Bank Asset Transparency and Credit Supply[*]

Karthik Balakrishnan,
London Business School
kbalakrishnan@london.edu

Aytekin Ertan,
London Business School
aertan@london.edu

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Abstract

We employ the European Central Bank's Loan-level Reporting Initiative as a shock to banks' asset disclosures. We find that after the disclosure regulation, treatment banks raise more capital at cheaper rates and increase lending. Using novel survey data on small businesses, we also document that, in regimes with heightened bank disclosures, borrowers receive greater funding, conditional on their demand for credit. Furthermore, companies whose relationship banks provide asset disclosures start to borrow and invest more relative to firms from the same country and industry. Collectively, our inferences suggest that asset disclosures alleviate the capital market frictions that banks face and allow them to supply more credit to the real economy.

JEL Classifications: G21, G28, G32, M41, M48
Keywords: asset disclosures, credit supply, bank regulation, real effects, SMEs

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1. Introduction

Do bank disclosures enhance the supply of credit to the real economy? This question is critical for understanding the efficacy of regulating banks' disclosures as a tool for promoting economic growth and financial stability (e.g., Acharya and Ryan 2016; Leuz and Wysocki 2016). Policymakers increased bank disclosure requirements after the recent financial crisis, with the hope that transparency and accountability would improve the functioning of the banking system.[1] The goal of these initiatives was a fast and sound recovery of financial intermediation and flow of credit to the real economy, especially to bank-dependent borrowers with positive net present value projects. However, there is little empirical evidence on whether and how bank transparency affects credit supply.

In theory, the impact of increased bank asset transparency on lending is ambiguous. An extensive literature finds that credible disclosure policies reduce the cost of capital and improve corporate financing conditions.[2] Specifically for banking, the dependence on external funding, along with the role of information asymmetry between the bank and its capital providers, is critical (Froot and Stein 1998; DeYoung et al. 2015). According to this view, when a bank cannot free up internal capital, it constrains credit supply. Alternatively, the increase in competition between banks, due to increased information on loans, may cause banks to reduce

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[1] The long title of the Dodd–Frank Wall Street Reform and Consumer Protection Act reads: "An Act to promote the financial stability of the United States by improving accountability and *transparency* in the financial system, to end 'too big to fail', to protect the American taxpayer by ending bailouts, to protect consumers from abusive financial services practices, and for other purposes" (emphasis added). Similarly, Pillar 3 of the Basel framework (2015) expanded disclosure requirements to enhance market discipline.

[2] See, for example, Diamond and Verrecchia (1991); Francis, Khurana, and Pereira (2005); Hail and Leuz (2006); Lambert, Leuz, and Verrecchia (2007); Daske, Hail, Leuz, and Verdi (2008).

lending.[3] Recent theoretical work takes a liability-centric view and points out that increasing information about bank assets can impede risk-sharing on the liability or funding side of the balance sheet. This reduced risk-sharing decreases the ability of banks to issue safe, money-like securities and results in a decline in lending (Dang et al. 2017).

Although important, providing empirical evidence on this issue is challenging, because it requires a meaningful increase in banks' asset transparency that is not confounded by changes in business conditions. One approach would be to use a setting of mandated asset disclosures, the initiation of which is free from or unrelated to other regulatory and supervisory interventions.[4] To do so, we employ the European Central Bank (ECB) Loan-level Disclosure (LLD) Initiative as a positive external shock to banks' asset transparency.

As the monetary authority of the Eurozone, the ECB provides credit to member banks and accepts bank assets as collateral, including asset-backed securities that banks retain on their balance sheets. Since January 2013, the ECB required banks that pledge their asset-backed securities as collateral for repo borrowing to report loan-level details of these instruments. These disclosures include information on the performance and structure of millions of individual loans and have been required to be released on a quarterly basis in a standardized format, dramatically increasing external capital providers' understanding of banks' assets and lending practices.[5]

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[3] Consistent with this idea, Petersen and Rajan (1995) argue that banks with market power are in a better position to conduct intertemporal cross-subsidization in lending relationships and are thus more likely to lend to young and risky firms.

[4] This issue has become particularly complicated in recent years, as most disclosure requirements have been bundled with additional rules, especially in the financial sector. To overcome this issue, prior work examines older settings, like the National Banking Era (Granja, 2018).

[5] The enforcement of these rules was stringent and conducted by national central banks. Further, banks that fail to comply with these new disclosure requirements would be excluded from the ECB repo

In addition to its impact on asset disclosures, the LLD Initiative has two key features that allay concerns about concurrent confounding events. First, the regulatory shock applied to banks that had already been in the ECB financing program, meaning that, while the amount of bank disclosures increased for treatment banks, the ECB financing itself remained constant.[6] Second, the regulation was not accompanied by any other significant banking law or a change in supervisory stringency that affected disclosing and nondisclosing banks differently (Ertan, Loumioti, and Wittenberg-Moerman 2017).

We compare the lending and financing of European banks that started providing asset-level disclosures per the LLD Initiative with that of nondisclosing banks. Consistent with the theories that argue that increases in asset transparency reduce financing frictions, we find that treatment banks (i.e., those that provide loan-level disclosures) issue more debt and equity, relative to otherwise similar banks that did not increase disclosure. We also find that treatment banks increase their borrowings in the interbank market and experience a decline in their debt costs. Regarding lending, we document a 3% relative increase in these banks' loan growth following the implementation of the disclosure regulation. Moreover, a comparison of the results from one-year, two-year and three-year windows around the passage of the law suggests that the effect of asset transparency on lending is observed following its effect of financing. Further bolstering the conclusion that asset transparency reduces financing frictions and improves lending, we document that loan growth is more pronounced for treatment banks that

operations. Data collection and administration are handled by the European DataWarehouse, which offers access to institutional investors, credit rating agencies, banks, and regulators.

[6] Even though most, if not all, banks in the Eurozone benefit from the ECB financing in some way, banks self-select into pledging asset-backed securities as collateral. We note, however, that the pre-regulation trends in the lending of this group of banks and that of others appear to remain comparable. Furthermore, aggregate securitization and repo figures in the Eurozone suggest that banks did not opt out of the financing program to avoid providing asset disclosures. These observations mitigate lingering concerns about selection.

raise capital as well as those with a greater involvement in securitization. We also find stronger

results for regimes in which banks have illiquid asset bases, in keeping with asset disclosures

alleviating banks' financing frictions.

The bank-level analyses have two shortcomings. First, credit supply is jointly

determined with credit demand (e.g., Acharya and Ryan 2016). That is, an increase in the

observed amount of lending on a bank's balance sheet might be driven by an increase in

demand from borrowers. Therefore, realized lending figures from bank balance sheets are not

sufficient to draw conclusions on banks' ability and willingness to lend (e.g., Jimenez et al. 2012).

Second, it remains unclear which type of borrowers benefit from this increased funding.

Regulators underscore the importance of unlocking credit to the real sector, in particular, to

small- and medium-sized enterprises (SMEs).[7] This is because, unlike large corporate

borrowers, which can also access public debt and equity markets, SMEs depend on banks. Since

bank balance sheets do not contain granular enough data to illuminate this issue, we analyze

ECB surveys on SMEs' access to finance. Conducted to identify the ease with which small

businesses obtain bank credit, these surveys provide information on firms' loan applications,

allowing us to distinguish loan supply from demand to a considerable extent.

We perform a series of difference-in-differences tests to understand the effects of the

LLD Initiative on firms' access to credit. The ECB survey does not include links between

borrowers and lenders. For this reason, in these tests, treatment is a continuous variable defined

at the country level. For each country, we measure the extent of treatment as the ratio of the

total balance of loans disclosed to the total loans outstanding in that country's banking system.

We find that SMEs in countries where banks started providing loan-level disclosures experience

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[7] Unless stated otherwise, we use "SME," "firm," "borrower," and "company" interchangeably.

an increase in credit access, relative to borrowers in other countries and themselves pre-treatment.[8] Economically, a 1% increase in the balance of disclosed loan portfolios increases SME funding, conditional on application, by a relative magnitude of 2.4%.

To triangulate our results from the bank-level analyses and the country-level survey data analyses, we perform a within-country test, in which we use Amadeus data on bank–borrower links. On a sample that includes companies from countries that were subject to the ECB regulation, we classify borrowing firms as treatment (those with a relationship bank that provides loan-level reports) or control (those with a relationship bank that does not provide loan-level reports). By doing so, we compare two firms from the same country and industry in the same year and thus remove, to a greater extent, confounding effects of local shocks, such as concurrent national banking regulations or other local economic trends. We find that firms that do business with "transparent banks" receive relatively more debt following the LLD requirements (but not before) and subsequently invest more.

Our paper extends the literature on the real effects of financial reporting (Leuz and Wysocki 2016). On credit markets, researchers have examined the role of borrowers' financial information in credit contracting (e.g., Armstrong, Guay, and Weber 2010; Christensen, Nikolaev, and Wittenberg-Moerman 2016). The focus on the effects of lenders' transparency, however, is relatively new (e.g., Balakrishnan and Ertan 2018; Chen et al. 2018; Dou, Ryan, and Xie 2018; Granja 2018). To our knowledge, the only study that directly examines the effect of banks' accounting practices on their overall lending is by Beatty and Liao (2011), who document the role of timely loan loss provisioning in bank lending when macroeconomic

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[8] We confirm that the outcome variable has similar trends for control and treatment groups pre-treatment. Further, our results are obtained after accounting for industry-country and industry-year fixed effects as well as controls for banking, macroeconomy, and SME characteristics.

conditions are tough. Our paper extends prior work along three dimensions. First, Beatty and Liao (2011) focus on the timely recognition of loan losses, which is a proxy for reporting and provisioning quality. In contrast, we focus on a specific form of disclosure regulation related to the disclosure of banks' assets, which is a construct that informs the theory directly (Sapra and Kanodia, 2016; Dang et al., 2017). Second, our study disentangles credit supply from credit demand to a significant extent and illuminates the role of bank disclosures on credit supply. In doing so, we respond to the calls for an improvement in experimental designs to test banking theories (Beatty and Liao 2014; Bushman 2014; Acharya and Ryan 2016). Third, our finding that banks' illiquid asset base mediates the relation between disclosure and credit rationing speaks to the underlying friction channel.[9]

Another related study is by Ertan, Loumioti, and Wittenberg-Moerman (2017), who use the LLD regulation setting and find that mandated disclosures improve the *quality* of lending. A natural question that arises in this context is whether banks enhance quality by reducing lending. Holding all else constant, superior bank monitoring and screening could imply less credit to the economy, which makes the investigation of credit supply a relevant and open empirical question. Our evidence suggests that the benefits of mandatory loan-level disclosures are far reaching—banks respond to reduced external financing costs and, in turn, increase the *quantity* of lending as well. In this respect, from a policy evaluation standpoint, we provide timely insights into the efficacy of loan-level disclosures, which were recently implemented in the U.S. (Regulation AB II) and are to be extended to all securitized loans in Europe

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[9] Beatty and Liao's (2011) focus on recessionary periods can be interpreted as identifying a time-series variation in the friction that our study sheds light on.

(Regulation (EU) 2017/2402).[10]

Finally, the insights we provide also speak to the literature on access to finance for small businesses (e.g., Berger and Udell 1995, 2002, 2006; Berger, Klapper, and Udell 2001). Researchers have examined the interest-rate effects of accrual accounting, audited or accruals-based financial statements, and ratings for small, private businesses (Allee and Yohn 2009; Minnis 2011; Cassar, Ittner, and Cavalluzzo 2015). In contrast, we focus on the role of bank disclosures in improving the supply of credit to SMEs. In this sense, our conclusions speak to the broader literature that explores the effects of regulatory shocks to credit supply, such as bank entries (Giannetti and Ongena 2012), targeted lending programs (Banerjee and Duflo 2014), unconventional monetary policy interventions (Ertan, Kleymenova, and Tuijn 2019). We extend this line of work by highlighting the influence of mandated bank disclosures.

Three caveats are in order. First, our study is susceptible to two forms of generalizability concerns. Although the mandatory nature of the disclosure regulation for the firms in the collateral-backed financing program alleviates concerns of self-selection of disclosers, our study is not immune to banks' decision to join the ECB's refinancing operations or pledge asset-backed securities as collateral. Specifically, it is not clear what the impact would be of such disclosures on banks that were not a part of the program. Moreover, given that our study focuses on the specific setting of the LLD Initiative, our results are not generalizable to other forms of asset transparency regulations. However, the inferences we provide can speak to similar regulations that involve asset-level disclosures, such as Regulation AB II in the United States.

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[10] Dou, Ryan, and Xie (2018) examine the real effects of FAS 166 and FAS 167 on banks' loan- level mortgage approval and sale decisions. As do we, Dou, Ryan, and Xie (2018) focus on the effect of increased disclosures of securitized assets. However, in contrast to our study, which examines the impact of increased loan-level disclosures, Dou, Ryan, and Xie (2018) examine the impact of consolidation of securitization entities on mortgage approval and sale decisions.

Second, our study explores on only one outcome variable, that is, credit supply. There could be other costs and benefits associated with regulation. For example, we do not evaluate the impact of the regulation on the stability of the financial system. Similarly, enhancing bank transparency could increase the sensitivity of depositor flows to performance, creating challenges on the funding side of the balance sheet (Chen et al. 2018). Accordingly, our conclusions on the LLD Initiative should not be interpreted as more mandated disclosure regulations are desirable for bank shareholders, depositors, or the overall economy.

Third, this study does not directly examine why banks were not willing to provide asset-level disclosures voluntarily prior to the regulation. Our discussions with the parties involved suggest several explanations. For example, the sheer amount of data infrastructure, standardization, collection, and verification is unattainable (at least as credibly) by a single bank's voluntary choices. Our conversations with regulators also reveal that banks were not willing to disclose their loan portfolios unilaterally, due mainly to competitive concerns.[11] Further, we note that some banks may find it optimal to remain opaque to reduce the sensitivity of depositor flows to bank performance (Chen et al. 2018). Finally, even in the absence of these factors, agency problems and various other frictions may have prevented the disclosure equilibrium pre-regulation.

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[11] For example, the French Banking Federation Response to the ECB's discussion paper on the loan-level disclosure issue states that "bank sponsors are bound by most originators and sellers of the securitized assets purchased by its conduits not to disclose confidential information about the originators' assets or customers or even the originators' name or the fact that they entered into the transaction. Such information would be commercially sensitive for these originators and the application of public disclosure requirements would likely result in the removal of this efficient source of funding for many of these originators." Similarly, EuroABS says in its discussion of this issue with the European Commission: "Our understanding is that the primary concern of asset originators is that, as a regulatory requirement of securitisation, they may be forced to disclose loan level information that would allow, perhaps in combination with other available datasets, identification of individual borrowers." Thus a first-order concern is that external parties could link the disclosed data to individuals and then sell this information to competitors, permitting them not only to reverse-engineer scoring models and marketing strategies but also to directly target a bank's best customers with great specificity and to loans that have a short remaining term. A competitor could then reach out to these individuals.

2. Background and hypotheses

2.1 The ECB Loan-level Reporting Initiative

To increase aggregate demand and raise depressed asset prices after the global financial crisis, central banks flooded the markets with cheap money. The ECB's expansionary monetary policies included various forms of repo financing to banks, which need to pledge their assets (e.g., loans, bonds, asset-backed securities) to the ECB as collateral. Following growing concerns with the opacity of the banking system post-financial crisis, the ECB required, effective from the first quarter of 2013, the reporting of loan-level information on securitized credit portfolios that are pledged as collateral in its credit operations. Banks that were subject to the regulation were required to upload loan-level information on mortgage-backed securities (commercial and residential) and small-business-loan-backed securities to a central repository, the European DataWarehouse. This platform made loan-level data and aggregated information available to the investment community.

The loan-level files include more than 100 static and dynamic fields on borrower profiles, loan characteristics and performance, interest rate, collateral, and internal bank ratings, many of which are essential inputs for understanding a bank's asset quality. Investors had little information about banks' loan portfolios prior to the regulation and received an exhaustive list of loan-level data in a standardized and machine-readable format afterward. Furthermore, these disclosures were not one-off requirements. Banks have been required to submit loan-level reports on a quarterly basis. The accuracy of the submitted information has been checked by the European DataWarehouse as well as national regulators. As of September 2018, the European DataWarehouse covers loan-level data on 1,219 asset-backed deals. These deals include 64.15

million distinct loans made to more than 54.85 million distinct borrowers.

The ultimate objective of these extensive disclosure requirements is to unlock credit to the real economy by reducing financing frictions caused by information asymmetry in the European banking sector. The ECB states that the LLD Initiative "increases transparency and makes available more timely information on the underlying loans and their performance to market participants in a standard format."[12] Further, the ECB's enforcement of this regulation increased the accuracy and credibility of the information. This action signaled to the market that the regulators were keen on improving transparency and the health of the banks. We expect that increased disclosures enhance the flow of external financing to banks. Moreover, we anticipate increases in funding to lead to an increase in the supply of credit to the real economy.

The LLD Initiative setting offers an empirical advantage, in that the regulation did not apply to all banks in a country. Banks were required to reveal their securitized loan portfolios only if the portfolios were pledged to the ECB as collateral. This characteristic helps us define the effects of the regulation heterogeneously for different banks and countries and thus rule out the influence of confounding factors that coincide with the regulation. By doing so, we address some of the inherent challenges faced by studies that examine the homogenous effects of a single regulation.

Another essential feature of the LLD regulation is that it offers a setting in which bank disclosures are not confounded by changes in bank supervision. Sample banks were in the ECB's repo financing operations before and after the LLD Initiative, and the ECB's regulatory stringency remained similar for treatment and control banks around the disclosure regulation. Similar to Granja's (2018) examination of the National Banking Era as a setting of disclosure

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[12] Source: https://www.ecb.europa.eu/paym/coll/loanlevel/html/index.en.html.

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regulation without concurrent bank supervision, these features allow us to distinguish the effects of mandated disclosure regulation from those of supervision and from those of banks' access to central bank financing.

2.2 Theoretical considerations and empirical predictions

In the asset-centric view of banks, banks are delegated monitors (Diamond 1984; Gorton and Winton 2003). They invest in assets, which, because of their information-intensive nature, cannot be traded in capital markets without frictions arising from asymmetric information. The information asymmetry between the bank and capital providers creates unavoidable conflicts as well as other transaction costs in accessing public markets, resulting in an increase in the cost of external funds (e.g., Myers and Majluf 1984; Holmstrom and Tirole 1997; DeMarzo and Duffie 1999).

When external financing is costly, the influence of risk aversion on banks' lending decisions rises (Froot, Scharfstein, and Stein 1993; Stein 1998; Froot and Stein 1998). Under these circumstances, banks base their decisions not only on the expected returns from the lending opportunity in question but also on the new loan's impact on the risk of their business and on their stock of available capital for future lending. Thus, a capital-constrained bank (i.e., one facing imperfect capital markets) might reject an otherwise potentially profitable lending opportunity. This problem translates to a reduction in the credit access of bank-dependent firms. An increase in the transparency of banks' assets helps capital providers better evaluate bank assets, thereby increasing the flow of equity as well as debt capital to good quality banks. Similarly, the increase in disclosures helps capital providers discern excessive risk-taking and demand higher yields on their investments (Bushman 2016). This increased monitoring ability

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disciplines bank managers and results in a lower cost of funds and higher external funding to banks. Using these additional funds, banks could increase lending to the real economy.

Increasing disclosure, however, is not without costs, and these may outweigh the benefits. Banks face a variety of market imperfections and shocks that cannot be perfectly insured against. In the presence of such imperfections, disclosure could hurt more than it helps. As pointed out by Goldstein and Sapra (2014), removing one friction might distort the overall outcome when multiple frictions are present. Consistent with this view, Dang et al. (2017) describe, specifically for banks, how and why transparency could harm banks' lending abilities. The output of banks is typically short-term money-like securities used for transactions and storing value (Gorton and Pennacchi 1990). Thus, bank money should not be sensitive to information, be it public or private. However, the assets that back these securities (i.e., loans) can be risky and necessitate banks to generate information for monitoring. The ability of banks to produce money-like securities—despite using information-sensitive assets to back them—arises from keeping the information that they produce about backing assets as a secret. This opacity enables risk-sharing (Hirshleifer 1971). Accordingly, increasing bank transparency could reduce the bank's ability to produce private money, resulting in a reduction in lending.[13] Consistent with this view, Chen et al. (2018) find that depositor flows to banks are more sensitive to performance. These opposing predictions lead us to our first hypothesis.

H1: Banks' external financing frictions and the supply of bank credit to the real

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[13] Increased transparency could also lead to inefficient bank runs driven by coordination failures among depositors and short-run creditors (Diamond and Dybvig 1983). When depositors care about not only how well-capitalized or solvent a bank is but also what other market participants believe about the bank's financial condition, disclosures could impair market discipline (Gorton 2015; Holmstrom 2015). Morrison and White (2013) argue that increased transparency can cause reputational contagion where the failure of one bank causes creditors in other banks to lose confidence in the bank regulator's competence. We do not examine contagion or bank runs in this study.

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economy increase/decrease after the Loan-level Disclosure Initiative.

We examine the cross-sectional variation in our main findings along three dimensions. First, we examine whether the relation between transparency and credit access varies with the level of balance sheet liquidity (Holmstrom and Tirole 1997; Diamond and Rajan 2011). The dependence on external financing, along with the role of information asymmetry between the bank and its investors, becomes critical when the bank cannot free up internal capital by selling off lower-yielding assets (Froot and Stein 1998; DeYoung et al. 2015). In their role as delegated monitors, banks have private information that makes their loans relatively or entirely illiquid. Thus, we examine whether the relation between transparency and credit access is greater for banks that hold illiquid assets. Second, we investigate whether the relation between transparency and credit access varies with capital raising activities of banks. Specifically, if increased disclosures alleviate financing frictions, then we would expect loan growth to be more pronounced for banks that raise capital. Third, we examine whether the relation between transparency and credit access varies with the level of banks' securitization activity. The impact of the LLD Initiative requires banks that have used securitized assets as collateral to disclose more. Accordingly, the effect of the transparency regulation should be greater on banks that have higher levels of securitization.

> *H2: The impact of the Loan-level Disclosure Initiative on credit supply is greater*
>
> *when bank balance sheets are less liquid, when banks raise capital, and for banks*
>
> *that involve more in securitization.*

3. Empirical analyses and results

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To test our hypotheses on the impact of asset disclosures on bank behavior, we adopt three approaches—bank-level regressions, borrower-level analyses of credit access, and tests that rely on bank–borrower links. In this section, we first discuss our bank-level tests that use realized lending amounts. We then explore the benefits and attributes of the ECB credit access survey and our inferences from this analysis. We conclude by explaining the details of the tests that use lender–borrower links to exploit the within-country variation in mandatory bank disclosures.

3.1 Bank-level tests on the effect of LLD on external funding and lending

To examine the effects of mandated bank disclosures on banks' loan growth and financing, we estimate a difference-in-differences model, using the following equation.

$$Bank\ Outcome_{i,t} = \alpha_i + \beta_1 Post_t \times Transparency\ Bank_i + \boldsymbol{\theta}\ CONTROLS + \eta_i + \delta_t + \varepsilon_{i,t.} \qquad (1)$$

In this model, i indexes banks, and t denotes years. *Bank Outcome* is a lending or financing variable that we detail below. *Transparency Bank* is an indicator variable that equals one if the bank provides loan-level disclosures and zero otherwise. The ECB LLD Initiative commenced in January 2013 for mortgage-backed securities and in March 2013 for SME-loan-backed securities, and hence the dummy variable *Post* switches on for observations after this date.[14] To account for the role of bank fundamentals in subsequent credit growth that might coincide with LLD requirements, we control for bank assets *(Size)*, return on equity (*Profitability*), the equity-to-assets ratio (*Capital*), the ratio of short-term assets to short-term

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[14] The asset classes that were under the 2013 wave of the LLD Initiative are residential and commercial mortgage-backed securities and SME-loan-backed securities. In 2014, the ECB extended the disclosure requirements to auto loans, credit cards, consumer credit, and leases. Since the latter group of securities are significantly smaller in economic magnitude, we focus only on the 2013 shock.

liabilities (*Liquidity*), and loan portfolio riskiness/quality (*Nonperforming Loans*). The appendix details variable definitions.

To minimize the confounding effect of selection at observables, we perform our tests on a matched sample that includes propensity-score-matched control banks from the same country and of similar size (as of 2012, the year before the regulation). Our estimation models include bank and year fixed effects. Bank fixed effects control for the inherent time-invariant bank characteristics as well as country-level institutional differences that could drive our inferences. Year fixed effects account for time trends as well as macroeconomic events that may affect the sample countries at the same time as the LLD Initiative.

We recognize that the banks that use asset-backed securities as collateral to obtain financing from ECB (i.e., treatment banks) may differ fundamentally from those that do not (i.e., control banks). However, as noted above, selection into the treatment and control groups happens prior to the LLD Initiative. That is, the decision to use asset-backed securities as collateral for the ECB financing predates the disclosure regulation. Thus, when the disclosure regulation arrives, there would not be a significant selection issue with respect to banks' choosing to obtain the ECB financing. We also evaluate this argument empirically by verifying the pre-treatment parallel trends assumption.

We are interested in the sign and magnitude of the difference-in-differences estimator, the coefficient on the interaction term, *Post × Transparency Bank*. This regressor compares the changes in the bank outcome measures pre and post regulation (first difference) for banks that are affected by the regulation, relative to those that are not (second difference). A positive and significant coefficient on the difference-in-differences estimator when the outcome variable relates to loan growth or capital issuance and a negative and significant coefficient on the cost

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of financing would suggest that the LLD Initiative leads to an improvement in banks' external financing conditions and an increase in credit supply.

We obtain the data for this analysis from SNL Financial. Table 1 describes the statistics of the regression variables used in the bank-level tests. On average, banks experience positive loan growth, with an average figure of 1.17% and a standard deviation of 13.79%. New equity and debt issuances occur in 20% and 30% of bank-years, respectively. The year-over-year growth in interbank borrowing is 15.80%. The cost of funds (excluding deposits) for the average bank is 3.66%, while the yield for bonds at the time of issuance averages at 5.59%. Sample banks post annual profits of 2.2% of total equity and maintain a 35.91% ratio of short-term assets to short-term borrowings and deposits. For the average bank, about 7.65% of assets are funded by equity, while 11.5% of loans are nonperforming.

We first examine banks' lending. The estimation results of Equation 1 using *Loan Growth* as the outcome variable is presented in Table 2. The results are presented for one-year, two-year and three-year treatment windows. Results presented in columns (1) through (3) of Table 2 suggest that there is an increase in lending post-disclosure regulation. We observe that the positive coefficient becomes significant in two-year and three-year treatment windows, suggesting that the loan growth effect sets in a little after one year. In terms of economic magnitudes, banks that became subject to the ECB LLD requirements experience a relative loan growth of about 3% (column (3)). Given the sample standard deviation of *Loan Growth*, this statistically significant inference is economically meaningful as well.

A critical assumption of our identification strategy is that the trends in loan growth for disclosure and nondisclosure banks would have been the same in the absence of mandatory LLD requirements (i.e., the parallel trends assumption). We assess the validity of this claim in a

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multivariate framework. We compute both pre- and post-coefficients, relative to one year before the treatment. Thus, we introduce a dummy variable (*Pre1*) that equals one for the one year before the treatment. We find that the coefficient on *Pre1 × Transparency Bank* is insignificant (column (4) of Table 2), which suggests that the treatment and control banks had statistically similar trends in loan growth leading up to the LLD requirements but displayed different trends in the post-period.

We next focus on the channel through which the disclosure regulation operates—banks' external financing conditions. If mandated disclosures reduce financing frictions, then we expect treatment banks to be able to raise funds more easily and possibly also at a lower cost. In terms of the type of external financing, we focus on debt and equity (Balakrishnan, Core, and Verdi 2014; Balakrishnan and Ertan 2018).[15] For debt, we focus on the likelihood of bond issuances and the growth in interbank borrowing. With respect to equity, we examine share issuances, inferred from increases in banks' equity capital.

Panel A of Table 3 presents the findings from the estimation of Equation 1, using an indicator for whether the bank issued net debt in a given year (*Debt Issuance*). We find that debt issuances increase after the LLD requirement. The difference-in-differences coefficient is positive across all columns (varying between 8.4% and 13.8%) and becomes statistically significant over the two-year and three-year windows. Table 3, Panel B, presents the results relating to equity issuances. Across each treatment window, we observe significant increases in the likelihood of equity issuances (varying between 6.2% and 8.4%). The main takeaway from this analysis is that banks find it easier to raise both debt and equity after increases in asset

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[15] A recent view is that transparency can have a direct impact on deposit flows. Chen et al. (2018) document such an effect on both insured and uninsured deposits. We do not examine deposits in this study because of the lack of availability of data on insured and uninsured deposits. Accordingly, we remove deposit expense from our calculation of interest expense.

disclosures. Banks also rely heavily on interbank borrowings as a source of funds (typically in the short term), and increased transparency could facilitate easier access to this form of financing as well (Heider, Hoerova, and Holthausen 2015). Accordingly, we next examine interbank borrowings and find an increase in interbank lending after the passage of the LLD regulation (Panel C of Table 3).

We also investigate whether banks benefit from a decline in the cost of raising new capital after increased transparency. We restrict our attention to the cost of debt financing, because we can observe the cost of debt metrics much more directly.[16] We use two measures of cost of debt—interest incurred on nondeposit liabilities and bond yields at issuance. We estimate funding costs as the interest incurred on nondeposit debt as a percentage of nondeposit liabilities (*Cost of Funds ex. Deposits*). We remove the effect of deposits to isolate the component related to interest-bearing liabilities and remove any effect of changing deposit rates. We estimate Equation 1 with *Cost of Funds ex. Deposits* as the dependent variable and present the pertinent results in Panel A of Table 4. We observe a decline in the cost of debt capital for treatment banks after the disclosure requirements. The effect is observed mainly in the third year of the treatment (column (3)) and corresponds to a decline of over 1.3%, which is a meaningful amount relative to the sample average of *Cost of Funds ex. Deposits.*

The lack of results in the one-year and two-year treatment windows can be explained by the sticky nature of the particular dependent variable, as total interest expense is determined also by the debt obtained before the LLD Initiative. To present more direct and timely evidence

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[16] Unlike cost of debt, cost of equity issuances would have to be imputed under more restrictive assumptions. Measuring changes in firms' costs of equity capital is highly debated. Studies use realized returns or dividend yields as proxies for the costs of capital. However, these proxies also capture changes in market expectations about firms' future cash flows. Further, long time-series of realized returns are required to obtain an unbiased estimate of cost of equity capital (e.g., Stulz 1999). Implied cost of capital estimates based on analyst inputs are affected by model assumptions and highly limited in our sample of European banks.

on the cost of debt, we examine bond yields at the time of issuance. In these tests, which are tabulated in Panel B of Table 4, the unit of observation is a bond issuance. Here we observe a decline in the yields over one-year, two-year, and three-year treatment windows of about 1.2% to 1.4%, which represents a quarter of the sample average issuance yield (5.59%). Collectively, these inferences suggest that asset transparency could reduce banks' external financing frictions.

Next, we explore the cross-sectional variation in our findings to shed further light on the channels through which bank disclosures affect lending. First, we connect the findings from Table 2 to those in Tables 3 and 4 by examining whether the increase in capital is associated with the increase in lending by banks. We use triple differences estimators by interacting *Post ×️ Treatment* with an indicator variable, *Capital Issuer*, that switches on only if the observation pertains to a bank-year with equity issuance. Results presented in Column 1 of Table 5 suggest that the relative growth in lending is stronger for banks that raise capital. For brevity, we report the coefficients of only the triple differences estimator and the main difference-in-differences estimator.

Second, we examine the effects of balance sheet liquidity. We use triple differences estimators by interacting *Post ×️ Transparency Bank* with *Liquidity Constrained*, which is an indicator variable that equals one for banks whose balance sheets are illiquid pre-treatment (i.e., the ratio of liquid assets to short-term funding and deposits is less than 10%). Column 2 of Table 5 presents the estimation results. We find that asset disclosures help more when banks have illiquid balance sheets. Specifically, the coefficient on *Post ×️ Transparency Bank ×️ Liquidity Constrained* is statistically and economically significant. This result bolsters the evidence that improved asset disclosures help banks raise funds and lend to the real economy. This inference is also consistent with the theory (e.g., DeYoung et al. 2015) that the illiquidity

of a bank's assets, combined with information frictions, makes the bank risk averse so that it avoids extending credit. Accordingly, the benefits of asset disclosures accrue more to banks with low balance-sheet liquidity.

Third, we evaluate whether banks that securitize to a large extent benefit more from the regulation. To this end, we perform an analysis that is akin to treatment intensity estimation. Here we interact *Post × Transparency Bank* with *High Securitization*—an indicator variable that switches on if a bank's securitization exposures, relative to its total assets, is larger than the median of the distribution.[17] Consistent with the notion that asset-level disclosures are more important to the market for banks with more securitization, we observe a statistically and economically significant coefficient on the double interaction term.

3.2 Tests based on the EC/ECB Survey on the Access to Finance of Enterprises

The bank-level analysis, despite its straightforwardness, cannot overcome the simultaneity between supply and demand (Acharya and Ryan 2016) and hence cannot directly speak to the credit supply effects of banks' asset transparency. An alternative explanation for our findings is that bank lending could rise due to an increase in demand from the real economy, not because of banks' increased ability or willingness to lend. To alleviate this concern, we conduct our investigation of credit supply using borrower-level data, which come from the Survey on the Access to Finance of Enterprises. An initiative by the ECB and the European Commission (EC), the survey is designed to establish a standardized and historical panel for

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[17] Time-varying data on individual banks' involvement in securitization is particularly sparse in the European setting, including Bankscope and our main data source, SNL. For this reason, we obtain this data from the European Banking Authority's (EBA) regulatory disclosures from 2013. Since this information is available for a subset of banks, banks with a missing value are coded as having low securitization.

SMEs and illuminate their financing conditions.[18] The EC states: "The survey results will be used to identify key areas of action regarding SMEs' access to finance, including innovative growth-oriented enterprises. For the ECB, the survey will provide complementary information concerning the effects of monetary policy and financial market developments on SMEs. Future regular surveys will chart the development of the situation in access to finance over time."

The survey contains questions that capture firms' need for different sources of funding (e.g., bank loans, credit lines, trade credit). The responses also provide some detail on firms' characteristics (e.g., the number of employees, age, sales growth). The survey was first conducted in 2009 and has been conducted semi-annually since. It is undertaken by ECB-approved independent policy and market research firms, which complete the questionnaires over four weeks via telephone interviews or online.[19] Respondents are anonymized, and their links to specific banks are unknown.

We study the semi-annual survey responses between 2011 and 2015 (each half-year is called a "wave") and limit our attention to Eurozone countries to keep the effects of monetary policies as well as macroeconomic trends similar across countries. To investigate the effects of LLD requirements on the financing of SMEs, we primarily focus on the response to the following question.

"If you applied and tried to negotiate for bank loans over the past six months, what was the outcome?"

We observe this variable for 17,350 observations. Based on the four possible responses

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[18] For further details, see https://www.ecb.europa.eu/stats/ecb_surveys/safe/html/index.en.html.

[19] The contact letter used by ECB also highlights the survey's purpose of understanding SME financing issues: https://www.ecb.europa.eu/stats/money/surveys/sme/shared/pdf/EN_SAFE_introductory_letter.pdf.

to the above question, we define *Funding upon application* as an ordinal variable that equals

one (for rejections), two (for successful financings up to 75% of the requested amount), three

(for those between 75% and 100% of the requested amount), and four (for responses that signify

the receipt of the full amount sought).[20] Panel A of Table 6 presents the summary statistics of

the survey variables. *Funding upon application* has a mean (standard deviation) of 3.38 (1.05),

suggesting that the average firm in the sample countries gets a significant fraction of the

requested amount. We view this outcome variable as a proxy for credit access conditional on

demand. Many of the concerns regarding changing investment opportunities of and general

conditions faced by SMEs should reflect on their decision to apply for a loan. Overall, the

survey does a good job accounting for the demand for funding, sharpening our analyses,

compared to a broad investigation of realized credit amounts.[21]

We estimate the following regression equation to test the effect of bank disclosures on

the supply of credit to SMEs, which we proxy for by *Funding upon application*.

$$Funding\ upon\ application_{i,t} = \alpha + \beta_1 Post_t \times Treatment_c + \boldsymbol{\theta}\ CONTROLS + \delta_{c,k} + \omega_{k,t} + \varepsilon_{i,t.} \quad (2)$$

In this model, *i* indexes firms, *t* waves (i.e., half-years), *k* industries, and *c* countries.[22]

We are interested in the sign and magnitude of the coefficient on the interaction term *Post* ×

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[20] Potential responses to this question also include "Do not know," "Application still pending," and "Applied but refused because the cost was too high." These alternatives, which constitute less than 10 percent of responses by loan applicants, are not used in the calculation of *Funding upon application*, because they are not associated with a clear loan application outcome.

[21] One concern with loan application datasets is their inability to illuminate discouraged applicants, i.e., companies that have demand for credit but refrain from applying for a loan, due to a fear of rejection. The survey, however, does include a question on this subject, getting at the reasons for not applying for a loan. In untabulated tests, we regress the likelihood of refraining from making a loan application, due to a fear of rejection, on the same right-hand-side variables in Equation 2. We find statistically and economically significant negative coefficients on the difference-in-differences estimator, consistent with our main arguments.

[22] The survey defines industry as manufacturing, construction, trade, services, or other.

Treatment. *Post* is an indicator variable that switches on for surveys pertaining to periods on or after January 1, 2013.[23] *Treatment* is a country-specific, time-invariant continuous variable that equals the relative magnitude of disclosures. Specifically, we calculate *Treatment* as the ratio of the total amount of disclosed loans to the total outstanding loans on banks' balance sheets in the country right before the treatment (i.e., 2012).[24] Accordingly, *Treatment* is a continuous variable that is nonzero for Belgium, France, Germany, Italy, the Netherlands, Portugal, and Spain (the countries with banks disclosing their securitized credit portfolios) and zero for all other (control) countries. This heterogeneity allows us to compare the treatment intensity within the group of treatment countries. We observe that the sample average of *Treatment* is 0.034, which suggests that disclosed loans constitute about 3.4% of total loans in the system.

To remove the impact of confounding issues, we use a vector of controls that could explain the variation in credit access. The survey collects information on SME characteristics (*Employees*, *Age*, and *Sales growth*). Like *Funding upon application*, these controls are ordinal variables: *Employees* and *Age* varies between 1 (smallest/youngest) and 4 (largest/oldest), and *Sales growth* takes the values of 1 (decline), 2 (stable), or 3 (growth). As shown in Panel A of Table 5, the median firm is over 10 years old, employs 10–49 people, and experiences stable sales growth.

Another important control is system-level time-varying factors. According to our arguments, credit access is enhanced by banks' disclosures rather than their inherent performance. To this end, we account for cases in which the extent of LLD requirements, that

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[23] Specifically, *Post* equals one for waves 9–14 of the survey and equals zero for waves 5–8, consistent with the widest measurement window we use in the paper (i.e., 2011–2015).

[24] We get the extent of loan-level disclosures from the European DataWarehouse. We calculate the denominator, total loans in the system, using total loans (in millions of euros) from Bankscope (item 2001).

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is, *Treatment*, is correlated with certain characteristics of the banks in the country. In the spirit of our bank-level tests, we control for *Bank profitability*, *Bank capitalization*, *Bank portfolio quality*, *Bank liquidity*, *Bank allowance coverage*, and *Bank financial health*, which are calculated at the country-year level. We also account for *GDP growth*, *GDP per capita*, *foreign bank presence*, *return on the stock market*, and *volatility of the stock market* so as to better isolate the effects of country-specific macroeconomic and sectoral changes that could impact SME credit access. We obtain these variables from the World Bank Global Financial Development Database. As shown in Panel A of Table 6, the sample banking systems have an average capital ratio of 5.93%. Their short-term assets correspond to 38.37% of short-term liabilities, including deposits. The average real GDP per capita is $32,330 (in 2005 U.S. dollars), and nominal GDP growth is 0.20% in our sample.

In addition to these time-varying controls at the company and country levels, we employ industry-wave (i.e., industry-half-year) and industry-country fixed effects. The first set of fixed effects controls for industry-level confounding effects that are time-varying (e.g., growth opportunities specific to manufacturing companies). The latter removes time-invariant features of industries in specific countries (e.g., structural differences between Italian and Portuguese manufacturing sectors). Industry-country fixed effects also account for confounding effects of legal structure, corporate culture, and institutional characteristics.

Panel B of Table 6 reports the estimation results of Equation 2 for one-year, two-year and three-year treatment windows. Similar to the results from our bank-level analyses, we observe that the magnitude and significance of the coefficients increase with the length of the treatment window. The coefficient on the difference-in-differences estimator for the three-year window is 2.364 and statistically significant. In terms of economic significance, disclosing 10%

of loans in the banking system translates to an increase of 0.24 in *Funding upon application*.

Given the sample mean of *Funding upon application* (3.38), bank disclosures help the average

SME to receive the full amount they apply for (i.e., move from a response of 3 to 4). Column 4

includes the results of the test for parallel trends. The coefficient on *Pre1 × Treatment* is

statistically insignificant, in keeping with the claim that the average borrower in treatment and

control countries experience a similar trend in credit access before the regulation. Overall, the

findings in this panel imply that the bank disclosures enhance SMEs' access to financing.

3.3 Within-country-year borrower-level tests of credit supply

Next, we triangulate our results by providing borrower-level evidence within country-

year—an inference that we cannot draw from the bank-level data or survey data alone. To do so,

we collect data on bank–borrower links and borrower financials from Bureau van Dijk's

Amadeus. We use the 2015 vintage of the Amadeus Banker dataset, which includes bank–

borrower links as of 2013–2014. By merging this data table with the Amadeus financials dataset,

we can examine lending relationships as well as the financing and investing of private

companies.[25]

The borrower-level analysis offers two advantages. First, by observing bank–borrower

links, we can explore the impact of a specific bank's transparency on its borrowers' activities.

This novel feature allows us to perform our tests within-country-industry-year. In doing so, we

can further mitigate lingering concerns about alternative factors concurrent to the LLD

regulation driving our results. For example, Dutch firms could be performing better in years

following the LLD requirements for reasons unrelated to the LLD Initiative, which we may

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[25] Amadeus Banker's coverage and data availability allows us to conduct this analysis on French, Portuguese, and Spanish companies.

misattribute to the disclosure requirements. The within-country-year analysis, however, alleviates this issue by allowing us to compare the financing and investment decisions of borrowers of disclosing lenders to those with nondisclosing lenders. The second advantage of this dataset is its longitudinal nature, which permits the use of firm fixed effects more confidently. However, the drawback of this dataset, relative to the survey data, is that the Amadeus framework does not necessarily tease out the effects of loan supply from loan demand.

We estimate the following difference-in-differences model.

$$Real\ Effect_{i,t} = \alpha + \beta_1 Post_t \times Treated\ SME_i + \boldsymbol{\theta}\ CONTROLS + \gamma_{k,c,t} + \eta_i + \varepsilon_{i,t} \qquad (3)$$

In this model, i indexes firms, t years, k industries, and c countries.[26] The dependent variable, *Real Effect*, is *Debt issuance* or *Capital expenditures*. Both of these dependent variables are measured at the borrower level and vary over time. We define *Treated SME* at the company level by using bank-specific disclosure data from the European DataWarehouse. This variable equals one for borrowers whose relationship banks provides loan-level disclosures and zero otherwise. This procedure enables the comparison of, for example, two French borrowers from the textile industry in 2015. We expect firms with a transparency lender to experience a relative improvement in credit access and, to the extent that they use these funds, to invest more subsequently. The controls vector includes basic firm fundamentals (total assets, employees, and profitability).

As Panel A of Table 7 shows, 42% of the firms are associated with a positive *Debt*

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[26] Since we observe Amadeus Financials data on an annual basis, the unit of observation is a firm-year. Regarding industry membership, Amadeus includes more granular information. Accordingly, firm industries are defined at the two-digit NAICS code level.

Issuance, while the sample mean of *Capital Investment* is 7.62%. The average borrower has a return-on-assets ratio of 4.17%, and the median firm size (i.e., total assets) is approximately 14 million euros ($=e^{16.44}$).

Panels B and C of Table 7 present the results from the estimation of Equation 3, using debt financing and capital expenditures as outcome variables. Relative to otherwise similar firms, companies with a relationship bank that provides loan-level disclosures are more likely to issue debt and, in turn, invest more post-disclosure regulation. The difference-in-differences estimator for debt financing is significant for two- and three-year windows, while the significance for the capital investments starts showing up in the third year. This observation is consistent with our prior findings as well—increased bank transparency improves access to credit for firms, which then invest relatively more. The economic magnitudes of the difference-in-differences estimators are also meaningful. Specifically, treatment borrowers become 1.7% more likely to issue debt and increase their investments by 1.3% (relative to a sample average of 42% and a sample standard deviation of 41%, respectively). Overall, this analysis provides within-country-year evidence that bank asset transparency increases lending to relationship borrowers, which use their capital to invest subsequently.

4. Conclusion

We study the impact of bank asset disclosures on the supply of bank credit to the real economy. We use the European Central Bank's loan-level disclosure requirements as a plausibly exogenous shock to banks' asset disclosures. We find that, relative to a control group, treatment banks enjoy lower costs of debt, raise more capital, and lend more post-disclosure regulation. We recognize that these bank-level inferences may be affected by the simultaneous

determination of credit demand and supply, an inherent challenge for research exploring commercial credit (e.g., Acharya and Ryan 2016). We alleviate this problem by using novel data from small business credit access surveys. We find that mandated bank disclosures enhance the supply of credit to small businesses. Specifically, in regimes with loan-level reporting, borrowers receive more funds (conditional on applying for a loan). Further, we provide borrower-level within-country-year evidence that firms borrow, invest, and employ more after their relationship lenders reveal their loan portfolios.

Even though we capture a rich spectrum of credit access, our findings apply to the magnitude of financing, not its efficiency. We do not make claims as to whether increased bank asset transparency or enhanced credit access by small businesses is more desirable for the overall economy, bank shareholders, depositors, or other borrowers (e.g., large corporates or consumers). Another argument is that the reduction in external financing frictions is a mechanism through which mandatory disclosures affect bank lending. More research on this issue could further understanding of the alternative channels that explain the relation between bank transparency and credit supply. For instance, revealing loan portfolios might influence the competition in the banking sector or lenders' screening and monitoring.

Appendix. Variable Definitions

Variable Name	Definition and Variable Code in the Original Dataset
Bank-level tests:[a]	
Transparency Bank	1 for banks that provide asset disclosures under ECB's Loan-level Reporting Initiative in 2013, 0 otherwise.
Post	1 for years 2013 and after, 0 otherwise.
Loan Growth	Annual growth in loans (%) (item 132050).
Debt Issuance	1 if there is a positive growth in debt (item 132319).
Equity Issuance	1 if there is a positive growth in equity minus earnings and the bank is in the top half of this distribution (item 131939). (This extra step is to better approximate the incidence of issuance of share capital, which is not available as a standalone variable for the majority of the sample.)
Growth in Interbank Borrowing	Annual growth in interbank liabilities (%) (item 227063).
Cost of Funds ex. Deposits	Interest incurred on nondeposit liabilities as a percentage of average nondeposit debt (item 133821 divided by item 132319).*
Bond Yield at Issuance	The yield rate at issuance, in percentage points, measured at the distinct bond issuance level. (There is no item number, as this is variable is from SNL debt issuance dataset. The pertinent variable is *interest rate*.)
Size	Natural logarithm of total assets (item 132264).
Profitability	Return on average equity (%) (item 245633).
Capital	Total equity divided by total assets (%) (item 131982).
Liquidity	Current liquid assets divided by short-term borrowings plus deposits (%) (item 256798).
Nonperforming Loans	Nonperforming loans divided by total loans (%) (item 243682).

* If this variable is missing, we use an indirect calculation of the same metric: $100 \times$ (All Interest Expense – Deposit Expense) / (Liabilities – Deposits).

ECB Credit Access Survey:[b]

Treatment	Defined as a continuous variable at the country level: The sum of the outstanding balance of disclosed loans under ECB's Loan-level Reporting Initiative (in 2013) divided by the total loans in the country's financial system as of the end of 2012.
Post	1 for years 2013 and after, 0 otherwise.
Funding upon application	1 if rejected, 2 if got up to 75%, 3 if got more than 75% but less than 100%, 4 if got 100% of the applied amount (Question 7b_a).
Employees	1 if up to 9 employees, 2 if between 10 and 49 employees, 3 if between 50 and 249 employees, 4 if over 250 employees (Question d5_rec).
Age	1 if up to two years, 2 if between two and five years, 3 if between five and 10 years, 4 if over 10 years (Question d1_rec).
Sales	1 for annual sales up to €2mm, 2 for sales between €2-10mm, 3 for sales between €10mm-50mm, 4 for sales over €50mm (Question d4).

Country-year-level metrics:[c]

Bank profitability	Bank return on equity (%) (item GFDD.EI.06).
Bank financial health	Bank Z-score (item GFDD.SI.01).
Bank portfolio quality	Bank nonperforming loans to gross loans (%) (item GFDD.SI.02).
Bank capitalization	Bank capital to total assets (%) (item GFDD.SI.03).
Bank liquidity	Liquid assets to deposits and short-term funding (%) (item GFDD.SI.06).
Bank allowance coverage	Loan loss allowance to nonperforming loans (%) (item GFDD.SI.07).
Foreign bank presence	Loans from nonresident banks (amounts outstanding) to GDP (%) (item GFDD.OI.09).
Return on the stock market	Growth rate of annual average stock market index (%) (item GFDD.OM.02).
Volatility of the stock market	Average of the 360-day volatility of the national stock market index (item GFDD.SM.01).
GDP per capita	Gross domestic product per capita in thousands (Constant 2005 USD) (item NY.GDP.PCAP.KD).
GDP growth	Year-over-year growth in gross domestic product (item NY.GDP.MKTP.CD).

Amadeus tests:[d]

Treated SME	1 for firms whose relationship banks provide asset disclosures under ECB's Loan-level Reporting Initiative in 2013, 0 otherwise.
Post	1 for years 2013 and after, 0 otherwise.
Debt Issuance	1 if there is a positive growth in debt (items *ltdb* and *loan*).
Capital Expenditures	Growth in net fixed assets as a percentage of the lagged fixed assets (items *fias*).
Size	Natural logarithm of total assets (item *toas*).
Employees	Natural logarithm of total employees (item *empl*).
Profitability	Pre-tax income as a percentage of total assets (items *plbt* and *toas*).

Notes:

Loan-level disclosure figures and banks that provide loan-level disclosures are based on the data from the European DataWarehouse.

[a] Source: SNL Financial.
[b] Source: ECB Survey on the Access to Finance of Enterprises.
[c] Source: IMF Global Financial Development Database.
[d] Source: Bureau van Dijk Amadeus.

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Table 1. Summary Statistics

This table presents the sample statistics. The unit of observation is a bank-year. Variable definitions are in the appendix. For indicator variables, only the mean values and observations counts are provided.

	Mean	stdev	p10	p50	p90	N
Loan Growth	1.17	13.79	-9.15	-1.15	12.11	817
Debt Issuance	0.30					817
Equity Issuance	0.20					817
Growth in Interbank Borrowing	15.80	47.86	-27.51	4.63	74.09	710
Cost of Funds ex. Deposits	3.66	6.64	1.08	2.07	6.60	716
Bond Yield at Issuance	5.59	2.45	3.00	5.00	10.00	7,896
Post	0.60					817
Transparency Bank	0.52					817
Size	15.94	2.02	13.33	15.96	18.83	817
Profitability	2.225	10.09	-9.71	3.09	11.34	817
Capital	7.65	3.39	3.81	7.33	11.76	817
Liquidity	35.91	26.90	7.10	32.08	64.18	817
Nonperforming Loans	11.54	7.85	2.60	10.38	22.90	817

Table 2. The Effects of Mandated Bank Disclosures: Bank Lending

This table presents the results from the regression of loan growth on mandatory bank disclosures and controls. The unit of observation is a bank-year. *Loan Growth* is the annual percentage growth in loans. *Transparency Bank* is an indicator variable that equals one if the bank provides loan-level disclosures and zero otherwise. *Post* equals one for years 2013–2015 and zero otherwise. *Pre1* is an indicator variable that switches on for 2012, one year before the effective year of the ECB LLD Initiative. Windows in column headings denote the years used in the test. Control variables are defined in the appendix. T-statistics presented in parentheses are robust to within-country and year correlation and heteroscedasticity. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
	Window: 2011–2013	Window: 2011–2014	Window: 2011–2015	Window: 2011–2015
	Loan Growth	Loan Growth	Loan Growth	Loan Growth
Post × Transparency Bank	1.532	2.787*	3.038**	4.491*
	(0.63)	(1.71)	(2.07)	(1.78)
Pre1 × Transparency Bank				2.851
				(1.13)
Size	-3.871	6.305	8.742	8.906
	(-0.52)	(0.76)	(1.58)	(1.60)
Profitability	0.219***	0.146***	0.172***	0.172***
	(2.84)	(2.88)	(3.10)	(3.12)
Capital	-2.686**	-1.413	-0.723	-0.711
	(-2.09)	(-1.40)	(-0.92)	(-0.91)
Liquidity	-0.053	-0.109	-0.018	-0.020
	(-0.48)	(-1.22)	(-0.15)	(-0.17)
Nonperforming Loans	-0.232	-0.329	-0.273	-0.273
	(-0.86)	(-1.61)	(-1.54)	(-1.53)
Observations	495	659	817	817
R-squared	0.412	0.341	0.331	0.331
Bank and Year FE	YES	YES	YES	YES

Table 3. The Effects of Mandated Bank Disclosures: Bank Capital

This table presents the results from the regression analysis of debt issuance (Panel A), equity issuance (Panel B), and growth in interbank borrowing (Panel C). The unit of observation is a bank-year. *Transparency Bank* is an indicator variable that equals one if the bank provides loan-level disclosures and zero otherwise. *Post* equals one for years 2013–2015 and zero otherwise. *Pre1* is an indicator variable that switches on for 2012, one year before the effective year of the ECB LLD Initiative. Windows in column headings denote the years used in the test. *Debt Issuance* (*Equity Issuance*) is an indicator variable that switches on if the bank issues debt capital (equity capital). *Growth in Interbank Borrowing* is the annual percentage growth in interbank liabilities. Controls are defined in the appendix. *T*-statistics presented in parentheses are robust to within-country and year correlation and heteroscedasticity. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels.

Panel A. Banks' Asset Disclosures and Debt Issuance

	(1)	(2)	(3)	(4)
	Window: 2011–2013	Window: 2011–2014	Window: 2011–2015	Window: 2011–2015
	Debt Issuance	*Debt Issuance*	*Debt Issuance*	*Debt Issuance*
Post × Transparency Bank	0.084	0.119*	0.138***	0.118**
	(1.19)	(2.03)	(3.00)	(2.20)
Pre1 × Transparency Bank				-0.039
				(-0.79)
Size	-0.093	-0.144	-0.132*	-0.134*
	(-0.60)	(-1.56)	(-1.82)	(-1.83)
Profitability	-0.003	-0.004*	-0.001	-0.001
	(-0.73)	(-1.86)	(-0.41)	(-0.40)
Capital	0.004	0.021	0.011	0.011
	(0.07)	(0.67)	(0.63)	(0.62)
Liquidity	-0.004	0.000	-0.002	-0.002
	(-1.60)	(0.19)	(-0.62)	(-0.61)
Nonperforming Loans	-0.016**	-0.024***	-0.023***	-0.023***
	(-2.33)	(-3.15)	(-3.08)	(-3.08)
Observations	495	659	817	817
R-squared	0.222	0.219	0.233	0.232
Bank and Year FE	YES	YES	YES	YES

Panel B. Banks' Asset Disclosures and Equity Issuance

	(1)	(2)	(3)	(4)
	Window: 2011–2013	Window: 2011–2014	Window: 2011–2015	Window: 2011–2015
	Equity Issuance	*Equity Issuance*	*Equity Issuance*	*Equity Issuance*
Post × Transparency Bank	0.084**	0.066*	0.062*	0.058*
	(2.00)	(1.78)	(1.83)	(1.77)
Pre1 × Transparency Bank				-0.009
				(-0.17)
Size	0.535	0.639***	0.426**	0.425**
	(1.61)	(4.63)	(2.16)	(2.16)
Profitability	-0.009	-0.014***	-0.009**	-0.009**
	(-1.49)	(-3.14)	(-2.41)	(-2.41)
Capital	0.151**	0.125***	0.081***	0.081***
	(2.75)	(4.95)	(3.01)	(3.01)
Liquidity	0.004	0.001	-0.001	-0.001
	(0.65)	(0.33)	(-0.26)	(-0.26)
Nonperforming Loans	0.020***	0.014***	0.016***	0.016***
	(4.21)	(3.14)	(3.75)	(3.75)
Observations	495	659	817	817
R-squared	0.294	0.264	0.262	0.261
Bank and Year FE	YES	YES	YES	YES

Panel C. Banks' Asset Disclosures and Interbank Borrowing

	(1)	(2)	(3)	(4)
	Window: 2011–2013	Window: 2011–2014	Window: 2011–2015	Window: 2011–2015
	Growth in Interbank Borrowing	*Growth in Interbank Borrowing*	*Growth in Interbank Borrowing*	*Growth in Interbank Borrowing*
Post × Transparency Bank	14.336**	11.291*	9.234*	13.629**
	(2.37)	(1.74)	(1.71)	(2.18)
Pre1 × Transparency Bank				6.357
				(0.73)
Size	8.733	45.115	47.004***	47.133***
	(0.16)	(1.57)	(2.99)	(2.99)
Profitability	0.046	0.236	0.545**	0.537**
	(0.09)	(0.64)	(2.03)	(2.04)
Capital	-2.957	1.169	-1.893	-1.942
	(-0.70)	(0.30)	(-0.58)	(-0.60)
Liquidity	-0.931	-0.943**	-0.790	-0.796
	(-1.26)	(-2.03)	(-1.61)	(-1.63)
Nonperforming Loans	-1.710*	-1.781**	-2.288***	-2.304***
	(-1.76)	(-2.39)	(-4.33)	(-4.33)
Observations	393	556	710	710
R-squared	0.408	0.360	0.359	0.358
Bank and Year FE	YES	YES	YES	YES

Table 4. The Effects of Mandated Bank Disclosures: Bank Cost of Debt Capital

This table presents the results from the regression of debt costs on mandatory bank disclosures and controls. The unit of observation is a bank-year in Panel A and a debt issuance in Panel B. *Transparency Bank* is an indicator variable that equals one if the bank provides loan-level disclosures and zero otherwise. *Post* equals one for years 2013–2015 and zero otherwise. *Pre1* is an indicator variable that switches on for 2012, one year before the effective year of the ECB LLD Initiative. Windows in column headings denote the years used in the test. *Cost of Funds ex. Deposits* is the percentage interest incurred on nondeposit liabilities. *Bond Yield at Issuance* is the yield rate at issuance, also in percentage points, measured at the distinct bond issuance level. Control variables are defined in the appendix. *T*-statistics presented in parentheses are robust to within-country and year correlation and heteroscedasticity. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Banks' Cost of Funds measured as Interest Expense excluding Deposit Expense

	(1)	(2)	(3)	(4)
	Window: 2011–2013	Window: 2011–2014	Window: 2011–2015	Window: 2011–2015
	Cost of Funds ex. Deposits	*Cost of Funds ex. Deposits*	*Cost of Funds ex. Deposits*	*Cost of Funds ex. Deposits*
Post × Transparency Bank	0.127	-0.828	-0.990*	-1.324**
	(0.24)	(-1.41)	(-1.73)	(-2.22)
Pre1 × Transparency Bank				-0.644
				(-1.00)
Size	-0.169	-1.992*	-2.870***	-2.918***
	(-0.25)	(-1.80)	(-3.39)	(-3.42)
Profitability	-0.024*	-0.009	0.004	0.005
	(-2.01)	(-0.40)	(0.19)	(0.20)
Leverage	0.094	-0.111	-0.224	-0.228
	(0.58)	(-0.58)	(-1.26)	(-1.28)
Liquidity	0.034**	0.058	0.076	0.077
	(2.46)	(1.08)	(1.66)	(1.67)
Nonperforming Loans	0.033	-0.037	-0.035	-0.035
	(0.69)	(-0.70)	(-0.71)	(-0.73)
Observations	437	579	716	716
R-squared	0.913	0.756	0.598	0.597
Bank and Year FE	YES	YES	YES	YES

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	(1)	(2)	(3)	(4)
	Window: 2011–2013	Window: 2011–2014	Window: 2011–2015	Window: 2011–2015
	Bond Yield at Issuance	*Bond Yield at Issuance*	*Bond Yield at Issuance*	*Bond Yield at Issuance*
Post × Transparency Bank	-1.204*	-1.216**	-1.427**	-1.615***
	(-1.72)	(-2.11)	(-2.34)	(-3.87)
Pre1 × Transparency Bank				-0.399
				(-0.43)
Size	1.506	2.836**	1.785*	1.870*
	(1.05)	(2.61)	(1.84)	(2.00)
Profitability	0.006	0.011	-0.002	-0.002
	(0.19)	(0.46)	(-0.07)	(-0.07)
Capital	0.178	0.091	0.053	0.072
	(0.82)	(0.63)	(0.40)	(0.54)
Nonperforming Loans	0.041	0.000	0.021	0.025
	(0.62)	(0.00)	(0.39)	(0.48)
Bond Amount	0.204	0.107	0.076	0.084
	(1.54)	(0.88)	(0.63)	(0.77)
Bond Maturity	0.255**	0.282**	0.279***	0.278***
	(2.16)	(2.68)	(2.89)	(2.94)
Observations	5,450	6,982	7,896	7,896
R-squared	0.802	0.780	0.783	0.784
Bank and Year FE	YES	YES	YES	YES

Panel B. Banks' Cost of Debt at Issuance

Table 5. Cross-sectional Variation in the Treatment Effect

This table presents the results from the tests on the cross-sectional in the main treatment effect. The unit of observation is a bank-year. *Loan Growth* is the annual percentage growth in loans. *Transparency Bank* is an indicator variable that equals one if the bank provides loan-level disclosures and zero otherwise. *Post* equals one for years 2013–2015 and zero otherwise. *Capital Issuer* is an indicator variable that switches on only if the observation pertains to an equity capital issuance. *Liquidity Constrained* is an indicator variable that switches on only if the observation pertains to a bank of which lagged ratio of current assets to short-term borrowings and deposits ratio is less than 10 percent. *Securitization Active* is an indicator variable that switches on only if the observation pertains to a bank for which securitization exposures as a fraction of total assets is above the median for banks with available information. (Data on securitization exposures comes from the European Banking Authority's regulatory disclosures.) Lower order terms are *Post × I*, *Transparency Bank × I*, *Post*, *Transparency Bank*, and *I*. These terms are included in the regression estimations, but their coefficients are suppressed for brevity. Previous controls include *Size*, *Profitability*, *Leverage*, *Liquidity*, and *Nonperforming Loans*, definitions of which appear in the appendix. T-statistics presented in parentheses are robust to within-country and year correlation and heteroscedasticity. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
	I = Capital Issuer	*I = Liquidity Constrained*	*I = High Securitization*
	Loan Growth	*Loan Growth*	*Loan Growth*
Post × Transparency Bank × I	11.560*	7.500*	9.033*
	(1.89)	(1.69)	(1.66)
Post × Transparency Bank	1.360	2.009	2.594*
	(1.05)	(1.17)	(1.90)
Observations	817	817	817
R-squared	0.348	0.333	0.330
Lower order terms	YES	YES	YES
Previous Controls	YES	YES	YES
Bank and Year FE	YES	YES	YES

Table 6. Bank Asset Disclosures and Credit Supply: Survey Evidence

This table reports the pertinent summary statistics (Panel A) and the results of regressions of SME credit access on banks' asset disclosure requirements (Panel B). Each observation is a firm-half-year as per the frequency of the ECB survey. The dependent variable, *Funding upon application*, varies between 1 (zero financing upon application) and 4 (full financing upon application). *Post* is an indicator variable that switches on for surveys of which are conducted in reference to 2013–2015. *Treatment* is a continuous, time-invariant, country-level variable calculated as the sum of the outstanding balance of disclosed loans under ECB's Loan-level Reporting Initiative divided by the total loans in the country's financial system. Windows in column headings denote the years used in the test. All control variables are defined in the appendix. *T*-statistics (in parentheses) are robust to within-country and year correlation and heteroscedasticity. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Descriptive Statistics

	Mean	stdev	p10	p50	p90	N
Funding upon application	3.38	1.05	1.00	4.00	4.00	17,350
Post	0.62					17,350
Treatment	0.034	0.029	0.00	0.03	0.07	17,350
Employees	2.32	0.96	1.00	2.00	4.00	17,350
Age	3.78	0.56	3.00	4.00	4.00	17,350
Sales	2.09	1.02	1.00	2.00	4.00	17,350
Bank profitability	-1.07	16.28	-13.83	3.05	9.10	17,350
Bank financial health	11.69	5.29	6.38	11.61	17.88	17,350
Bank portfolio quality	7.90	6.42	2.80	4.70	16.50	17,350
Bank capitalization	5.93	1.34	4.70	5.60	7.50	17,350
Bank liquidity	38.37	19.92	17.64	32.29	69.64	17,350
Bank allowance coverage	56.40	26.64	40.30	54.95	68.40	17,350
Foreign bank presence	71.98	31.28	49.00	65.69	91.54	17,350
Return on the stock market	4.75	15.30	-19.08	7.33	20.37	17,350
Volatility of the stock market	24.29	6.24	15.49	26.20	31.72	17,350
GDP per capita	32.33	8.54	19.24	35.21	41.11	17,350
GDP growth	0.20	6.61	-8.33	0.00	9.52	17,350

	(1)	(2)	(3)	(4)
	Window: 2011–2013	Window: 2011–2014	Window: 2011–2015	Window: 2011–2015
	Funding upon application	*Funding upon application*	*Funding upon application*	*Funding upon application*
Post × Treatment	-0.088	2.426**	2.364**	2.205**
	(-0.08)	(2.44)	(2.43)	(2.27)
Pre1 × Treatment				-0.844
				(-0.50)
Employees	0.091***	0.106***	0.097***	0.097***
	(4.34)	(5.84)	(6.15)	(6.14)
Age	0.090***	0.099***	0.083***	0.082***
	(4.17)	(4.95)	(4.65)	(4.65)
Sales	0.074***	0.083***	0.095***	0.095***
	(3.97)	(5.42)	(7.00)	(7.03)
Bank profitability	-0.001	-0.002	-0.002*	-0.002*
	(-0.30)	(-1.61)	(-1.86)	(-1.79)
Bank financial health	-0.033*	-0.020*	-0.009	-0.008
	(-1.92)	(-1.76)	(-1.50)	(-1.48)
Bank portfolio quality	0.008	-0.000	-0.009	-0.009
	(0.66)	(-0.03)	(-1.31)	(-1.38)
Bank capitalization	0.006	-0.009	0.060**	0.058*
	(0.08)	(-0.15)	(2.08)	(1.97)
Bank liquidity	-0.004**	-0.003*	-0.000	-0.000
	(-2.61)	(-1.84)	(-0.12)	(-0.00)
Bank allowance coverage	0.000	0.001*	0.001	0.001
	(0.53)	(1.78)	(1.39)	(1.34)
Foreign bank presence	-0.007	-0.003	-0.002	-0.003
	(-1.46)	(-1.01)	(-0.91)	(-0.98)
Return on the stock market	0.003	0.003	0.004*	0.004*
	(0.70)	(1.10)	(1.84)	(1.83)
Volatility of the stock market	0.002	0.015*	0.009	0.009
	(0.27)	(1.72)	(1.49)	(1.56)
GDP per capita	0.074**	0.083**	-0.015	-0.017
	(2.16)	(2.61)	(-0.46)	(-0.53)
GDP growth	-0.009	0.007	0.004	0.004
	(-1.18)	(1.22)	(0.81)	(0.83)
Observations	10,195	13,929	17,350	17,350
R-squared	0.115	0.120	0.114	0.114
Previous Controls	YES	YES	YES	YES
Industry-Country FE	YES	YES	YES	YES
Industry-Half-Year FE	YES	YES	YES	YES

Panel B. Main Regression Results

Table 7. Borrower-Lender Matching and Within-Country-Year Variation in Treatment Effects

This table reports the pertinent summary statistics (Panel A) and the regression analysis of European private companies' financing and investing activities (Panels B and C). The unit of observation is a firm-year. *Debt Issuance* is an indicator that switches on only if there is a positive growth in debt. *Capital Investment* is the percentage growth in net fixed assets, relative to the lagged fixed assets. *Post* equals one for years 2013–2015 and zero otherwise. *Pre1* is an indicator variable that switches on for 2012, one year before the effective year of the ECB LLD Initiative. Windows in column headings denote the years used in the test. Control variables are defined in the appendix. *Treated SME* is an indicator variable that equals one only if at least one of the firm's relationship banks releases asset disclosures under the loan-level reporting regulation. Controls are defined in the appendix. *T*-statistics presented in parentheses are robust to within industry, country, and year correlation and heteroscedasticity. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Descriptive Statistics

	Mean	stdev	p10	p50	p90	N
Debt Issuance	0.42	0.49	0.00	0.00	1.00	97,154
Capital Expenditures	7.62	41.02	-16.29	-1.01	34.44	97,154
Post	0.62	0.49	0.00	1.00	1.00	97,154
Treated SME	0.55	0.50	0.00	1.00	1.00	97,154
Size	16.71	1.66	15.32	16.44	17.86	97,154
Profitability	4.17	8.68	-4.09	3.10	14.45	97,154
Employees	4.11	1.12	2.64	4.19	5.47	97,154

Panel B. Regressions Results: Debt Financing

	(1)	(2)	(3)	(4)
	Window: 2011–2013	Window: 2011–2014	Window: 2011–2015	Window: 2011–2015
	Debt Financing	*Debt Financing*	*Debt Financing*	*Debt Financing*
Post × Treated SME	0.012	0.015*	0.017**	0.016*
	(1.06)	(1.65)	(2.23)	(1.68)
Pre1 × Treated SME				-0.002
				(-0.22)
Size	0.114***	0.099***	0.087***	0.087***
	(5.77)	(7.29)	(8.17)	(8.16)
Profitability	-0.006***	-0.006***	-0.006***	-0.006***
	(-9.11)	(-11.80)	(-14.06)	(-14.06)
Employees	0.013	0.018	0.022**	0.022**
	(0.88)	(1.62)	(2.36)	(2.36)
Observations	57,210	78,267	97,154	97,154
R-squared	0.481	0.392	0.337	0.337
Country-Industry-Year FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES

Panel C. Regressions Results: Investments

	(1)	(2)	(3)	(4)
	Window: 2011–2013	Window: 2011–2014	Window: 2011–2015	Window: 2011–2015
	Capital Investment	*Capital Investment*	*Capital Investment*	*Capital Investment*
Post × Treated SME	1.304	1.096	1.348**	1.299*
	(1.57)	(1.59)	(2.20)	(1.65)
Pre1 × Treated SME				-0.099
				(-0.10)
Size	6.923***	6.493***	5.566***	5.566***
	(3.98)	(5.37)	(6.34)	(6.34)
Profitability	0.018	0.045	0.058	0.058
	(0.22)	(0.76)	(1.28)	(1.28)
Employees	1.180	0.403	-0.152	-0.152
	(0.70)	(0.30)	(-0.13)	(-0.13)
Observations	57,210	78,267	97,154	97,154
R-squared	0.486	0.388	0.331	0.331
Country-Industry-Year FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES