | (0.014) | (0.008) | (0.009) |
| Score | | | | | 0.016*** | -0.018*** | 0.011*** | -0.013*** |
| | | | | | (0.004) | (0.004) | (0.002) | (0.003) |
| Expected labor demand in next 3 months (omitted category "*unchanged*") | | | | | | | | |
| *Lower* | 0.118*** | -0.114*** | 0.118*** | -0.114*** | 0.088*** | -0.083*** | 0.103*** | -0.096*** |
| | (0.024) | (0.020) | (0.023) | (0.020) | (0.020) | (0.017) | (0.013) | (0.011) |
| *Higher* | -0.089*** | 0.146*** | -0.088*** | 0.146*** | -0.101*** | 0.149*** | -0.090*** | 0.135*** |
| | (0.017) | (0.030) | (0.017) | (0.030) | (0.015) | (0.025) | (0.011) | (0.019) |
| Expected total demand in next 3 months (omitted category "*unchanged*") | | | | | | | | |
| *Lower* | 0.059* | -0.062** | 0.059* | -0.063** | 0.096*** | -0.086*** | 0.082*** | -0.080*** |
| | (0.031) | (0.028) | (0.031) | (0.028) | (0.029) | (0.021) | (0.017) | (0.014) |
| *Higher* | -0.045*** | 0.061*** | -0.044*** | 0.062*** | -0.053*** | 0.066*** | -0.041*** | 0.053*** |
| | (0.015) | (0.023) | (0.015) | (0.023) | (0.014) | (0.019) | (0.009) | (0.013) |
| Expected price change in next 12 months | | | | | | | | |
| | -0.003* | 0.003** | -0.003* | 0.003* | -0.002* | 0.003* | -0.003*** | 0.004*** |
| | (0.001) | (0.002) | (0.001) | (0.002) | (0.001) | (0.002) | (0.001) | (0.001) |
| Factors affecting expected price change in next 12 months: | | | | | | | | |
| Cost of labor | -0.004 | 0.005 | -0.004 | 0.006 | -0.017** | 0.019** | -0.011** | 0.013** |
| | (0.007) | (0.009) | (0.007) | (0.009) | (0.007) | (0.008) | (0.004) | (0.005) |
| Raw materials price | -0.005 | 0.006 | -0.005 | 0.006 | -0.004 | 0.005 | 0.003 | -0.003 |
| | (0.006) | (0.008) | (0.006) | (0.008) | (0.006) | (0.007) | (0.004) | (0.005) |
| Current conditions to invest compared with previous 3 months (omitted category "*unchanged*") | | | | | | | | |
| *Worse* | 0.113*** | -0.110*** | 0.112*** | -0.110*** | 0.118*** | -0.105*** | 0.086*** | -0.083*** |
| | (0.030) | (0.023) | (0.029) | (0.023) | (0.027) | (0.020) | (0.016) | (0.014) |
| *Better* | -0.081*** | 0.131*** | -0.081*** | 0.131*** | -0.057*** | 0.074*** | -0.080*** | 0.116*** |
| | (0.018) | (0.034) | (0.018) | (0.033) | (0.019) | (0.027) | (0.012) | (0.020) |
| Current access conditions to credit compared with previous 3 months (omitted category "*unchanged*") | | | | | | | | |
| *Worse* | 0.065** | -0.070*** | 0.065** | -0.071*** | 0.059** | -0.058*** | 0.060*** | -0.061*** |
| | (0.026) | (0.024) | (0.026) | (0.025) | (0.023) | (0.020) | (0.015) | (0.014) |
| *Better* | -0.081*** | 0.129*** | -0.081*** | 0.130*** | -0.068*** | 0.091*** | -0.065*** | 0.091*** |
| | (0.016) | (0.030) | (0.016) | (0.030) | (0.017) | (0.025) | (0.013) | (0.021) |
| N. employees (log) | 0.008 | -0.011 | 0.008 | -0.010 | 0.008* | -0.009* | -0.002 | 0.002 |
| | (0.006) | (0.007) | (0.006) | (0.007) | (0.005) | (0.005) | (0.004) | (0.004) |
| Italy's current economic outlook compared with previous 3 months (omitted category "*unchanged*") | | | | | | | | |
| *Worse* | 0.028 | -0.032 | 0.028 | -0.033 | 0.035 | -0.036* | 0.017 | -0.019 |
| | (0.023) | (0.026) | (0.023) | (0.026) | (0.021) | (0.021) | (0.013) | (0.014) |
| *Better* | -0.036* | 0.050 | -0.035* | 0.049 | -0.049*** | 0.062** | -0.022* | 0.027 |
| | (0.021) | (0.031) | (0.021) | (0.031) | (0.019) | (0.026) | (0.013) | (0.017) |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Probability of an improvement in Italy's general economic situation in next 3 months (omitted category "*Zero*") | | | | | | | | |
| *1-25 percent* | 0.004 | -0.005 | 0.004 | -0.005 | 0.008 | -0.009 | -0.013 | 0.016 |
| | (0.015) | (0.020) | (0.015) | (0.020) | (0.014) | (0.016) | (0.009) | (0.011) |
| *26-50 percent* | 0.002 | -0.002 | 0.004 | -0.005 | 0.022 | -0.024 | -0.013 | 0.015 |
| | (0.024) | (0.031) | (0.024) | (0.031) | (0.023) | (0.025) | (0.016) | (0.019) |
| *51-75 percent* | 0.068 | -0.075* | 0.070 | -0.077* | 0.032 | -0.035 | 0.008 | -0.009 |
| | (0.043) | (0.041) | (0.043) | (0.041) | (0.033) | (0.034) | (0.023) | (0.025) |
| *75-99 percent* | 0.078 | -0.085 | 0.081 | -0.087 | -0.026 | 0.032 | 0.003 | -0.003 |
| | (0.093) | (0.085) | (0.094) | (0.085) | (0.068) | (0.090) | (0.062) | (0.069) |
| Share of revenues from exports (omitted category "*0 percent*") | | | | | | | | |
| *0-33 percent* | 0.002 | -0.003 | 0.003 | -0.004 | -0.020 | 0.023 | -0.012 | 0.014 |
| | (0.018) | (0.022) | (0.018) | (0.022) | (0.016) | (0.019) | (0.011) | (0.013) |
| *33-66 percent* | 0.015 | -0.019 | 0.017 | -0.020 | 0.001 | -0.001 | 0.011 | -0.013 |
| | (0.022) | (0.026) | (0.022) | (0.026) | (0.020) | (0.022) | (0.013) | (0.015) |
| *66 percent and over* | -0.011 | 0.014 | -0.010 | 0.014 | -0.029 | 0.035 | -0.029** | 0.037** |
| | (0.022) | (0.029) | (0.022) | (0.029) | (0.020) | (0.024) | (0.014) | (0.017) |
| Geographical area (omitted category "*North-West*") | | | | | | | | |
| *North-East* | -0.031* | 0.043** | -0.030* | 0.041* | -0.020 | 0.024 | -0.004 | 0.005 |
| | (0.016) | (0.022) | (0.016) | (0.022) | (0.016) | (0.018) | (0.011) | (0.012) |
| *Centre* | -0.025 | 0.033 | -0.023 | 0.031 | -0.047*** | 0.060*** | 0.003 | -0.004 |
| | (0.018) | (0.025) | (0.018) | (0.025) | (0.017) | (0.021) | (0.011) | (0.013) |
| *South and Islands* | -0.041** | 0.057** | -0.039** | 0.055** | -0.031* | 0.038* | -0.017 | 0.020 |
| | (0.018) | (0.025) | (0.018) | (0.025) | (0.017) | (0.021) | (0.011) | (0.013) |
| Observations | 3,137 | | 3,137 | | 3,080 | | 8,946 | |
| Pseudo R-square | 0.043 | | 0.044 | | 0.047 | | 0.082 | |

*Notes*. In this table we report the marginal effects on the predicted probability of reporting lower or higher investment expenditure of explanatory variables (expect for the sector and time fixed effects). In columns (1) and (2) the results are obtained using specification (2); in columns (3) and (4) the results are obtained using specification (3); in columns (5)-(8) the results are obtained using specification (4). In columns (5) and (6) the estimation sample is the same as in columns (1)-(4) whereas in columns (7) and (8) the estimation sample uses all available observations. The marginal effects are computed using the sample mean values for the continuous explanatory variables and the sample model categories for the qualitative explanatory variables. ***, **, * denote statistical significance at 1, 5 and 10 percent level. Robust standard errors are in parentheses.

*Appendix Table 10. Exploring the Channels: Role of the Interest Rate*

| Regressors | Marginal effects of 6-month inflation expectations on predicted probability to invest | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Lower (1) | Higher (2) | Lower (3) | Higher (4) | Lower (5) | Higher (6) | Lower (7) | Higher (8) |
| Real interest rate | 0.009*** | -0.012*** | | | | | | |
| | (0.003) | (0.004) | | | | | | |
| Nominal interest rate | | | 0.008** | -0.010** | | | | |
| | | | (0.003) | (0.004) | | | | |
| Inflation expectation | | | -0.031* | 0.038** | -0.029* | 0.035* | -0.038*** | 0.045*** |
| | | | (0.016) | (0.020) | (0.016) | (0.019) | (0.009) | (0.011) |
| Score | | | | | 0.019*** | -0.023*** | 0.011*** | -0.012*** |
| | | | | | (0.005) | (0.005) | (0.002) | (0.003) |
| Expected labor demand in next 3 months (omitted category "*unchanged*") | | | | | | | | |
| *Lower* | 0.118*** | -0.114*** | 0.118*** | -0.114*** | 0.107*** | -0.103*** | 0.102*** | -0.096*** |
| | (0.024) | (0.020) | (0.023) | (0.020) | (0.024) | (0.021) | (0.013) | (0.011) |
| *Higher* | -0.089*** | 0.146*** | -0.089*** | 0.146*** | -0.092*** | 0.147*** | -0.090*** | 0.135*** |
| | (0.017) | (0.030) | (0.017) | (0.030) | (0.017) | (0.030) | (0.011) | (0.019) |
| Expected total demand in next 3 months (omitted category "*unchanged*") | | | | | | | | |
| *Lower* | 0.059* | -0.062** | 0.058* | -0.061** | 0.070** | -0.071*** | 0.082*** | -0.080*** |
| | (0.031) | (0.028) | (0.031) | (0.028) | (0.032) | (0.027) | (0.017) | (0.014) |
| *Higher* | -0.045*** | 0.061*** | -0.045*** | 0.061*** | -0.046*** | 0.062*** | -0.041*** | 0.053*** |
| | (0.015) | (0.023) | (0.015) | (0.023) | (0.016) | (0.023) | (0.009) | (0.013) |
| Expected price change in next 12 months | | | | | | | | |
| | -0.003* | 0.003** | -0.003* | 0.003* | -0.003** | 0.003** | -0.003*** | 0.004*** |
| | (0.001) | (0.002) | (0.001) | (0.002) | (0.001) | (0.002) | (0.001) | (0.001) |
| Factors affecting expected price change in next 12 months: | | | | | | | | |
| Cost of labor | -0.004 | 0.005 | -0.004 | 0.006 | -0.006 | 0.007 | -0.011** | 0.012** |
| | (0.007) | (0.009) | (0.007) | (0.009) | (0.007) | (0.009) | (0.004) | (0.005) |
| Raw materials price | -0.005 | 0.007 | -0.005 | 0.006 | -0.005 | 0.006 | 0.002 | -0.003 |
| | (0.006) | (0.008) | (0.006) | (0.008) | (0.007) | (0.008) | (0.004) | (0.005) |
| Current conditions to invest compared with previous 3 months (omitted category "*unchanged*") | | | | | | | | |
| *Worse* | 0.113*** | -0.110*** | 0.112*** | -0.110*** | 0.115*** | -0.109*** | 0.086*** | -0.083*** |
| | (0.030) | (0.023) | (0.029) | (0.023) | (0.030) | (0.023) | (0.016) | (0.014) |
| *Better* | -0.081*** | 0.130*** | -0.081*** | 0.129*** | -0.079*** | 0.122*** | -0.080*** | 0.117*** |
| | (0.018) | (0.033) | (0.018) | (0.033) | (0.019) | (0.033) | (0.012) | (0.020) |
| Current access conditions to credit compared with previous 3 months (omitted category "*unchanged*") | | | | | | | | |
| *Worse* | 0.065** | -0.070*** | 0.066** | -0.071*** | 0.072*** | -0.075*** | 0.060*** | -0.062*** |
| | (0.026) | (0.024) | (0.026) | (0.024) | (0.026) | (0.024) | (0.015) | (0.014) |
| *Better* | -0.081*** | 0.129*** | -0.081*** | 0.130*** | -0.083*** | 0.128*** | -0.066*** | 0.091*** |
| | (0.016) | (0.030) | (0.016) | (0.030) | (0.016) | (0.030) | (0.013) | (0.021) |
| N. employees (log) | 0.008 | -0.010 | 0.008 | -0.010 | 0.007 | -0.009 | -0.002 | 0.003 |
| | (0.006) | (0.007) | (0.006) | (0.007) | (0.006) | (0.007) | (0.004) | (0.004) |
| Italy's current economic outlook compared with previous 3 months (omitted category "*unchanged*") | | | | | | | | |
| *Worse* | 0.027 | -0.032 | 0.028 | -0.032 | 0.019 | -0.022 | 0.017 | -0.019 |
| | (0.023) | (0.026) | (0.023) | (0.026) | (0.023) | (0.026) | (0.013) | (0.014) |
| *Better* | -0.036* | 0.050 | -0.036* | 0.049 | -0.038* | 0.052* | -0.022 | 0.027 |
| | (0.021) | (0.031) | (0.021) | (0.031) | (0.021) | (0.031) | (0.013) | (0.017) |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Probability of an improvement in Italy's general economic situation in next 3 months (omitted category "*Zero*") | | | | | | | | |
| *1-25 percent* | 0.004 | -0.005 | 0.004 | -0.005 | 0.002 | -0.002 | -0.014 | 0.016 |
| | (0.015) | (0.020) | (0.015) | (0.020) | (0.016) | (0.020) | (0.009) | (0.011) |
| *26-50 percent* | 0.001 | -0.002 | 0.002 | -0.003 | 0.008 | -0.010 | -0.015 | 0.017 |
| | (0.024) | (0.031) | (0.024) | (0.031) | (0.025) | (0.031) | (0.016) | (0.019) |
| *51-75 percent* | 0.067 | -0.074* | 0.069 | -0.076* | 0.063 | -0.068* | 0.005 | -0.005 |
| | (0.043) | (0.041) | (0.043) | (0.041) | (0.042) | (0.041) | (0.023) | (0.025) |
| *75-99 percent* | 0.078 | -0.084 | 0.079 | -0.085 | 0.074 | -0.079 | 0.001 | -0.001 |
| | (0.093) | (0.085) | (0.094) | (0.085) | (0.092) | (0.084) | (0.062) | (0.069) |
| Share of revenues from exports (omitted category "*0 percent*") | | | | | | | | |
| *0-33 percent* | 0.002 | -0.002 | 0.003 | -0.004 | 0.004 | -0.004 | -0.012 | 0.014 |
| | (0.018) | (0.022) | (0.018) | (0.022) | (0.018) | (0.022) | (0.011) | (0.013) |
| *33-66 percent* | 0.015 | -0.018 | 0.015 | -0.018 | 0.010 | -0.012 | 0.010 | -0.011 |
| | (0.022) | (0.026) | (0.022) | (0.026) | (0.022) | (0.026) | (0.013) | (0.015) |
| *66 percent and over* | -0.011 | 0.014 | -0.011 | 0.015 | -0.018 | 0.024 | -0.029** | 0.037** |
| | (0.022) | (0.029) | (0.022) | (0.029) | (0.022) | (0.029) | (0.014) | (0.017) |
| Geographical area (omitted category "*North-West*") | | | | | | | | |
| *North-East* | -0.032** | 0.043** | -0.032** | 0.043** | -0.029* | 0.038* | -0.005 | 0.006 |
| | (0.016) | (0.022) | (0.016) | (0.022) | (0.017) | (0.022) | (0.010) | (0.012) |
| *Centre* | -0.025 | 0.034 | -0.024 | 0.032 | -0.024 | 0.032 | 0.004 | -0.004 |
| | (0.018) | (0.025) | (0.018) | (0.025) | (0.019) | (0.025) | (0.011) | (0.013) |
| *South and Islands* | -0.041** | 0.057** | -0.040** | 0.055** | -0.029 | 0.039 | -0.016 | 0.020 |
| | (0.018) | (0.025) | (0.018) | (0.025) | (0.018) | (0.024) | (0.011) | (0.013) |
| Observations | 3137 | | 3137 | | 3080 | | 8946 | |
| Pseudo R-square | 0.043 | | 0.044 | | 0.047 | | 0.082 | |

*Notes*. In this table we report the marginal effects on the predicted probability of reporting lower or higher investment expenditure of explanatory variables (expect for the sector and time fixed effects). In columns (1) and (2) the results are obtained using specification (2); in columns (3) and (4) the results are obtained using specification (3); in columns (5)-(8) the results are obtained using specification (4). In columns (5) and (6) the estimation sample is the same as in columns (1)-(4) whereas in columns (7) and (8) the estimation sample uses all available observations. The marginal effects are computed using the sample mean values for the continuous explanatory variables and the sample model categories for the qualitative explanatory variables. ***, **, * denote statistical significance at 1, 5 and 10 percent level. Robust standard errors are in parentheses.

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