# Unconventional Monetary Policy and SME Expectations of Future Credit Availability*

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**Keywords**: Unconventional monetary policy, sovereign stress, firm expectations.

*The opinions expressed herein are those of the authors and do not necessarily reflect those of the ECB or the Eurosystem.

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**Abstract**

We study the impact of the announcement of the ECB's Outright Monetary Transactions Program on small firms' expectations about the availability of future financing through credit markets. We find that following the announcement, firms' expectations improved throughout the Euro Area. Importantly, expectations improved significantly more for firms borrowing from banks with high balance sheet exposures to impaired sovereign debt. We also find that firms expecting the availability of bank credit to improve in the future invest more and engage in more product innovation, suggesting that unconventional monetary policy can stimulate the real economy through a credit-access-expectations channel.

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# 1 Introduction

On July 25, 2012, at the peak of the euro-area sovereign debt crisis, the President of the European Central Bank (ECB) Mario Draghi delivered a speech in London which culminated in the following statement: "Within its mandate, the ECB is ready to do whatever it takes to preserve the euro. And believe me, it will be enough." These much quoted two short sentences are possibly the best example of successful monetary policy communication during the 20-year history of the ECB. Draghi's speech contained no details beyond the promise to act, and it took another month to announce the Outright Monetary Transactions (OMT) Program, which fleshed out the ECB's commitment to preserve the euro by addressing bond and financial market disfunctionality.[1] Yet, markets were immediately relieved, and bond yields on sovereign debt issued by fiscally stressed countries declined immediately, sharply, and permanently.[2] The sovereign debt crisis that had raged for more than two years, threatening the future of the common currency itself, essentially ended on that day.

While recent evidence has suggested that unconventional monetary policy can affect the real economy through the bank lending channel, e.g. by reducing the funding costs of banks (Acharya et al., 2019; Ferrando et al., 2019), the above narrative suggests that much of its impact can come via the channel of expectations. One manifestation of this channel is related to firms' beliefs that funding conditions will improve in the future, whereby improvements in expectations of future credit availability can affect firms' investment decisions even in the absence of an actual improvement in credit conditions. In this paper, we use a novel micro-level dataset to study the impact of the OMT announcement on firms' expectations of future credit availability, and the transmission of these changes in expectations to firms' real decisions. This line of analysis is important for two reasons. First, while shocks to inflation expectations have been studied extensively (e.g., Cogley and Sargant, 2008; Orphanides and Williams, 2008; Guiliano and Spilimbergo, 2014), to our knowledge we are the first to analyze the interplay among monetary policy, firms' expectations of future funding, firms' real decisions, and the conditions of firms' banks. Because firm investment and productivity-enhancing activities are central to many macroeconomic models, it is important to

[1] Under the OMT Program, the ECB committed itself—under strict conditionality—to purchasing unlimited amounts of eligible sovereign bonds, making it the largest and the most ambitious unconventional monetary policy ever implemented in the euro area.

[2] See Altavilla et al. (2016).

understand the mechanisms driving this interplay. Second, because the past decade has seen a wide range of unconventional monetary policies implemented by central banks throughout the world, and because unconventional policies seem to have entered permanently the toolbox of modern monetary authorities, the question we study in this paper has external validity which goes beyond one specific episode.

How should we expect unconventional monetary policy to affect firms' beliefs about future credit market conditions? In answering this question, we are guided by Gertler and Karadi (2011) who interpret unconventional monetary policy in terms of expanding central bank credit intermediation to offset a disruption of private financial intermediation.[3] Their theoretical model incorporates financial intermediaries into a standard macroeconomic model and shows how the flow of credit is influenced by the condition of bank balance sheets, given an agency problem between intermediaries and depositors that drives an endogenous constraint on the intermediary's leverage ratio. In their model the Central Bank can intervene in a financial crisis using unconventional monetary policy because it does not face an agency problem-driven constraint on its leverage ratio. This type of framework is not only useful in thinking about how the OMT—as an extreme example of unconventional monetary policy—can effect contemporaneous firm access to credit, but also how it can effect expectations about future firm access to finance. We focus on the latter effect by analyzing how the ECB's announcement of the OMT affected euro area SMEs' expectation of future access to credit using survey data on euro area firms.

We present four main sets of findings. First, the announcement of the OMT Program had a significant effect on expectations about future credit availability for all firms in the euro area. In the year after the announcement, the average euro-area firm was 20-percent more likely to expect that financing through banks will improve in the short-to-medium term, compared to similar firms during the year before the announcement. Second, this effect was particularly strong for firms borrowing from banks with significant balance sheet exposures to impaired sovereign debt. This suggests the existence of a funding-expectations channel of unconventional monetary policy that works through bank balance sheet strength. Third, firms with higher expectations of future credit availability have higher investment and are more likely to engage in innovation. This effect is

[3] This was certainly the case with the OMT. In a subsequent speech on September 6, 2012, outlining the details of the OMT, Draghi was explicit: "Furthermore, in a number of euro area countries, the segmentation of financial markets and capital constraints for banks continue to weigh on credit supply."

observed while controlling for current credit conditions, suggesting that the funding-expectations channel can impact firms' real decision over and above firms' actual access to finance. Finally, we find that expectations of future credit availability lead actual credit availability by 6 months to one year, suggesting that empirical tests which fail to control for the role of firm expectations can overstate the impact of credit access on firm growth.

We subject the main findings in the paper to a battery of sensitivity tests aimed at strengthening the identification of the causal effects of unconventional monetary policy. First, we employ country-sector-time fixed effects in all regressions, thereby netting out the effect of shocks that are common to all firms in a country at the same point in time (e.g., the perception that the euro itself will survive), and to all firms in the same sector in the same country at the same point in time (e.g., shocks to the demand for German manufacturing goods in the second half of 2012). Second, we employ bank fixed effects, thereby soaking up the effect of shocks to all firms borrowing from the same bank at the same point in time. Third, we show that the trend in beliefs about future credit availability do not predate the OMT announcement. Fourth, we run our tests on the subset of firms that are observed more than once during the sample period. This allows us to include firm fixed effects in the regression which reduces concerns about omitted variable bias at the firm level related, for example, to unobservable investment opportunities. Finally, we show that the same transmission channel did not affect firm expectations of future availability of financing via non-bank sources, such as equity, trade credit, and bond securities. Our findings thus suggest that we have indeed identified an expectations channel of monetary policy that works through firms' beliefs about the availability of bank credit in the future.

Our paper is related to a number of different literatures. First, the analysis directly relates to the literature on monetary policy and expectations. There is, of course, a large literature on this topic. Coibion and Gorodnichenko (2012), Coibion et al. (2018a), and Coibion et al. (2018) provide discussions of the importance of agent expectations in macroeconomic models and particularly the "workhorse" role of full-information rational expectations. In addition, these two papers also address issues that arise from deviations from full-information rational expectations with a particular focus on the value of agent survey data like the data that we use in our paper. Our paper is also related to papers on firm expectations and reactions to monetary policy such as Hachem (2017) that explores how monetary policy can affect the importance of relationship lending

and, ultimately, aggregate output.

In considering the effect of the OMT program our paper necessarily relates to research on monetary policy and the bank lending channel (e.g., Bernanke and Blinder, 1988; Kashyap and Stein, 1994). Our paper also relates to the general body of work on credit and conventional monetary policy (e.g., Gertler and Gilchrist, 1994; Jimenez et al., 2012; Massa and Zhang, 2013) and credit and unconventional monetary policy (e.g., Acharya et al., 2018; Andrade et al., 2017; Carpinelli and Crosignani, 2018; Crosignani et al., 2017; Daetz et al., 2016; Eser and Schwaab, 2016; Giannone et al., 2012; Gilchrist and Zakrajsek, 2013; Gilchrist et al., 2015; Foley-Fisher et al., 2016; Garcia-de-Andoain et al., 2016; Heider et al., 2019; Krishnamurthy and Vissing-Jorgensen, 2011; Krishnamurthy et al., 2017).

Like the papers on the bank lending channel, and on credit and conventional and unconventional monetary policy, we are interested in the link between funding availability and monetary policy. However, our paper focuses on how monetary policy – and, specifically, unconventional monetary policy - affects expectations about future funding availability. So, our focus on expectations shares much with the broad literature on expectations and monetary policy mentioned above. However, our focus is not on expectations about inflation, but rather on expectations about future access to credit. As far as we are aware, there is only one other paper that has looked at the effect of monetary policy on expectations about future credit availability, Dunkelberg and Scott (2009) (DS). Like our paper, DS use firm-level survey data to analyze changes in firm expectations – including expectations about changes in credit availability – in response to three different monetary policy shocks in the: "the April 2001 surprise decrease in rates"; the "April 1994 surprise increase"; and, "the unexpected rate cuts of September 2007 through January 2008". Our paper differs from DS in a number of important ways. First and most important, we look at the response to an "unconventional" monetary policy shock, as opposed to a conventional monetary policy shock. As we noted above unconventional monetary policy initiatives are primarily directed at mitigating problems in bank sector to re-energize credit availability (Gertler and Karadi, 2011). As far as we are aware, no other paper has examined the impact of any unconventional monetary policy on firm expectations about future credit availability. Second, unlike DS, we compare the impact of the OMT initiative on immediate credit availability with its impact on expectations about future credit access. Third, because of our cross-data and because we can link our firms with their banks, we

explore how differences in country-level conditions and bank-level conditions affect the expectations response to the Euro Area wide announcement of the OMT. And, unlike DS our data allow us to control in our multivariate analysis for a number of time-varying firm-level characteristics that could affect funding expectations,[4] and they allow us to examine several distinct funding channels, rather than only bank loans.

The rest of the paper is organized as follows. Section 2 presents the institutional background and our research hypotheses. Section 3 summarizes the data. Section 4 discusses the empirical strategy. Section 5 presents the evidence on the impact of the OMT Program. Section 6 documents the impact of firm expectations on real decisions, such as investment and innovation, and discusses aggregate effects. Section 7 concludes.

# 2 Institutional design and theoretical underpinnings

## 2.1 The euro area sovereign debt crisis and unconventional monetary policy

The sovereign debt crisis which erupted in the euro area in 2010 sent ripples through the global banking system and prompted interventions by governments and central banks on a scale comparable to the programs implemented during the financial crisis of 2008–09. Over the course of 2010–2012, yields on sovereign bonds issued by the governments of Greece, Ireland, and Portugal reached levels which made their overall stock of debt unserviceable, with Italy and Spain facing record costs of issuing new debt, too. On the fiscal response side, the €440 billion-strong European Financial Stability Facility (EFSF) was established by the 27 member states of the EU in May 2010 with a mandate to provide financial assistance to euro area states. Its committed funding was later boosted to around €1 trillion.

On the side of monetary policy, the ECB implemented a series of non-standard monetary policy measures. In May 2010, the ECB instituted the Security Markets Program (SMP) whereby it began open market operations buying government and private debt securities in secondary markets, reaching about €220 billion in February 2012, and simultaneously absorbing the same amount of liquidity to prevent a rise in inflation (Eser and Schwaab, 2015). In December 2010, the ECB

[4] DS employ a univariate analysis on how each variable (i.e., each of their business plan variables and the expected loan access variable) changes pre- and post- in response to each of the three U.S. conventional monetary policy shocks examined in the paper.

extended €489 billion in loans to more than 500 European banks at a fixed 1 percent interest rate. This was followed, in February 2012, by a second long-term refinancing operation, injecting an additional €530 billion into the banking system.

Concerned that the effect of all these interventions would be short-lived, on 2nd August 2012 the ECB announced that it would undertake outright transactions in secondary sovereign bond markets (OMT Program), aimed at safeguarding an appropriate monetary policy transmission and the singleness of the monetary policy. It set a number of conditions. The technical details of the program itself were announced on 6th September 2012. First, a country seeking access to the OMT must request financial assistance from the EFSF. Second, the EU and/or IMF must agree to provide financial assistance through the EFSF and lay out the terms of a deficit reduction program that the country must abide by. Third, the applicant country must agree to the terms of the program. At this point, the ECB can start purchasing sovereign bonds issued by the requesting country, focusing on the shorter part of the yield curve (with maturity of 3 years or less). The ECB set no ex ante quantitative limits on the amount of government bonds that could be purchased through the OMT Program. However, in order to neutralize the potential impact on the money supply, all bond purchases would be offset by selling other securities of equal amount. The Program would run until the country regained market access and could once again fund itself normally in bond markets.

Despite the fact that no OMT Programs were ready to start at the time of the announcement, the financial markets reacted immediately by pricing in a decline of both short term and long term interest rates in all European countries previously suffering from elevated interest levels. By the end of 2013, even though the ECB did not purchase a single bond through the OMT Program, capital had flown back into stressed countries such as Italy and Spain, and government bond yields had tumbled, returning to pre-crisis levels (Altavilla et al., 2016).

### 2.2 Unconventional monetary policy, credit access, and firm expectations

Theory has emphasized both the role of borrowers' balance sheets (e.g., Bernanke and Gertler, 1989; Kiyotaki and Moore, 1997; Bernanke et al., 1996), whereby expansionary monetary policy can strengthen firms' balance sheets by increasing cash flow net of interest and by raising the value of collateralizable assets, as well as the role of lenders' balance sheets (e.g., Bernanke and Blinder,

1992; Kashyap et al., 1993), whereby monetary policy regulates the pool of funds available to bank-dependent borrowers in the presence of reserve requirements on bank deposits. More broadly, theory suggests that during a crisis when lenders become more balance-sheet-constrained the benefits of unconventional monetary policy increase (Gertler and Karadi, 2011).

In the case of the OMT Program, we expect the main effect to come through strengthening of the balance sheets of banks holding large amounts of sovereign debt. There are at least three mechanisms at play. First and foremost, as the OMT announcement reduces yields on previously impaired sovereign debt, investors now perceive banks with substantial balance sheet exposures to a risky sovereign as less risky and start lowering the rates they demand to keep funding them. There is already abundant evidence that the OMT announcement had such an effect on bank borrowing costs. For example, Acharya et al. (2015) provide evidence that U.S. money market funds became more willing to provide unsecured funding to European banks after the OMT announcement. In an analysis of euro area sovereign markets, money markets, and banking markets, Szczerbowicz (2015) shows that the OMT announcement not only reduced sovereign market tensions, but also lowered long-term bank funding costs.

Second, the eligibility of sovereign bonds as collateral to secure wholesale funding increases as well. Drechsler et al. (2016) document how collateral quality affects banks' incentives to pledge collateral with the central bank. Finally, as yields on sovereign debt decline, the sovereign's ability to support the domestic banking sector increases, and this effect should be stronger for banks that were at a higher risk before the policy's announcement. Consequently, banks' funding costs after the OMT should go down relatively more for banks with large balance sheet exposures to risky sovereign debt, leading us to expect more favorable lending conditions for SMEs that have credit relationships with such banks.

Even though in practice we cannot distinguish among these three mechanisms, they all go in the same direction, comprising a "bank funding" channel of unconventional monetary policy. We note that this is a distinctly different mechanism from other channels activated by the OMT which affect all firms in the economy equally, such as expectations about the survival of the euro or improved consumer confidence.

Importantly, models such as Gertler and Karadi (2011) indicate that through the bank funding channel, unconventional monetary policy can affect firms' actual access to finance. A natural

extension of these models is that unconventional monetary policy also affects expectations about future firm access to finance. Because firms know the net worth of their banks, and because they understand that unconventional monetary policy is targeting precisely this net worth, they rationally expect a larger improvement in future access to finance if their main creditor benefits more from unconventional monetary policy. Which of the two channels is more potent and which one comes first is ultimately an empirical question. This general insight, however, allows us to formulate the following research hypothesis:

*H0: The announcement of the OMT Program will improve firm expectations about future credit availability, more so for firms borrowing from banks with large holdings of impaired sovereign bonds whose value is directly affected by the Program.*

# 3 Data

The main data source for our analysis is the firm-level "Survey on the Access to Finance of Enterprises" (SAFE) run jointly by the ECB and the European Commission. The SAFE has been conducted fourteen times since 2009. The survey started after the financial crisis initially hit the euro area. The survey waves include the period before the sovereign debt crisis (survey waves 1 and 2, from 1st January until 31st December, 2009); the period during which the sovereign debt crisis unfolded (wave 3, from 1st April until 30th September, 2010); the period of the sovereign debt crisis (waves 4, 5, 6, and 7, from 1st October 2010 until 30th September 2012); and the period after the OMT Program announcement (waves 8 and on, from 1st October 2012). This firm-level SME survey contains information on each respondent firm's characteristics (size, sector, autonomy, turnover, age, and ownership) and on its assessment of recent short-term developments regarding its financing including information on its financing needs and its access to finance.[5] The sample contains only non-financial firms and excludes firms in agriculture, public administration, and financial services.[6]

Importantly, the dataset also contains information on firms' expectations about the evolution

[5] The survey's main results are published in the ECB website every six months. For more information on the survey and its individual waves, see http://www.ecb.europa.eu/stats/money/surveys/sme/html/index.en.html.

[6] The SAFE data include an oversample of firms in smaller countries. For this reason, the survey providers also compute sampling weights that adjust the sample to be representative of the frame from which the sample was drawn. As a result, all empirical tests in the paper make use of sampling weights which restore the representativeness of each individual firm with respect to the average firm in the population of firms in the Eurozone.

of the availability of future financing in the short-run. In particular, it includes questions about expectations related to the availability, in the next six months, of a wide range of funding sources: retained earnings, bank loans, bank credit lines, equity, trade credit, and debt securities. While a number of recent firm-level datasets include information on firm's *actual* access to finance and *existing mix* of funding sources, the SAFE is to our knowledge the first firm-level dataset that incorporates information on firms' expectations about *future* access to finance for the universe of funding sources. Because of the latter, the SAFE makes it possible to identify the impact of targeted policy shocks that are expected to affect firms through well-defined channels.

We next merge the SAFE with Bankscope, a bank-level dataset that contains information on banks' exposures to sovereign debt. To do so, we make use of a variable called "BANKER", made available through a merge with Bureau van Dijk's Amadeus dataset and originally acquired from the Kompass dataset. This variable displays the name of the banks with which the firm has a credit relationship. Following Kalemli-Ozcan, Laeven, and Moreno (2015), we use OpenRefine and Reconcile-CSV to match bank names to the BvD ID numbers of banks and we subsequently match these bank names with bank information on total sovereign bond holdings and on total assets from Bankscope. If a firm reports more than one bank, we use the bank reported first as the firm's main bank. In all, we recover information on 126 banks from Bankscope in eight countries with which the firms in the dataset have a credit relationship.[7]

In our analysis, we use the four waves around the announcement of the OMT Program, waves 6 and 7 (pre-OMT) and waves 8 and 9 (post-OMT), for a total of 30,040 initial observations. Most of the firms are interviewed only once in the survey but there is a small subsample of firms present in at least two waves. In particular, out of the 21,110 unique firms present in waves 6–9, 3,937 are observed at least once during the pre-OMT and at least once during the post-OMT period. Once we focus only on the firms in the dataset comprising survey waves 6, 7, 8, and 9 which report the identity of a creditor that can be matched to Bankscope, this reduces the dataset to 2,628 firm-observations. 84 of these firms are observed at least once during the pre-OMT and at least once during the post-OMT period.

Table 1 reports descriptive statistics on the main variables of interest, for the sample of 2,628

[7] There is no firm-bank match for firms in Belgium, Finland, and Italy, reducing the sample to eight countries from the original 11 eurozone countries in SAFE: Austria, France, Germany, Greece, Ireland, the Netherlands, Portugal, and Spain.

firms with creditor information. All survey-based percentages are weighted statistics that restore the proportions of the economic weight (in terms of number of employees) of each size class, economic activity, and country. *Bank financing will improve*, our main dependent variable, is derived from the firm's answers to two different questions. The first one is: "Could you please indicate whether the availability of bank overdrafts, credit lines or credit cards overdraft will improve, deteriorate, or remain unchanged over the next 6 months?" The second one is: The second one is: "Could you please indicate whether the availability of bank loans (new or renewal; excluding overdraft or credit lines) will improve, deteriorate, or remain unchanged over the next 6 months?" We construct the variable *Bank financing will improve* as a dummy variable equal to 1 if the firm said "Will improve" in response to any of these two questions, and to zero if it responded "Will remain unchanged" or "Will deteriorate" to both questions. Of the 2,123 firms that reported the identity of their creditor(s) and that gave a response to this question, 24.5 percent expect the availability of financing through banks to improve in the next six months. Looking at the individual components of Bank financing will improve, we find that 17.6 percent expect the availability of new loans to improve, and 11 percent have such expectations about the availability of bank credit lines.[8]

Table 1 also reports similar summary statistics on firms' expectations about the availability of financing through alternative channels. The data suggest that far and beyond, bank lending is the channel whereby most firms expect to be able to better finance their operations in the future. Only 13 percent of firms expect the availability of trade credit to increase in the next six months, and only 9.7 percent and 11.3 percent have such expectations about equity financing and financing through debt securities, respectively.

We also report summary statistics on the rest of the firm-specific variables included in the survey and used in our tests. On average the banks from which the firms in our sample are borrowing hold in their portfolios sovereign bonds amounting to 5.1 percent of their total assets. Firms operating in fiscally stressed countries (Greece, Ireland, Portugal, and Spain) account for 53.4 percent of the sample, suggesting an almost even split between treatment and control firms. 82.3 percent of the firms are stand-alone, rather than subsidiaries of larger firms, and 69.9 percent are individuals- or family-owned. By default, the survey includes mostly SMEs, with 28 percent having less than 50

[8] Firms are interviewed at the end of each wave. Therefore, if a firm is included in wave 8 (1st October 2012 – 31st March 2013) and it is asked about its credit experience in the past six months, this experience is limited to the period 1st October 2012 – 31st March 2013 and does not spill over back into the pre-OMT period.

employees, and 40 percent of the firms having more than 250 employees. In terms of turnover, around three-quarters of the firms have an annual turnover of less than EUR 10 million. At the same time, the firms in the sample are relatively mature, with only 10.5 percent of them younger than 10 years.

Turning to firms' credit quality and economic outlook, one-quarter of the companies in our sample report that their outlook, in terms of sales and profitability, improved during the past six months. 29.2 percent say the same about the quality of their capital, and 24.8 make a similar statement about the quality of their credit history.

With regard to real economic activity, we use information from two sources. The SAFE contains a question on whether firms are currently engaged in product innovation. Using this information, we create a dummy variable *New product* equal to one if the firm answered "Yes" to the question: "In the past six months, did your firm introduce a new or significantly improved product or service to the market?" Around a third of all firms report that they have engaged in this type of innovation.

We also match the firms in the SAFE to the Amadeus database, which allows us to extract information on their investment activity. We measure firm investment as the log difference in tangible assets from the pre-OMT to the post-OMT period. On average, this change is 0.5 percent.

Finally, we compare actual credit experience in the past six months and expectations of future credit availability. In line with Jappelli (1990), Cox and Jappelli (1993), and Duca and Rosenthal (1993), we define credit constrained firms as those who are subject to both formal and informal credit constraints. Therefore, to us credit constrained is a firm that declared a positive demand for bank financing in the past 6 months, but it was discouraged from applying because it expected to be rejected, or it applied but its loan application was denied, or it applied and got less than 75% of the requested amount, or it refused the loan because the cost was too high. On average, this definition applies to 14 percent of the firms in our sample.

Figure 1 compares the evolution of actual credit constraints and of expectations of future credit availability over time, for the firms in our sample. It plots the change over the previous period in the share of firms that are not credit constrained, and the change over the previous period in the share of firms that expect credit availability to improve in the future. The Figure illustrates two very important fact. First, while at the time of the OMT announcement, an almost equal share of firms (around 20 percent) were experiencing a tightening in credit and a decline in their optimism

of future credit availability, right after the announcement both actual credit experience and credit expectations started improving. Second, the improvement in expectations leads the improvement in actual credit experience. In particular, 1 year after the announcement, more firms expect credit conditions in the future to improve than to remain unchanged or deteriorate. However, it takes nearly a year for a larger share of firms to experience an improvement, rather than a stagnation or a deterioration, in actual credit access.

Figure 2 illustrates the same pattern for the two types of countries in our dataset, those not experiencing fiscal stress at the time of the OMT announcement, as well as those experiencing one. The data clearly suggest that the pattern documented in Figure 1 is by and large driven by firms in fiscally stressed countries. This early evidence thus supports the idea that unconventional monetary policy targeting the balance sheets of banks can affect both the actual credit experience and the expectations of future credit availability of firms borrowing from such banks. Importantly, expectations lead actual experience. To the extent that expectations can have an independent effect on firm activity, Figures 1 and 2 suggest that unconventional monetary policy can transmit to the real economy faster than conventional analysis would suggest.

Recent studies aiming at identifying the transmission of monetary policy through bank lending have typically relied on credit registers (e.g., Jimenez et al., 2012) or on syndicated loan data (e.g., Acharya et al., 2018). Relative to the former, the SAFE does not contain information on the universe of firms, but only on a small representative sample of firms, and relative to the latter, it does not have—for most firms—multiple firm-specific and bank-specific observations over time. Nevertheless, our dataset has a number of unique advantages when it comes to identifying the impact of unconventional monetary policy on firm expectations. First and foremost, it contains answers to questions on firms' expectations about the availability of financing in the short run. This makes it the first dataset of its kind with information on firm expectations for alternative sources of funding. Second, the SAFE contains a small panel component of firms which allows us to perform tests with firm fixed effects that aim at eliminating omitted variable bias related to unobservable firm-specific heterogeneity. Third, it contains information on firm-specific outcomes that other types of datasets do not have access to, such as information about innovative activities.

# 4 Empirical methodology and identification

We investigate the impact of unconventional monetary policy on small firms' expectations about bank funding by comparing the evolution of said expectations around the time of the OMT announcement for firms borrowing from banks with high balance sheet exposures to impaired sovereign debt relative to firms borrowing from banks with low such exposures.

To calculate the extent to which a firm's creditor is exposed to the unconventional monetary policy shock, we first take data from Bankscope on banks' total sovereign bond holdings in 2012. We next distinguish between firms in countries with sovereign debt problems during the 2010–2012 period (Greece, Ireland, Portugal, and Spain—"stressed countries") and firms in countries without sovereign debt problems during the 2010–2012 period (Austria, France, Germany, and the Netherlands—"non-stressed countries").[9]

We use three sources of identifying variation in our analysis: the time before and after the ECB's OMT announcement; the cross section of firms borrowing from banks with different balance sheet exposures to sovereign bonds relative to their assets; and the issuer of sovereign bonds. We estimate the following difference-in-difference-in-differences (DIDID) model:

$$\begin{aligned}\Pr ob(Bank\ financing\ will\ improve_{iscbt}) = \quad & \varphi(\beta_1 Post_t \times Stressed_c \times \tfrac{Sovereign\ bonds}{Assets}_b \\ & +\beta_2 Post_t \times \tfrac{Sovereign\ bonds}{Assets}_b \\ & +\beta_3 Stressed_c \times \tfrac{Sovereign\ bonds}{Assets}_b \\ & +\beta_3 Stressed_c \times \tfrac{Sovereign\ bonds}{Assets}_b \\ & +\beta_4 X_{iscbt} + \beta_5 \mu_{sct} + \beta_6 \eta_b + \varepsilon_{iscbt}\end{aligned} \tag{1}$$

$Bank\ financing\ will\ improve_{iscbt}$ is a dummy variable equal to 1 if the firm said "Will improve" in response to any of these two questions: "Could you please indicate whether the availability of

[9] The choice of countries is motivated by the fact that all countries in the treatment group experienced severe problems in accessing government bond markets over the sample period. In 2010, 10-year bond yields reached levels usually associated with a high probability of sovereign default: 1210 basis points (Greece), 950 basis points (Ireland), 750 basis points (Portugal), and 550 basis points (Spain). European policy makers recognized the severity of the sovereign problems in these five countries. Greece received a bailout from the EC and the IMF in May 2010, Ireland received one in November 2010, and Portugal agreed on a bailout in May 2011. As mentioned above, the European Central Bank instituted the SMP whereby in May 2010 it started buying (in secondary markets) Greek, Irish, and Portuguese government debt, and in August 2011 it intervened in Italian and Spanish debt markets, too. For comparison, yields on 10-year government bonds for the six countries in the control averaged 340 basis points at the end of 2010, similar to yields on 10-year US treasury bills.

bank overdrafts, credit lines or credit cards overdrafts will improve, deteriorate, or remain unchanged over the next 6 months?", and "Could you please indicate whether the availability of bank loans (new or renewal; excluding overdraft or credit lines) will improve, deteriorate, or remain unchanged over the next 6 months?" It is equal to zero if the firm responded "Will remain unchanged" or "Will deteriorate" to both questions. $Post_t$ is a dummy variable that captures the ECB's OMT announcement and is equal to 0 between 1st October 2011 and 30th September 2012 (survey waves 6 and 7), and to 1 between 1st October 2012 and 30th September 2013 (survey waves 8 and 9).[10] $Stressed_c$ is a dummy variable equal to 1 if the firm is domiciled in a stressed countries (Greece, Ireland, Portugal, and Spain), and to 0 otherwise. $\frac{Sovereign\ bonds}{Assets}_b$ is the ratio of sovereign bond holdings to total assets—at the end of 2012—of bank $b$ with whom firm $i$ in sector $s$ in country $c$ has a credit relationship during the entire sample period. Data on these exposures come from Bankscope. While Bankscope does not distinguish between domestic and foreign bond holdings, the vast majority of sovereign bonds held by banks in the Euro Area are issued by the domestic sovereign.[11]

We also include a number of controls to account for shocks to firm expectations which are not related to the OMT announcement. $X_{iscbt}$ is a vector of time-varying firm-level control variables. These capture any unobservable shocks to firm $i$ in sector $s$ in country $c$ during time $t$, such as firm-specific growth, investment opportunities, or demand for credit by capturing the independent impact of firm-level heterogeneity related to size, age, turnover, ownership structure, etc. Ample evidence points to a negative relation between profitability and the demand for external funds (Almeida and Campello, 2010). Therefore, we expect larger and older firms, whose projects have matured, to have a lower demand for external financing. $\mu_{sct}$ is an interaction of country, sector, and time (i.e., survey wave) fixed effects (sectors are defined at the 1-digit SIC level). These net out variation in firm expectations that is common to all firms in sector $s$ in country $c$ during time $t$ (e.g., demand for Spanish agricultural products). Its inclusion also alleviates concerns that the observed variation in firm expectations is driven by global shocks that are common to all firms

[10] We deliberately choose a symmetric sample period around the OMT announcement that is long enough to allow us to measure any material change in credit access. In robustness tests, we compare credit access six months before and six months after the OMT announcement.

[11] Using an ECB dataset on monthly holdings by 250+ Eurozone banks that distinguishes between domestic and foreign sovereign bond holdings, Ongena, Popov, and van Horen (2019) report that the share of domestic sovereign bond holdings out of total sovereign bond holdings for the median Eurozone bank at the time of the OMT announcement was 0.97.

(e.g., a global repricing of risk). $\eta_b$ is a bank fixed effect which is common to all firms borrowing from the same bank. It controls for all observable and unobservable characteristics of an individual bank, such as capitalization, business model, risk appetite, etc. The combination of firm-specific factors and various fixed effects addresses the concern that our estimates can be contaminated by shocks to credit demand unrelated to the supply of credit. For example, while agency cost problems may have become less severe and/or growth opportunities may have improved more for firms domiciled in stressed countries, this should be accounted for by the firm-specific information and by the country-sector-time fixed effects. Finally, $\varepsilon_{iscbt}$ is an i.i.d. error term. $Post_t \times Stressed_c$, $Post_t$, and $Stressed_c$ are not included in the specification because their effect on firm expectations is subsumed in the matrix of country-sector-time fixed effects. $\frac{Sovereign\ bonds}{Assets}_b$ is not included in the specification because its effect on firm expectations is subsumed in the bank fixed effects.

The coefficient of interest is $\beta_1$. In a classical DIDID sense, it captures the change in expectations from the pre-treatment to the post-treatment period, for firms borrowing from banks with large sovereign exposures relative to firms borrowing from banks with low sovereign exposures, in stressed versus non-stressed countries. A positive coefficient would imply that all else equal, after the OMT announcement expectations about the availability of bank financing improved more for firms borrowing from banks with large sovereign bond exposures in stressed countries.

We estimate the parameters of Model (1) using Probit. We cluster the standard errors at the county level (Petersen, 2009), to account for the spacial correlation in the standard errors. In robustness tests, we also employ OLS instead of Probit, as a way of dealing with a potential incidental parameters problem.

# 5 Empirical results

## 5.1 The OMT and firm expectations: Main result

In Table 2, we present the point estimate for Model (1) whereby we compare the change in expectations of future credit availability from the pre-OMT period to the post-OMT period, for firms borrowing from banks with larger versus smaller balance sheet exposures to impaired sovereign debt. In terms of the precise sample period, we compare the period 1st October 2011 – 30th September 2012 (survey waves 6 and 7) to the period 1st October 2012 – 30th September 2013 (survey waves 8

and 9). We are therefore comparing the evolution of expectations over the short-to-medium-term, the one year after the OMT announcement relative to the one year before the announcement. We thus allow for the effect to build beyond an immediate short-term reaction, but we stop the sample period before it becomes contaminated by later developments in the business environment and in monetary policy.

We start, in column (1), with a version of Model (1) that includes firm-specific covariates, but is stripped from bank and country×industry×time fixed effects. The model thus controls for observable factors that can affect a firm's expectations of future credit availability in the absence of a monetary policy shock. At the same time, the exclusion of the fixed effects makes it possible to estimate the direct effect of background factors that are common to different groups of firms and would thus be netted out by the fixed effects. Such factors include the monetary shock itself, the sovereign exposure of the main bank that the firm is borrowing from, and the circumstances of operating in a fiscally stressed country.

We first note that the data strongly reject the hypothesis that the OMT had no effect on firms' expectations of future credit availability. In particular, we find that in the year after the OMT announcement, firms were on average 20 percent more likely to expect that bank credit would improve in the next six months.[12] This suggests that the OMT announcement generated an improvement in firm expectations of future credit availability across the board. At the same time, on average expectations are lower for firms operating in stressed countries and borrowing from banks with large exposures, indicating that these are indeed the firms that are hardest hit by deteriorating bank lending conditions during the sovereign debt crisis (i.e., before the OMT announcement).

Crucially, the estimate of $\beta_1$ is positive and significant at the 1 percent statistical level. This suggests that after the OMT announcement, and relative to firms in non-stressed countries, firms borrowing from banks with large impaired sovereign exposures were considerably more likely to expect credit conditions to improve than otherwise similar firms borrowing from banks with smaller such exposures. The effect is economically meaningful, too. The point estimate on the interaction term is 0.031. Given an interquartile range for the ratio of Sovereign bonds / Assets of 5.12, the

[12] In all tables, we report coefficients from marginal probit. Hence, they can be interpreted as the marginal change in probabilities for a firm for which all other control variables are at their sample means.

point estimate implies that in the year after the OMT announcement, a firm in a stressed country was 15.8 percentage point more likely to expect bank credit conditions to improve—relative to a firm in a non-stressed country—if before the announcement it was associated with a bank at the 75th percentile of sovereign debt exposure, compared to a firm associated with a bank at the 25th percentile of sovereign debt exposure.

In addition, we find that a number of firm-specific factors are correlated with firm expectations, in the statistical sense. For example, the oldest firms (more than ten years of age) are more likely to have positive expectations of future credit availability, potentially because of their lower informational opacity (Berger and Udell, 1995; Cole 1998). Similarly, firms with improving capitalization and/or improving credit history (over the past 6 months) are more likely to be optimistic about future credit conditions than firms whose capital or credit history deteriorated or did not change. This suggests that firms know that banks use hard information in their credit granting decisions.[13]

In column (2), we estimate the fully saturated model with bank fixed effects and country×industry×time fixed effects. The inclusion of these allows us to hold constant any background forces that affect in a similar way all firms borrowing from the same bank, and all firms operating in the same industry in the same country during the same time period. In this specification, we find that the youngest firms (age 2 or less) and firms with improving capitalization and/or improving credit history are more likely to be optimistic about future credit condition. Crucially, we continue finding that the probability that an otherwise similar firm would have positive expectations of future credit availability increased significantly more after the OMT announcement for firms borrowing from banks with a significant exposure to domestic sovereign debt domiciled in stressed countries. The effect is once again significant at the 1 percent statistical level, and economically larger than in column (1). The point estimate on the interaction term is 0.052, suggesting that in the year after the OMT announcement, a firm in a stressed country was 26.4 percentage points more likely to expect bank credit conditions to improve—relative to a firm in a non-stressed country—if before the announcement it was associated with a bank at the 75th percentile of sovereign debt exposure, compared to a firm associated with a bank at the 25th percentile of sovereign debt exposure. The variables and fixed effects included in this regression explain around 17 percent of the variation in credit access

[13] While we do not find that firm size matters, a finding that runs contrary to the evidence in Hadlock and Pierce (2010), we are not looking at listed firms, like they do, but at SMEs for whom age is potentially a more important determinant of credit constraints than size.

over the sample period, which is an excellent fit for a regression without firm fixed effects.

### 5.2 The OMT and firm expectations: Falsification tests

The key identifying assumption of our DIDID approach is that in the absence of the OMT-driven positive shock to bank funding costs for banks with relatively large balance sheet exposures to impaired sovereign debt, all firms would be subject to the same trend in expectations of future credit availability.[14] This does not have to be the case, and the break in trends we report in Table 2 may have started already before the OMT announcement for reasons unrelated to sovereign stress or to unconventional monetary policy. While we condition our tests on observables, our empirical strategy would be compromised if the expectations of future credit availability for firms in stressed countries borrowing from banks with large sovereign balance sheet exposures started to improve already before the OMT announcement. This could have happened for a variety of reasons unobservable to the econometrician, such as better investment opportunities. If this were to be the case, we might incorrectly interpret pre-determined trends as evidence of the positive effect of unconventional monetary policy.

To address this potential problem we take advantage of the fact that our original dataset is long enough to allow us to test our key identifying assumption explicitly. We now focus on survey waves 6–7 which were conducted over the period 1st October 2011 – 30th September 2012. As both survey waves took place before the OMT announcement, we can apply our DIDID strategy to test for differences in credit access trends across firms within the pre-OMT sample period. In practice, in column (1) of Table 3, we compare the change in expectations of future credit availability across firms with credit relationships to more versus less sovereign-debt-exposed banks, in stressed versus non-stressed countries. The estimates from this regression suggest that there was no difference in expectations across firms exposed to different credit shocks coming from banks with different degrees of exposure to impaired sovereign debt in the one year before the OMT announcement. While positive, the point estimate on the interaction of interest is not significantly different from zero. This placebo test thus confirms that the improvement in expectations we registered in Table 2 did not predate the announcement of the OMT program.[15]

[14] See Roberts and Whited (2011) for details.

[15] From the point of view of the theoretical mechanism we test in this paper—bank lending being affected by the price of a class of assets that bank hold on their portfolios—these results are not surprising. In the year before

Another potential challenge to our empirical approach is that the OMT announcement increased general economic optimism in the corporate sector, and so the increase in optimism about future credit availability is a manifestation of a broad-based increase in economic confidence. This would still suggest that unconventional monetary policy has an impact on expectations of future credit availability, but not through the bank lending channel, putting our empirical approach in question. To tackle this issue, in the next three columns we report estimates from Model (1) whereby the dependent variables is the change in firm expectations of future availability of other funding sources: trade credit (column (2)), equity, (column (3)), and debt securities (column (4)). If our identification strategy is correct, we should see no impact on these in a DIDID sense. If, however, the OMT affected corporates through a simple confidence channel, then relative to firms in the control group, the expectations of firms in the treatment groups should improve with regard to other types of funding, too.

We find that there is no statistical difference in changes in expectations about future availability of non-credit sources of finance across firms in stressed versus non-stressed countries, borrowing from high-exposure versus low-exposure banks. This suggests that the effect we document is indeed confined to the bank lending channel of firm funding expectations, and is driven by an expected improvement in lending by banks that stand to benefit the most from the OMT, in terms of funding costs.

## 5.3 The OMT and firm expectations: Robustness tests

### 5.3.1 Model robustness

In Table 4 we address a number of non-trivial concerns related to our choice of empirical model. To begin with, the difference-in-difference-in-differences approach we employ is predicated on an interaction term, and calculating and interpreting marginal effects in non-linear models with triple interaction terms is not straightforward (e.g., Ai and Norton, 2003). To address this issue, in column (1), we estimate Model (1) using OLS. The point estimate on the interaction term is 0.043, and as in the probit version of the model, it is significant at the 1 percent level. This implies that

the OMT, average sovereign bond yields hovered for a long time around higher levels, but were relatively flat: the average yield on a 10-year bond issued by the Italian, Irish, Spanish, or Portuguese government was 7.4 in the month of the OMT announcement, and 7.6 a year earlier. For comparison, that same number was 4.9 a year after the OMT announcement.

in the year after the OMT announcement, a firm in a stressed country experienced a 22 percentage point increase in the probability that it would expect credit availability to improve in the future, relative to a firm in a non-stressed country, if before the announcement it was associated with a bank at the 75th instead of the 25th percentile of sovereign debt exposure.

Next, we note that although our DIDID specifications allows us to control for omitted variables that affect both the treatment and the control group in a similar manner, identification of the causal effect requires controlling for any systematic shocks to the treatment group. That is, we need to control for other shocks that might be correlated with the financial sector's exposure to sovereign stress. For example, it might be the case that credit constraints mapping firm-specific net worth loosened differently across the treatment and the control group around the time of the OMT announcement. Our results so far can thus be the outcome of a mechanism whereby the expectation about the allocation of loanable funds is largely driven by firms' knowledge of their balance sheet strength (Ashcraft and Campello, 2007).

We address this concern by controlling for such shocks explicitly. In column (2), we add interactions of all firm-specific variables with the Stressed and the Post dummies. This procedures aims at accounting for the possibility that the effect of various empirical proxies for net worth, such as age and size, is time-varying and our main explanatory variable may be picking up part of it. However, we find that association with a creditor with substantial balance sheet exposure to impaired sovereign debt continues to explain a substantial portion of the variation in changes in credit access after the announcement of the ECB's OMT program. At the same time, the magnitude of the coefficient declines by two thirds, suggesting that firm-specifc shocks did have a contemporaneous effect on firm expectations of future credit availability around the time of the OMT announcement.

We next address the possibility that the shift in expectations that we observe is driven by shocks to firms' demand for credit that are unrelated to shocks to credit supply. So far, we have attempted to identify an expectations shock driven by changes in monetary policy by comparing firms with credit relationships with banks that benefited a lot from the OMT-driven decline in the yields of certain sovereign bonds to firms with credit relationships with banks whose funding costs were arguably not strongly affected by the OMT. This identification strategy also allows us to control for a range of firm-specific characteristics and for country sector survey wave fixed effects, ensuring that our results are not contaminated by firm-specific factors such as size or age, or by

general changes in country-sector-specific conditions, such as country-specific shocks to the demand for real estate services. However, it can still be the case that during the sample period, agency cost problems are less severe and/or unobservable growth opportunities are better for firms borrowing from affected banks.

We address this issue by isolating those firms that are observed at least once before and at least once after the announcement of the OMT Program. While the panel component in the SAFE is too limited to allow us to include firm fixed effects in the primary regressions, there are 84 firms with full balance sheet information which also disclosed their main creditor, which are present at least once in each sub-period, and for which the empirical proxy for expectations of future credit availability changed between the pre-OMT and the post-OMT period. We can therefore run our model on this limited sub-sample of panel firms and include firm fixed effects, thereby addressing lingering concerns about omitted variable bias related to time-invariant firm characteristics that can be correlated with the demand for credit.

The point estimate from this modified version of Model (1) is reported in column (3). We continue finding a significant expectations effect of the OMT on firms with credit relationship with banks exposed to impaired sovereign debt. The effect is significant at the 1 percent statistical level, and if anything numerically larger than in the baseline specification. Importantly, this more restricted test confirms that variations in changes in expectations of future credit access after the OMT are strongly related to creditors' funding costs even in a specification which controls for unobservable firm quality.

One remaining concern is related to selection. We are so far calculating changes in expectations for those firms that have a credit relationship. An alternative approach would be to look at the population of firms with positive demand for credit. This alternative approach would incorporate information on firms that declare no demand for bank credit because they have enough internal resources. About 43 percent of the firms in the dataset declare a need for bank credit, while the rest declare that they do not need bank credit because they have enough retained earnings to finance their investment and day-do-day operations. We now focus on the sub-sample of firms with a strictly positive demand for credit, and address the selection issue of them being a non-random sample of the population by employing a two-stage Heckman model. In practice, in the first stage we regress on all right-hand-side variables that we have used so far the probability that a firm will

declare a positive need for credit. We include an instrument that is then excluded in the second stage, namely, a dummy variable equal to one if the firm's own outlook has improved in the past six months, and to zero if it has not. We argue that this variable should satisfy the relevance condition because a better outlook should increase the demand for funding and hence for credit, and it should satisfy the exclusion restriction as it is unlikely that the bank can observe the firm's improved outlook so quickly. We calculate the inverse Mills' ratio from the first-stage and include it in the second stage, which is now only based on 1,529 firm observations. The results from the second stage are reported in column (4), and they strongly confirm that firms with credit relationships with banks positively affected by the OMT were more likely to experience an improvement in their expectations of future funding in the wake of the OMT announcement.

#### 5.3.2 Sample robustness

We now address several concerns related to our sample choice. To begin with, our choice of the main sample period is one year before and one year after the OMT announcement. We believe that this sample period allows for a reasonable lag in the evolution of any improvement in bank funding costs due to the OMT announcement to the real sector. Nevertheless, it might be that a shorter time frame would provide for a cleaner identification of the effect on credit access by minimizing any contamination by developments that took place over the course of the year after the OMT announcement. To address this issue, in column (1) of Table 5 we adapt our empirical models to test for a short-term OMT effect whereby we compare firm expectations of future credit availability during the six months before the OMT announcement (wave 7) to expectations of future credit availability during the six months after the announcement (wave 8). This empirical strategy reduces the number of available observations to 617. Nevertheless, we keep finding a strong effect of the OMT announcement on the probability that firms borrowing from banks with significant exposures to impaired sovereign debt would experience a larger improvement in their expectations of future funding. The effect is significant at the 5 percent statistical level, and two-and-a-half times larger than the one reported in column (2) of Table 2, suggesting that the immediate effect of the announcement is indeed much stronger than the medium-run effect.

We also perform this exercise for three waves (1.5 years) on each side of the OMT announcement, to gauge the long-term effect (column (2)). The coefficient on the triple interaction of interest turns

out to be remarkably stable, compared to the one reported in column (2) of Table 2. However, its statistical significance declines sharply, suggesting that indeed the OMT announcement had an effect on firm expectations mostly in the short-to-medium term, rather than in the longer term.

We next address the concern that all announcements related to the OMT were made between July and September 2012 before most of wave 7 was conducted—our pre-OMT period. It may therefore not be appropriate to classify firms in wave 7 as pre-OMT observations. While our approach is still superior to classifying them as post-OMT, we need to show that these observations are not driving our results. To address this concern, we drop wave 7 from the analysis. Column (3) shows that the point estimate on the main variable of interest is still positive, as well as significant at the 1 percent level.

One final consideration is related to the fact that Greece is an outlier in the sample: it is the only country to have effectively been shut out of international bond markets and to have experienced a quasi-default when private investors were asked in February 2012 to accept a write off equal to 53.5 percent of the face value of Greek governmental bonds. We therefore test if our results are robust to the exclusion of Greek firms from the sample. The evidence reported in column (4) confirms that this is the case, and the point estimate on the coefficient of interest is practically identical to the one reported in column (2) of Table 2.

#### 5.3.3 Robust dependent variable

In our analysis so far, we have attempted to gauge the impact of unconventional monetary policy shocks on firm expectations of future credit availability. We have so far defined the latter as a dummy equal to one if the firm believes that either "*the availability of bank overdraft, credit lines or credit cards overdraft*" or "*the availability of bank loans (new or renewal; excluding overdraft or credit lines)*" will improve over the next 6 months. The variable is equal to zero if the firm responded "Will remain unchanged" or "Will deteriorate" to both questions.

In practice, however, these are conceptually different situations. Lines of credit (and overdraft facilities and credit cards) are forward commitments (typically one year in the SME sector) that provide a revolving facility where firms have the option to borrow (in total) any amount up to the facility's limit. These are typically used to fund working capital (i.e., accounts receivable and inventory) whose combined amount varies daily as do the total draws under the facility. Unlike

lines of credit (and other revolving facilities such as overdraft and credit cards) which tend to be relationship-driven in the SME sector, bank loans are likely to be longer term, transactions-driven, amortizing loans used to finance fixed assets like equipment and real estate (Berger and Udell, 1995). Moreover, collateralization of lines of credit with the underlying assets (accounts receivable and inventory) is more challenging than amortizing loans with equipment or real estate (e.g., Berger and Udell 1995; Udell 2004; Cerquiero et al., 2016; Calomiris et al., 2017 ) New loans can be short-term, while credit lines signal a longer-term commitment, therefore, an increase in the availability of the latter would signal a relatively higher confidence by firms in the willingness of banks to provide credit in the future. These distinctions may related to the differences reported in Table 1 that show that over the sample period, firms are less likely to expect that the availability of credit lines will improve than they are to expect that the availability of new bank loans will improve (11 percent versus 17.6 percent).

In Table 6, we repeat our main empirical test for each individual component of our main dependent variable. In column (1) we define firm expectations of improved future credit availability as a dummy equal to one if the firm said "Will improve" in response to the question "Could you please indicate whether the availability of bank loans (new or renewal; excluding overdraft or credit lines) will improve, deteriorate, or remain unchanged over the next 6 months?", and to zero if it said "Will remain unchanged" or "Will deteriorate." Analogously, in column (2) we define firm expectations of improved future credit availability as a dummy equal to one if the firm said "Will improve" in response to the question "Could you please indicate whether the availability bank overdraft, credit lines or credit cards overdraft will improve, deteriorate, or remain unchanged over the next 6 months?", and to zero if it said "Will remain unchanged" or "Will deteriorate."

The evidence reported in the table strongly suggests that following the OMT announcement, firm expectations of credit access increased in both dimensions, for firms borrowing from banks with larger, relative to firms borrowing from banks with smaller, impaired sovereign exposures. However, the effect is substantially larger for new loans than for bank credit lines and overdraft facilities. A firm in a stressed country was 21.4 percentage point more likely to expect the availability of new loans to improve—relative to a firm in a non-stressed country—if before the announcement it was associated with a bank at the 75th percentile of sovereign debt exposure, compared to a firm associated with a bank at the 25th percentile of sovereign debt exposure. In the case of credit lines

and overdraft facilities, the same difference is only 8.1 percent. The evidence thus strongly suggests that the monetary-policy-driven improvement in firm expectations of future credit availability likely reflects less optimism about working capital financing facilities than transactions-based fixed asset financing.

# 6 Real effects

## 6.1 The OMT, firm expectations, and real decisions

So far we have established that the announcement of the OMT Program had a positive impact on expectations about the availability of bank credit in the future, for firms whose banks were exposed to impaired sovereign debt and thus plausibly benefited from the OMT-driven reduction in sovereign bond yields. Ultimately, however, what really matters is whether such improvement in expectations of future credit availability had an impact on SME decisions and outcomes. It is important to determine whether the announcement of this particular unconventional monetary policy by the ECB led to an increase in firms' activities. Furthermore, it is important to study whether such "real effects" from the improvement in funding expectations were focused on current operations, or whether they also extended to firms' future prospects (e.g., innovation).

Regarding the latter, while there is considerable evidence connecting venture capital financing to innovation, it is important to note that there is also evidence that commercial banks play a role in financing innovation, particularly for smaller and external finance-dependent firms (e.g., Benfratello et al., 2008; Ferrando and Lekpek, 2018). The SAFE questionnaire includes some information that allows us to assess potential real effects from the OMT a bit further. While it contains no questions about investment, it does ask firms whether they have recently engaged in a number of innovative activities. The one most directly related to actual innovation is the question: "Has your firm in the past six months the firm introduced a new or significantly improved product or service to the market?" We create a dummy variable equal to one if the firm indicated that it did. To ensure timing consistency, we focus on wave 9 which was conducted fully 1 year after the OMT. Table 1 reports that a non-negligible fraction of all firms (35.5 percent) have engaged in some type of innovative activity over the course of the past half-year.

In the first column of Table 7, we present evidence from a test whereby we study the correlation

between the probability that a firm engaged in innovation in the past six months and the so-far main dependent variable, the dummy for improving expectations of future credit availability. The evidence strongly suggests that over the sample period, firms that are experiencing an improvement in their expectations of future credit availability are more likely to make product improvements. Numerically, firms that expect the availability of bank credit to improve in the future are 4 percentage point more likely to engage in product innovation, corresponding to a 12 percent increase over the sample mean.

We also match the firms in the SAFE to the Amadeus database, which allows us to extract information on their investment activities. We measure firm investment as the log difference in tangible investment from the pre-OMT to the post-OMT period, and then regress this variable on the dummy for improving expectations of future credit availability. The estimates from this regression points to a robust link between expectations of future funding and investment activities (column (2)). Numerically, investment by firms that expect the availability of bank credit to improve in the future is higher by 1.3 percentage points than investment by similar firms that expect the availability of bank credit to decrease or to remain the same.

Importantly, in all regressions we also control for actual credit experience. In practice, we include on the right-hand side a dummy variable *Credit constrained* equal to 1 if the firm declared a positive demand for bank financing in the past 6 months, but it was discouraged from applying because it expected to be rejected, or it applied but its loan application was denied, or it applied and got less than 75% of the requested amount, or it refused the loan because the cost was too high. Firms that are credit constrained report lower innovative activities and investment levels. Crucially, the impact of expectations of future credit availability on innovation and investment exists independently of the effect of actual credit constraints. Our data thus strongly suggest that there is a distinct funding-expectations channel whereby unconventional monetary policy can affect the real economy.

### 6.2 Aggregate effects

These results raise the natural question, how large is the aggregate economic effect of changes in expectations on firm real decisions, over and above the impact of improving actual access to finance. Focusing on investment, we make use of the coefficient on firm expectations in column

(2) of Table 7. First of all, we note that in the year after the announcement, the share of firms that experienced an improvement in expectations of future credit availability increased by around 26 percentage points, and the share of firms that experienced an increase in actual credit access increases by around 6 percentage points. This correspond to around 20 percent of all firms that have experienced a change in expectations without experiencing a change in actual credit access, or three-quarters of all firms that experienced an improvement in expectations. The point estimate suggests a 1.3 percentage point increase in investment for the average firm that experienced an improvement in expectations of future funding. This implies that in the year after the OMT announcement, aggregate investment in the economy increased by around 0.26 percentage points due to the impact of the OMT announcement on firm expectations.

# 7 Conclusion

In this paper, we examine the impact of one particular unconventional monetary policy tool—the ECB's government bond purchasing program, the OMT—on the variation in small firms' expectations of future credit availability. In particular, we investigate 1) whether firms experienced an improvement in their expectations of future credit availability after the announcement of the program, and 2) whether said improvement was bigger for firms whose bank benefited more from the program because it had substantial exposure to sovereign debt, relative to similar firms borrowing from an unaffected creditor. We also study how this improvement in expectations affected firms' real decision, such as investment and innovation decisions. We do so for a sample of 2,123 SMEs in eight euro area countries, using a restricted access dataset containing rich balance sheet information for individual firms, information on expectations, and the identity of their main bank.

We find that the announcement of the OMT Program resulted in a strong short-term (six months) and medium-term (one-year) improvement in expectations of future credit availability. by firms borrowing from banks with substantial balance sheet exposures to impaired sovereign debt. Numerically, in the year after the OMT announcement, a firm in a stressed country was 26.4 percentage points more likely to expect bank credit conditions to improve—relative to a firm in a non-stressed country—if before the announcement it was associated with a bank at the 75th of sovereign debt exposure, compared to a firm associated with a bank at the 25th percentile of

sovereign debt exposure. Second, this effect was particularly strong for firms borrowing from banks with significant balance sheet exposures to impaired sovereign debt. This suggests the existence of a funding-expectations channel of unconventional monetary policy that works through bank balance sheet strength. Third, firms with higher expectations of future credit availability have higher investment and are more likely to engage in innovation. This effect is observed while controlling for current credit conditions, suggesting that the funding-expectations channel can impact firms' real decision over and above firms' actual access to finance. Finally, we find that expectations of future credit availability lead actual credit availability by 6 months to one year, suggesting that empirical tests which fail to control for the role of firm expectations can overstate the impact of credit access on firm growth. Our results imply that unorthodox monetary policy can stimulate the real economy through a funding-expectations channel, by reducing the riskiness of a class of assets that weighs heavily on some banks' balance sheets.

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Table 1. Summary statistics

| Variable | Observations | Mean | St. dev. | Min | Max |
|---|---|---|---|---|---|
| Firm expectations about future financing | | | | | |
| Bank financing will improve | 2,123 | 0.245 | 0.430 | 0 | 1 |
| Bank loans will improve | 2,123 | 0.176 | 0.381 | 0 | 1 |
| Bank credit lines will improve | 2,123 | 0.110 | 0.313 | 0 | 1 |
| Trade credit financing will improve | 1,871 | 0.130 | 0.336 | 0 | 1 |
| Equity financing will improve | 696 | 0.097 | 0.296 | 0 | 1 |
| Debt securities financing will improve | 443 | 0.113 | 0.317 | 0 | 1 |
| Firm characteristics | | | | | |
| Main bank's sovereign bonds / Assets | 2,628 | 5.119 | 4.273 | 0.007 | 20.597 |
| Stressed | 2,628 | 0.534 | 0.499 | 0 | 1 |
| Stand-alone firm | 2,627 | 0.823 | 0.382 | 0 | 1 |
| Individual- or family-owned | 2,628 | 0.699 | 0.459 | 0 | 1 |
| Size_1 | 2,628 | 0.138 | 0.345 | 0 | 1 |
| Size_2 | 2,628 | 0.241 | 0.428 | 0 | 1 |
| Size_3 | 2,628 | 0.219 | 0.413 | 0 | 1 |
| Size_4 | 2,628 | 0.402 | 0.490 | 0 | 1 |
| Age_1 | 2,568 | 0.003 | 0.057 | 0 | 1 |
| Age_2 | 2,568 | 0.017 | 0.130 | 0 | 1 |
| Age_3 | 2,568 | 0.084 | 0.278 | 0 | 1 |
| Age_4 | 2,568 | 0.895 | 0.306 | 0 | 1 |
| Turnover_1 | 2,592 | 0.226 | 0.419 | 0 | 1 |
| Turnover_2 | 2,592 | 0.243 | 0.429 | 0 | 1 |
| Turnover_3 | 2,592 | 0.290 | 0.454 | 0 | 1 |
| Turnover_4 | 2,592 | 0.240 | 0.427 | 0 | 1 |
| Own outlook better | 2,548 | 0.244 | 0.429 | 0 | 1 |
| Capital better | 2,611 | 0.292 | 0.455 | 0 | 1 |
| Credit history better | 2,549 | 0.248 | 0.432 | 0 | 1 |
| Credit constrained | 2,628 | 0.142 | 0.349 | 0 | 1 |
| Real decisions | | | | | |
| New product | 11,612 | 0.336 | 0.472 | 0 | 1 |
| Fixed assets / Assets | 14,805 | 0.248 | 0.229 | 0 | 0.968 |
| Investment | 4,701 | -0.007 | 0.171 | -0.5 | 1.041 |

Note: This table presents weighted summary statistics for the variables used in the empirical tests. The weights restore the proportions of the economic weight (in terms of number of employees) of each size class, economic activity and country and are applied to the variables derived from the survey. 'Bank financing will improve' is a dummy variable equal to 1 if the firm believes that the availability of bank loans or of credit lines will improve in the next six months. 'Bank loans will improve' is a dummy variable equal to 1 if the firm believes that the availability of bank loans will improve in the next six months. 'Bank credit lines will improve' is a dummy variable equal to 1 if the firm believes that the availability of bank credit lines will improve in the next six months. 'Trade credit financing will improve' is a dummy variable equal to 1 if the firm believes that the availability of financing through trade credit will improve in the next six months. 'Equity financing will improve' is a dummy variable equal to 1 if the firm believes that the availability of financing through equity (including venture capital or business angels) will improve in the next six months. 'Debt securities financing will improve' is a dummy variable equal to 1 if the firm believes that the availability of financing through issued debt securities will improve in the next six

months. ‘Main bank’s sovereign bonds / Assets’ is the ratio of sovereign bond holdings to total assets of the firm’s main bank, in percentage points. ‘Stressed’ is a dummy variable equal to 1 if the firm is domiciled in Greece, Ireland, Portugal, or Spain, and to 0 if the firm is domiciled in Austria, France, Germany, or the Netherlands. ‘Stand-alone firm’ is a dummy variable equal to 1 if the firm is an autonomous profit-oriented enterprise. ‘Individual- or family-owned’ is a dummy variable equal to 1 if the firm’s owner is an individual or a family. ‘Size_1’ is a dummy variable equal to 1 if the firm has between 1 and 9 employees. ‘Size_2’ is a dummy variable equal to 1 if the firm has between 10 and 49 employees. ‘Size_3’ is a dummy variable equal to 1 if the firm has between 50 and 249 employees. ‘Size_4’ is a dummy variable equal to 1 if the firm has 250+ employees. ‘Age_1’ is a dummy variable equal to 1 if the firm is less than 2 years old. ‘Age_2’ is a dummy variable equal to 1 if the firm is between 2 and 5 years old. ‘Age_3’ is a dummy variable equal to 1 if the firm is between 5 and 10 years old. ‘Age_4’ is a dummy variable equal to 1 if the firm is 10+ years old. ‘Turnover_1’ is a dummy variable equal to 1 if the firm’s annual turnover is less than €2 mln. ‘Turnover_2’ is a dummy variable equal to 1 if the firm’s annual turnover is between €2 mln. and €5 mln. ‘Turnover_3’ is a dummy variable equal to 1 if the firm’s annual turnover is between €5 mln. and €10 mln. ‘Turnover_4’ is a dummy variable equal to 1 if the firm’s annual turnover is €10+ mln. ‘Own outlook better’ is a dummy variable equal to 1 if the firm’s own outlook improved in the past 6 months. ‘Capital better’ is a dummy variable equal to 1 if the firm’s capital improved in the past 6 months. ‘Credit history better’ is a dummy variable equal to 1 if the firm’s credit history improved in the past 6 months. ‘Credit constrained’ is a dummy variable equal to 1 if the firm declared a positive demand for bank financing in the past 6 months, but it was discouraged from applying because it expected to be rejected, or it applied but its loan application was denied, or it applied and got less than 75% of the requested amount, or it refused the loan because the cost was too high. ‘New product’ is a dummy variable equal to one if in the past six months the firm introduced a new or significantly improved product or service to the market. ‘Fixed assets / Assets’ denotes the ratio of fixed assets to total assets. ‘Investment’ denotes the change in tangible assets over the past year divided by last year’s tangible assets.

Table 2. Unconventional monetary policy and firm expectations about future bank financing: Main test

| | Bank financing will improve | |
|---|---|---|
| | (1) | (2) |
| Main bank's sovereign bonds / Assets × Post × Stressed | 0.031*** | 0.052*** |
| | (0.007) | (0.014) |
| Main bank's sovereign bonds / Assets × Post | -0.041*** | -0.054*** |
| | (0.005) | (0.007) |
| Main bank's sovereign bonds / Assets × Stressed | -0.035*** | 0.016** |
| | (0.007) | (0.009) |
| Stressed × Post | -0.103*** | |
| | (0.031) | |
| Main bank's sovereign bonds | 0.045*** | |
| | (0.007) | |
| Stressed | 0.203*** | |
| | (0.028) | |
| Post | 0.208*** | |
| | (0.020) | |
| Stand-alone firm | 0.063 | 0.076 |
| | (0.055) | (0.078) |
| Individual- or family-owned | -0.013 | -0.016 |
| | (0.051) | (0.053) |
| Size_1 | -0.020 | -0.050 |
| | (0.037) | (0.062) |
| Size_2 | -0.012 | -0.012 |
| | (0.017) | (0.042) |
| Size_4 | 0.023 | 0.018 |
| | (0.033) | (0.029) |
| Age_1 | 0.147 | 0.578*** |
| | (0.146) | (0.031) |
| Age_2 | -0.095 | -0.079 |
| | (0.089) | (0.110) |
| Age_4 | 0.131* | 0.103 |
| | (0.075) | (0.100) |
| Turnover_1 | -0.009 | 0.019 |
| | (0.034) | (0.051) |
| Turnover_2 | -0.044 | -0.014 |
| | (0.039) | (0.029) |
| Turnover_4 | 0.005 | 0.006 |
| | (0.048) | (0.045) |
| Capital better | 0.080** | 0.100* |
| | (0.030) | (0.062) |
| Credit history better | 0.155*** | 0.140** |
| | (0.031) | (0.052) |
| Country × Industry × Time FEs | No | Yes |
| Bank FE | No | Yes |
| No. Observations | 1,630 | 1,529 |
| R-squared | 0.13 | 0.17 |

Note: This table presents difference-in-difference-in-differences estimates of firms' beliefs that the availability of bank financing will improve in the next six months. The model is estimated using probit. The estimation period is 1st October 2011 – 30th September 2013. See Table 1 for variable definitions and sources. All regressions use sampling weights that adjust the sample to be representative of the population. All regressions include fixed

effects as specified. Standard errors clustered at the country level appear in parentheses. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 3. Unconventional monetary policy and firm expectations about future bank financing: Falsification tests

| | Bank financing will improve: Pre-trend, two waves | Trade credit financing will improve | Equity financing will improve | Debt securities financing will improve |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Main bank's sovereign bonds / Assets × Post × Stressed | 0.025 | 0.180 | 0.012 | 0.111 |
| | (0.024) | (0.177) | (0.025) | (0.096) |
| Double interactions included | Yes | Yes | Yes | Yes |
| Firm-specific controls | Yes | Yes | Yes | Yes |
| Country × Industry × Time FEs | Yes | Yes | Yes | Yes |
| Bank FE | Yes | Yes | Yes | Yes |
| No. Observations | 381 | 1,343 | 295 | 127 |
| R-squared | 0.02 | 0.23 | 0.21 | 0.42 |

Note: This table presents difference-in-difference-in-differences estimates of firms' beliefs that the availability of different types of financing will improve in the next six months. The model is estimated using probit. The estimation period is 1st October 2011 – 30th September 2012 (column (1)) and 1st October 2011 – 30th September 2013 (columns (2)–((4)). See Table 1 for variable definitions and sources. All other firm-specific control variables from Table 2 are included in the regressions. All regressions use sampling weights that adjust the sample to be representative of the population. All regressions include fixed effects as specified. Standard errors clustered at the country level appear in parentheses. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 4. Unconventional monetary policy and firm expectations about future bank financing: Robust model

| | Bank financing will improve | | | |
|---|---|---|---|---|
| | OLS | Alternative shocks | Panel firms | Heckman correction |
| | (1) | (2) | (3) | (4) |
| Main bank's sovereign bonds / Assets × Post × Stressed | 0.043*** | 0.016** | 0.381*** | 0.161*** |
| | (0.014) | (0.007) | (0.142) | (0.050) |
| Double interactions included | Yes | Yes | Yes | Yes |
| Firm-specific controls | Yes | Yes | Yes | Yes |
| Country × Industry × Time FEs | Yes | Yes | Yes | Yes |
| Bank FE | Yes | Yes | Yes | Yes |
| No. Observations | 1,529 | 1,529 | 168 | 1,529 |
| R-squared | 0.19 | 0.19 | 0.60 | 0.17 |

Note: This table presents difference-in-difference-in-differences estimates of firms' beliefs that the availability of bank financing will improve in the next six months. The model is estimated using OLS (column (1)) and probit (columns (2)–(4)). The estimation period is 1st October 2011 – 30th September 2013. See Table 1 for variable definitions and sources. All other firm-specific control variables from Table 2 are included in the regressions. In column (2), the regression includes an interaction of all firm-level variables with the Post dummy. In column (3), only firms observed at least once before the OMT announcement and at least once after the OMT announcement are used. In column (4), a two-stage Heckman correction procedure is applied which incorporates information from firms that declare no demand for a bank loan. All regressions use sampling weights that adjust the sample to be representative of the population. All regressions include fixed effects as specified. Standard errors clustered at the country level appear in parentheses. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 5. Unconventional monetary policy and firm expectations about future bank financing: Robust sample

| | Bank financing will improve | | | |
|---|---|---|---|---|
| | Short-run | Long-run | Excluding wave 7 | Excluding Greek firms |
| | (1) | (2) | (3) | (4) |
| Main bank's sovereign bonds / Assets × Post × Stressed | 0.123** | 0.056* | 0.074*** | 0.053*** |
| | (0.067) | (0.034) | (0.025) | (0.014) |
| Double interactions included | Yes | Yes | Yes | Yes |
| Firm-specific controls | Yes | Yes | Yes | Yes |
| Country × Industry × Time FEs | Yes | Yes | Yes | Yes |
| Bank FE | Yes | Yes | Yes | Yes |
| No. Observations | 617 | 2,427 | 1,243 | 1,404 |
| R-squared | 0.26 | 0.19 | 0.17 | 0.17 |

Note: This table presents difference-in-difference-in-differences estimates of firms' beliefs that the availability of bank financing will improve in the next six months. The model is estimated using probit. The estimation period is 1st April 2012 – 31st March 2013 (column (1)), 1st April 2011 – 31st March 2014 (column (2)), and 1st October 2011 – 30th September 2013 (columns (3)–(4)). In column (3), observations from 31st March 2012 – 30th September 2012 are excluded. In column (4), all firms domiciled in Greece are excluded from the analysis. See Table 1 for variable definitions and sources. All other firm-specific control variables from Table 2 are included in the regressions. All regressions use sampling weights that adjust the sample to be representative of the population. All regressions include fixed effects as specified. Standard errors clustered at the country level appear in parentheses. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 6. Unconventional monetary policy and firm expectations about future bank financing: Robust dependent variable

| | Availability of bank loans will improve | Availability of bank credit lines will improve |
|---|---|---|
| | (1) | (2) |
| Main bank's sovereign bonds / Assets × Post × Stressed | 0.042*** | 0.016* |
| | (0.014) | (0.010) |
| Double interactions included | Yes | Yes |
| Firm-specific controls | Yes | Yes |
| Country × Industry × Time FEs | Yes | Yes |
| Bank FE | Yes | Yes |
| No. Observations | 1,682 | 1,359 |
| R-squared | 0.19 | 0.23 |

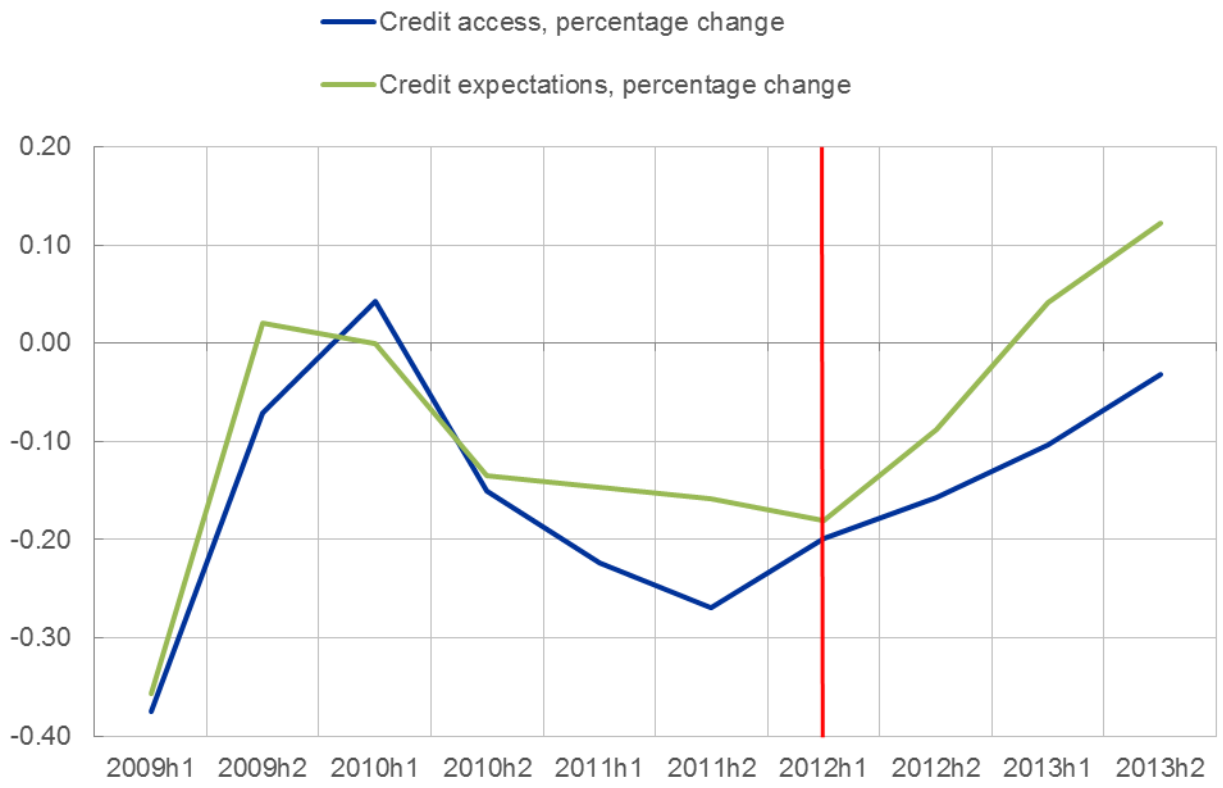
Note: This table presents difference-in-difference-in-differences estimates of firms' beliefs that the availability of bank loans (column (1)) and the availability of bank credit lines (column (2)) will improve in the next six months. The model is estimated using probit. The estimation period is 1st October 2011 – 30th September 2013. See Table 1 for variable definitions and sources. All other firm-specific control variables from Table 2 are included in the regressions. All regressions use sampling weights that adjust the sample to be representative of the population. All regressions include fixed effects as specified. Standard errors clustered at the country level appear in parentheses. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 7. Unconventional monetary policy and firm expectations about future bank financing: Real effects

| | New product | Investment |
|---|---|---|
| | (1) | (3) |
| Bank financing will improve | 0.039*** | 0.013** |
| | (0.013) | (0.005) |
| Credit constrained | 0.061*** | -0.013* |
| | (0.020) | (0.007) |
| Firm-specific controls | Yes | Yes |
| Country × Industry × Time FEs | Yes | Yes |
| Bank FE | Yes | Yes |
| No. Observations | 9,741 | 5,557 |
| R-squared | 0.05 | 0.09 |

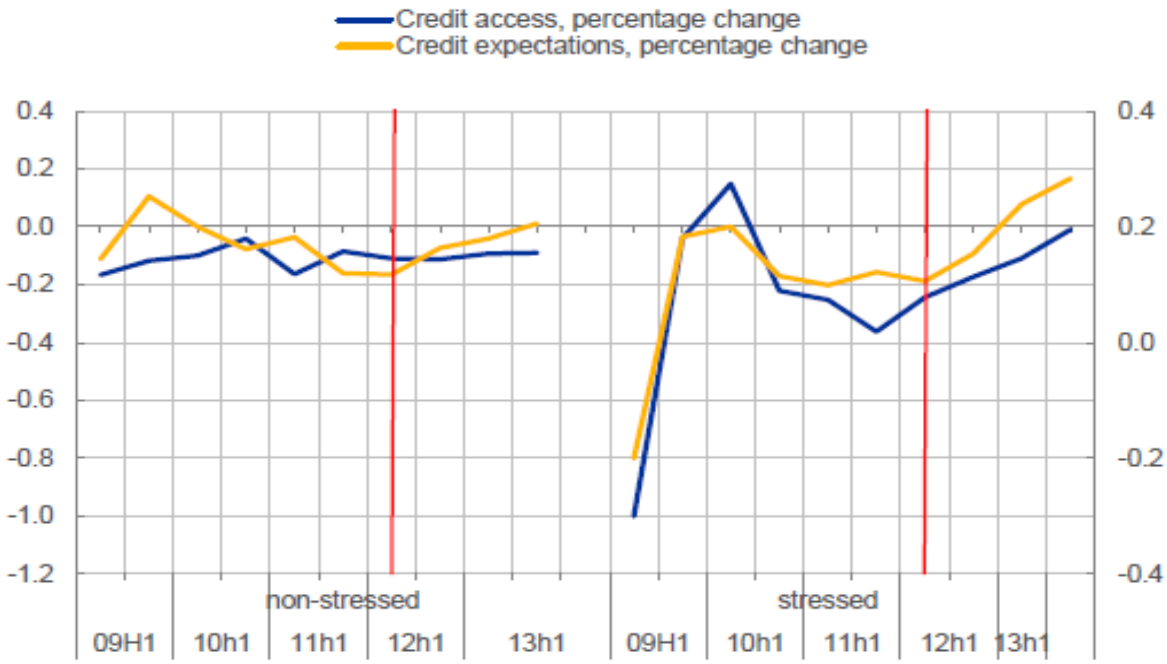
Note: This table presents difference-in-difference-in-differences estimates of firms' probability introduction of a new product in the past six months (column (1)) and of firms' percentage change in tangible assets in the past year (column (2)). The models are estimated using probit (column (1))) and OLS (column (2)). The estimation period is 1st October 2011 – 30th September 2013. See Table 1 for variable definitions and sources. All other firm-specific control variables from Table 2 are included in the regressions. 'Credit constrained' is a dummy variable equal to 1 if the firm declared a positive demand for bank financing in the past 6 months, but it was discouraged from applying because it expected to be rejected, or it applied but its loan application was denied, or it applied and got less than 75% of the requested amount, or it refused the loan because the cost was too high. All regressions use sampling weights that adjust the sample to be representative of the population. All regressions include fixed effects as specified. Standard errors clustered at the country level appear in parentheses. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Figure 1. Credit availability and expectations of future funding: Full sample




Note: The Figure plots percentage changes, from one survey wave to the next, in actual access to credit and in expectations of future funding, for all the firms in the sample. Data are weighted averages. The vertical line indicates the timing of the announcement of the OMT Program. Source: SAFE.

Figure 2. Credit availability and expectations of future funding: Stressed versus non-stressed countries




Note: The Figure plots percentage changes, from one survey wave to the next, in actual access to credit and in expectations of future funding, for firms in stressed versus non-stressed countries. Data are weighted averages. The vertical line indicates the timing of the announcement of the OMT Program. Source: SAFE.