Stress tests, information disclosure, and credit line runs*

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Abstract

Stress testing of banks is a tool widely used by supervisory authorities. The public disclosure of bank-level results provides valuable information to market participants, but it can entail adverse consequences for under-performing entities. We uncover a novel cost of disclosing stress test results in the form of credit line runs. Using the Spanish Credit Register and the 2011 stress test of the European Banking Authority, we find that, following the release of the results, firms drew down approximately 10 pp more available funds from lines granted by banks with a worse performance in the stress test. Moreover, before the release date, worse-performing banks reduced more the size of credit lines, and those underperformers with higher credit line balances were also more likely to cut term lending ex-post.

Keywords: stress tests, credit lines, bank runs, bank risk management.

JEL Codes: G01, G14, G21.

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1 Introduction

Stress testing of banks has become a key element of the bank supervisory toolkit.[1] Yet the benefits and costs of the public disclosure of stress test results remain only partially understood.[2] By providing valuable information to all market participants, publishing individual stress test results can reduce uncertainty and improve market functioning. However, their public disclosure can also have negative financial consequences on the banks that perform poorly in such exercises (e.g., worsening their funding conditions and limiting their capacity to perform intermediation functions), which might then spill-over to the financial sector more broadly. Thus, a comprehensive understanding of the involved benefits and costs is central for designing regulatory stress tests, and potential complementary measures.

In this paper, we uncover a new cost of publicly disclosing individual stress test results in the form of credit line runs. In particular, we study whether, following the publication of individual stress test results, firms run on credit lines granted by banks with poor performance in the test. Additionally, we analyze whether banks take mitigation actions to abate the impact of these extraordinary drawdowns before and after results become public. To conduct our analysis, we exploit the implementation of the 2011 European stress test and the Spanish credit register.

Briefly, our results can be divided into two parts. First, on the demand side, we show that after the public release of the stress test results, firms used more intensively credit lines granted by worse-performing banks in the test. Moreover, the precautionary drawdowns were concentrated in credit lines of firms at higher risk of breaching a financial covenant, as banks have the right to restrict credit line access in such cases. In addition, they were larger for smaller and less capitalized banks. Second, on the supply side, we find that worse-performing banks were more likely to downsize credit lines and cut term lending before and after the announcement of the results. Because the stress test used information as of end of 2010, we interpret these actions as mitigating measures banks took to lessen the impact of precautionary drawdowns rather than efforts to improve their performance in the stress test.

The paper bears important implications for the design of stress tests, prudential policy, and the regulation of credit lines. First, it contributes to a better understanding of the cost-benefit analysis of the disclosure of stress test results. In particular, our results suggest that authorities should consider implementing complementary measures that address concerns about weaker banks when results are published. Moreover, from a prudential point of view, acknowledging this cost of disclosing stress test results is important, as bank capital and liquidity buffers can be depleted following a sudden and significant increase in drawdowns.[3]

[1] Stress tests enable authorities to assess the resilience of banks against adverse scenarios, monitor risks at the system-wide level, and help them set capital requirements.

[2] See Goldstein and Sapra (2014) and Goldstein and Leitner (2018) for a theoretical discussion of the benefits and costs involved in the publication of stress test results.

[3] Capital requirements for undrawn credit are small compared to drawn credit. For instance, 10% of

Finally, our study suggests that stricter liquidity and capital requirements on the unused part of credit lines can be useful, as stronger bank fundamentals can help reduce the occurrence of credit line runs.

Our analysis centers on Spanish banks and firms during the implementation of the EBA 2011 stress test.[4] As opposed to other countries, all Spanish saving banks and almost all commercial banks, 25 banks accounting for nearly 93% of the assets of the Spanish banking sector, participated in this stress test.[5] In addition, we have access to the comprehensive Spanish Credit Register, maintained by Banco de España, allowing us to conduct our analysis at the bank-firm level. The EBA published the stress test scenarios and methodology on March 18 and announced the results on July 15. Among the Spanish banks, 12 underperformed in the test, as their projected stressed Core Tier 1 capital (equity and retained profits) to risk-weighted assets fell below 6%. These results provided relevant information to market participants, impacting stock market performance of listed banks (Petrella and Resti, 2013), and were broadly covered in the main Spanish newspapers.[6] The timeline implementation of the stress test allows us to study (1) banks' and (2) firms' behavior before and after the disclosure date.

Our analysis can be divided in two parts. First, our empirical exercise examines whether, after the announcement of the results, a credit line extended by bank b to firm f was used more intensively by firm f if bank b underperformed in the stress test. That is to say, whether firms precautionarily drew down out of concern that banks facing a negative information shock may tighten future credit access. Answering this question requires us to control for firm liquidity demand, to address the potential problem that banks with worse performance in the exercise might have been sorted with firms with higher liquidity needs. Thus, we employ a sample with the important feature that each firm has at least two credit lines from two different banks. This allows us to control for credit demand by adding firm fixed effects in our regressions, following Khwaja and Mian (2008). Then, using a difference-in-differences approach, we compare, for the same firm, its credit line usage rate before and after the release of the results, with better- and worse-performing banks in the stress test.

Next, we examine banks' mitigating actions before (or after) the results became public. Contrary to firms, banks knew ex-ante their financial health, as they used their models

unused credit line balances is treated as on-balance-sheet exposures for the calculation of capital requirements under the standardized approach for credit risk (BCBS, 2017). Thus, drawdowns decrease bank capital ratios.

[4] A previous stress test was implemented in 2010, but it was poorly received due to a mild adverse scenario (Hardy and Hesse, 2013). Event studies around the announcement date of both stress tests confirm that, while the 2011 stress exercise affected bank stock returns, this was not the case for the 2010 stress test, see Appendix B.

[5] The EBA required the largest banks in each country to participate in the stress test, covering at least 50% of the national banking sectors in each EU member state.

[6] The two leading Spanish newspapers, *El País* and *El Mundo*, published headlines on their front pages of July 16, 2011, about the performance of Spanish banks in the exercise. More related articles appeared in other Spanish newspapers in the following days.

to predict their hypothetical losses under the assumptions and scenarios provided by the EBA. Hence, banks could have taken actions to mitigate the expected effect of extraordinary drawdowns even before the disclosure of their private information. In addition, one crucial feature of the 2011 stress test is the static balance sheet assumption, helping us in interpreting banks' actions as a response to anticipated precautionary drawdowns rather than as a desire to improve their stress test results.[7] Hence, by using our credit line-level data and conditioning on firms with more than one line, we explore whether worse-performing banks were more likely to not renew expiring lines or reduce their available funds than other banks. In addition, we analyze the effect on term lending to firms that did not have credit lines, and examine whether worse-performing banks with more significant credit line balances cut term loans more often.

We find evidence of precautionary drawdowns after the disclosure, on July 15, of the 2011 EBA stress test results. Specifically, Spanish firms with at least two credit lines from different banks chose to use 9.5 pp more of undrawn funds (or 1.2 pp more of granted, undrawn plus drawn) between June and July from lines extended by worse-performing banks in the stress test. Moreover, we find no evidence, prior to the disclosure of the results, that credit lines extended by worse-performing banks were used more intensively than lines granted by other banks. In addition, we find that firms that precautionarily drew down funds after the disclosure of the results decided to repay the credit lines a few months later. This indicates that, after the initial worries dissipated, liquidity returned to banks from firms that made extraordinary drawdowns, supporting the interpretation of a precautionary motive instead of a genuine liquidity need. The extraordinary drawdowns that we find are sizeable, considering that a 10% of the undrawn balances of credit lines is assumed to be drawn for the computation of the exposure at default in the standardized approach for credit risk. Our results suggest that 10% could arise due to precautionary motives alone.

The size of precautionary drawdowns depends on firm, bank, and credit line features. First, we find that precautionary drawdowns were concentrated in credit lines of firms at higher risk of violating a financial covenant. To approximate the effect of covenant compliance, we divide our sample of firms into different groups based on a capital (or interest coverage) ratio.[8] We find that firms with good financial ratios (highly capitalized and with low-interest burden) did not react to the disclosure of the results. Similar behavior is observed for firms with worse financial ratios, which were likely to have already violated a financial covenant. In contrast, firms with doubtful economic prospects but likely in compliance with financial covenants did react to the disclosure of the results. These findings are

[7] Under the static balance sheet assumption, banks' balance sheets as of December 2010 were frozen to carry out the stress test. In this way, banks were discouraged from claiming that risk would be mitigated by selling off risky assets or changing their business model.

[8] Acharya et al. (2020) find that the most common financial covenants are related to leverage restrictions, interest coverage limitations, and capitalization and collateral requirements. Because we do not have information on compliance with financial covenants, we use the financial ratios as proxies.

consistent with banks closely monitoring credit lines, restricting line access to firms that do not comply with financial covenants. Yet, firms in compliance with covenants but at risk of violating them in the near future may decide to draw down out of fear of losing access to funds later. Second, we show that precautionary drawdowns were more significant for ex-ante less solvent and smaller banks, as these banks might find it more difficult to access external funds and sustain an increase in demand for drawdowns. Finally, these extraordinary drawdowns were larger for lines with longer residual maturity, higher initial usage rate, larger amount of granted funds, and those having been downsized before.

Several robustness checks support the interpretation that extraordinary drawdowns were driven by negative news about banks' solvency and not by other developments during this period. Specifically, we explore alternative explanations that could drive our results, primarily associated with how the European Sovereign Debt Crisis could have affected Spanish banks differently. First, if we remove from our sample banks with high exposure to home sovereigns, our results remain robust. Second, the results also remain robust to excluding banks that received public funds or were part of a merging process. An additional concern could be that extraordinary drawdowns resulted from banks' performance in the stock market and not from the release of stress test results. However, the results remain significant even after the exclusion of public banks. In addition, we check that firms did not use credit lines more intensively due to a fall in other lending sources before the disclosure of the results. Overall, evidence points to the direction that additional drawdowns were driven by concerns about worse-performing banks.

Affected banks tightened their lending standards. As noted, banks could have predicted their performance in the stress test after knowing the assumptions in the exercise. Because the EBA announced them on March 2011, there was a four-month gap until the results were public, allowing banks to take mitigating actions. We find that worse-performing banks were approximately 10 pp more likely to decrease the total amount of a credit line a quarter before the disclosure date. Moreover, such different behavior was not observed in the previous quarter (before the exercise's assumptions were known) and the following (after the results became public). Additionally, banks with a worse performance in the test and more significant undrawn credit line balances cut term lending more to firms without credit lines. In particular, for banks performing poorly in the test, a one standard deviation increase in undrawn credit line-to-assets would have increased the probability of cutting term lending by more than 20% to these firms in over 0.5 pp. These results can be explained by the impact of drawdowns on liquidity and capital buffers, as banks potentially facing extraordinary drawdowns would prefer to save on buffers by tightening their lending standards. Moreover, our second finding suggests that banks cannot fully mitigate their exposure to undrawn credit lines by just downsizing them. As a result, banks may find it necessary to adjust their credit policy along other dimensions, such as reducing term lending to other types of firms.

The paper contributes to two strands of literature. First, we add to the literature studying the effect of stress tests. On the one hand, a strand of this literature studies the effect

of publicly realising stress test information on financial markets, such as their impact on prices (Petrella and Resti, 2013; Morgan et al., 2014; Alves et al., 2015; Flannery et al., 2016; Borges et al., 2019; Fernandes et al., 2020). Another strand investigates the effect of stress tests on participating banks' behavior, such as their effect on lending, bank capital, dividend payments, or lending to small businesses (Acharya et al., 2018; Gropp et al., 2018; Berrospide and Edge, 2019; Cornett et al., 2020; Nguyen et al., 2020; Cortés et al., 2020; Doerr, 2021). We contribute to this literature by investigating whether credit line clients, in particular non-financial firms, react to the information disclosed in stress tests. To the best of our knowledge, this is the first paper showing that, following the publication of stress test results, banks with negative performance can be subjected to credit line runs.

The paper also relates to the literature showing that banks are exposed to credit line runs (Ivashina and Scharfstein, 2010; Campello et al., 2010; Berrospide and Meisenzahl, 2015; Ippolito et al., 2016). We depart from these papers in two important dimensions. First, our analyzed shock is primarily informational. The publication of the stress test results did not change bank fundamentals, but provided information to market participants about banks' resilience.[9] The informational nature of the shock is supported by the fact that extraordinary credit line drawdowns are not found in a previous stress test which was generally perceived as too mild.[10] Therefore, stress test-induced credit line runs are only expected to take place if the stress test is credible and demanding enough, so that its results are truly informative for market participants. Although the nature of the shock is different, the effect of our informational shock on credit line usage is similar in magnitude to that of the bank funding liquidity shock studied in Ippolito et al. (2016).[11] Second, the implementation timeline and design of the 2011 stress test allows us to examine banks' mitigating actions before and after the arrival of the informational shock, helping us to understand banks' reaction to a possible credit line run.

The rest of the paper is organized as follows: section 2 provides details about the 2011 stress test and presents the theoretical background; section 3 describes our data; section 4

[9]Banks with poor performance in the stress test had to take recapitalization measures. However, due to country-specific instruments with the capacity to absorb losses, no Spanish bank needed additional capitalization. Such components included general provisions, convertible bonds that were not part of the EBA's definition of core tier 1 capital, plans on equity security sales made before April 30, and unrealized gains in the portfolio of listed equities available for sale in the period 2011-2012. The EBA's main results did not consider them in order to preserve the exercise's homogeneity across countries.

[10]We find that, contrary do the 2011 case, the 2010 stress test exercise did not cause extraordinary credit line drawdowns. Importantly, the adverse scenario in the 2010 stress test was considered mild (Hardy and Hesse, 2013), and event studies around the disclosure date of the 2010 and 2011 stress tests indicate that the former did not impact bank stock performance, as opposed to the latter, supporting the idea that only in 2011 the stress test provided relevant information to market participants.

[11]Ippolito et al. (2016) find that, following the 2007 freeze of the European interbank market, a two-standard deviation increase in the interbank funding ratio would have caused a quarterly increase in the drawn-to-granted ratio of 1.08%, whereas we find that the disclosure of the 2011 stress test caused a monthly increase in the drawn-to-granted ratio of 1.2% for worse-performing banks.

explains our identification strategy; results are discussed in section 5; extensions are explored in section 6; and section 7 concludes.

2 Background

2.1 Stress Testing

Several supervisory institutions worldwide regularly perform bank stress tests. They enable authorities to assess the resilience of banks against adverse scenarios, monitor risks at the system-wide level, and help them set capital requirements.[12] In the European Union (EU), the European Banking Authority (EBA) has coordinated the European bank stress testing exercises since 2011.

2.1.1 The 2011 EBA EU-Wide Stress Test

The first exercise coordinated by the EBA occurred in 2011. However, the Committee of European Banking Supervisors (CEBS) previously carried out the 2009 and 2010 EU-wide stress tests. For the former, only aggregate results were disclosed; whereas for the latter, individual results were available but poorly received due to the relatively mild stressed scenario (Hardy and Hesse, 2013). Moreover, as shown next, as opposed to the 2010 exercise, the 2011 stress test results carried informational content as they impacted bank stock performance. Thus, our focus is on the 2011 EBA stress test.

The 2011 stress test methodology and assumptions were announced on March 18. Banks were instructed to incorporate them into to their internal risk models to predict the hypothetical losses they would suffer under the stressed scenario. The EBA also announced that banks with a ratio of CET1 capital (equity and retained profits) to risk-weighted assets (CT1R) below 5% in the adverse scenario should take remedial measures to cover the shortfall. In this way, banks could have anticipated their performance in the stress test before the disclosure date.

The results of the 2011 stress test were published for each participating bank on July 15. On the publication date, due to a prudential stance regarding growing concerns about the European economy, the EBA also recommended banks with a CT1R in the adverse scenario above but close to the 5% threshold to strengthen their capital position. In particular, when the results were announced, the EBA not only highlighted those banks with a CT1R under the adverse scenario below 5% but also those between 5% and 6% (EBA, 2011).[13] Thus, due to this update, market participants might have found it additionally difficult to anticipate that the latter group was as well under heightened supervisory attention.

[12] In the US, the FED uses stress test results to set the stress capital buffer requirement, whereas, in the euro area, the ECB uses stress test results to set capital requirements for significant European institutions.

[13] For a more detailed description of the 2011 EBA stress test, see Appendix A.

The results for the 25 Spanish banks participating in the 2011 stress test can be found in Appendix A. First, five banks had a CT1R in the stress scenario below the 5% benchmark: one commercial bank and four saving banks. Second, seven banks had a CT1R between 5% and 6%: three commercial banks and four saving banks. Thus, based on the EBA's announcement of July 15, twelve Spanish banks were singled out as *underperforming* in the test. However, no Spanish bank needed to take recapitalization measures due to loss-absorbing country-specific instruments.[14] This helps our informational shock interpretation of the results.

The 2011 stress test provided information to market participants that helped them distinguish between sound and fragile banks. For instance, Petrella and Resti (2013) find that, only after the publication of the results, banks with lower CT1R in the adverse scenario were punished with lower cumulative abnormal returns (CAR) compared to banks with higher stressed CT1R. Likewise, using event study methods, we show that (1) underperforming banks in the 2011 stress test (stressed CT1R $< 6\%$) were penalized with 2.4 pp lower CAR after the disclosure of the results; (2) there was no statistically significant difference between the CAR of underperforming banks and the rest prior to the disclosure of the 2011 results; (3) the 2010 stress test did not affect banks' CAR, see Appendix B. These findings suggest that the 2011 stress test results had valuable information for *sophisticated* investors (stock market participants), were unanticipated, and that the 2010 exercise was relatively uninformative; hence, our focus on the 2011 exercise.[15]

2.2 Theoretical Implications

Credit lines provide firms with pre-arranged funding to address sudden liquidity needs.[16] Therefore, firms widely use them as a tool for their liquidity risk management.[17]

However, access to credit lines depends on the firm's and its bank's financial health. First, these contracts incorporate financial covenants to protect banks against borrowers' creditworthiness deterioration.[18] Thus, a bank can restrict the usage of a credit line if a firm does not comply with financial covenants.

[14] Such components included general provisions, convertible bonds that were not part of the EBA's definition of core tier 1 capital, plans on equity security sales made before April 30, and unrealized gains in the portfolio of listed equities available for sale in the period 2011-2012.

[15] Accordingly, we do find precautionary drawdowns on credit lines granted by worse-performing banks after the disclosure of the 2011 stress test, but do not find them for the 2010 stress test exercise.

[16] For instance, at the onset of the COVID-19 crisis, US non-financial firms drew significant amounts from their pre-existing credit lines (Greenwald et al., 2021; Kapan and Minoiu, 2020).

[17] According to Sufi (2009) and Demiroglu et al. (2009), 87% of public firms and 64% of large private firms have access to credit lines in the US. In our sample, available funds at credit lines represented 9.6% of Spanish firms' assets as of June 2011.

[18] Acharya et al. (2020) find that the most common financial covenants are related to leverage restrictions, interest coverage limitations, and capitalization and collateral requirements.

Second, banks in financial distress (e.g., liquidity- or capital-constrained) find it harder to meet credit line drawdowns, leading to tougher responses to covenant violations. Particularly, a spike in credit line usage drops banks' liquidity and capital buffers, providing financially distressed banks with incentives to reduce their undrawn credit line balances.[19] For example, Acharya et al. (2020) and Chodorow-Reich and Falato (2022) show that, after a covenant violation, distressed banks are more likely to restrict access to loan commitments. Likewise, Pelzl and Valderrama (2020) find that capital-constrained Austrian banks managed their exposure to credit lines during the 2008-09 financial crisis by cutting little-used credit lines.

The possibility of losing access to funds may lead firms to precautionarily use credit lines, creating a form of bank run. Particularly, losing access to credit lines can negatively impact firms if liquidity is difficult to substitute. For example, evidence from the Global Financial Crisis shows that firms that lost access to liquid funds reduced investment spending (Campello et al., 2011; Almeida et al., 2012). Thus, firms may draw down funds precautionarily from their credit lines if tighter credit conditions are expected from their banks. This situation is called a *credit line run* because fear, rather than a genuine liquidity need, drives drawdowns (Ivashina and Scharfstein, 2010; Campello et al., 2010; Ippolito et al., 2016).[20]

Our study examines the effect of the public disclosure of stress test results. First, this paper aims to analyze whether, after stress test results are public, firms run on credit lines granted by banks underperforming in the test. Thus, after processing the information of the 2011 stress test results, which were widely publicized, firms may have drawn down credit lines from these banks due to a precautionary reason, motivated by the fear that such banks might restrict credit access in the future.[21]

Second, we explore whether stress-test underperforming banks behaved differently before (and after) the disclosure of the results. Recall that the EBA announced the stress test methodology and scenarios four months before the results publication date, allowing banks to predict their performance in the stress test and potentially take actions to mitigate the possibility of precautionary drawdowns. Thus, we also analyze whether underperforming banks reduced credit line and term loan balances before (and after) the announcement of the results.

[19] Under the current regulatory framework, funds drawn from credit lines are backed up with more bank capital than undrawn funds. For instance, under the standardized approach for credit risk, a *credit conversion factor* (CCF) of 10% is applied to convert unused balances of credit lines into on-balance-sheet exposures for the calculation of capital requirements (BCBS, 2017).

[20] By using a multi-country survey of CFOs, Campello et al. (2010) report that constrained firms drew down funds during the 2008-09 financial crisis out of fear that banks would limit access to their credit lines.

[21] The main Spanish newspaper, *El País*, published on their front page of July 16, 2011, an article about the performance of Spanish banks in the stress test. More articles related to the exercise results appeared in other newspapers and the following days.

3 Database Construction & Summary Statistics

Our main datasets are constructed from three sources: (i) the Spanish Credit Register (CIR), which is managed by the Banco de España (BdE), the regulator and supervisor of the Spanish banking system, (ii) the stress test results of the 2011 EU-wide stress test, which was coordinated by the EBA, and (iii) Spanish banks' financial statements as of December 2010, which are available at BdE for each banking group. Moreover, to analyze the effect of firm heterogeneity on precautionary drawdowns, we employ firms' balance-sheet information as of December 2010, which is available from the Spanish Mercantile Register.

The information on credit lines, available at the bank-firm level, is obtained from the CIR. This supervisory credit register contains information on any loan commitment above €6,000 granted by any bank operating in Spain, that is, the CIR is an exhaustive database containing almost all credit commitments granted to Spanish firms by different banks. Specifically, we observe drawn and undrawn amounts at the bank, firm, instrument type, maturity, collateral, default status, and currency level, which are reported on a monthly basis.[22] One important caveat of our database is that we do not explicitly observe whether an observation is a credit line or not. Moreover, the drawn and undrawn amounts of two different products (e.g., a credit line and a fixed-term loan) that share the same characteristics are aggregated into a single observation. Thus, to identify a credit line in our database, the following conditions must be satisfied: (i) the undrawn amount in month t has to be greater than zero, (ii) the granted amount, which is the sum of the drawn and undrawn amounts, between t and $t+1$ must remain equal.[23] The first condition keeps only loan commitments that have available funds that can be requested from banks by firms, and it does not take into account fully used credit lines (i.e., undrawn amount equals zero), which cannot be distinguished from fixed-term loans. However, our interest is to determine whether credit lines were used more intensively after the publication of the stress results, which could not be feasible for credit lines that were already fully used before the results became public. The second condition discards observations whose granted amount decreases in the following month, which can be driven by the risk management practice of the bank or the repayment of a fixed-term loan that shares the exact characteristics of a credit line. However, the former possibility is less likely to occur within a short period, in our case a month, because contractual terms in credit lines remain largely fixed unless a financial covenant is violated. For instance, among all the observations that satisfy condition (i), approximately 10% experience a drop in their granted amount.[24] The identified credit line could still correspond to an existing credit line plus a term loan if the term loan was not amortized between months. The effect of including

[22] For a more detailed explanation of the CIR database, see Jimenez and Saurina (2004).

[23] We control for mergers and acquisitions to keep track of credit lines when bank identifiers vary.

[24] Observations whose granted amount increase in the next month are interpreted as a new contract, whereas our analysis focuses on credit lines that were already conceded at month t. As part of our robustness checks, we also estimate our main specification including observations whose granted amount diminishes.

this "line" would be to bias downwards our results since our main variable normalizes the change in credit line usage by the total size of the "line", which in this case would be the real line's size plus the term loan's size; see below. After credit lines are identified, we proceed to aggregate all the credit lines, drawn and undrawn amounts, in euros and with residual maturity of less than three years that each firm has with any bank in the banking group.[25,26]

Our variable of interest is the change in the credit line usage rate of firm f from bank b between June 30 and July 31, 2011. That is, two weeks before and after the release of the stress results, which occurred on July 15, 2011. In particular, the change in usage rate for month $t+1$ is computed as

$$\Delta Usage_{f,b,t+1} = \frac{Drawn_{f,b,t+1} - Drawn_{f,b,t}}{Granted_{f,b,t}}, \tag{1}$$

where $Granted_{f,b,t} = Drawn_{f,b,t} + Undrawn_{f,b,t}$. Hence, the change in usage rate for July allows us to analyze whether, for existing credit lines in June that were not fully used, firms chose to use more intensive credit lines granted by underperforming banks in the stress test after the disclosure date. Moreover, we extend our analysis for months before July to discard pre-event trends or anticipation of the stress results.

To analyze banks' behavior before (or after) the information release, we employ credit lines with available funds to be drawn and quarterly data, as banks may find it harder to modify credit line terms in a shorter period. Then, we examine whether bank b reduced the line's size of firm f within the quarter. Such analysis allows us to study whether underperforming banks in the test reduced their exposure to credit lines before (or after) the stress test results became public.

Our primary sample is composed of non-financial firms that have at least two credit lines from two different banks that participated in the 2011 stress test exercise.[27] This sample of firms enables the addition of firm fixed effects in our main specifications, which is part of our identification strategy, explained in the next section. For instance, our primary sample of credit lines in June is comprised of 93,010 lines granted to 34,773 non-financial firms by Spanish banks that participated in the 2011 stress test. These credit lines represent more than 60% of the total amount granted to non-financial firms via credit lines as of June 2011.

Finally, we match our dataset to bank information from the 2011 stress test results, available on the EBA's website, and banks' financial statements, accessible to the BdE in

[25]Credit lines in a currency different from euros represent just around 1% of our original sample. Most credit lines offered by banks have maturities between 1 and 3 years; loan commitments with maturities of more than three years are mostly related to real estate activities and the construction sector, in which drawdowns typically occur as construction work progresses. The results remain robust to the inclusion of such commitments and are available upon request.

[26]Aggregation at the banking group is a necessary step as stress test results and bank information are only available for banking groups.

[27]As part of our extensions, the analysis is redone to include firms with a credit line from a single bank.

its supervisor role. Bank variables contain the outcome in the 2011 stress test, assets, profitability, liquidity, NPL, and CET1 capital ratios, and a commercial bank dummy. Moreover, we use firm data from financial statements available at the Spanish Mercantile Register to study heterogeneous effects based on firms' compliance with financial covenants in section 6. We only use such information for this analysis, and our sample size decreases when using it.[28] All variables in our analysis are defined in Table C.2, and their descriptive statistics are reported in Table C.1.

4 Empirical Strategy

4.1 Identification Strategy

First, we are interested in analyzing whether precautionary drawdowns from credit lines occur following information disclosures of individual stress results. Such analysis faces important empirical challenges. For instance, the possibility that banks with worse financial health might be matched with firms that frequently demand funds from their credit lines for business-related purposes (e.g., paying wage bills), which complicates the identification of precautionary drawdowns.

To address such concerns, our identification strategy of precautionary drawdowns relies on two crucial ingredients: (i) the disclosure of the 2011 European stress test results, in which almost every Spanish banking institution participated; (ii) an exhaustive credit register that records all credit lines granted by different banks to each firm, which allows, by the addition of firm fixed effects, to control for observed and unobserved firm characteristics that may drive demand for liquidity.

As mentioned in section 2, the EBA disclosed the results of the 2011 stress test exercise on July 15. As opposed to other countries, all Spanish savings and almost all commercial banks participated, accounting for 25 banks. These banking institutions performed differently under the adverse scenario of the stress test. Specifically, 12 Spanish banks had a CT1R below 6% in the adverse scenario. As a result, the EBA suggested such *underperforming* banks in the stress test strengthen their capital position.[29]

The Spanish Credit Register covers all the outstanding credit lines extended by different banking institutions to each firm. In particular, we conduct our analysis at the bank-firm level and employ a sample with the important feature that the same firm has at least two credit lines from two different banks before and after the stress results were announced. This feature helps, by adding firm fixed effects, to control for credit demand (Khwaja and

[28] Our main dataset contains 34,773 firms, whereas the dataset with firm characteristics has 24,256 firms.

[29] Initially, the EBA considered failing the test if a bank had a CT1R$<$ 5% in the adverse scenario. However, on the disclosure date, the EBA also highlighted the importance of strengthening the capital position of banks with stressed CT1R$<$ 6% due to growing concerns about the European economy.

Mian, 2008). Hence, after isolating shocks to credit demand, precautionary drawdowns can be observed if a particular firm chooses to use more intensive credit lines extended by underperforming banks in the test over lines granted by other banks. This approach helps to address the potential problem that banks that performed worse in the stress test were sorted with firms that may have higher liquidity needs. Moreover, our monthly analysis helps better identify whether precautionary drawdowns happened after disclosing the results. For instance, it could happen that a firm withdrew extra funds from banks that appeared weak in the test right after the announcement but returned the funds a few months later. Such events might be missed if the observation frequency is too coarse.

The aforementioned ingredients permit us to exploit an identification strategy based on a difference-in-differences approach: we compare for the same firm its credit line usage before and after the release of the stress test results for banks more or less affected by the adverse scenario. Our analysis will point to the existence of precautionary drawdowns following the disclosure of stress tests if, after the announcement, a firm prefers drawing down from its lines granted by worse-performing banks over lines extended by its other banks.

Additionally, we are interested in whether banks took mitigating actions in anticipation of potential precautionary drawdowns. The event (the disclosure of the stress test results) has a key feature for analyzing such a possibility. Banks, as opposed to firms, could predict their performance in the test as they used their models to calculate hypothetical losses under the assumptions and stress scenarios provided by the EBA. Note that there was a four-month gap between the announcement of the assumptions and the results; see section 2. Thus, banks could have taken actions to mitigate the impact of precautionary drawdowns before their private information was disclosed to financial markets. Moreover, due to the 2011 stress test's static balance sheet assumption, we can closely associate a bank's actions with a response to precautionary drawdowns rather than a desire to obtain a better stress test result.[30] These stress test features allow us to analyze banks' reactions to credit line drawdowns before the disclosure date. Thus, we examine whether underperforming banks in the stress exercise were more likely to downsize credit lines. Additionally, we explore whether underperforming banks with larger exposure to undrawn credit lines were more likely to cut term lending to firms without credit lines. As in the previous case, for our analysis, firms with multiple lending relationships are employed to control for credit demand by adding firm fixed effects.

4.2 Empirical Models

First, we regress the change in usage rate between the end of June and the end of July 2011 for a credit line extended by bank b to firm f on a stress test performance variable, bank and relationship controls, and controlling for credit demand by adding firm fixed effects. The

[30] To carry out the stress test, banks' balance sheets as of December 2010 were assumed frozen, discouraging banks from selling off risky assets or changing their business model to mitigate their risk.

dependent variable, based on Ippolito et al. (2016), quantifies a firm's additional use of its credit line in a month. Formally, we estimate the following specification:

$$\Delta Usage_{f,b,July} = \alpha_f + \beta \times ST\text{-}Underperforming_b + \underbrace{\gamma' bank_b + \delta' credit\ line_{f,b}}_{\text{controls}} + \varepsilon_{f,b}. \quad (2)$$

The dependent variable is the change in usage rate between June and July and is defined in (1). The stress test performance variable is represented by the *ST-Underperforming* dummy, which takes value one if the bank had a CT1R below 6% under the adverse scenario of the stress exercise, and 0 otherwise. Recall that such banks were singled out by the EBA when results were made public. Thus, if precautionary drawdowns occurred after the disclosure of the results, the coefficient β should be positive and significant only when the results became public and not before unless important anticipation effects occurred.[31] Recall that precautionary drawdowns are driven by firms' fear that weaker banks as indicated by the stress test may reduce their lending to firms in the following months. It is important to remark that our dependent variable only increases if more funds are requested by the firm and not because the granted amount is decreased by the bank.[32]

In our specification, we control for other possible sources explaining firms' credit line usage. As we previously pointed out, a key feature of our identification strategy relies on the inclusion of firm fixed effects α_f, which allows us to control for relevant, yet unobservable, firm characteristics that can drive demand for liquidity (e.g., a drop in revenues and thus a need for liquidity).

Additionally, we include bank controls, such as a dummy variable for whether the bank is a commercial bank, the logarithm of assets, the return on assets, the liquidity, CET1 capital, and non-performing loan ratios. These controls are meant to isolate the part of the informational shock that firms were not able to predict. Also, firms could have reacted to weaker bank fundamentals, hence, the need for adding bank controls.

Furthermore, we add relationship and credit line controls. Specifically, we include a dummy for whether the firm has a past-due loan with its bank, the line's initial usage rate, the share of its line that is collateralized, the share of its line that matures within a year, and the share of the line out of the firm's total committed funds. These variables could also explain firms' drawdown behavior. For instance, Jiménez et al. (2009) find that a line's default status is a key determinant of its usage as firms with prior defaults access them less, suggesting that banks monitor firms and, through this, influence firms' usage decisions. They also find that firms draw down less on credit lines granted by their main banks, which indicates that banks limit funding to their most dependent borrowers. Thus, the need to include lending relationship variables. All control variables are defined in Table C.2.

[31] Equation (2) is estimated for other months to observe whether anticipation or lagged responses occurred.

[32] In our robustness section, we also estimate equation (2) including observations whose granted amount decreased in July. Even for those, the dependent variable is built such that it can only increase if more funds are drawn.

To analyze banks' behavior before the disclosure of the stress results, we estimate the following linear probability model

$$\mathbb{1}(Downsized_{f,b}) = \alpha_f + \theta \times ST\text{-}Underperforming_b + controls_{f,b} + \varepsilon_{f,b}, \tag{3}$$

where the dependent variable is a dummy variable that takes value one if bank b reduced the line's size of firm f by $x\%$ within the quarter, and the explanatory variables are the *ST-Underperforming* dummy, bank, and credit line/relationship controls, which were defined before.[33] In particular, we are interested in determining whether underperforming banks in the test were more likely to reduce their exposure to credit line balances in anticipation of the disclosure of their private information. Again, such analysis requires us to control for firms' credit demand; hence, we add into the regression firm fixed effects. If banks actively managed their exposure to credit lines, we expect a positive and significant coefficient for θ in equation (3).

Finally, we also analyze whether underperforming banks in the test with more significant undrawn credit line balances originated fewer loans to other types of firms, in particular firms without credit lines. For that purpose, we estimate the following equation

$$\begin{aligned}\mathbb{1}(\Delta Lending_{f,b,t+1} < x\%) = \alpha_f + \rho_0 \times ST\text{-}Underperforming_b + controls_{f,b} + \varepsilon_{f,b} \\ + \rho_1 \times ST\text{-}Underperforming_b \times \Big(\frac{CreditLines}{Assets}\Big)_b,\end{aligned} \tag{4}$$

where the dependent variable is a dummy that takes value one if the quarterly percentage change in term loans granted by bank b to firm f is lower than $x\%$.[34] To the previous set of explanatory variables in (3), we add the interaction between the *ST-Underperforming* dummy and the ratio of total undrawn credit line balances-to-assets of bank b as of December 2010. In particular, we want to explore whether banks mitigated the impact of precautionary drawdowns on bank capital and liquidity buffers by tightening their lending standards in anticipation or due to the disclosure of stress test results. We expect the coefficient ρ_1 to be positive if banks implement this mitigating action. As before, we must add firm fixed effects to control for credit demand appropriately.

5 Results

5.1 Evidence on Precautionary Drawdowns

This part analyzes whether precautionary drawdowns occurred once the stress test results became public in July 2011. Additionally, we explore anticipated or lagged responses of firms

[33] Different thresholds of x are explored to secure that banks' risk management indeed drives our results.

[34] We explore different thresholds of x to guarantee that the results are not driven by repayments of the principal of term loans, that we could erroneously identify as part of credit lines. Further details of how credit lines are identified in our data can be found in section 3

by performing our analysis for other months around the announcement date of the results. Finally, we run a number of robustness checks.

Table 1: Effect of the 2011 Stress Test on Credit Line Usage

	Change in Drawn June/July 2011			
	Fixed Effects		OLS	
	Over Granted	Over Available	Over Granted	Over Available
	(1)	(2)	(3)	(4)
ST-Underperforming	0.012***	0.095**	0.015**	0.098**
	(0.003)	(0.044)	(0.007)	(0.037)
Controls	Y	Y	Y	Y
Firm FE	Y	Y	N	N
Observations	93,010	90,375	93,010	91,092
R-squared	0.5468	0.4460	0.1083	0.0501

This table contains a set of regressions of the change in drawn funds from credit lines over the period June/July 2011, which includes the announcement date of the stress results (July 15, 2011), on a stress test performance variable, bank and credit line control variables (detailed in Table C.2). In columns 1 and 3, the change in drawn funds is measured relative to the granted (drawn and undrawn) amount by bank b to firm f, as in Equation 1. Columns 2 and 4 measure the change in drawn funds relative to available funds in June 2011. *ST-Underperforming* is a dummy variable that takes value one if the bank had a CT1R below 6% under the adverse scenario of the 2011 stress test exercise. The sample only includes firms that have at least two outstanding and not fully used credit lines in June from two different banks. Additionally, to avoid extreme negative values of the dependent variable, column 2 does not include credit lines whose initial usage is above 99%. Columns 1 and 2 present the results including firm fixed effects, whereas columns 3 and 4 the OLS estimates. Standard errors are double clustered at the bank and firm levels and reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 1 shows the estimate of the coefficient of the *ST-Underperforming* dummy in our main specification; see equation (2). For comparison, we include the OLS estimation results (without firm fixed effects). However, to ensure that our results are not driven by firm characteristics related to banks' stress test performance (sorting effect), we primarily focus on the estimation results that include firm fixed effects. In column 1, the dependent variable is the change in credit line usage rate between June and July, which is computed as the difference in drawn funds over the period divided by the granted amount in June, see equation (1). As it can be appreciated, the coefficient is positive and statistically significant at the 1% level. Specifically, after the announcement of the stress results on July 15, firms with two (or more) lines provided by different banks chose to draw down on average 1.2 pp more of their credit lines extended by banks that underperformed in the 2011 stress test. Note that the inclusion of firm fixed effects in our main identification allows us to control for

credit demand factors. Thus, the results suggest the existence of precautionary drawdowns following the disclosure of negative stress test results about individual banks. Additionally, to explore the effect of the 2010 stress test on credit line drawdowns, we estimate equation (2) for the period after the announcement of the 2010 stress test results (July 23, 2010). In particular, we do not find statistical evidence of such an effect, which is consistent with the fact that the 2010 stress test was relatively uninformative about banks' soundness (see Appendix B).[35]

The following remarks are helpful for understanding the economic significance of the estimated coefficient. First, it is worth noting that the mean and median change in credit line usage between June and July were relatively low, at 2.5% and 0%, respectively, see Table C.1. Our results indicate that the additional usage of credit lines extended by underperforming banks in the test is about 50% of the average increase during that month. Second, a considerable share (72%) of credit lines with an initial usage rate equal to zero remained unused in July, accounting for nearly 25% of our sample. It is important to highlight that little-used credit lines are the only ones whose change in usage rate can be potentially significant. For instance, a credit line with an initial usage rate of 90% can only increase its usage 10pp. more. Our analysis of heterogeneous effects on credit line characteristics in section 6 shows that precautionary drawdowns were more significant in lines with an initial usage rate above its median (52%). The effect that we find is of similar magnitude to that found by Ippolito et al. (2016).[36] This indicates that, with respect to credit-line runs, the informational shock of a negative result in the 2011 stress test is equivalent to being highly exposed to the interbank market during the financial turnmoil of August 2007. It is also important to note that we find no effect in the 2010 stress test, so only credible and relatively demanding stress tests, which really convey new information to market participants, can be expected to induce credit line runs.

To better understand the magnitude of our main result, in column (2) of Table 1, we present results using the change in drawn funds over available funds as a dependent variable. Note that, when defined in this way, the dependent variable can increase up to 100% independently of the initial usage rate, indicating that the firm draws down all the funds left in the credit line. Column 2 in Table 1 shows that the magnitude of the estimated coefficient increases for the alternative definition of the dependent variable. Specifically, compared to other banks, firms drew down 9.5 pp more of the available funding (undrawn funds) from their credit lines extended by underperforming banks in the test.[37] We note that currently,

[35]The results for this estimation are available upon request.

[36]Ippolito et al. (2016) find that, following the 2007 freeze of the European interbank market, a two-standard deviation increase in the interbank funding ratio would have caused a quarterly increase in the drawn-to-granted ratio of 1.08%.

[37]The sample size in column 2 of Table 1 decreases because it does not include credit lines with an initial usage rate above 99%. This step is needed to avoid extreme negative values of the dependent variable, which would unduly affect the results. Note that a decrease in the used amount in July can generate substantial

under the standardized approach for credit risk, only a 10% of the undrawn balances of credit lines is assumed to be drawn for the computation of the *exposure at default* (EAD); whereas, this result suggests that almost an additional 10% could arise due to precautionary motives when the bank shows signs of distress.

Table 1 shows that firms drew down more from banks underperforming in the test test. Two alternatives could be behind the result. First, firms reallocated their demand for drawdowns from better-performing towards worse-performing banks without an overall increase in their demand for liquidity. Alternatively, firms increased their demand for funds and focused such additional demand on worse-performing banks. To distinguish between these two possibilities, Table 2 shows the firm-level regressions of the change in aggregate drawn funds between June and July on a dummy (*Treated*) that indicates whether a firm has a line granted by an underperforming bank in the test and controls. Column 1 shows for the same sample of firms as in Table 1 that a firm with at least one line from an underperforming bank in the test used 0.8 pp. more of its total granted funds. To better control for credit demand, column 3 includes firm observables in the regression, though the sample size decreases as not all firms in our initial sample have balance sheet information. In this case, a *treated* firm used 1 pp. more of its total granted funds; see column 4. Likewise, when using the alternative dependent variable, *treated* firms drew down 5.7 pp. more of their available funds; see column 6. Consequently, these complementary results suggest that underperforming banks in the test met an increase in total drawdowns instead of a reallocation of credit from performing towards underperforming banks in the test.

In order to confidently attribute the additional drawdowns to the effect of the stress test results release we need to rule out differential pre-trends. Table 3 shows that underperforming banks in the stress test did not experience elevated drawdowns before the announcement of the results in July 2011. The table shows placebo tests for our main specification in Table 1. Specifically, we run equation (2) for months prior to July 2011. As it can be appreciated, the coefficient of interest is not statistically different from zero for any month before July. Similarly, for the same period in 2010, the coefficient of the *ST-Underperforming* dummy is not statistically significant. Thus, there is no evidence that firms used more intensively lines extended by underperforming banks in the test over lines granted by other banks before the stress test results became public (July 15). The findings help to discard the possibility that firms found it easier to use their lines with banks that underperformed in the test due to fewer financial covenants set by these banks. Moreover, the results point in the direction that no information leakage of the results happened. Therefore, there is no evidence of either pre-event trends or anticipation of the results, which helps to alleviate concerns that our findings might be spurious and not truly due to the release of the stress test results.

Between August and September, firms used lines granted by underperforming banks in the

negative values if the undrawn amount available in June is close to zero. In contrast, positive values are bounded by 1.

Table 2: Effect of the 2011 Stress Test on the July-2011 Demand for Credit Line Drawdowns

	Multibank Firms		Multibank Firms with Firm Observables			
	ΔDrawn-to-Granted	ΔDrawn-to-Available	ΔDrawn-to-Granted		ΔDrawn-to-Available	
	(1)	(2)	(3)	(4)	(5)	(6)
Treated	0.008***	0.053**	0.011***	0.010***	0.069***	0.057**
	(0.003)	(0.021)	(0.003)	(0.003)	(0.025)	(0.025)
Industry FE	Y	Y	Y	Y	Y	Y
Province FE	Y	Y	Y	Y	Y	Y
Credit Line Controls	Y	Y	Y	Y	Y	Y
Firm Controls	N	N	N	Y	N	Y
Observations	34,764	34,632	24,250	24,250	24,188	24,188
R-squared	0.0925	0.0498	0.0971	0.1079	0.0552	0.0612

This table reports firm-level regression of the change in aggregate drawn funds of firm f between June and July from its credit lines granted by stress-tested banks on a dummy *Treated*, controls, and province and industry fixed effects. In columns 1, 3, and 4, we normalize the change in drawn funds over aggregate granted (drawn and undrawn) funds, whereas in columns 2, 5, and 6 over available (undrawn) funds. *Treated* is a dummy variable that takes value one if firm f has at least one credit line granted by an underperforming bank in the 2011 stress test. Credit line controls are aggregated at the firm level and weighted by the size of each firm's f credit line. Credit line and firm controls are defined in Table C.2. In columns 1 and 2, we use the entire sample of firms with more than one credit line granted by a stress-tested bank. To add firm controls, we employ the previous sample but exclude firms without balance sheet information as of December 2010. Additionally, to avoid extreme negative values of the dependent variable, column 2, 5, and 6 exclude credit lines whose initial usage is above 99%. Robust standard errors are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

stress test less intensively than those granted by other banks; see the last column of Table 3. A possible explanation is that firms concerned with losing access to liquidity returned drawn funds months after their initial worries relating to particular banks did not materialize.[38] Such a possibility would reinforce the idea that drawdowns following the disclosure date were related to concerns about banks' soundness rather than genuine liquidity needs.

We explore this possibility by checking whether it was the firms that *run* in July the ones that returned funds in September. To do this, we run our main specification for July-August and August-September adding an interaction term between *ST-Underperforming* and a dummy variable (*Run*) that identifies those firms that incurred in precautionary drawdowns after the announcement of the stress test results. In particular, we consider that a firm *run* in July if its average change in credit line usage with banks that underperformed in the test is strictly positive and larger than its average change with other banks.

Table 4 shows that a reversal in precautionary drawdowns explains the decrease in the September usage rate of credit lines granted by underperforming banks in the stress test.

[38] Due to interest payments on drawn amounts, drawing down to create cash reserves is costly.

Table 3: Placebo Tests

	Change in drawn over granted funds						
	2010	2011					
	Jun-Jul	Mar-Apr	Apr-May	May-Jun	Jun-Jul	Jul-Aug	Aug-Sep
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ST-Underperforming	0.005	0.004	0.004	-0.005	0.012***	-0.007	-0.019**
	(0.004)	(0.003)	(0.004)	(0.006)	(0.003)	(0.008)	(0.007)
Controls	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y
Observations	108,718	98,238	94,437	93,403	93,010	92,723	88,873
R-squared	0.542	0.528	0.535	0.522	0.547	0.548	0.541
Within R-squared	0.193	0.179	0.188	0.179	0.202	0.187	0.182

This table replicates column 1 of Table 1 on data from months before and after the announcement of the stress test results. For each month, we regress the change in usage rate on *ST-Underperforming*, bank (computed as of December 2010) and credit line controls (calculated with information available at month t), and firm fixed effects. As a reference, column 5 (June-July) coincides with column 1 of Table 1. Standard errors are double clustered at the bank and firm levels and reported in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Specifically, the negative and significant sign of the interaction term *ST-Underperforming* $\times$ *Run* indicates that firms that run in July used less intensive their lines with banks that underperformed in the stress test, suggesting that they returned drawn funds to their banks within the two months following the disclosure of the results. Note as well that once we consider the interaction term, the coefficient of *ST-Underperforming* is no longer statistically significant for July-August or August-September.

The reversion of drawdowns could be a consequence of no Spanish bank needing recapitalization once other loss-absorbing instruments were considered. In particular, country-specific loss-absorbing instruments permitted Spanish banks to survive the EBA's adverse scenario.[39] Following the publication of the results, the Bank of Spain highlighted such specificities of the Spanish banking system that the EBA's main results did not sufficiently emphasize to secure the exercise's homogeneity across countries.

To sum up, the analysis in this section shows that, after the announcement of the stress results in mid-July, firms drew down more funds from credit lines extended by banks that underperformed in the 2011 stress test. Such increase in credit line usage was associated to an increase in the demand for drawdowns as opposed to a credit reallocation from performing

[39]Such components included general provisions, convertible bonds, plans on equity security sales, and unrealized gains in the portfolio of listed equities available for sale.

Table 4: Reversal in Precautionary Drawdowns

	Change in drawn over granted funds		
	Jun-Jul	Jul-Aug	Aug-Sep
	(1)	(2)	(3)
ST-Underperforming	0.012***	0.006	-0.006
	(0.003)	(0.008)	(0.006)
ST-Underperforming × Run		-0.044***	-0.027***
		(0.005)	(0.003)
Controls	Y	Y	Y
Firm FE	Y	Y	Y
Observations	93,010	92,723	88,873
R-squared	0.547	0.549	0.541

The table contains the regression results for the monthly change in credit line usage rate on *ST-Underperforming*, *Run*, their interaction, bank and credit line controls, and firm fixed effects for July-August and August-September. For comparison, column 1 replicates the results of column 1 in Table 1. *Run* is a dummy variable that takes value one if the firm's average change in credit line usage rate with banks that underperformed in the stress test is strictly positive and larger than the average change with other banks in July (column 2) or July or August (column 3). Standard errors are double clustered at the bank and firm levels and reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

to underperforming banks in the test. Moreover, there is no evidence of such drawdown behavior prior to the release of the results. Finally, a reversal in precautionary drawdowns was found in the months following the publication of the results, presumably once worries about bank safety did not materialize. It is important to remark that our analysis controls for credit demand factors by including firm fixed effects in the analysis, which is necessary to identify precautionary drawdowns.

5.1.1 Robustness Checks

We start by addressing the possibility that firms could have substituted a decrease in term funding from underperforming banks in the test by drawing down lines in July 2011. In particular, banks with poor performance in the test could have tightened term loans before the disclosure of the results (e.g., by not renewing maturing loans). Hence, firms with access to credit lines could have substituted such a decrease in funding by drawing down from their existing credit lines, preferentially from the banks that decreased term funding. Thus, our findings could be associated with firms rebalancing their funding sources rather than precautionarily using their lines. We study this possibility by regressing at the bank-firm level the change in log term loans on the *ST-Underperforming* bank dummy, together with bank and credit line controls, and firm fixed effects. The results are shown in Table 5. The coefficient for the change in the log of term loans in July is small and insignificant

Table 5: Effect of Performance in the Stress Test on Lending via Term Loans - Firms with Multiple Credit Lines in June 2011

	Log Difference in the Amount of Term Loans			
	Jun-2011	Jul-2011	2Q-2011	3Q-2011
	(1)	(2)	(3)	(4)
ST-Underperforming	0.017**	-0.005	0.028**	0.018*
	(0.008)	(0.006)	(0.011)	(0.010)
Controls	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y
Observations	68,990	68,990	62,803	62,803
R-squared	0.2786	0.2857	0.3191	0.3175

This table reports the regression results for the change in the log of the amount of term loans on *ST-Underperforming*, bank and credit line controls, and firm fixed effects for the sample of firms in column 1 of Table 1. The dependent variable is the difference of the logarithm of the amount of term loans granted to firm f by bank b over the selected period. In order to have constant samples, only observations available in June and July (columns 1 and 2) or 2Q-2011 and 3Q-2011 (columns 3 and 4) are included in the regressions. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

(column 2), while that of the change in the third quarter of 2011 is positive (column 4). This indicates that firms did not see their term loans significantly reduced from banks with poor performance in the stress test, and therefore this mechanism cannot explain our main results. It is still possible that firms saw their term funding decreased by these banks *before* the results were known since presumably banks could have anticipated the results; hence, the increase in credit line usage from these banks could have been a delayed response to this event. We see no evidence of this effect, as the coefficient of the *ST-Underperforming* dummy is positive (and significant) for the month or quarter before the release of the stress test (columns 1 and 3). So, if anything, firms saw their term funding preferentially increasing from banks with poor performance in the stress test before the results were released. Thus, the results indicate that firms did not have an additional need to substitute a drop in term funding coming from underperforming banks in the test, which supports the idea that the extraordinary drawdowns in July 2011 were motivated by precautionary reasons.

Next, we consider variations in our sample and statistical model to examine whether the results are robust. We start by estimating our specification in (2) including commitments whose granted decreased in the period of analysis. Recall that our definition of a credit line relies on the assumption that the granted amount extended in a credit line (drawn plus undrawn funds) remains fixed within a month; see section 3. Consequently, such an assumption reduces our sample because it does not include other loan commitments whose granted amount decreased between June and July 2011. Although the assumption is reasonable

and permits us to identify credit lines better, we might be ruling out credit lines that were downsized in that period, generating a potential problem of sample selection.

Table 6 reports the regression results for our specification in (2) after adding credit lines whose granted amount decreased less than 40%, 80%, or decreased any amount, respectively. To avoid an artificially increase in the usage rate of those lines whose granted diminished in July, we compute the dependent variable as the change between June and July in the drawn funds by firm f from bank b over the granted funds on June to firm f by bank b (i.e., prior to the downsizing). For comparison, the first column in Table 6 replicates the results of column 1 in Table 1. As it can be appreciated, the coefficient of *ST-Underperforming* remains positive and statistically significant across all samples.

Additionally, we investigate whether firms with downsized credit lines in July behaved differently after the release of the stress results. To do so, we add the interaction term *ST-Underperforming* $\times$ *Drop*, where *Drop* is a dummy variable that takes value one if the credit line extended by bank b to firm f is downsized in July. A priori, the sign of the coefficient of this term is unclear. On the one hand, a line that is downsized will mechanically restrict the amount of funds that can be drawn.[40] On the other hand, a firm that experiences a downsizing might react by drawing down available funds if a future downsizing is expected. The results in Table 6 suggest that firms with downsized lines drew down more from underperforming banks in the test after the release of the results than firms that did not experience a downsizing; see columns 3, 5, and 7. Similar evidence is presented in column 8, though the effect is lower for firms that experienced large drops in their granted amounts. Thus, results suggest that firms with downsized lines in July drew down more after the release of the results than other firms, which is consistent with extraordinary drawdowns being driven by fear that underperforming banks in the test may further downsize their lines in the future.

Next, to address concerns that a particular group of banks could drive the results, we explore if our results are robust to changes in the sample of banks. First, we remove from the sample lines extended by banks with stressed CT1R below 5%. Recall that before results became public, the EBA initially announced as a benchmark a CT1R of 5%; see Table A.1. However, on the disclosure date, the EBA recommended that banks close to but above the initial threshold strengthen their capital positions. Thus, according to our underlying mechanism, firms should also respond to the stress test results of banks falling into this second category. Second, we keep only lines extended by banks whose CT1R under the adverse scenario of the stress test fell between 5% and 7%, that is, banks near the CT1R threshold of 6%. In this way, by analyzing banks close to the threshold, we can better associate our findings with the informational content of the stress test, as it would have been more difficult to separate these banks into performing and underperforming banks in

[40] For instance, for a credit line whose granted amount was reduced to almost zero, the drawn amount in July could not surpass this new limit, making it more likely that the drawn amount decreased between June and July.

Table 6: Effect of the 2011 Stress Test on Usage Rate - Including Lines whose Granted Diminished

	Change in drawn over granted funds (June-July)							
	$\lvert\Delta$%Granted$\rvert \leq$							
	0 %	40%		80%		100%		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ST-Underperforming	0.012***	0.014***	0.012***	0.015***	0.014***	0.017***	0.016***	0.013***
	(0.003)	(0.005)	(0.004)	(0.005)	(0.004)	(0.005)	(0.004)	(0.004)
ST-Underperforming			0.019*		0.018*		0.016	0.024*
× Drop			(0.010)		(0.010)		(0.011)	(0.012)
ST-Underperforming								-0.144***
× Drop × $\lvert\Delta$Granted$\rvert$/Granted								(0.037)
Controls	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	93,010	105,290	105,290	107,165	107,165	107,683	107,683	107,683
R-squared	0.5468	0.5381	0.5394	0.5369	0.5409	0.5358	0.5417	0.5576

This table reports the difference-in-differences regression estimates for analyzing the effect of the 2011 stress test on credit line usage. As part of our robustness checks, we add lines whose granted amount decreased between June and July 2011. Column 1 replicates, for comparison, our main results, which only include credit lines whose granted amount remained fixed between June and July 2011; see Table 1. In columns 2-3, we add lines whose granted amount decreased by less than 40%. Additionally, in columns 4-5, we add lines whose granted amount decreased by less than 80%. Finally, columns 6-8 include any loan commitment independently of whether the granted amount decreased or not. The dependent variable is the change between June and July in the drawn funds by firm f from bank b over the granted funds in June to firm f by bank b. *ST-Underperforming* is a dummy variable that takes value one if a bank had a CT1R below 6% in the adverse scenario of the stress test, and *Drop* is a dummy variable that takes value one if the credit line extended by bank b to firm f is downsized. All regressions include bank and credit line controls and firm fixed effects. Standard errors are double clustered at the bank and firm levels and reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

the test before the results were known. Third, we exclude credit lines granted by banks that resulted from an Institutional Protection Scheme (IPS).[41] Fourth, we do not include credit lines extended by banks that received government support.[42] Fifth, we do not consider

[41]During 2009-2011, many restructuring and integration processes of saving banks were carried out in Spain. One particular merging process was the IPS. From an economic, but not legal, perspective, an IPS was equivalent to a merging process, and it was promoted by savings banks for their restructuring. The most well-known example of a successful IPS is Bankia; wherein seven savings banks were integrated into a single entity.

[42]To enhance the strength and solvency of credit institutions, the Bank of Spain required 12 banking institutions to take recapitalization measures on March 10, 2011. To cover the shortfall, some of these

credit lines extended by the two largest Spanish banks as they could have been regarded as *too-big-to-fail*. Such robustness checks are presented in Table 7. As it can be appreciated, the coefficient of *ST-Underperforming* remains positive and statistically significant across all the different samples, which indicates that our findings remain robust to these exclusions.

In addition, we exclude public banks from the main sample, in order to provide more supporting evidence that the negative informational content of the stress test results led to precautionary drawdowns. Stress test results could have been more informative about private banks' financial soundness. Therefore, an increase in the usage of lines granted by private underperforming banks can be more clearly associated with precautionary drawdowns driven by banks' unfavorable information in the stress test results. As it can be appreciated in Table 7, the coefficient of our variable of interest is significant and positive for this sample.

Finally, one potential concern is that banks with significant exposure to domestic sovereign debt were the ones that had a poorer performance in the stress test. In particular, domestic sovereign exposures could have been inferred from the 2010 stress test; hence, firms could have run on their credit lines due to concerns about their banks' exposure to the European Sovereign Debt Crisis and not due to new information provided by the 2011 exercise. However, the cross-correlation coefficient between banks' exposure to Spanish sovereigns over total assets and the $ST\text{-}Undeperforming$ dummy is negative, at -0.21, contrary to this alternative hypothesis. Moreover, if we exclude from the sample the bottom and top five banks (out of the total twenty five) ranked by their exposure to Spanish sovereigns over total assets, results remain significant (see last column in Table 7). Therefore, concerns about banks' high exposure to domestic sovereigns do not appear to be driving our results. This supports the idea that the run was motivated by new information from the stress test results.

5.2 Bank Risk Management Before and Response to the Information Disclosure

In this section, we investigate the implications of credit line drawdowns on the behavior of the affected banks. A feature of the 2011 stress test important for our analysis is the static balance sheet assumption, which discouraged banks from selling off risky assets or changing their business model to improve their position in the stress test. Hence, findings in this section are more likely to be associated with banks taking actions to mitigate the effect of precautionary drawdowns rather than with an effort to obtain better results in the test. We pay particular attention to banks' behavior after the announcement of the stress test methodology but prior to the disclosure of their stress test results. First, we explore whether underperforming banks in the test cut on their existing credit lines. Second, we examine whether underperforming banks in the test with more significant undrawn credit line balances reduced lending to other types of firms.

requested public support from the Fund for Orderly Bank Structuring (FROB); see FROB (2019).

Table 7: Effect of the 2011 Stress Test on Usage Rate - Different Samples of Banks

	Change in Drawn to Granted (June-July)						
	Excluding:						
	Banks with CT1R<5%	Banks with CT1R<5% & CT1R>7%	IPS merged banks	Banks that received public funds	Top 2 banks	Listed banks	Top & bottom 5 ranked by exposure to home sovereigns
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ST-Underperf.	0.014***	0.020*	0.036*	0.056**	0.015***	0.016***	0.023**
	(0.004)	(0.010)	(0.020)	(0.020)	(0.004)	(0.005)	(0.009)
Controls	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y
Observations	82,780	41,975	75,023	64,878	56,677	22,945	25,521
R-squared	0.5531	0.5840	0.5602	0.5703	0.5689	0.5868	0.5895

This table reports the difference-in-differences regression estimates for analyzing the effect of the 2011 stress test on credit line usage. As part of our robustness checks, we exclude credit lines extended by certain banks. First, we exclude lines extended by banks whose stressed CT1R fell below 5%. Second, we only maintain in the sample lines extended by banks whose stressed CT1R fell between 5% and 7%. Third, we exclude lines that were the result of an Institutional Protection Scheme (IPS). Fourth, we exclude lines extended by banks that received government support. Fifth, we exclude lines granted by the two largest Spanish banks. Sixth, we excluded lines granted by listed banks. Finally, we exclude the bottom and top five banks ranked by their exposure to Spanish sovereigns over total assets. The dependent variable is the change between June and July in the drawn funds by firm f from bank b over the granted funds on June to firm f by bank b. *ST-Underperforming* is a dummy variable that takes value one if a bank had a stressed CT1R below 6%. All regressions include bank and credit line controls, and firm fixed effects. Standard errors are double clustered at the bank and firm levels and are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

We start exploring credit line risk management by banks around July 15, when stress test results became public. Specifically, we examine whether credit lines granted by underperforming banks in the test were more likely to be downsized. To do so, we estimate a linear probability model, in which we regress a dummy that takes value one if bank b downsized the credit line extended to firm f by an x% (1%, 10%, and 20%) within a quarter on *ST-Underperforming*, bank and credit line characteristics, and firm fixed effects.[43] It is important to remark that, differently from before, we carry out this analysis quarterly rather than monthly because, as we pointed out before, contractual terms of credit lines remain

[43]Different thresholds are chosen to deal with the drawback that we do not observe credit lines, and a decrease in the granted amount could be associated with principal repayments of term loans. Further details on how credit lines are identified in our data can be found in section 3.

largely fixed within a short period.

Table 8: Banks' Credit Line Risk Management

	Downsized Dummy: 1 if credit line was decreased more than								
	1%			10%			20%		
	1Q-11	2Q-11	3Q-11	1Q-11	2Q-11	3Q-11	1Q-11	2Q-11	3Q-11
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ST-Underperforming	0.034	0.100***	0.018	0.006	0.082***	-0.019	-0.005	0.073***	-0.028
	(0.021)	(0.022)	(0.020)	(0.018)	(0.021)	(0.022)	(0.017)	(0.020)	(0.022)
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	129,110	126,221	121,950	129,110	126,221	121,950	129,110	126,221	121,950
R-squared	0.4475	0.4425	0.4380	0.4486	0.4364	0.4354	0.4494	0.4330	0.4358

This table reports a linear probability model regression of whether a credit line is downsized an x% on the stress test performance variable, bank and credit line controls, and firm fixed effects. The dependent variable is a dummy that takes value one if bank b downsized the credit line extended to firm f by x% during the quarter. Columns 1-3, 4-6, 7-9 consider downsizings larger than 1, 5, and 10%, respectively. Column 1, 4, and 7 cover the first quarter of 2011, prior to the announcement of the assumptions. Columns 2, 5, and 8 cover the second quarter of 2011 after the exercise's assumptions were known but before the results became public. Columns 3, 6, and 9 consider the third quarter of 2011 after the results were disclosed. The ST-Underperforming dummy takes value one if the bank's CT1R under the adverse stress test scenario is below 6%. All control variables are defined in Table C.2. Standard errors are double clustered at the bank and firm levels and are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 8 reports the results. As can be appreciated, credit lines extended by underperforming banks were roughly 10pp more likely to be downsized during the second quarter of 2011; see column 2. Furthermore, such mitigating actions were only observed after the methodology's announcement and before the release of the results; note that coefficients in the first and third quarters of 2011 are not statistically significant (columns 1 and 3). Similar conclusions are obtained when we consider downsizings larger than 10 and 20%, respectively. Recall that, as opposed to firms, banks knew their financial condition before the announcement of the results. Thus, affected banks could take advantage of their private information before sharing it with market participants by reducing credit lines before the disclosure date. Therefore, firms' fears of losing access to funds available on their credit lines were justified, as underperforming banks in the test were more prone to downsize lines. Such findings are consistent with the literature that shows that stress-tested banks reduce lending (Acharya et al., 2018; Gropp et al., 2018; Berrospide and Edge, 2019; Cortés et al., 2020). It is important to remark that banks' anticipated reaction to the results may have limited the size of precautionary drawdowns, implying that our results are a lower bound of the effect

that could be expected after the release of truly unexpected negative news about banks.

Additionally, we study whether banks adjusted their lending standards besides downsizing credit lines due to the implementation of the stress test. In particular, banks might be reluctant to downsize credit lines due to reputational costs or contractual restrictions; hence, they could have adjusted other forms of lending to mitigate their exposure to undrawn credit lines. Furthermore, the additional liquidity demand created by the run on credit lines could lead banks to reduce term lending after the publication of the stress test results. Consequently, we explore whether banks' exposure to undrawn credit lines could have affected lending to firms that rely entirely on term loans (firms without credit lines). Particularly, we assess whether underperforming banks in the test with higher exposure to undrawn credit lines were more likely to decrease lending to this type of firm.

Table 9: Stress-Tested Banks' Lending to Firms without Credit Lines

	Dummy variable: 1 if lending was decreased more than								
	20%			40%			60%		
	1Q-11	2Q-11	3Q-11	1Q-11	2Q-11	3Q-11	1Q-11	2Q-11	3Q-11
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ST-Underperforming	-0.005	-0.015***	-0.015**	0.001	-0.005	-0.012**	0.001	-0.002	-0.005*
	(0.006)	(0.004)	(0.006)	(0.004)	(0.004)	(0.004)	(0.002)	(0.002)	(0.003)
× Undrawn Credit	0.077	0.306***	0.290**	-0.040	0.050	0.197**	-0.035	0.032	0.100*
Lines over Assets	(0.125)	(0.092)	(0.127)	(0.090)	(0.085)	(0.093)	(0.048)	(0.041)	(0.049)
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	248,923	255,300	260,850	248,923	255,300	260,850	248,923	255,300	260,850
R-squared	0.4676	0.4529	0.4532	0.4374	0.4252	0.4175	0.4053	0.3986	0.3981

This table reports a linear probability model regression of the probability that bank b reduces lending to firm f by an x% within a quarter as a function of the stress test performance variable, its interaction with bank's b undrawn credit line balances-to-assets, bank and credit line controls, and firm fixed effects. The sample contains only firms with no credit line at the beginning of quarter t. Columns 1-3, 4-5, and 7-9 consider drops in lending larger than 20, 40, and 60%, respectively. Columns 1,4, and 7 cover the first quarter of 2011, that is, prior to the announcement of the assumptions; columns 2, 5, and 8 cover the second quarter of 2011, that is, after the exercise's assumptions were known but before the results became public; whereas, columns 3, 6, and 9 consider the third quarter of 2011, after results were disclosed. The ST-Underperforming dummy takes value 1 if the bank's CT1R under the adverse scenario of the stress test is below 6%. Undrawn credit lines-to-assets is measured as bank's b undrawn credit line balances over its total assets as of December 2010. All control variables are defined in Table C.2. Standard errors are double clustered at the bank and firm levels and are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 9 shows the regression results of a dummy that takes value one if bank b reduced lending to firm f by an x% (20, 40, and 60%) within the quarter on *ST-Underperforming*, its interaction with bank's b undrawn credit line balances-to-assets, bank and relationship

controls, and firm fixed effects for the sample of firms with no credit lines.[44] The results show that underperforming banks with more significant undrawn balances were likelier to reduce lending by more than 20% to these firms after the disclosure of the methodology and the results; see columns 2 and 3, respectively. For instance, one standard deviation increase in undrawn credit line-to-assets would have increased the probability of an underperforming bank decreasing lending by more than 20% by 0.55 percentage points during the second quarter of 2011 and of similar effect during the third quarter. For decreases in lending larger than 40 and 60% to this type of firm, we only find a statistically significant effect after the disclosure of the results; see columns 6 and 9, respectively. These results indicate that the reduction in term lending is more evident after the disclosure of the results, likely due to the additional drawdowns triggered by the stress test, rather than before their release, which could be seen as an ex-ante measure to accommodate the expected increase in credit demand.

Our results suggest that, in addition to downsizing credit lines, banks mitigate their exposure to precautionary drawdowns by originating fewer credits. Furthermore, this evidence points to the possibility that downsizing credit lines may not be sufficient to reduce exposure to undrawn credit lines due to contractual and reputational costs (Thakor, 2005). Such an alternative is consistent with findings in Greenwald et al. (2021), in which credit line drawdowns during the COVID-19 crisis crowd out lending to firms without credit lines. Moreover, banks more exposed to credit line runs seem to reduce term lending ex-post, which we interpret as a side effect of the increase in funding demand suffered via credit lines.

6 Extensions

6.1 Heterogeneous Effects on Bank & Credit Line Characteristics

In this section, we investigate whether the effect of stress test results on firms' credit line usage is heterogeneous across bank and credit line/relationship characteristics.

First, we explore whether certain bank characteristics affect the size of precautionary drawdowns. In particular, whether drawdowns on underperforming banks differed. To this end, we estimate our specification in (2), but adding interactions between the *ST-Underperforming* dummy and bank characteristics, such as the logarithm of assets, liquidity ratio, ROA, Non-performing loan ratio, CT1R, and a Commercial Bank dummy. Table 10 reports these results. As it can be appreciated, the coefficient of bank size (measured by the logarithm of bank book assets as of December 2010) is negative and statistically significant, indicating that precautionary drawdowns were larger in lines granted by smaller underperforming banks in the test. This result is consistent with large banks having easier access to external finance to sustain an increase in firms' demand for liquidity, possibly abating

[44] For thresholds smaller than 20%, we do not find significant effects.

their clients' fear of tighter credit conditions. The interaction with CT1R is not significant when added on its own but is negative and statistically significant when added together with the other bank characteristics. This result shows that precautionary drawdowns were more significant in lines granted by ex-ante less solvent banks. Recall that the 2011 EBA stress test indicated what would a bank's CT1R have been if macroeconomic conditions had significantly deteriorated. Therefore, a bank that underperformed in the test might find it more difficult to access external funds if it additionally has a low CT1R to start with, making it harder to sustain an increase in the demand for drawdowns. These results, however, should be interpreted with caution, given that our sample only includes 12 banks that underperformed in the 2011 EBA stress test.

Table 10: Heterogeneous Effects on Bank Characteristics

	Change in drawn over granted funds (June/July)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ST-Underperforming	0.217**	0.016	0.018***	0.005	0.051*	0.014***	0.719***
	(0.097)	(0.025)	(0.006)	(0.024)	(0.030)	(0.004)	(0.225)
× Log(Assets)	-0.011**						-0.033***
	(0.005)						(0.010)
× Liquidity ratio		-0.042					0.601
		(0.219)					(0.356)
× ROA			-2.802				-6.524
			(2.312)				(4.180)
× Non-performing loan ratio				0.153			-0.393
				(0.536)			(0.368)
× CT1R					-0.561		-1.696***
					(0.425)		(0.537)
× Commercial Bank Dummy						-0.010	0.047
						(0.013)	(0.028)
Controls	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y
Observations	93,010	93,010	93,010	93,010	93,010	93,010	93,010
R-squared	0.5469	0.5468	0.5468	0.5468	0.5469	0.5468	0.5473

This table reports the difference-in-differences regression estimates for analyzing the effect of the 2011 stress test on credit line usage. The dependent variable is the change between June and July in the drawn funds by firm f from bank b over the granted funds in June to firm f by bank b. *ST-Underperforming* is a dummy variable that takes value one if a bank had a stressed CT1R below 6%. Regressions include interactions between *ST-Underperforming* and bank characteristics. The last column includes all interactions. All variables are defined in Table C.2. All regressions include bank and credit line controls and firm fixed effects. Standard errors are double clustered at the bank and firm levels and reported in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Next, we analyze whether drawdowns on lines extended by underperforming banks are

affected by specific contractual terms of the credit lines or relationship characteristics. To do so, we add to our main specification in (2) an interaction term of *ST-Underperforming* with each one of the considered bank-firm characteristics. Table 11 reports these results. First, precautionary drawdowns were more significant in highly used credit lines. In this regard, Jiménez et al. (2009) find that as a firm's financial condition worsens, its credit line usage increases. Thus, considering that firms with highly used lines might face, on average, a worsening of their financial conditions, this group may especially worry about losing access to their credit lines since banks can withhold funds due to an increase in their risk profile; hence the positive sign of the interaction of *ST-Underperforming* with *Initial Usage Rate*. Second, precautionary drawdowns were more sizable in credit lines with large granted amounts. This is because firms may precautionary use these lines granted by underperforming banks in anticipation of potential downsizing of these lines, as large credit lines can expose fragile banks to higher liquidity risk. Finally, precautionary drawdowns were concentrated in credit lines with larger maturity. Note that if a credit line is close to expiring, any drawdown must be paid back to the bank before maturity. Hence, any drawdown on a nearly expired line will be of little use since the firm must almost immediately return the funds to its bank. Thus, the negative sign of the interaction term between *ST-Underperforming* and *Short Term Maturity*.

6.2 Heterogeneous Effects Based on Financial Covenants

Financial covenants in credit line contracts permit banks to restrict the usage of credit lines. Acharya et al. (2020) find, for their sample of U.S. stock exchange listed firms, that the most common financial covenants are related to leverage restrictions, interest coverage limitations, and capitalization and collateral requirements. Hence, high-leverage firms may find it harder to draw down funds from their credit lines, whereas low-leverage firms can easily dispose of funds available at their lines, as they are more likely to comply with financial covenants.

To capture the effect of complying with financial covenants, we employ firm balance sheet data to construct leverage and interest coverage ratios. The leverage and interest coverage ratios are computed as the book debt over book assets and net interest payments over revenues, respectively. We do not have data on the covenants applied to each credit line, but we employ the value of these ratios as proxies for covenant compliance. In this way, we expect firms will find it more difficult to access their credit lines if they use a significant fraction of their revenues to pay their debt or are highly indebted. Next, we divide our sample of firms into quintiles for each of our measures. Regarding their response to the stress test results release, we expect firms at the top quintiles to be unable to react as banks might have restricted access to credit lines by not waiving a covenant violation. On the other extreme, firms at the bottom quintiles will tend not to react since they might be less worried about losing access to liquidity, as banks would not be contractually able to withhold funds from them. Contrary, firms in the middle of the distribution may be more likely to react to

Table 11: Heterogeneous Effects on Credit Line/Relationship Characteristics

	Change in drawn over granted funds (June/July)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ST-Underperforming	0.012***	0.029***	0.012***	0.017**	0.002	0.005	0.021**
	(0.004)	(0.008)	(0.003)	(0.007)	(0.005)	(0.005)	(0.010)
× Collateralized	-0.004						-0.013
	(0.014)						(0.013)
× Short term maturity		-0.020**					-0.019*
		(0.010)					(0.010)
× Past due			-0.016				-0.016
			(0.039)				(0.039)
× Share of credit line				-0.016			-0.017
				(0.015)			(0.014)
× Initial usage rate					0.019***		0.018**
					(0.007)		(0.006)
× $\mathbb{1}$(Granted $\geq$ P_{50})						0.013***	0.011**
						(0.004)	(0.004)
Controls	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y
Observations	93,010	93,010	93,010	93,010	93,010	93,010	93,010
R-squared	0.5468	0.5469	0.5468	0.5468	0.5469	0.5469	0.5472

This table reports the difference-in-differences regression estimates for analyzing the effect of the 2011 stress test on credit line usage. The dependent variable is the change between June and July in the drawn funds by firm f from bank b over the granted funds in June to firm f by bank b. *ST-Underperforming* is a dummy variable that takes value one if a bank had a stressed CT1R below 6%. Regressions include interactions between *ST-Underperforming* and credit line/relationship characteristics. The last column includes all interactions. All variables are defined in Table C.2. All regressions include bank and credit line controls and firm fixed effects. Standard errors are double clustered at the bank and firm levels and reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

the results if they fear failing to comply with a financial covenant soon and, consequently, losing access to their credit lines. Those are, however, only rough expectations, as we lack data on covenant compliance.

Table 12 presents the regression results for our specifications in Table 1, but interacting the stress test variable with whether a firm belongs to a given quintile of the coverage ratio distribution. We find that firms at the top quintiles of the distribution did not react to the disclosure of the results, presumably due to banks not waiving a covenant violation. Likewise, firms at the bottom of the distribution did not react, likely due to solid financial performance measures that secure credit line access. On the contrary, firms in the third quintile reacted to the information disclosure, in line with our hypothesis that firms in compliance with covenants but doubtful prospects are at risk of losing access to funding due

to a future covenant violation. Similar conclusions can be obtained for the measure based on the leverage ratio. Again, no effect is observed at the bottom or top quintile, whereas quintiles in the middle did react; see Table 12.

Table 12: Heterogeneous Effects Based on Covenants

	Interest Coverage Ratio	Leverage Ratio
	(1)	(2)
ST-Underperforming ×		
Quintile 1	0.005	0.010
	(0.005)	(0.006)
Quintile 2	0.010	0.017***
	(0.007)	(0.005)
Quintile 3	0.016**	0.007
	(0.007)	(0.005)
Quintile 4	0.010	0.010*
	(0.007)	(0.006)
Quintile 5	0.008	0.005
	(0.006)	(0.006)
Controls	Y	Y
Firm FE	Y	Y
Observations	64,873	64,873
R-squared	0.5479	0.5479

This table reports the difference-in-differences regression estimates for analyzing the effect of the 2011 stress test on credit line usage. The dependent variable is the change between June and July in the drawn funds by firm f from bank b over the granted funds in June to firm f by bank b. *ST-Underperforming* is a dummy variable that takes value one if a bank had a stressed CT1R below 6%. Regressions include interactions between *ST-Underperforming* and categories based on proxies of firms' compliance with financial covenants. In column 1, the sample is divided into quintiles based on the distribution of firms' interest coverage ratio, whereas in column 2, quintiles are based on the distribution of firms' leverage ratio. All regressions include bank and credit line controls and firm fixed effects. All variables are defined in Table C.2. Standard errors are double clustered at the bank and firm levels and reported in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

6.3 Analysis of Single-Bank Firms

As discussed, our identification strategy relies on firms with more than one bank credit line. However, this type of firm may behave differently from single-bank firms. A priori it is unclear whether multi-bank firms are more sensitive to information disclosures. On the one hand, multi-bank firms are, on average, less financially constrained, allowing them to

substitute lost funds more easily; hence, they may react less to information disclosures. On the other hand, they could potentially be better informed or more sophisticated, leading them to respond more strongly to the release of the stress test results. In this subsection, we explore whether multi- and single-bank firms behave differently.

Table 13: Expanding the sample to include single-bank firms

	June/July 2011, Change in Drawn to Granted					
	Multi-bank Firms		All Firms			
	(1)	(2)	(3)	(4)	(5)	(6)
ST-Underperforming	0.012***	0.014**	0.015**	0.019**	0.013*	0.017**
	(0.003)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)
x Single-Bank				-0.007		-0.007
				(0.006)		(0.005)
Credit line and bank controls	Y	Y	Y	Y	Y	Y
Firm FE	Y	N	N	N	N	N
Firm controls	N	Y	Y	Y	N	N
Industry x Province FE	N	Y	Y	Y	Y	Y
Observations	93,010	64,873	149,173	149,173	225,433	225,433
R-squared	0.5468	0.2042	0.1407	0.1416	0.1202	0.1210

This table contains a set of regressions for analyzing the effect of the 2011 stress test on credit line usage. The dependent variable is the change between June and July in the drawn funds by firm f from bank b over the granted funds in June to firm f by bank b. *ST-Underperforming* is a dummy variable that takes value one if a bank had a stressed CT1R below 6%. Column 1 repeats, for ease of comparison, column 1 of Table 1. Column 2 drops firm fixed effects, using firm observables and industry-province fixed effects instead. Columns 3 and 4 use the same controls as column 2 but increases the sample to include firms with credit lines with a single bank. Columns 5 and 6 further expand the sample by dropping firm observables as controls. Additionally, columns 4 and 6 include an interaction term between *ST-Underperforming* and a dummy variable (*Single-bank*) that takes value one if the firm only has one credit line. All regressions include bank and credit line controls and firm fixed effects. All variables are defined in Table C.2. Standard errors are double clustered at the bank and firm levels and reported in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

We extend our sample to include firms with one credit line from banks participating in the 2011 stress test. Table 13 presents the results for this expanded sample. As a reference, we include in column 1 the results of column 1 in Table 1. Next, in column 2 for the initial sample of multi-bank firms, we control for credit demand factors via firm observables and industry-province fixed effects rather than firm fixed effects.[45] As it can be appreciated, the coefficient of interest remains practically unchanged, indicating that this way of controlling

[45]Note that firm fixed effects cannot be used when we include firms with a single credit line since the fixed effect would completely capture the observation. For this reason, we drop firm fixed effects and add

for demand factors is similar to adding firm fixed effects. Next, we add single-bank firms to our sample in columns 3-6. Columns 3 and 4 include firm observables and industry-province fixed effects. In contrast, columns 5 and 6 only consider industry-province fixed effects, allowing us to increase the sample as not all firms have balance sheet information. Moreover, columns 4 and 6 add an interaction term between *ST-Underperforming* and a dummy variable (*Single-bank*) that takes value one if the firm only has one credit line. As seen from columns 3 and 5, the coefficient of our variable of interest does not exhibit a significant change once single-bank firms are included. Furthermore, as indicated by the non-significance of the interaction between *ST-Underperforming* and *Single-bank*, multi- and single-bank firms did not draw down differently when the stress test results were announced.

7 Conclusions and Policy Implications

Credit lines are fundamental instruments for firm financing and banks' business model. The flexible nature of these instruments, whereby firms can borrow funds at will (up to a predetermined amount), expose banks to potential credit line runs. This paper provides evidence that banks can be subjected to credit line runs when information questioning their solvency is released, such as the public disclosure of regulatory stress test results.

Using the Spanish Credit Registry and the release of the results of the 2011 EBA stress test, we uncover a novel cost of publicly disclosing stress test results in the form of credit line runs. In particular, we show that firms drew down 9.5 pp more of undrawn funds (or 1.2 pp more of granted, undrawn plus drawn) from lines granted by underperforming banks in the test following the release of the results. Moreover, we show that these extraordinary drawdowns reverted in September, confirming that they were precautionary (i.e., driven by concerns about banks' prospects rather than genuine immediate liquidity needs). We also show that precautionary drawdowns were concentrated in credit lines of firms at risk of violating a financial covenant and on smaller and less solvent banks. These findings are consistent with precautionary drawdowns being driven by firms' fear that weaker banks, as indicated by the stress test results, may tighten their lending standards.

On the supply-side, we find that banks took mitigating actions against possible credit line runs. First, banks adjusted their exposure to credit lines before the disclosure date of the results, as banks took advantage of their private information before sharing it with market participants. Second, banks underperforming in the test with larger undrawn credit line balances reduced term lending to firms with no credit lines, affecting credit allocation. Thus, our results suggest that banks cannot fully mitigate exposure to undrawn credit lines by only using financial covenants to restricting access to them.

firm controls in the primary sample (firms with multiple credit lines) to examine whether this specification makes a material difference. We quantify industry at the three-digit CNAE level. Together with the 50 provinces of Spain, this leads to 8,949 groups, providing a relatively tight set of controls.

Our results add to the literature studying the financial effects of the public release of stress test results. The evidence in this paper indicates that there are costs associated with that publication in the form of possible credit line runs for weaker banks. However, the stress test results publication also provides valuable information to all market participants, reducing uncertainty and improving market functioning, which might prevent more general bank runs. Furthermore, stress tests disclosures can act as a disciplining device that provides ex-ante incentives for prudent risk management by banks. By contributing to a better understanding of the cost-benefit trade-offs associated with this policy tool, this article can help to improve the planning and execution of stress tests. In particular, supervisors should communicate results for weaker banks carefully and consider the announcement of complementary measures that address their weaknesses at the time of publication.

These findings also bear important implications for the calibration of liquidity and capital requirements of credit lines, particularly from a macroprudential perspective. For instance, our results show that precautionary drawdowns were more sizable for stress-test underperforming banks with lower initial capital ratios. Therefore, the unused part of credit lines might need to be subject to higher capital requirements, as credit line runs can occur when a bank is perceived to be under solvency stress. Currently, the unused part of a credit line is subjected to a 10% capital requirement in the standardized approach for credit risk. Our results indicate that if information about a bank under capital stress becomes public, the bank could expect to see an additional 9.5 pp of its unused credit lines drawn. This would come on top of increases in usage due to other reasons, which suggests that the current 10% requirement could be low.

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A The 2011 EBA Stress Test

A.1 Key dates

The following table summarizes the main dates in the implementation of the 2011 stress test.

Table A.1: Key Dates of the 2011 EBA EU-Wide Stress Test

Date	Events
Jan. 13, 2011	The stress test exercise was announced by the EBA.
Mar. 2, 2011	An overview and timeline of the exercise were provided.
Mar. 18, 2011	Stress test scenarios (baseline and adverse) and methodology were published.
Apr. 8, 2011	The sample of participating banks was announced. A Core Tier 1 capital ratio (CT1R) of 5% was chosen as benchmark.
Jul. 15, 2011	Results became public at the end of the day. EBA recommended that banks with CT1R between 5%-6% should also strengthen their capital position.
May 2, 2012	A report on the fulfilment of the EBA's recommendation was published.

A.2 Assumptions

The exercise was carried out using financial data as of December 2010. In its implementation, a static balance sheet was assumed. That is, balance sheets as of the end of 2010 were frozen, which discouraged banks from claiming that risk would be mitigated by selling off risky assets or changing their business model. As in most stress testing practices, both baseline and adverse scenarios covered two years (2011 and 2012). Due to the uncertainty about a macroeconomic recovery of the EU, the adverse scenario incorporated a further aggravation of the EU sovereign debt crisis as of early 2011. Such a scenario affected each member country differently. For instance, under the adverse scenario, GDP in the EU would shrink by 0.4% in the period of analysis (2011 and 2012), whereas the Spanish GDP would decrease by 2.2%. Moreover, concerns were also focused on banks' exposure to sovereign risk. Consequently, in the adverse scenario, sovereign exposures in the trading book were subject to valuations haircuts, which depend on the maturity and issuing country.

Table A.2: Results for Spanish banks in the 2011 EBA EU-wide stress test

	Core Tier 1 capital ratio	
		Adverse Scenario
Bank	2010	2012
Santander	7.1	8.4
BBVA	8.0	9.2
Bankia	6.9	5.4
Caixa	6.8	6.4
Popular	7.1	5.3
Sabadell	6.2	5.7
Catalunyacaixa	6.4	4.8
NCG	5.2	5.3
Civica	8.0	5.6
CAM	3.8	3.0
BMN	8.3	6.1
Bankinter	6.2	5.3
Espiga	8.2	7.3

	Core Tier 1 capital ratio	
		Adverse Scenario
Bank	2010	2012
Ibercaja	9.7	6.7
Unicaja	12.5	9.4
Effibank	8.3	6.8
Pastor	7.6	3.3
BBK	10.2	8.8
Unnim	6.3	4.5
Kutxa	13.2	10.1
Caja3	8.6	4.0
March	22.2	23.5
Vital	12.5	8.7
Ontinyent	8.9	5.6
Pollensa	11.2	6.2

This table contains the CT1R as of December 2010 and the CT1R under the adverse scenario of the 2011 EBA EU-wide stress test for each of the 25 Spanish banks that were part of the exercise.

A.3 Scope

The largest banks of each country, covering at least 50% of the national banking sectors in each EU member state (measured as total consolidated assets as of the end of 2010), were required to participate. However, national supervisors could add other banks to the sample. In total, 90 banks from 21 countries were part of the stress test exercise, representing more than 65% of the total assets in the EU banking system. Contrary to other countries, Spain included almost all commercial and all saving banks in the exercise (25 banks in total), representing nearly 93% of the Spanish banking sector by assets. According to the EBA's requirement, only the four largest Spanish banks, representing more than half of the Spanish banking assets, were required to participate.

A.4 Results

Table A.2 reports the CT1R under the adverse scenario of the participating Spanish banks in the 2011 EU-wide stress test.

B EU-wide Stress Tests and Bank Stock Performance

We follow the methodology in Petrella and Resti (2013). Price information is obtained from Bloomberg for 44 (46) European banks with stock price information that participated in the 2010 (2011) EU-wide stress test, 8 of them were Spanish.

Let t^* be the event date, that is, the next trading day after the stress results became public: Monday July 18th and 23th for the 2010 and 2011 stress test exercise, respectively.[46] First, we estimate a one-factor model (CAPM) using the 200-trading day window ranging from $t^* - 210$ to $t^* - 11$. Specifically, we estimate the following model

$$R_{j,t} = \alpha_j + \beta_j R^M_{c(j),t} + \varepsilon_{j,t}, \tag{5}$$

where $R_{j,t}$ is the logarithmic return of security j at time t, α_j is the average CAPM pricing error for security j, and $R^M_{c(j),t}$ is the return of a country-specific stock market index. For instance, in the case of Spanish banks, we use the IBEX-35.

Next, we compute abnormal returns ($AR_{j,t}$) as the difference between the actual stock return and the expected stock return generated by the model estimated in equation (5). Cumulative abnormal returns (CAR_j) are computed as the sum of $AR_{j,t}$ over an interval.

Finally, we compute the Weighted Least Square (WLS) regression of CAR for a given window on a stress test performance variable using as weights the inverse of the root-mean-squared error from the one-factor model estimated in (5).

Table B.1 shows the effect, before and after the results were public, on CAR of having a CT1R below 6% under the adverse scenario of the 2011 stress test. As it can be seen, only after the announcement of the results, banks with a worse performance (CT1R $< 6\%$) were penalized with 2.4 pp lower CARs compared to banks that performed better (CT1R $\geq 6\%$). Overall, market returns indicate that the 2011 EBA EU-wide stress test provided valuable information to *sophisticated* investors (stock market participants) who could not anticipate such results.

Conversely, performance in the 2010 stress test, measured as the distance to the regulatory benchmark, did not have an effect on CAR (see Table B.2). Because no bank with price information failed the 2010 exercise, we repeat the analysis considering this time the distance

[46] Note that the stress results were released on Friday after markets had closed.

Table B.1: Effect of the 2011 EBA EU-wide Stress Test on Bank Stock Prices

	Cumulative Abnormal Returns (CAR)	
	Before Release Date	After Release Date
	(1)	(2)
ST-Underperforming	0.007	-0.024***
$\mathbb{1}$(CT1R $< 6\%$)	(0.008)	(0.009)
No of Banks	46	46
R^2	0.019	0.146

This table shows the Weighted Least Square (WLS) regressions of Cumulative Abnormal Returns (CAR) on the ST-Underperforming dummy. The sample contains 46 European banks with stock price information that participated in the 2011 EBA EU-wide stress test, 8 of them are Spanish. The ST-Underperforming dummy takes value 1 if the bank's CT1R under the adverse scenario is below 6% and 0 otherwise. In the first column, CARs are computed over the window Jul. 14 − Jul. 15, 2011, before the results were announced. In the second column, CARs are computed over the window Jul. 18 − Jul. 20, 2011, after the results were public (note that the stress tests results were released on Friday July 15, after markets closed). The weights are calculated as the inverse of the root MSE from the one-factor model estimation stage.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

to the regulatory benchmark. Again, results support that 2011 stress test contained relevant information, pointed by the significance of the coefficient in column (4) of Table B.2, whereas the 2010 exercise was relatively uninformative about banks' soundness, no significant coefficient after the release of the results (see column 2 in Table B.2). Moreover, it is interesting to highlight the increase in the R-squared for column (4), indicating the predictive power of the stress test performance measure for the CARs following the release of the 2011 stress test results.

Table B.2: Effect of the 2010 EBA EU-wide Stress Test on Bank Stock Prices

	Cumulative Abnormal Returns (CAR)			
	2010 exercise		2011 exercise	
	Before Release Date	After Release Date	Before Release Date	After Release Date
	(1)	(2)	(3)	(4)
Distance to regulatory ratio	0.06	0.08	-0.08	0.51***
	(0.11)	(0.23)	(0.12)	(0.11)
No of Banks	44	44	46	46
R^2	0.01	0.00	0.01	0.31

This table shows the Weighted Least Square (WLS) regressions of Cumulative Abnormal Returns (CAR) on distance to regulatory ratio for the 2010 and 2011 stress tests, measured as the capital ratio in the adverse scenario minus the benchmark set by the supervisory authority. The sample contains 44 (46) European banks with stock price information that participated in the 2010 (2011) EU-wide stress test, 8 of them were Spanish. In the first and third column, CARs are computed over the window Jul. 22 − Jul. 23, 2010 and Jul. 14 − Jul. 15, 2011, respectively (before the release of the results). In the second and fourth column, CARs are computed over the window Jul. 26 − Jul. 28, 2010 and Jul. 18 − Jul. 20, 2011, respectively (after the release of the results). The weights are calculated as the inverse of the root MSE from the one-factor model estimation stage.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

C Additional Tables

Table C.1: Descriptive Statistics

	Mean	Median	St. dev.	Obs.
Credit Line Variables				
Change in Drawn-to-Granted June/July (pp)	2.50	0.00	25.53	93,010
Change in Drawn-to-Granted May/June (pp)	0.64	0.00	24.38	93,403
Dummy if past-due loan w/ bank b	0.02	0.00	0.13	93,010
Collateralized	0.03	0.00	0.18	93,010
Maturity ≤ 1 y	0.86	1.00	0.35	93,010
Share of firm's f line granted by bank b	0.37	0.35	0.22	93,010
Initial usage rate	0.48	0.52	0.38	93,010
Bank Variables				
ST-Underperforming dummy	0.29	0.00	0.46	25
Log(Assets)	19.65	20.11	1.26	25
ROA (%)	0.55	0.76	0.44	25
Liquidity ratio (%)	14.49	17.47	4.61	25
Non-performing loan ratio (%)	3.40	2.84	1.47	25
CT1R (%)	7.35	7.07	1.49	25
Commercial dummy	0.62	1.00	0.49	25
Undrawn credit line balances over Assets	0.04	0.03	0.02	25

Firm Variables

	Stressed CT1R					
	< 6		≥ 6			
	Mean	SD	Mean	SD	Diff.	SD
Assets (thousand €)	23,463	310,914	26,194	331,385	-2,731	3,185
Liquidity ratio (%)	5.84	9.09	5.73	8.92	0.11	0.09
Capital ratio (%)	31.91	25.10	32.40	24.80	-0.49**	0.25
ROA (%)	0.95	9.52	1.02	9.21	-0.07	0.09
Dummy if past due loan	0.086	0.281	0.086	0.281	0.000	0.003
No. Obs.	20,192		20,495		40,687	

Table C.2: Definitions of All Variables Used in the Estimations

Bank-Firm Variables	Description	Source
Drawn over granted funds	Monthly change in drawn funds over initial granted funds of firm f with bank b	Credit Register
Drawn over available funds	Monthly change in drawn funds over initial available (undrawn) funds of firm f with bank b	Credit Register
Past-due	Dummy variable equal to 1 if firm f has past due loans with bank b	Credit Register
Collateralized	The fraction of the granted amount of the credit line that is collateralized	Credit Register
Short Maturity	The fraction of the granted amount of the credit line that expires within a year	Credit Register
Share of credit line	Share of the line with bank b out of the granted amount to firm f via credit lines.	Credit Register
Initial usage rate	Drawn-to-granted ratio of credit line granted by bank b to firm f	Credit Register
Granted	Total committed funds (drawn plus undrawn) extended by bank b to firm f	Credit Register
Firm Variables		
Assets	Total assets of firm f	Mercantile Register
ROA	Ratio of profits over total assets of firm f	Mercantile Register
Liquidity ratio	Ratio of cash over total assets of firm f	Mercantile Register
Capital ratio	Ratio of own funds over total assets of firm f	Mercantile Register
Interest coverage ratio	Net interest payments over revenues of firm f	Mercantile Register
Past-due in the system	Dummy variable equal to 1 if firm f had past due loans with any bank	Credit Register
Bank Variables		
ST-Underperforming	1 if bank b had a CT1R $< 6\%$ in the 2011 stress test adverse scenario; 0 otherwise.	EBA
CT1R	Core Tier 1 capital (equity and retained profits) to risk weighted assets of bank b.	EBA
Log(Assets)	The log of the total assets of bank b.	Supervisory Reports
ROA	The total net income over assets of bank b.	Supervisory Reports
Liquidity ratio	The ratio of liquid assets (cash and balance with central banks, and loans and advances to governments and credit institutions) held by bank b over its total assets.	Supervisory Reports
Non-performing loan ratio	Doubtful loan ratio of bank b.	Supervisory Reports
Commercial Bank Dummy	1 if bank b is a commercial bank; 0 otherwise.	Supervisory Reports
Undrawn Lines-to-Assets	Bank's b undrawn credit line balances over its total assets.	Credit Register