EUROPEAN CENTRAL BANK

EUROSYSTEM

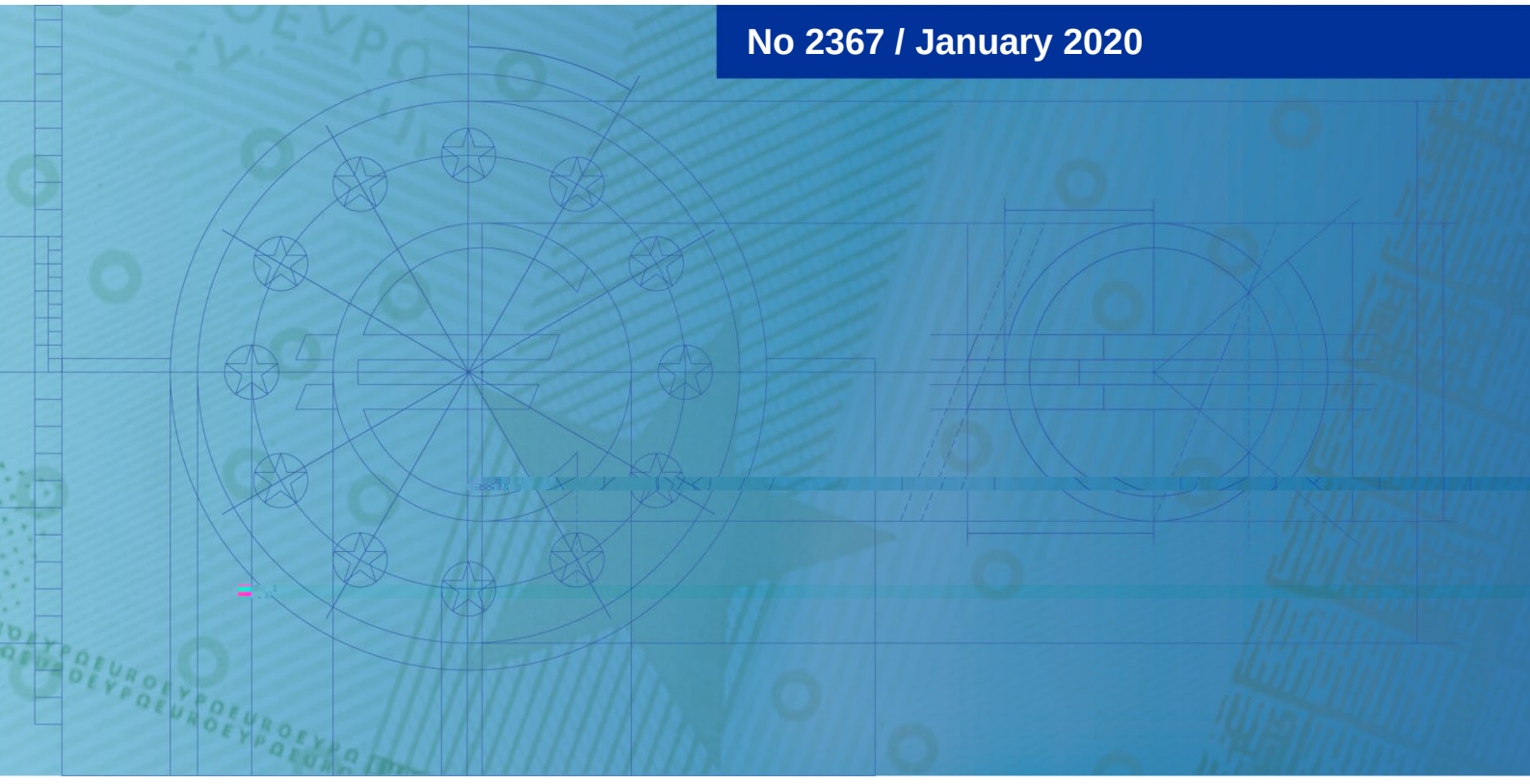
Working Paper Series

Jung Koo Kang, Maria Loumioti,
Regina Wittenberg-Moerman

Lifting the banking veil: credit standards' harmonization through lending transparency

ECB - Lamfalussy Fellowship Programme

No 2367 / January 2020



Disclaimer: This paper should not be reported as representing the views of the European Central Bank (ECB). The views expressed are those of the authors and do not necessarily reflect those of the ECB.

ECB Lamfalussy Fellowship Programme

This paper has been produced under the ECB Lamfalussy Fellowship programme. This programme was launched in 2003 in the context of the ECB-CFS Research Network on “Capital Markets and Financial Integration in Europe”. It aims at stimulating high-quality research on the structure, integration and performance of the European financial system.

The Fellowship programme is named after Baron Alexandre Lamfalussy, the first President of the European Monetary Institute. Mr Lamfalussy is one of the leading central bankers of his time and one of the main supporters of a single capital market within the European Union.

Each year the programme sponsors five young scholars conducting a research project in the priority areas of the Network. The Lamfalussy Fellows and their projects are chosen by a selection committee composed of Eurosystem experts and academic scholars. Further information about the Network can be found at http://www.eufinancial-system.org and about the Fellowship programme under the menu point “fellowships”.

ABSTRACT

We explore whether the transparency in banks' lending activities enhances the harmonization of credit terms that a bank offers across its different geographic regions. We take advantage of a novel loan-level reporting initiative by the European Central Bank, which requires repo borrowing banks that pledge their asset-backed securities as collateral to disclose granular information on loan characteristics and performance. We find that loans originated under the transparency regime share more similar interest rate, loan-to-collateral-value ratio and maturity compared to same-purpose loans issued by the same bank in different regions. Underperforming regional branches and those with less easily accessible peer-branches experience greater convergence in their credit terms, suggesting that transparency facilitates learning across a bank's different geographic regions. Additionally, banks that face stronger regulatory scrutiny are more likely to alleviate credit term disparities under the transparency regime. Overall, our findings suggest that transparency enhances the within-bank harmonization of lending practices.

Keywords: transparency, harmonization, credit market, learning, regulatory scrutiny
JEL Classifications: M41, G21, D83

Non-technical summary

In this paper, we explore whether the transparency in banks' lending decisions can alleviate the dispersion in credit standards that a bank employs across the different geographic regions in which it operates. We take advantage of the introduction of the ECB's loan-level reporting initiative in January 2013 for banks that borrow from its repo financing using their asset-backed securities (ABS) as collateral. Under the new reporting requirements, banks that access ECB's repo financing adopted in a staggered manner quarterly loan-level disclosures of their ABS' loan characteristics and performance. Importantly, the new reporting requirements did not directly aim to alleviate banks' divergence in regional lending practices; rather the ECB's primary objective was to facilitate better risk assessment of banks' securitization activities. Using a sample of 2,607,042 residential mortgages issued by 49 commercial banks over the 2009-2017 period in Belgium, France, Ireland, Italy, Spain and the Netherlands, we find that, compared to mortgages issued in the pre-transparency period, mortgages originated under the transparency regime share more similar credit terms (interest rate, loan-to-collateral-value ratio and maturity) to same-purpose mortgages issued by the same bank in different geographic regions.

Examining the economic mechanisms that likely explain the positive association between transparent reporting and lending practices' harmonization, we show that convergence of credit standards under the transparency regime is stronger for regional branches that underperform their peer branches and for those with not easily accessible peer branches. Thus, under the transparency regime, regional branches can effectively learn about the credit practices in banks' other regions. Moreover, greater regulatory scrutiny further contributes to the positive effect of transparency on credit term convergence. We find that highly profitable banks are more likely to harmonize their credit standards, potentially because these banks are subject to stronger monitoring pressure about disparities in their lending practices. Additionally, under the transparency regime, banks are more likely to converge the credit standards in less-developed regions compared to those in well-developed ones, consistent with regulatory scrutiny in banks' lending practices being stronger in regions with low economic growth.

In supplemental analyses, we show that credit term convergence improves banks' loan portfolio quality and leads to beneficial lending terms for borrowers. We also find that competition across a bank's regional branches does not seem to influence the effect of transparency on lending term convergence. Further, we show that transparent reporting facilitates the harmonization of credit standards that different banks offer to households in the same region and that this effect is also explained by learning and regulatory scrutiny. Last, we document that our findings are generalizable to different credit market segments, such as auto-loans. Overall, we provide evidence that transparent reporting alleviates credit term dispersion across the different geographic regions in which a bank operates.

Prior research in credit markets has examined the effect of transparent reporting and loan-level information sharing on credit availability and risk.[a] However, less attention has been given to the effect of transparency on how banks internally process and assimilate information in their

[a] Pagano and Jappelli 1993; Djankov et al. 2007; Love et al. 2016; Calomiris et al. 2017; Ertan et al. 2017; Sutherland 2018; Liberman et al. 2018.

lending decisions. Divergence in the credit standards that a bank employs across different borrowers is an important aspect of banks' lending decisions in light of recent research showing an economically significant price dispersion in household credit markets (mortgages, credit cards and auto-loans), with much of this dispersion occurring within the same lender and leading to higher borrowing costs and weaker access to credit.[b] We contribute to this literature by documenting that transparent reporting incentivizes banks to harmonize their lending practices by facilitating learning across regional branches and allowing tighter regulatory scrutiny. Moreover, we extend the literature that explores the effect of loan-level information sharing across banks on lending efficiency.[c] Our contribution lies in documenting the role of transparency in enhancing lending practices within banks. Finally, we extend recent studies on the role of bank regulators in promoting transparent reporting practices by providing evidence of credit term convergence as an unintended consequence of ECB's regulatory agenda.[d]

[b] Woodward and Hall 2012; Allen et al. 2014; Gurun et al. 2016; Stango and Zinman 2016; Argyle et al. 2017; Bhutta et al. 2018; Alexandrov and Koulayev 2018.
[c] Jappelli and Pagano 2006; Djankov et al. 2007; Doblas-Madrid and Minetti 2013; Liberti et al. 2018; Darmouni and Sutherland 2018.
[d] Granja 2018; Granja and Leuz 2018; Costello et al. 2018.

1. Introduction

A large body of literature on credit markets has shown that banks specialize in producing and utilizing private information about their borrowers (e.g., Diamond 1984, 1991; Fama 1985; Rajan 1992). Over the past few decades, however, banks have alleviated information frictions about borrowers by exchanging information with other lenders through credit bureaus and other loan reporting platforms (e.g., Pagano and Jappelli 1993). Greater transparency has been documented to influence credit availability (e.g., Jappelli and Pagano 2006; Djankov et al. 2007; Liberti et al. 2018) and lending quality (Ertan et al. 2017; Sutherland 2018). In this literature, less attention has been given to the effect of transparency on how banks internally process and assimilate information in their lending decisions. In this paper, we provide initial evidence on this topic by examining whether transparency in banks' loan decisions can foster the harmonization of credit standards that a bank employs across the different geographic regions in which it operates.

To address our research question, we take advantage of the new loan-level reporting requirements introduced by the ECB in January 2013 for banks that use their asset-backed securities (ABS) as repo collateral. Under the new reporting rules, banks that accessed the ECB's repo financing adopted in a staggered manner quarterly loan-level disclosures of their ABS portfolio structure (i.e., loan characteristics such as interest rate, loan-to-collateral-value ratio and maturity) and performance (e.g., loan defaults and delinquencies). Specifically, banks that had ECB's repo credit lines outstanding by the end of 2012 were required to report loan-level data as of January 2013, while others had to comply with the new reporting rules only when they started repo borrowing in later quarters. A central information repository, the European DataWarehouse (ED), administers data collection and compliance under the transparency regime. Other than the ECB, these loan-level disclosures are available to banks, regulators, credit rating agencies and

other non-bank institutional investors. Importantly, the new reporting requirements did not directly aim to alleviate banks' divergence in regional lending practices; rather, the ECB's primary objective was to facilitate better risk assessment of banks' securitization activities. The new reporting standards forced banks to enhance their internal information reporting by collecting and disclosing a broader range of borrower- and loan-level data.[1] Moreover, the ED monitors data consistency and accuracy, helping banks improve reported data quality.

We predict that transparent reporting will foster the harmonization of the credit standards that a bank employs across its different geographic regions for two primary reasons. First, the granular information collection and disclosure will better allow loan officers to learn what branches in other regions offer to similar borrowers. Importantly, transparency is likely to facilitate the transmission of the more efficient credit practices across a bank's regional branches, leading to lower within-bank disparities in credit standards. This prediction is in line with findings in the corporate setting that external reporting rules affect internal reporting quality and consequently investment choices (e.g., McNichols and Stubben 2008; Shroff 2017; Roychowdhury et al. 2019).

Second, while credit term dispersion can be driven by borrower- or region-specific risk factors, prior studies show that lending term dispersion persists even within the same bank and for borrowers with similar credit risk profiles, particularly for those with low credit score and income (Woodward and Hall 2012; Allen et al. 2014; Stango and Zinman 2016; Argyle et al. 2017; Bhutta et al. 2018). Alleviating excessive credit standard discrepancies is an important objective of the ECB. In this respect, transparency can facilitate greater external monitoring by exposing excessive deviations in the lending terms that a bank offers to households across different regions. We thus

[1] Indeed, using ED's loan-level data in 2014 (i.e., one year after the reporting initiation), Ertan et al. (2017) document a significant volume of missing variable values at the beginning of the transparency regime, with banks enhancing their information collection by about 12.5% over the first three quarters of 2013, i.e., over the grace period that the ECB offered banks to fully comply with loan data reporting.

expect that greater regulatory scrutiny under the transparency regime will further contribute to the harmonization of the lending standards that a bank employs across different regions.

However, greater transparency may not result in higher credit term convergence. Although transparency can facilitate learning and tighter regulatory oversight, it does not alleviate persistent differences in lending standards driven by regional characteristics, local debt market dynamics and risk factors. Relatedly, borrower-specific soft information commonly employed by loan officers when issuing loans will naturally lead to different credit terms across borrowers (e.g., Petersen and Rajan 1994; Agarwal and Hauswald 2010). Moreover, since the loan-level data is not available to borrowers, they cannot compare lending terms across a bank's different branches. Thus, the transparency initiative does not diminish borrowers' search costs, which prior studies identified as the primary driver of credit term dispersion (e.g., Lacko and Pappalardo 2010; Allen et al. 2014).

We test our predictions by employing data on residential mortgages reported to the ED over the 2013-2017 period. Our sample covers 2,607,042 residential mortgages issued by 49 commercial banks over the 2009-2017 period in Belgium, France, Ireland, Italy, Spain and the Netherlands. We focus on three primary mortgage terms reported by banks—interest rate, loan-to-collateral-value (LTV) ratio and maturity. For each sample mortgage, we construct a benchmark loan group by selecting residential mortgages originated by the same bank for the same purpose (house purchase or home equity) in different geographic regions of the same country over the previous quarter (benchmark mortgages, hereafter). We measure mortgage term divergence using the distance between a mortgage's terms and the average terms of its benchmark mortgages.

Supporting our prediction, we find that residential mortgages originated under the transparency regime share more similar terms to benchmark mortgages, controlling for loan and borrower characteristics, and year of loan origination, region and bank fixed effects. Economically, relative

to pre-transparency mortgages, mortgages originated post-transparency have about 45.1% lower interest rate divergence compared to their benchmark mortgages. Also, LTV ratio and maturity divergence drops by about 10.0% and 13.2% for mortgages issued post-transparency compared to their benchmark mortgage groups, respectively.

We recognize the possibility that our results may be influenced by other regulatory initiatives, such as the Mortgage Credit Directive in 2016 and the EU Securitization Regulation 2017/2402. To address this concern, we restrict our sample to mortgages issued over the 2011-2014 period, i.e., the period preceding the introduction of these initiatives. Further, we take advantage of banks' staggered adoption of the loan-level reporting requirements. We focus on mortgages issued by banks that adopted the reporting standards in the first two quarters of 2013 and compare them to mortgages issued over this period by non-reporting banks (i.e., banks that started borrowing from the ECB's repo operations in later quarters and were thus not required to report yet). In both tests, we continue to find that transparency reduces credit term dispersion in most specifications.

Another concern is that banks may strategically choose when to adopt the new reporting standards (i.e., when to access the ECB's repo credit line) based on the characteristics of their securitized portfolio loans. To mitigate this concern, we limit our sample to banks that started ECB repo borrowing prior to the first quarter of 2013, since these banks must adhere to the reporting standards as of January 2013. We continue to find that transparency attenuates the dispersion of the credit practices that a bank employs across its different geographic regions. Further, we examine whether our results may be influenced by the higher quality of loans that banks issue post-transparency (e.g., Ertan et al. 2017), which may decrease the heterogeneity of borrower and loan characteristics in their portfolio and thus lead to greater credit term convergence. Our findings are overall robust to (1) redefining benchmark mortgage groups to account for borrower features (age

and income); (2) controlling for borrower fixed effects; and (3) using a propensity score matching methodology, where we match transparency with pre-transparency mortgages on their terms. In additional univariate tests, we show that borrowers' credit risk profiles do not significantly differ between the pre- and post-transparency period. Collectively, these analyses suggest that our results are unlikely to be driven by a shift in borrower characteristics or an overall change in credit standards under the transparency regime.

Next, we delineate the channels through which transparency affects credit standard harmonization. We show that mortgage term convergence post-transparency is greater for banks' low-performing regional branches, suggesting that these branches learn from and converge to the lending practices of the better performing branches. Specifically, we show that regional branches with a substantially higher volume of mortgage defaults relative to that of their benchmark branches are more likely to issue mortgages with more similar terms to those offered in their benchmark regional branches. We also document that mortgage term convergence is greater post-transparency when benchmark regional branches are spatially remote, consistent with the view that transparency allows loan officers to learn about the contractual terms of similar loans offered by their colleagues located in not easily accessible regions.

Moreover, we examine our prediction that regulatory scrutiny under the transparency regime further enhances credit term convergence. We focus on the mortgage term convergence of high-income banks, as these banks likely face greater regulatory scrutiny regarding disparities in their lending practices (e.g., Binkley 2008; Steil et al. 2018; Bouyon and Oliinyk 2019). We find that high-income banks are more likely to harmonize their credit standards across the different regions post-transparency. In addition, excessive dispersion in the credit terms offered by a bank to similar households across a country's economically strong and weak regions is likely to attract greater

scrutiny by the ECB given its objective to alleviate such disparities. We show that under the transparency regime, banks are more likely to converge the credit standards in their less-developed regions towards those in well-developed ones, in line with regulatory scrutiny incentivizing banks to revisit and harmonize their lending practices in regions with low economic growth.

In supplemental analyses, we examine whether the harmonization of lending standards post-transparency affects banks' financial performance. We show that banks with a higher degree of credit term convergence under the transparency regime decrease their non-performing loan intensity and do not experience significant changes in their return on assets. These findings are consistent with the view that transparency forced banks to revisit and improve their internal lending processes by converging towards better credit practices. With respect to the benefits of credit term harmonization for borrowers, we find that mortgages issued by high-convergence banks post-transparency have lower interest rate and longer maturity. This evidence is in line with prior studies which show that credit term dispersion is associated with certain households overpaying for their debt (e.g., Allen et al. 2014; Bhutta et al. 2018); thus, as credit term dispersion decreases post-transparency, borrowing terms improve. Given these benefits of credit term convergence to banks and borrowers, one may question why banks have not voluntarily adopted more effective internal reporting systems. While adopting a comprehensive loan-level internal reporting system may be very costly for banks, the ED's reporting infrastructure and close monitoring of loan-level data quality helped banks to significantly reduce the costs of building such systems. Thus, the transparency initiative was likely instrumental in facilitating better accuracy, consistency and accountability of banks' information collection and internal reporting process.

We further examine the credit term harmonization *across banks*. We show that transparency promotes greater convergence of the lending practices across different banks that operate in the

same geographic region, and learning and regulatory scrutiny continue to be instrumental to the association between transparency and cross-bank lending standard harmonization. Importantly, we fail to find that competition across regional branches of the same bank (or across banks within the same region) influences the effect of transparency on lending term convergence. Finally, we show that our findings are robust when we examine a different credit market segment—auto-loans.

Although our findings suggest that greater transparency in the banking sector can alleviate excessive regional credit standard disparities, we caution against a normative interpretation of our results. More homogenous lending practices may entail certain costs that are unexplored in this study. For instance, holding more homogenous loans may make banks' balance sheets more exposed to macroeconomic risks. As such, we cannot conclude on the optimality of greater transparency in the banking sector.

The paper makes several contributions to the literature. Our research is relevant to studies that examine how external reporting incentives and compliance with reporting rules influence companies' internal information collection and processing, and consequently, their investment decisions (e.g., Kanodia and Sapra 2016; Roychowdhury et al. 2019). To exemplify, McNichols and Stubben (2008) show that when internal information quality is negatively affected by external reporting incentives, the efficiency of managers' investment decisions decreases. Shroff (2017) finds that compliance with new accounting rules forces managers to collect and process additional information relevant to their investment decisions. We add to these studies by documenting that transparent reporting facilitates banks' learning about more efficient credit practices and influences their lending decisions.

We further extend the growing literature which documents a significant price dispersion in the household debt markets. Prior studies have documented that price dispersion unexplained by

borrowers' credit risk has negative implications for borrowers' cost of capital, access to credit and consumer behavior (e.g., Woodward and Hall 2012; Allen et al. 2014; Gurun et al. 2016; Stango and Zinman 2016; Scharfstein and Sunderam 2016; Bhutta et al. 2018; Argyle et al. 2017). Our contribution lies in showing that transparent reporting incentivizes banks to harmonize their lending practices by facilitating tighter regulatory scrutiny and learning across regional branches.

Moreover, our research adds to the literature that examines the influence of information sharing across banks on credit availability and lending efficiency (e.g., Jappelli and Pagano 2006; Djankov et al. 2007; Doblas-Madrid and Minetti 2013; Ertan et al. 2017; Liberti et al. 2018; Sutherland 2018). We add to these studies by documenting the role of transparency in enhancing lending practices *within banks*. Our work is also related to Darmouni and Sutherland (2019), who find that information sharing among lenders in a U.S. commercial credit bureau motivates them to issue small business loans with more similar maturity to what other lenders offer. They show that these findings are driven by lenders' incentives to preserve market share by matching their competitors' credit terms. Our contribution lies in documenting the effect of transparency on harmonizing credit standards *within banks* as well as examining both loan pricing and non-pricing terms (loan interest rate, credit availability and maturity). Importantly, we show that learning and regulatory scrutiny, rather than competitive pressures, are the primary channels that link transparency with credit term harmonization. Finally, we add to studies on the role of bank regulators in promoting transparent reporting (e.g., Granja 2018; Granja and Leuz 2018; Costello et al. 2018) by providing evidence of credit term convergence as an unintended consequence of the ECB's regulatory agenda.

2. Institutional background and predictions

2.1. Transparency initiatives in the banking sector

Over the past two decades, the banking sector has experienced many transparency initiatives

that aim to make granular and detailed information about lenders' credit decisions available to other lenders, investors and regulators. Prior literature has provided mixed evidence on the benefits and costs of these initiatives with respect to credit frictions and risk. On one hand, Jappelli and Pagano (2006) and Djankov et al. (2007) show that banks' information sharing through credit registries can alleviate borrowing constraints. Similarly, Love et al. (2016) and Calomiris et al. (2017) document that national credit registries for movable collateral enhance firms' access to credit. Transparent reporting has further benefited lenders that can learn about and enter new credit market segments (Liberti et al. 2018). Moreover, prior studies document a positive impact of transparency on banks' credit risk: loan defaults and banks' likelihood to lend to low-quality borrowers substantially decrease after they adopt more transparent reporting (e.g., Doblas-Madrid and Minetti 2013; Ertan et al. 2017). Ertan and Balakrishnan (2018) also show that credit information sharing improves banks' loss recognition timeliness. On the other hand, prior studies outline the costs of greater transparency. Hertzberg et al. (2011) show that transparency may incentivize a run-like behavior by banks, leading to borrowers' financial distress. Sutherland (2018) finds that initiating loan-level disclosures deters banks from establishing strong lending relationships with borrowers. Also, Murfin and Pratt (2018) show that granular credit data can urge banks to compare loan prices, leading to herding and low-quality credit decisions.

In the banking literature, less attention has been given to whether transparent reporting initiatives affect how lenders process information internally and make loan decisions. However, in the corporate setting, the effect of external reporting incentives and compliance with reporting rules on internal information processing has been well documented (Roychowdhury et al. 2019). For instance, McNichols and Stubben (2008) show that managers' reliance on their own misreported financial statements leads to low investment performance. Relatedly, Shroff (2017)

finds that when managers are required to comply with new external reporting rules, they are forced to collect and process additional information, which improves their investment decisions and performance. Consistently, Heitzman and Huang (2019) provide evidence of managers' decision-making extensively relying on information within their firms when internal information quality is high. In addition, Bae et al. (2017) examine the role of auditors as information intermediaries and show that knowledgeable auditors improve companies' information quality and, consequently, their investment efficiency.

Motivated by these studies, we attempt to provide preliminary evidence of whether transparency affects banks' internal information processing and lending practices. Specifically, we examine whether the introduction of transparent reporting fosters greater convergence of the lending standards that a bank employs across its different geographic regions. Credit term divergence can be driven by borrower- or region-specific risk factors, credit market dynamics (e.g., number of regional bank branches) and local lending practices (e.g., PwC 2015; Belke et al. 2016).[2] Also, credit term divergence may be influenced by loan officers' use of soft information that they collect through repeated interactions with borrowers (e.g., Petersen and Rajan 1994; Agarwal and Hauswald 2010). However, credit term divergence can also indicate inconsistent credit standards and excessive discrepancies in local credit practices. Allen et al. (2014), Gurun et al. (2016), Bhutta et al. (2018) and Alexandrov and Koulayev (2018) document a significant mortgage price dispersion even within the same lender and across borrowers with very similar credit risk profiles, showing that a bank charges a higher interest rate for certain borrowers while offering lower mortgage rates to other similar borrowers. This price dispersion is found to be more pronounced

[2] Within the EU context, significant disparities in regional credit access are documented in the 2018 ECB's survey results (Benoit Coeure, "The local impact of the ECB's monetary policy", 4 October 2018, https://www.ecb.europa.eu/pub/pdf/annex/ecb.sp181004_slides.en.pdf).

among less sophisticated borrowers and those with lower credit score, income and net worth. Similar results are also documented in the auto-loan (e.g., Argyle et al. 2017) and credit cards setting (e.g., Stango and Zinman 2016). This price dispersion has been shown to adversely affect household consumption and access to credit and to impede the transmission of fiscal policies (e.g., Scharfstein and Sunderam 2016; Argyle et al. 2017; ECB 2018). In addition, De Santis (2016) finds substantial borrowing cost heterogeneity of European firms, which is not explained by credit risk, and documents the adverse impact of these disparities on economic growth.

2.2. The ECB loan-level reporting initiative

Perhaps the most important transparency initiative in the EU credit markets so far has been the introduction of the new loan-level reporting requirements for the ECB's repo borrowers. Starting in January 2013, the ECB mandated that banks must quarterly disclose granular loan data on the portfolio structure (i.e., loan terms and borrower characteristics) and performance (e.g., loan defaults and delinquencies) of the asset-backed securities (ABS) that they originated and pledge as repo collateral. Thus, banks that traditionally used the ECB's ABS-backed repo credit line started loan-level reporting as of January 2013, while others that subsequently accessed this repo financing adopted the new disclosure standards in later quarters. These ABS primarily cover residential mortgage-backed securities (RMBS), auto-loan, SME-loan and consumer finance loan/credit card-backed securities. The framework of the new reporting requirements was designed and negotiated among banks, ECB representatives, institutional investors and credit rating agencies over the 2010-2011 period.[3]

The new disclosure requirements were first introduced in April 2011 for RMBS and SME-loan ABS, to which banks participating in repo borrowing had to adhere from January 2013. Loan-level

[3] A bank that fails to comply with these new disclosure requirements cannot borrow from the ECB's repo financing, which can be costly given the very low interest rates the ECB offers (ECB Euro Money Survey 2012).

reporting is facilitated by the European DataWarehouse (ED). Launched in June 2012, the ED is the central repository of ABS information that administers data collection and compliance with the ECB reporting standards. The ED also monitors data consistency and accuracy, including checking for inappropriate or excessive missing variable values and for material deviations in key data compared to previous submissions.[4] The ED data is accessible to and used by the ECB, banks (data providers and others), regulators, non-bank institutional investors and credit rating agencies.[5] The ECB's goal in implementing the new reporting requirements was to improve the risk assessments of ABS that in the past "have been hampered by the lack of standardized, timely and accurate information on single loan exposure." The ECB thus posits that "greater transparency will help to restore confidence in the securitization market."

The new reporting standards mandated by the ECB forced banks to materially increase their loan-level collection volume and quality.[6] To exemplify, the RMBS disclosure framework includes 183 loan-level variables, with reporting requirements for other ABS categories being similarly extensive. Prior to the new requirements, many of these variables were not collected.[7] The ECB granted banks a nine-month grace period to improve their information collection and fully comply with the new reporting mandate. Indeed, using ED's loan-level data in 2014 (i.e., one year after the reporting initiation), Ertan et al. (2017) document a significant volume of missing variable values at the beginning of the transparency regime, with banks enhancing their information

[4] Moreover, the ED pressures banks for greater reporting compliance by backfilling quarterly missing observations. A significant component of ED analysts' tasks is the development of new data verification and accuracy checks as well as the improvement of existing ones.
[5] Loan-level data is not accessible by borrowers or included in banks' annual reports. The ED has more than 160 institutional subscribers.
[6] The stricter monitoring and oversight on banks by central regulators has been also documented in prior studies (e.g., Behn et al. 2015; Granja and Leuz 2018; Costello et al. 2018).
[7] The lack of detailed, granular and standardized loan information collection and processing by banks can also be witnessed in the ECB's Anacredit project, which was initiated in 2014 with the aim to force banks to provide detailed loan-level information about their entire portfolio. A pilot reporting of the data was only launched in late 2018.

collection by about 12.5% over the first three quarters of 2013. Moreover, to a large extent, loan-level variables were not shared across different branches within the bank. Our interviews with credit managers at large European banks, who are directly involved with reporting loan-level data to the ED, further confirm this argument. As these managers conveyed in our discussions, prior to the transparency regime, many information items had been kept in decentralized local branch reporting systems or in hardcopy format and therefore were not shared across branches or effectively used by loan officers in loan underwriting. The ECB's new reporting mandate thus forced banks to improve their data collection process and internal information reporting systems.

2.3. Predictions

We predict that loans originated under the transparency regime will have more similar terms to loans issued by the same bank to borrowers across its different regions for two primary reasons. First, the granular reporting of loan terms, borrower characteristics and credit outcomes can facilitate greater learning across a bank's regional branches, allowing loan officers to gain insight into what their colleagues offer for similar loans and borrowers in different regional branches (i.e., creating a feedback loop for their own lending decisions). Specifically, transparent reporting is likely to facilitate the learning of better or more efficient credit practices across regional branches, leading to smaller contractual differences in the credit terms a bank offers to borrowers across different regions. This prediction is also consistent with prior evidence in the corporate setting that external reporting incentives and compliance with reporting rules affect internal information quality and, consequently, decision making (McNichols and Stubben 2008; Kanodia and Sapra 2016; Shroff 2017; Roychowdhury et al. 2019).

Second, greater regulatory scrutiny under the new reporting requirements is also likely to contribute to the harmonization of the lending terms that a bank offers to its borrowers across

different regions. Recent studies suggest that, even after controlling for borrowers' credit risk, there is a substantial dispersion in lending terms across borrowers in the household credit markets, and that these discrepancies are prevalent within the same bank (Woodward and Hall 2012; Allen et al. 2014; Stango and Zinman 2016; Argyle et al. 2017; Bhutta et al. 2018). Critically, these studies document that credit term dispersion is more prevalent across less sophisticated borrowers and those with low credit score, income and net worth, which adversely affects these borrowers' cost of debt and access to credit. An important objective in the ECB's agenda is to monitor and attenuate material divergence in borrowing costs and credit availability across different European regions (ECB 2018). Although the ECB's new reporting requirements did not directly aim to alleviate banks' divergence in regional lending practices, transparent reporting can indicate material discrepancies in regional credit standards. We therefore expect transparency to increase regulatory scrutiny related to banks' credit decisions, incentivizing them to identify and alleviate excessive heterogeneity in the loan terms offered to borrowers across different regions.

Although we expect that greater transparency will harmonize banks' lending practices across the different regions in which they operate, we recognize several factors that may confound our prediction. First, while transparency can facilitate learning and enhance regulatory oversight, it does not alleviate strong and persistent differences in lending standards driven by regional characteristics and risk factors. Second, borrower-specific soft information is commonly employed by loan officers to enhance the quality of their lending decisions (e.g., Petersen and Rajan 1994; Agarwal and Hauswald 2010). Reliance on soft information will naturally lead to greater credit term divergence. Third, the loan-level data is not available to households; thus, borrowers cannot compare lending terms across the different branches of a bank. As a result, the ECB's transparency initiative does not alleviate borrowers' search costs, which prior studies have argued to be the

primary driver of credit term dispersion (e.g., Lacko and Pappalardo 2010; Allen et al. 2014). As a result, whether transparency can lead to greater harmonization of a bank's lending terms across different regions remains an open question.

3. Data methodology

We obtain data on the lending terms and borrower characteristics of securitized residential mortgages (RMBS) from the European DataWarehouse (ED). Since January 2013, the ED has retrieved loan-level information on the portfolio structure and performance of asset-backed securities (e.g., residential mortgage, SME loan, auto-loan, credit card/consumer finance and commercial mortgage ABS), which are pledged by European banks as collateral for repo financing from the ECB. Given that this form of repo borrowing can be facilitated by ABS that banks have issued and are currently outstanding, the ED database covers granular information on ABS' loans issued before and after the initiation of the new reporting standards.

We focus on residential mortgage-backed securities for at least two reasons. First, housing finance constitutes the largest liability of households and a significant proportion of bank lending, accounting for 47% of the EU's GDP (European Mortgage Federation 2017). Second, with respect to residential mortgage securitizations, the ED covers detailed information on borrowers' profiles (e.g., age and employment) and financial performance (e.g., annual income), as well as loan characteristics (e.g., interest rate, loan-to-value ratio and maturity). We are thus able to control in our empirical analyses for a battery of borrower and loan characteristics that can affect banks' choices in setting credit terms.

Our primary sample includes 3,523,512 residential mortgages with complete data on credit terms issued over the 2009-2017 period to 2,279,917 unique borrowers. We focus on mortgages issued after 2009 to alleviate the concern that our results are affected by the greater standardization

of securitized loan contracts during the credit expansion (e.g., Ayotte and Bolton 2011; Bozanic et al. 2018). Moreover, we exclude banks that only report mortgages issued in the pre-transparency period (255,559 mortgages), as we cannot test the effect of the new reporting standards on their lending practices. We further exclude mortgages in restructured RMBS to mitigate the concern that RMBS renegotiations can affect securitized mortgage pool characteristics (221,724 mortgages).[8] Last, we eliminate regions where sample banks report a very low mortgage issuance volume (regions with mortgage reporting intensity at the bottom decile of sample banks' reporting intensity, i.e., regions where a bank reports fewer than 400 new mortgages per quarter; 439,187 mortgages are excluded). Our final sample includes 2,607,042 mortgages issued to 1,620,386 borrowers by 49 commercial banks over the 2009-2017 period in Belgium, France, Ireland, Italy, Spain and the Netherlands.[9] Our sample banks cover small regional banks to national and international banks.[10] The sample process criteria are described in Panel A of Table 1.

We report sample statistics in Panel B. Consistent with credit market reports on RMBS issuance volume across Eurozone countries (e.g., AFME 2017), our sample residential mortgages are primarily originated in the Netherlands (50%), France (25.1%) and Belgium (19.2%). Further, following the RMBS issuance contraction related to the European sovereign bond crisis in 2011 (e.g., SIFMA 2018), the number of securitized residential mortgages in our sample is substantially lower post-transparency, especially in South Europe; about 37% of the sample mortgages are issued under the new reporting standards.

[8] These mortgages are related to RMBS Bass Master N.V.S.A. Series-2008, restructured in 2015.
[9] The RMBS volume in the sample countries accounts for about 91.5% of the Eurozone RMBS balance outstanding (AFME 2017). As of 2017 Q3, about 18% of residential mortgages outstanding were securitized in our sample countries (AFME 2017; European Mortgage Federation 2017).
[10] Based on our signed nondisclosure agreement, we are privy to the bank names and detailed characteristics.

$$+\beta_8 Borrower\ employment + \beta_9 Borrower\ age + Fixed\ effects. \quad \text{(Model 1)}$$

The analysis is at the mortgage level. The primary independent variable of interest in Model 1 is an indicator variable of whether a mortgage is originated after the bank initiated transparent reporting (*Transparency*). Based on our predictions, β_1 should be negative. We control for mortgage terms, including mortgage interest rate in percentage points (*Mortgage interest rate*), the natural logarithm of loan-to-value ratio in percentage points (*LTV ratio*), the natural logarithm of mortgage maturity in months (*Mortgage maturity*) and an indicator variable of whether the mortgage is guaranteed (*Mortgage guarantee*). We further control for borrower characteristics measured at mortgage origination, such as the natural logarithm of a borrower's annual income in euros (*Borrower income*), an indicator variable of whether the borrower is unemployed or a student (*Borrower employment*) and the natural logarithm of a borrower's age in years (*Borrower age*). The variables are described in detail in Appendix A, and we report their summary statistics in Table 2. Moreover, we include in our tests year of mortgage origination, property region (NUTS1) and bank fixed effects (49 unique banks) to control for changes in credit standards over time, region-specific risk factors and bank characteristics that may influence credit term divergence.[12] Results are robust when controlling for year-quarter fixed effects (untabulated). Last, we include mortgage purpose (house purchase or home equity) and borrower type (individual or other) fixed effects to capture differences in lending terms across borrower and mortgage types. Standard errors are clustered at the bank level.

We report the results of these analyses in Table 3. Across all specifications, we show that transparent reporting significantly decreases mortgage term divergence. Economically, relative to

[12] We control for NUTS1 rather than NUTS3 fixed effects to mitigate the concern of biased estimates due to controlling for a very large number of NUTS3-region dummies (e.g., Angrist and Pischke 2008). However, our results are robust to controlling for NUTS2, NUTS3 or country fixed effects (untabulated).

pre-transparency mortgages, mortgages originated post-transparency have about 45.1% lower interest rate divergence compared to their benchmark mortgages (specification 1).[13] Also, *LTV ratio divergence* and *Maturity divergence* drop by about 10.0% and 13.2% for mortgages issued post-transparency compared to their benchmark mortgage group, respectively (specifications 2 and 3). Thus, while banks in the post-transparency period offer mortgages with more similar terms across the geographic regions in which they operate, transparent reporting has a greater effect on the convergence of loan interest rate rather than of loan-to-collateral-value or maturity. This finding is consistent with prior evidence that credit availability divergence narrows at a slower pace than price-based divergence (ECB 2018).[14]

In terms of our control variables, we find that credit term divergence is higher for borrowers with low income, consistent with prior studies showing that credit term dispersion is more prevalent among low-quality borrowers (e.g., Stango and Zinman 2016; Gurun et al. 2016; Bhutta et al. 2018). Relatedly, we further show that credit term divergence is lower for guaranteed mortgages, i.e., less risky mortgages. We find that mortgage term divergence increases with a borrower's age, in line with borrowers' delinquency risk increasing closer to retirement.[15] Our findings continue to hold when we further control for *Mortgage interest rate* (specification 1), *LTV ratio* (specification 2) and *Mortgage maturity* (specification 3) (untabulated robustness tests).

There is also a possibility that mortgage term divergence may be driven by the similarity in borrower characteristics and credit terms between the mortgage under consideration and the

[13] Given that the sample mean mortgage value is about 80,000 Euros and the mean mortgage maturity is 30 years, the euro-value effect of transparency on borrowing cost convergence is about 7,200 Euros over the mortgage life (or about 2% of the annual borrower income).
[14] Our findings continue to hold when we eliminate from our sample mortgages issued by banks that received bailout funding during the European sovereign debt crisis in 2010-2013, suggesting that the ECB's close monitoring of the lending practices of these banks is unlikely to drive our results (untabulated tests).
[15] For example, recent studies by the Consumer Financial Protection Bureau (2015) and the American Association of Retired Persons (2016) highlight the highly increasing delinquency rates by U.S. borrowers age 50 and older on their debt.

mortgages in its benchmark group. To alleviate this concern, in untabulated tests, we further control for measures of the distance of our control variables between the mortgage under consideration and its benchmark group mortgages (e.g., with respect to *Borrower income*, we add a control that reflects the absolute value of the difference between a borrower's income and the average income of borrowers in the benchmark group). Our results continue to hold. Also, we find no economically significant differences in these distance measures for mortgages issued pre- versus post-transparency (untabulated univariate tests).

The results presented in Panel A of Table 3 are consistent with our hypothesis that banks' transparent reporting attenuates credit term dispersion. However, an important concern is that our findings may be driven by the introduction of other regulatory initiatives that can affect banks' reporting or securitization activities. For example, the adoption of the Mortgage Credit Directive in 2016 mandates that banks provide borrowers with information about mortgage terms in a standardized and comparable format (the European standardized information sheet). This information likely improves borrowers' understanding of mortgage terms and facilitates the comparison of mortgage terms offered by a bank's branches. Therefore, although the Mortgage Credit Directive does not require banks to standardize mortgage terms, it is likely to reduce borrowers' search costs. Thus, bank branches may be incentivized to offer mortgages with more similar credit terms. In addition, under the new EU Securitization Regulation 2017/2402 introduced in 2015, the design of securitized loans should be more standardized with respect to the interest rate, early amortization terms and provisions of creditors' control rights. While this regulation does not become effective until 2019, we acknowledge that banks may change their lending and securitization practices in anticipation of the required compliance.

To address the concern that our findings can be attributed to these regulatory changes that are

unrelated to reporting transparency, we perform two sets of analyses. First, we restrict our sample to mortgages issued within a two-year period around the initiation of transparent reporting standards (i.e., during the 2011-2014 period). This sample period precedes the two regulatory changes discussed above. Panel B of Table 3 reports the results of these tests. We show that our findings on mortgage interest rate and maturity convergence continue to hold within this significantly shorter sample period.

Second, we take advantage of banks' staggered adoption of the ECB's reporting standards. Thus, we limit our sample to mortgages originated in the first two quarters of 2013 and compare the credit term convergence of mortgages issued by transparent banks and banks that have yet to adopt the new reporting standards (i.e., banks that started using repo financing in later quarters). Note that banks that adopted the new disclosure standards in 2013Q1 reported loan-level data in early January 2013, i.e., they reported granular information of previously issued ABS loans. Thus, we can identify mortgages issued by these banks in the last quarter of 2012 and construct benchmark loan groups for mortgages issued in the first quarter of 2013.

As we report in Panel C, despite a drastic reduction in the sample size, we find that *Transparency* has a significant negative effect on mortgage price and maturity divergence. Economically, relative to mortgages originated during the first two quarters of 2013 by non-reporting banks, mortgages originated during the same period by reporting banks have a lower interest rate and maturity divergence by about 10.3% and 2.7%, respectively. We fail to find that transparency can foster LTV convergence over the first two quarters of 2013, potentially because banks adjust credit availability at a slower pace than they do for other contractual terms (e.g., ECB 2018). The economic significance of *Transparency* is lower in these analyses relative to that reported in our primary tests, which can be explained – at least partially – by better controlling for

the evolution in banks' reporting and securitization dynamics. In addition, a bank's branches may require a longer period to sufficiently learn about the efficient credit practices of the other branches and regulators may need information from multiple reporting quarters to put substantial pressure on banks to harmonize their credit standards. Collectively, the analyses in Panel B and Panel C suggest that our results on the association between transparency and lending term harmonization are unlikely to be explained by other regulatory initiatives.

Next, we address the concern that banks may strategically choose when they adopt the new transparent reporting standards based on the characteristics of their underlying securitized portfolio mortgages. To alleviate this concern, based on banks' annual reports, business press articles and the ED's reports, we identify 12 sample banks that started using ECB's ABS-backed repo financing prior to January 2013.[16] These banks are thus required to adopt the new standards in the first quarter of 2013. We re-estimate Model 1 for these banks and present the results in Panel D of Table 3. We find that transparency reduces interest rate and LTV divergence, and these effects are statistically and economically similar to those of our primary analyses. Note that the sample size in these analyses represents a significant proportion of our total sample (42%), because the above-mentioned repo-borrowers are relatively larger size banks with greater lending volume.

4.2. Sensitivity analyses

We perform a battery of additional sensitivity tests to support the credibility of our findings. Ertan et al. (2017) show that banks issue better-quality loans following the adoption of the ECB's transparent reporting standards. These findings suggest that banks may reject loan applications of riskier borrowers post-transparency, which results in banks' loan portfolios largely consisting of

[16] We rely on various external reports—instead of merely using the ED's loan-level reporting data in January 2013—to verify that these sample banks borrowed repo prior to 2013, rather than starting this credit line in January 2013.

higher quality and thus more homogenous borrowers. This "flight to quality" can decrease heterogeneity in borrower and loan characteristics, influencing our findings on the higher credit term convergence post-transparency.

To alleviate this concern, we first explore whether borrowers' credit risk profiles change post-transparency. We report the results of these univariate tests in Appendix B. We find no evidence that borrower characteristics commonly employed to assess loan repayment ability—including income, age and employment status—are significantly different across the pre- and post-transparency periods. For instance, the difference in the mean borrower income pre-and post-transparency is only €111, and this difference is not statistically or economically significant.

Furthermore, we perform several multivariate tests to further alleviate the concern that our results are driven by changes in the composition of banks' loan portfolios. First, we estimate mortgage term divergence by redefining benchmark mortgage groups to include borrower characteristics. Specifically, we use as benchmark mortgages those issued to borrowers with *similar income* and *age* (i.e., within the same quartile rank) for the *same purpose* by the *same bank* in *different geographic regions* (NUTS3) within the *same country* over the *previous quarter*. We re-estimate Model 1 and report the results in Panel A of Table 4. The sample size is slightly smaller than that in our primary analyses due to the additional criteria used to define benchmark mortgage groups. Our primary findings continue to hold in these specifications (the effect of transparency on LTV divergence is only significant at the 10% level), suggesting that credit term divergence narrows post-transparency even for borrowers with very similar risk profiles.

Second, we restrict our sample to borrowers that take on at least three mortgages over our sample period (and at least one mortgage before and after the transparency regime) to allow for enough within-borrower variation in lending decisions. We re-estimate Model 1 controlling for

borrower fixed effects, and all other control variables and model specifications remain the same. We thus compare the credit standard convergence of mortgages issued in the pre- and post-transparency period to the same borrowers. We report our findings in Panel B of Table 4. Although the sample size in these analyses declines drastically, our findings continue to hold for two out of the three loan terms we explore. We show that interest rate and LTV ratio of mortgages issued by a bank across different regions converge more under the new transparent reporting requirements, even after controlling for borrower fixed effects.

Last, we match mortgages issued in the pre- and post-transparency period based on their terms (interest rate, LTV ratio and maturity). The one-to-one propensity score matching of treated (transparency) mortgages with control (pre-transparency) mortgages is done in random order and without replacement. Matched mortgages are within a distance ("caliper") of 0.01 of the propensity score of the mortgages in the treatment group.[17] We replicate our primary analyses within the sample of matched loans: as we report in Panel C of Table 4, our findings continue to hold in this specification. Importantly, these tests suggest that credit term convergence increases post-transparency even for loans with very similar credit risk and repayment horizon; thus, our results cannot be attributed to an overall shift in lenders' credit standards. Collectively, our findings on the association between transparency and lending term harmonization remain mostly robust to addressing changes in mortgage and borrower characteristics over time.

4.3. Transparency, learning and mortgage term convergence

We next examine the channels through which transparency can lead to greater convergence of the credit standards that a bank employs across geographic regions. We first investigate whether

[17] In unreported analyses, we check whether there are any significant differences in the weighted means of the matching variables between the control and treatment groups and find no such differences.

the comprehensive data collection and reporting mandated by the ECB can facilitate greater learning across a bank's different regional branches. We perform several cross-sectional tests on credit term convergence in regions where we predict that transparency is more likely to facilitate learning. We first expect that the effect of transparency on learning will be more pronounced for low-performing regional branches. Specifically, the new reporting requirements can allow these branches to access information about credit decisions and terms that highly performing regional branches typically offer for similar loans. In an effort to mitigate bad credit decisions, these low-performing regional branches may learn from the credit practices of their highly performing peers. Thus, banks will harmonize their credit standards across their different regions, with low-performing regional branches converging to the lending practices of better performing ones.

We measure a bank's low regional performance using an indicator variable of whether the percentage difference between the mortgage default rate in a loan's region (NUTS3) and mean default rate in the regions of benchmark mortgages ranks in the upper quartile of this ratio (*Underperforming region*).[18] Mortgage default rates at the regional level are measured using loan performance data from the bank's first reporting quarter; thus, our variable captures the bank's regional credit performance at the beginning of the transparency regime. We augment Model 1 with the *Underperforming region* indicator variable and its interaction term with *Transparency*. All other control variables and specifications are the same as in Model 1. We report the results of these tests in Panel A of Table 5. Consistent with our expectations, we find that mortgage term convergence post-transparency is greater for regional branches that underperform their peers, as reflected by the negative and significant coefficients on the interaction term in specifications 1 and

[18] The quartile cut-off is 83%, i.e., the percentage difference between a bank region's defaulted or delinquent mortgages and those in the regions of benchmark mortgages is 83%. Our results are robust when using a quintile ranking (untabulated test).

2. Relative to mortgages originated by highly performing branches, mortgages originated by underperforming regional branches exhibit interest rate and LTV ratio convergence with benchmark mortgages that are greater by about 27.7% and 13.0%, respectively (our results on LTV ratio convergence are statistically significant at 10%).

Furthermore, we expect that transparent reporting is more effective in facilitating learning across a bank's regional branches when accessing information about lending practices of benchmark regions was harder prior to the ECB's disclosure mandate. As we note in Section 2, prior to the reporting mandate, much credit information was stored in local branches' data systems or in hardcopy format, and thus was not readily available. Therefore, obtaining information about lending practices of branches in not easily accessible regions was costly. Transparent reporting can mitigate information frictions by allowing a bank's regional branches to learn about the contractual terms of similar loans offered by their colleagues in not easily accessible regions.

We measure a bank's regional branch spatial accessibility using Eurostat data on inland transport network at the regional level. Specifically, *Spatial accessibility* is an indicator variable of whether benchmark regions' (NUTS2) average motorway and railroad network density (km/km^2) is lower than the EU's median regional network density.[19] Our variable thus captures a loan officer's effort to visit the bank's branches in different geographic regions that issue similar-type loans. We augment Model 1 with *Spatial accessibility* and its interaction term with *Transparency*. All other control variables and specifications are the same as in Model 1. Sample size decreases due to limited data availability on the infrastructure characteristics for our sample

[19] We benchmark a bank's regional spatial accessibility against the EU median regional infrastructure to capture scarce motorway and railroad density so that our measure is not biased by our sample distribution. Data is reported only at the NUTS2 level (https://ec.europa.eu/eurostat/statistics-explained/index.php/Inland_transport_infrastructure_at_regional_level). Based on Eurostat's data on passenger transportation, car and train are the most popular means of transport for national trips within our sample countries (https://ec.europa.eu/eurostat/statisticsexplained/index.php/Passenger_transport_statistics#Air_passengers).

regions. We report the results of these tests in Panel B of Table 5. Consistent with our predictions, we find that interest rate and maturity convergence post-transparency is greater for mortgages issued by branches with less spatially accessible benchmark regions by about 15.9% and 22.7%, respectively (our results on interest rate convergence are statistically significant at the 10% level).

Overall, we show that transparent reporting effectively facilitated credit standards convergence among a bank's regional branches by urging low-performing branches to learn from and adopt the lending practices of their better-performing peer-branches as well as by supporting information sharing among a bank's more remote branches. To further support our across-branch-learning inferences, we address the possibility that credit term convergence may be the outcome of loan officers learning to better screen borrowers through the more standardized and granular information collection process following the adoption of the transparent reporting, rather than through information sharing and transparency across branches. To alleviate this concern, we restrict our post-transparency sample to mortgages originated over the January 2013 to September 2013 period, i.e., during the "grace period" that the ECB granted to banks to fully comply with the new reporting requirements. During this period, credit information had been shared across branches, but data collection was only slowly improving (e.g., Ertan et al. 2017). Our results continue to hold in this specification (untabulated), suggesting that our findings on credit term convergence are unlikely to be primarily driven by loan officers' learning from the more extensive information collection under the transparency regime.

4.4. Transparency, regulatory scrutiny and mortgage term convergence

Next, we investigate whether regulatory scrutiny is instrumental to the association between transparent reporting and the convergence of credit practices across a bank's regional branches. Specifically, economically significant inconsistencies in the credit standards that a bank employs

across different regions are likely to capture regulatory attention. While the new disclosure requirements did not explicitly aim to incentivize banks to revisit their lending practices, transparent reporting likely indicates material discrepancies in regional credit standards. Banks that face greater regulatory scrutiny are thus more likely to correct these discrepancies.

We expect that under transparent reporting high-income banks are more likely to harmonize the credit terms that they offer to borrowers in different regions, since these banks may face extensive regulatory oversight regarding disparities in their lending practices. Specifically, in the aftermath of the financial crisis, regulatory agencies and consumer protection institutes have heavily scrutinized banks' high-income-generating lending practices and business activities to understand the drivers of their financial performance and the extent to which their lending practices are sensible and sustainable (e.g., Binkley 2008; Steil et al. 2018; Bouyon and Oliinyk 2019). Thus, high-income banks are likely to be under greater pressure to soften material discrepancies or inconsistencies in their credit standards across their regional branches.

Using Bankscope data, we define *High-income bank* as an indicator variable of whether a bank's ratio of annual interest and non-interest income to total assets ranks in the upper quintile of the distribution of this ratio among banks within the same country. We augment Model 1 with the *High-income bank* variable and its interaction term with *Transparency*. All other control variables and specifications are the same as in Model 1. Sample size decreases due to limited data availability on banks' accounting performance (Bankscope covers financial data for 21 out of the 49 banks in our sample). As we report in Panel A of Table 6, consistent with our predictions, mortgage term convergence post-transparency is greater for high-income banks (this effect on interest rate and LTV convergence is statistically significant at the 10% level). Economically, for these banks, transparency mortgages have greater interest rate, LTV ratio and maturity

convergence compared to benchmark mortgages by 18.6%, 15.9% and 45.7%, respectively.

Moreover, the ECB and other regulators are likely to more closely monitor credit term divergence in economically weak regions and for borrowers with poor access to credit, where discrepancies in credit standards can have a greater adverse impact on economic activity. Indeed, prior studies show that, holding borrowers' credit risk constant, credit term dispersion is more pronounced among less sophisticated borrowers and those with lower credit score, income or net worth, having negative consequences on their cost of debt and access to credit (e.g., Allen et al. 2014; Stango and Zimman 2016; Argyle et al. 2017; Bhutta et al. 2018). We therefore expect that transparent reporting can expose such discrepancies, potentially incentivizing banks to harmonize lending practices across regions and thus alleviate regulatory pressure and scrutiny.

We assess regional economic activity based on Eurostat data on GDP per capita, with less- (well-) developed regions (NUTS3) defined as those for which annual GDP per capita ranks in the bottom two quintiles (upper quintile) of the distribution of annual GDP per capita across a country's regions. To alleviate the concern that our measure for regional economic growth is biased by our mortgage sample distribution, we rank regional GDP per capita across all NUTS3 within a country. As a result, defining low-developed regions by the bottom two quintile of annual GDP per capita distribution allows us to have a more similar sample size of mortgages issued in well- and less-developed regions, as significantly fewer mortgages are issued in less economically developed than in well-developed regions.[20] We measure the divergence of credit standards across a country's well- and less-developed regions by redefining *Interest rate divergence, less- (well-) developed regions* as the absolute value of the difference between a mortgage's interest rate (in percentage points) issued in a less- (well-) developed region (NUTS3) and the mean interest rate

[20] Our findings are robust when we categorize less-developed regions using the bottom quintile of the distribution of annual GDP per capita across a country's regions (untabulated test).

of mortgages issued by the same bank for the same purpose in well-(less-) developed regions. Also, we employ similar definitions for measuring *LTV ratio divergence, less (well-) developed regions* and *Maturity divergence, less (well-) developed regions*, and we test our predictions using Model 1 with these new dependent variables.

We report the results of these tests in Panel B of Table 6. We present the results for the less-(well-) developed regions in columns 1-3 (4-6). We document that transparency is significantly more effective in converging credit terms that a bank offers in less-developed regions compared to those in well-developed ones, suggesting that regulatory scrutiny likely incentivizes banks to revisit and harmonize lending practices in regions with low economic growth. Mortgages originated post-transparency by a bank in less-developed regions exhibit more similar interest rate, LTV ratio and maturity by about 64.6%, 15.7% and 12.2%, respectively, relative to benchmark mortgages issued by the same bank in well-developed regions. While mortgages originated post-transparency by a bank in well-developed regions also exhibit more similar interest rate to mortgages in less economically developed regions, we do not find a statistically significant effect of transparency on LTV ratio and maturity convergence for such mortgages. Overall, we show that regulatory scrutiny is instrumental to the relation between transparent reporting and the convergence of credit practices across a bank's regional branches.

5. Supplemental analyses

5.1. Transparency, mortgage term convergence and banks' financial performance

So far, we provide robust evidence of the positive association between transparent reporting and credit term convergence, which is likely to be driven by the greater regulatory scrutiny and banks' learning under the transparency regime. We abstain from concluding whether this effect is a positive development in the private debt market. Although making a normative interpretation of

our results is beyond the scope of this study, we provide preliminary evidence of the potential benefits of credit standard harmonization for lenders and borrowers.

We first assess whether harmonizing lending standards post-transparency affects banks' financial performance. On one hand, we show that the new reporting requirements facilitate greater learning by low-performing regional branches that converge to the lending practices of their better-performing peers. Thus, we expect that banks with greater mortgage term convergence will have better credit performance post-transparency. On the other hand, credit term convergence may also arise from loan officers' over-reliance on standardized hard information collected under the new reporting rules, thus forgoing important borrower-specific soft information cues. Soft information has been documented to significantly improve credit quality (e.g., Petersen and Rajan 1994; Agarwal and Hauswald 2010). In addition, we show that under the transparency regime, banks and regional branches that are susceptible to tighter regulatory scrutiny are more likely to harmonize their lending standards. Banks may thus inefficiently eliminate deviations in regional credit standards to mitigate external monitoring pressure. Collectively, these arguments suggest that lending term convergence will lead to worse credit performance.

To address this question, we examine whether banks' financial performance under the transparency regime varies with the extent of their mortgage term convergence. We obtain banks' accounting data from BankScope (as we mention in Section 4.4, the data is available for 21 sample banks). We focus on two primary aspects of bank performance: (1) the quality of loan portfolio, measured by the ratio of non-performing loans to total loan amount (*NPL ratio*), and (2) the return on assets, measured by the ratio of net income to total assets (*Return on assets*). We estimate the following OLS model at the bank-year level, where the dependent variable is one of the bank performance measures.

$$NPL\ ratio\ (Return\ on\ assets) = \alpha + \beta_1 Transparency + \beta_2 High\ convergence + \beta_3 Transparency \times High\ convergence + Controls + Fixed\ effects.$$

(Model 2)

The primary independent variable of interest is the interaction term between *Transparency* and *High convergence*, defined as an indicator variable equal to one if at least one of the *Interest rate divergence*, *LTV ratio divergence* or *Maturity divergence* measures, averaged at the bank-year level, ranks in the bottom quintile of the respective variable's sample distribution, and zero otherwise. Control variables include the natural logarithm of total assets (*Size*), the ratio of cash to short-term borrowing and deposits (*Liquidity*), the ratio of gross loans to prior year's gross loans (*Loan growth*) and Tier 1 capital ratio (*Tier 1 capital*). We include bank and year fixed effects and cluster standard errors at the bank level. While a large number of fixed effects may bias the results due to a small sample size (Angrist and Pischke 2008), our findings are very similar when we exclude bank fixed effects (untabulated).

We present the results of these analyses in Table 7. In specification 1, we find a negative and significant coefficient on *Transparency* × *High convergence*: high convergence banks have about 4.1% lower *NPL ratio* post-transparency. Also, we show that the return on assets of high-convergence banks does not differ significantly from that of other banks in the post-transparency period (specification 2). Overall, an important implication of our results is that greater mortgage term convergence under the transparency regime does not lead to a deterioration in banks' financial performance. We rather show that the new reporting requirements likely alleviate inefficient inconsistencies in local lending standards and allow banks to improve their credit quality.

5.2. Transparency, mortgage term convergence and borrowing terms

We next examine the effect of credit standard convergence under the transparency regime on borrowing terms. On one hand, credit term dispersion may arise when loan officers charge some

borrowers with higher interest rate or use more restricted lending terms than they do for loans to other borrowers, holding credit risk constant. Indeed, prior research shows that even after accounting for borrowers' risk profiles, credit term divergence is found to be associated with certain households overpaying for their debt (e.g., Allen et al. 2014; Stango and Zimman 2016; Argyle et al. 2017; Bhutta et al. 2018). Transparency can facilitate learning and thus alleviate these excessive discrepancies in the loan underwriting process across branches, leading to an overall improvement in credit terms for borrowers. In addition, as we show in Section 4.4, banks are likely to harmonize their credit standards due to tighter regulatory scrutiny under the transparency regime. Greater regulatory scrutiny can force banks to attenuate inconsistencies in lending practices across branches that make credit less affordable to borrowers, further improving borrowing terms. On the other hand, credit term dispersion may arise when loan officers offer more favorable credit terms to some borrowers compared to the standard terms used for loans to borrowers of similar credit risk. In this case, since transparency alleviates divergence in credit standards, borrowers will on average experience more adverse credit terms post-transparency.

To examine our predictions, we estimate the following OLS model where the dependent variables are *Mortgage interest rate, LTV ratio* and *Mortgage maturity* defined in Section 4.1.

$$\begin{aligned} \textit{Mortgage term} = \quad & \alpha + \beta_1 \textit{Transparency} + \beta_2 \textit{High mortgage term convergence} \\ & + \beta_3 \textit{Transparency} \times \textit{High mortgage term convergence} \\ & + \textit{Controls} + \textit{Fixed effects}. \end{aligned} \tag{Model 3}$$

High mortgage term convergence is an indicator variable reflecting whether the *Mortgage term divergence* measure, averaged at the bank-quarter level, ranks in the bottom quintile of this variable's sample distribution. To exemplify, for mortgage interest rate analyses, we define *High mortgage term convergence* as equal to one if *Interest rate divergence,* averaged at the bank-quarter level, ranks in the bottom quintile of this variable's sample distribution, and zero otherwise.

All other variables and specifications are the same as in Model 1.

We report our findings in Table 8. We find a significant and negative (positive) coefficient on *Transparency* for *Mortgage interest rate* (*Mortgage maturity*) specifications. Economically, relative to the pre-transparency regime, mortgages issued post-transparency have about 19.78% lower interest rate and 8.49% higher maturity. More importantly, we find a significant and negative (positive) coefficient on *Transparency* × *High mortgage term convergence* for *Mortgage interest rate* (*Mortgage maturity*) specifications, suggesting that the effect of transparency on mortgage terms is more pronounced for banks that experience greater convergence in their credit terms (the coefficient on *Transparency* × *High interest rate convergence* is significant at the 10% level). Economically, relative to other banks, high-convergence banks further decrease (increase) mortgage interest rate (maturity) by about 2.69% (8.14%) post-transparency. Thus, our findings suggest that credit standard harmonization benefits borrowers via more favorable mortgage terms. This evidence indicates that credit term divergence in the pre-transparency period was likely associated with banks overcharging borrowers for their debt by extracting excessive rents, which is attenuated when a bank's branches start sharing loan-level information.[21]

5.3. Other supplemental tests

5.3.1. Transparency and lending term convergence across banks

Although our study focuses on the effect of transparent reporting on credit standard harmonization *within a bank*, transparency can also facilitate greater convergence of the lending practices *across banks* since banks have access to the granular loan information that other lenders share. To examine the effect of transparent reporting on the convergence of credit practices *across*

[21] Importantly, in section 5.1., we show that high-convergence banks' balance sheets strengthen post-transparency, indicating that the better borrowing terms from these banks are not related to laxer credit standards.

banks, we measure mortgage term divergence by the distance between a mortgage's terms and the average terms of similar mortgages issued by different banks in the same region (NUTS1) over the prior quarter.[22] Thus, for each sample mortgage, we construct a group of benchmark mortgages (*benchmark mortgages by different banks* hereafter) by selecting residential mortgages originated by *different banks* for the *same purpose* (house purchase or home equity) in the *same region* over the *previous quarter*. Specifically, we measure *Interest rate divergence across banks* by taking the distance between a mortgage's interest rate (in percentage points) and the mean interest rate of the benchmark mortgages by different banks. Similarly, we proxy for *LTV ratio divergence across banks* (*Maturity divergence across banks*) using the natural logarithm of the distance between a mortgage's LTV ratio (maturity in months) and the mean LTV (maturity) of different banks' benchmark mortgages. We employ Model 1 with the dependent variables defined above and with all other model specifications and control variables remaining unchanged.

We report the results of these tests in Panel A of Table 9. Across all specifications, we show that transparent reporting and credit information sharing leads to banks issuing mortgages with terms similar to those offered by other banks to households in the same region. Economically, transparency mortgages have more similar interest rate, LTV ratio and maturity by about 48.6%, 9.2% and 18.8%, respectively, relative to mortgages issued by other banks in the same region.

Next, we investigate the mechanisms that can facilitate the greater cross-bank lending convergence post-transparency. First, similar to our hypothesis on the within-bank lending practice harmonization, we predict that banks are likely to learn from their better-performing peers. To test for the role of learning in fostering lending standard convergence, we construct an indicator

[22] We define benchmark regions more broadly at the NUTS1 level to increase the size of benchmark mortgage groups by different banks. Our results continue to hold when we define benchmark regions at the NUTS2 or NUTS3 level (untabulated).

variable of whether *benchmark banks'* mean ratio of non-performing loans to total assets ranks in the bottom quintile of the distribution of this ratio across banks within the same country (*High loan quality benchmark banks*). Second, in line with our within-bank analyses, we expect regulatory scrutiny to affect the link between transparency and lending standard harmonization. We expect that banks are more likely to converge on their credit standards in regions where they potentially face greater regulatory scrutiny. *Well-developed region* is an indicator variable of whether annual GDP per capita of the region (NUTS1) where a mortgage is originated ranks in the upper quintile of the variable's distribution. We augment Model 1 with the indicator variable *High loan quality benchmark banks* (*Well-developed region*) and its interaction term with *Transparency* in Panel B (C) of Table 9. All other model specifications and control variables remain unchanged. We predict a negative (positive) coefficient on the interaction term for the *High loan quality benchmark banks* (*Well-developed region*).

In most specifications, we find that the two channels (learning and regulatory scrutiny) are instrumental to the association between transparency and lending standard harmonization across banks. To exemplify, in Panel B, we show that cross-bank credit standard convergence is greater when benchmark banks issue high-quality loans. Specifically, transparency mortgages have by about 14.8% and 7.4% more similar interest rate and LTV ratio, respectively, relative to mortgages issued by benchmark banks in the same region when these benchmark banks have on average a low ratio of non-performing loans. Moreover, in Panel C, we document that cross-bank lending harmonization is significantly lower in well-developed regions potentially because credit standard divergence among affluent households are less likely to receive close regulatory scrutiny by the ECB. We find that LTV ratio and maturity convergence of mortgages issued by different banks in well-developed regions under the transparency regime is by about 11.7% and 15.6% lower

compared to mortgage credit term convergence in other regions, respectively.

5.3.2. Transparency, competitive pressure and lending term convergence

Another important economic channel that may link transparency to within-bank (cross-bank) credit term convergence is the competitive pressure across a bank's regional branches (across banks). Indeed, examining lenders' loan-level information sharing through their participation in a U.S. credit bureau, Darmouni and Sutherland (2019) show that lenders who face greater competitive pressures are more likely to adjust loan maturity towards what their rivals offer.

We measure competitive pressure across a bank's regional branches using an indicator variable of whether the quarterly Herfindahl-index (HHI) of a bank's proximal regional branches (i.e., local branches [NUTS3] belonging to the same wider region [NUTS1]) ranks below the variable's median value within a country (*High within-bank competition*). HHI of a bank's proximal regional branches is estimated based on their quarterly mortgage issuance volume. We augment Model 1 with the *High within-bank competition* indicator variable and its interaction term with *Transparency*. All other variables and specifications are the same as in Model 1. Next, we measure competitive pressure across different banks using an indicator variable of whether a region's (NUTS1) HHI, based on banks' quarterly mortgage issuance volume, ranks below the variable's median value within a country (*High cross-bank competition*). We augment Model 1 with the *High cross-bank competition* indicator variable and its interaction term with *Transparency*, where the dependent variables are *Interest rate divergence across banks*, *LTV ratio divergence across banks* and *Maturity divergence across banks* defined in Section 5.3.1. All other control variables and specifications are the same as in Model 1.

We report the results of the analyses that examine whether competitive pressure is instrumental to the association between transparency and within-bank or cross-bank credit term convergence in

Panel A and Panel B of Table 10, respectively. Across all specifications, we find no evidence supporting the argument that credit term convergence post-transparency is higher in more competitive credit market segments, suggesting that our primary findings cannot be attributed to banks' competitive pressures.[23] Although these results and inferences differ from those of Darmouni and Sutherland (2019), there is a potentially important conclusion: the economic mechanisms that link transparency to lending standard harmonization likely vary based on institutional features and reporting frameworks. We leave for future research to explore the factors that drive the relative importance of these mechanisms across different settings.

5.3.3. Transparency and lending term convergence: auto-loans

In our last set of supplemental analyses, we explore whether our primary findings can be generalizable to different credit market segments. We thus examine the effect of transparency on the harmonization of credit terms that a lender offers for auto-loans across its different regional branches. We focus on this credit market segment given that auto-loan securitizations constitute the second-largest ABS category of European banks.[24]

We measure auto-loan term divergence using the distance between an auto-loan's terms and the average terms of similar auto-loans issued by a lender in different regions over the prior quarter. Specifically, for each sample auto-loan, we construct a benchmark loan group by selecting auto-loans originated by the *same lender* for the *same borrower type* (corporate, individual and other)

[23] In untabulated analyses, we find no evidence that loan officers adjust the credit terms towards those offered by their colleagues in larger regional branches (measured by the volume of new residential mortgage issuance), potentially suggesting that credit term convergence across the different regions in which a bank operates is unlikely to be driven by regional branches that aim to increase their lending volume. Also, in additional analyses, we restrict our sample to mortgages issued in regions close to national borders where competition is likely higher. We fail to find that our findings on credit term convergence post-transparency are stronger in these regions.

[24] Our primary securitized auto-loan sample includes about 9 million unique loans. The sample selection criteria for auto-loans are similar to the ones used for mortgages and described in Section 3. However, to facilitate empirical estimations, we restrict this sample to randomly selected 200,000 auto-loans by lender (this sample size is also comparable to the number of mortgages per lender used in our primary tests).

and *same vehicle condition* (new, used, demo and other car) in *different regions* (NUTS3) within the *same country* over the *previous quarter*. Thus, *Interest rate divergence*, *LTV ratio divergence* and *Maturity divergence* of auto-loans are defined similar to the dependent variables used in our primary analyses.[25] We test the association between transparent reporting and auto-loan term divergence using an OLS model where the dependent variables are *Interest rate divergence*, *LTV ratio divergence* and *Maturity divergence*.

$$\begin{aligned} \textit{Auto-loan term divergence} = \; & \alpha + \beta_1 \textit{Transparency} + \beta_2 \textit{Loan interest rate} + \beta_3 \textit{LTV ratio} \\ & + \beta_4 \textit{Loan maturity} + \beta_5 \textit{Loan amount} + \beta_6 \textit{Down payment} \\ & + \beta_7 \textit{Borrower income} + \beta_8 \textit{Vehicle condition} \\ & + \beta_9 \textit{Purchase contract} + \textit{Fixed effects}. \end{aligned} \qquad \text{(Model 4)}$$

Similar to Model 1, *Transparency* is an indicator variable of whether an auto-loan is originated after the bank initiated transparent reporting. We control for auto-loan characteristics, including auto-loan interest rate in percentage points (*Loan interest rate*), the natural logarithm of loan-to-value ratio in percentage points (*LTV ratio*), auto-loan maturity in years (*Loan maturity*), an indicator variable of whether the loan was issued for a used or new vehicle (*Vehicle condition*) and an indicator variable of whether the loan is for a vehicle purchase (*Purchase contract*). We further control for borrower characteristics measured at loan origination, such as the natural logarithm of a borrower's annual income in euros (*Borrower income*) and an indicator variable of whether the borrower submitted a down-payment for the auto-loan (*Down payment*).[26] We include fixed effects for loan origination year, property region (NUTS1), borrower type (corporate, individual and other) and lender (26 unique lenders) to control for differences in credit standards over time and

[25] Since auto-loan maturity is significantly shorter compared to mortgages, we measure *Maturity divergence* as the distance between an auto-loan's maturity in years and the mean maturity in years of benchmark auto-loans (rather than by the natural logarithm of this distance).
[26] Variable coverage for RMBS and auto ABS does not perfectly overlap; thus, we cannot use the same control variables as the ones used in our primary tests.

across regions, borrowers and lenders. Standard errors are clustered at the lender level.

We report the results of the analyses in Panel A of Table 11. We show that our primary findings for mortgages are mostly robust to the auto-loan sample. Although we find that LTV ratio divergence is not affected by the new reporting standards, divergence of auto-loans' interest rate and maturity decreases by about 23.3% and 7.9% under the transparency regime, respectively. Moreover, we replicate our primary analyses reported in Table 5 and Table 6 on the role of learning and regulatory scrutiny in promoting greater credit standard convergence under the new reporting standards. Our findings are mostly robust using the auto-loan sample (Panels B-E of Table 11). In addition, in untabulated analyses, we find that our results on the greater cross-bank credit term harmonization continue to hold in the auto-loan sample. Collectively, the auto-loan analyses provide further evidence that transparent reporting incentivizes banks to revisit and adjust their lending standards across different credit market segments.

6. Conclusion

We explore whether greater transparency in banks' lending decisions can facilitate the harmonization of the credit standards that a bank employs across the different regions in which it operates. We take advantage of the introduction of the ECB's loan-level reporting initiative in January 2013 for banks that borrow from its repo financing using their ABS as collateral. Under the new reporting rules, these banks adopted in a staggered manner quarterly loan-level disclosures of their ABS' loan characteristics and performance. Using a sample of residential mortgages issued over the 2009-2017 period, we find that, compared to mortgages issued in the pre-transparency period, mortgages originated under the transparency regime share more similar credit terms (interest rate, loan-to-collateral-value ratio and maturity) to same-purpose mortgages issued by the same bank in different geographic regions over the prior quarter.

Examining the economic mechanisms that can explain our findings, we show that convergence of credit standards under the transparency regime is stronger for regional branches that underperform their peer branches and for those with not easily accessible peer branches. Thus, under the transparency regime, regional branches can effectively learn about the credit practices in banks' other regions and adjust the lending terms they offer. Moreover, greater regulatory scrutiny is instrumental to the association between transparency and credit term convergence. We find that high-income banks are more likely to harmonize their credit standards, potentially because these banks are subject to stronger monitoring pressure about disparities in their lending practices. Also, under the transparency regime, banks are likely to converge the credit standards in their less-developed regions compared to those in well-developed ones, consistent with the greater regulatory scrutiny of banks' lending practices in regions with low economic growth.

We supplement these results by providing evidence that credit term convergence improves banks' loan portfolio quality and leads to beneficial lending terms for borrowers. Further, we find that transparent reporting facilitates the harmonization of credit standards that different banks offer to households in the same region and that this effect is also explained by learning and regulatory scrutiny. Last, we show that our findings are generalizable to different credit market segments, such as auto-loans. Overall, we provide evidence that transparent reporting alleviates credit term dispersion across the different geographic regions in which a bank operates.

References

AARP Public Policy Institute. 2016. Nightmare on Main Street: Older Americans and the Mortgage Market Crisis.

AFME Finance for Europe. 2017. Securitization Data Report.

Agarwal, S., and R. Hauswald. 2010. Distance and private information in lending. *Review of Financial Studies* 23 (7): 2757–2788.

Alexandrov, A., and S. Koulayev. 2018. No Shopping in the U.S. Mortgage Market: Direct and Strategic Effects of Providing Information. *Working paper*.

Allen, J., R. Clark, and J.F. Houde. 2014. Price Dispersion in Mortgage Markets. *Journal of Industrial Economics* 62 (3): 377–416.

Angrist, J. D., and J.S. Pischke. 2008. Mostly Harmless Econometrics: An Empiricist's Companion. Princeton University Press.

Argyle, B., T. Nadauld, and C. Palmer. 2017. Real effects of search frictions in consumer credit markets. *Working Paper*.

Ayotte, K., and P. Bolton. 2011. Covenant lite lending, liquidity and standardization of financial contracts. *Research Handbook on the Economics of Property Law*: 174.

Bae, G. S., S. U. Choi, D. S. Dhaliwal, and P. T. Lamoreaux. 2017. Auditors and Client Investment Efficiency. *The Accounting Review* 92 (2): 19-40.

Behn, M., R. Haselmann, T. Kick, and V. Vig. 2015. The political economy of bank bailouts. Working Paper.

Belke, A., U. Haskamp, and R. Setzer. 2016. Bank efficiency and regional growth in Europe: new evidence from micro-data. *ECB working paper series.*

Binkley, A. 2008. Developments in Banking and Financial Law: 2006-2007, The Subprime Mortgage Crisis. *Review of Banking and Financial Law* 27: 1-125.

Bouyon, S., and I. Oliinyk. 2019. Price rules in consumer credit: should the EU act? *European Credit Research Institute Report* No. 22.

Bozanic, Z., M. Loumioti, and F. P. Vasvari. 2018. Corporate loan securitization and the standardization of financial covenants. *Journal of Accounting Research* 56 (1):45-83.

Bhutta, N., N. Fuster, and A. Hizmo. 2018. Paying Too Much? Price Dispersion in the US Mortgage Market. *Working Paper*.

Calomiris, C. W., M. Larrain, J. Liberti, and J. Sturgess. 2017. How collateral laws shape lending and sectoral activity. *Journal of Financial Economics* 123 (1):163-188.

Consumer Financial Protection Bureau. 2015. Older consumers and student loan debt by state.

Costello, A., J. Granja, and J. Weber. 2018. Do strict regulators increase the transparency of the banking system? *Journal of Accounting Research forthcoming*.

Darmouni, O., and A. Sutherland. 2019. Learning about Competitors: Evidence from SME Lending. *Working Paper*.

De Santis, R.A. 2016. Credit spreads, economic activity and fragmentation. *ECB Working Paper*.

Diamond, D. 1984. Financial intermediation and delegated monitoring. *Review of Economic Studies* 51 (3): 393-414.

Diamond, D. W. 1991. Monitoring and Reputation: The Choice between Bank Loans and Directly Placed Debt. *The Journal of Political Economy* 99 (4): 689-721.

Djankov, S., C. McLiesh, and A. Shleifer. 2007. Private credit in 129 countries. *Journal of Financial Economics* 84 (2): 299-329.

Doblas-Madrid, A., and R. Minetti. 2013. Sharing information in the credit market: Contract-level evidence from US firms. *Journal of Financial Economics* 109 (1):198-223.

Ertan, A., M. Loumioti, and R. Wittenberg-Moerman. 2017. Enhancing Loan Quality Through Transparency: Evidence from the European Central Bank Loan Level Reporting Initiative. *Journal of Accounting Research* 55 (4): 877-918.

Ertan, A., and K. Balakrishnan. 2018. Credit Information Sharing and Loan Loss Recognition. *Working paper.*

European Central Bank. 2012. Euro Money Market Survey.

European Central Bank. 2018. Financial Integration in Europe.

European Mortgage Federation. 2017. A review of Europe's mortgage and housing market.

Fama, E. 1985. What's different about banks?, *Journal of Monetary Economics* 15: 29-39.

Granja, J. 2018. Disclosure regulation in the commercial banking industry: Lessons from the national banking era. *Journal of Accounting Research* 56 (1): 173-216.

Granja, J., and C. Leuz. 2018. The death of a regulator: Strict supervision, bank lending and business activity. *Working paper*.

Gurun, U. G., G. Matvos, and A.Seru. 2016. Advertising Expensive Mortgages. *The Journal of Finance* 71 (5): 2371-2416.

Heitzman, S., and M. Huang, 2019. Internal Information Quality and the Sensitivity of Investment to Market Prices and Accounting Profits. *Contemporary Accounting Research forthcoming*.

Hertzberg, A., J. M. Liberti, and D. Paravisini. 2011. Public information and coordination: evidence from a credit registry expansion. *The Journal of Finance* 66 (2): 379-412.

Higgins, M. J., D. Levy, and A. T. Young. 2006. Growth and convergence across the United States: Evidence from county-level data. *The Review of Economics and Statistics* 88 (4): 671-681.

Jappelli, T., and M. Pagano. 2006. The Role and Effects of Credit Information Sharing. *The economics of consumer credit*: 347.

Kanodia, C., and H. Sapra. 2016. A real effects perspective to accounting measurement and disclosure: Implications and insights for future research. *Journal of Accounting Research* 54 (2): 623-676.

Lacko, J. M., and J. K. Pappalardo. 2010. The Failure and Promise of Mandated Consumer Mortgage Disclosures: Evidence from Qualitative Interviews and a Controlled Experiment with Mortgage Borrowers. *American Economic Review: Papers & Proceedings* 100 (2): 516–521.

Liberti, J. M., J. Sturgess, and A. Sutherland. 2018. Economics of voluntary information sharing. *Working Paper.*

Love, I., M. S. M. Pería, and S. Singh. 2016. Collateral registries for movable assets: does their introduction spur firms' access to bank financing? *Journal of Financial Services Research* 49 (1): 1-37.

McNichols, M., and S. Stubben. 2008. Does earnings management affect firms' investment decisions? *The Accounting Review* 83 (6):1571–1603.

Murfin, J., and R. Pratt. 2018. Comparables pricing. *Working Paper*.

Pagano, M., and T. Jappelli. 1993. Information Sharing in Credit Markets. *The Journal of Finance* 48 (5): 1693-1718.

Petersen, M., and R. Rajan. 1994. The benefits of firm-creditor relationships: Evidence from small business data. *Journal of Finance* 49 (1): 3–37.

PricewaterhouseCoopers. 2015. Capital Markets Union: Integration of Capital Markets in the European Union. Research report.

Rajan, R.G. 1992. Insiders and Outsiders: The Choice between Informed and Arm's-Length Debt. *The Journal of Finance* 47 (4): 1367-1400.

Roychowdhury, S., N. Shroff, and R. S. Verdi. 2019. The Effects of Financial Reporting and Disclosure on Corporate Investment: A Review. *Journal of Accounting and Economics forthcoming.*

Scharfstein, D., and A. Sunderam. 2016. Market power in mortgage lending and the transmission of monetary policy. *Working Paper*.

Shroff, N. 2017. Corporate Investment and Changes in GAAP. *Review of Accounting Studies* 22 (1): 1–63.

SIFMA. 2018. European Securitization Data Report.

Stango, V., and J. Zinman. 2016. Borrowing high versus borrowing higher: price dispersion and shopping behavior in the US credit card market. *The Review of Financial Studies* 29 (4): 979-1006.

Steil, J.P., L. Albright, K.S. Rugh, and D.S. Massey. 2018. The social structure of mortgage discrimination. *Housing Studies* 33(5): 759-776.

Sutherland, A. 2018. Does credit reporting lead to a decline in relationship lending? Evidence from information sharing technology. *Journal of Accounting and Economics* 66 (1):123-141.

Woodward, S. E., and R. E. Hall. 2012. Diagnosing Consumer Confusion and Sub-Optimal Shopping Effort: Theory and Mortgage-Market evidence. *American Economic Review* 102 (7): 3249-3276.

APPENDIX A

Definitions of variables in our primary analyses

Variable	Definition
Mortgage term divergence	
Interest rate divergence	The absolute value of the difference between a residential mortgage's interest rate (in percentage points) and the mean interest rate of residential mortgages issued by the same bank for the same purpose (house purchase or home equity) in different regions (NUTS3) within the same country over the previous quarter.
LTV ratio divergence	The natural logarithm of the absolute value of the difference between a residential mortgage's loan-to-collateral-value ratio (LTV) and the mean LTV of residential mortgages issued by the same bank for the same purpose (house purchase or home equity) in different regions (NUTS3) within the same country over the previous quarter.
Maturity divergence	The natural logarithm of the absolute value of the difference between a residential mortgage's maturity (in months) and the mean maturity of residential mortgages issued by the same bank for the same purpose (house purchase or home equity) in different regions (NUTS3) within the same country over the previous quarter.
Interest rate divergence, less (well-)developed regions	The absolute value of the difference between a residential mortgage's interest rate (in percentage points) issued in a region (NUTS3), for which annual GDP per capita ranks in the bottom two quintiles (upper quintile) of the distribution of annual GDP per capita across a country's regions, and the mean interest rate of benchmark mortgages issued in regions, for which annual GDP per capita ranks in the upper quintile (bottom two quintiles) of annual GDP per capita across a country's regions.
LTV ratio divergence, less (well-)developed regions	The natural logarithm of the absolute value of the difference between a residential mortgage's LTV issued in a region (NUTS3), for which annual GDP per capita ranks in the bottom two quintiles (upper quintile) of the distribution of annual GDP per capita across a country's regions, and the mean LTV of benchmark mortgages issued in regions, for which annual GDP per capita ranks in the upper quintile (bottom two quintiles) of annual GDP per capita across a country's regions.
Maturity divergence, less (well-)developed regions	The natural logarithm of the absolute value of the difference between a residential mortgage's maturity (in months) issued in a region (NUTS3), for which annual GDP per capita ranks in the bottom two quintiles (upper quintile) of the distribution of annual GDP per capita across a country's regions, and the mean maturity of benchmark mortgages issued in regions, for which annual GDP per capita ranks in the upper quintile (bottom two quintiles) of annual GDP per capita across a country's regions.

APPENDIX A (continued)

Variable	Definition
Mortgage characteristics	
LTV ratio	The natural logarithm of the loan-to-collateral-value ratio (in percentage points).
Mortgage amount	The natural logarithm of mortgage amount (in euros).
Mortgage interest rate	Mortgage interest rate (in percentage points).
Mortgage maturity	The natural logarithm of a mortgage's maturity (in months).
Mortgage guarantee	An indicator variable of whether a mortgage is guaranteed.
Transparency	An indicator variable of whether a mortgage is issued after the bank adopted the ECB loan-level reporting.
Borrower characteristics	
Borrower age	The natural logarithm of a borrower's age (in years).
Borrower employment	An indicator variable of whether a borrower is unemployed or a student.
Borrower income	The natural logarithm of a borrower's annual income (in euros).
Bank characteristics	
High-income bank	An indicator variable of whether a bank's ratio of annual interest and non-interest income to total assets ranks in the upper quintile of the distribution of this ratio among banks within the same country.
Spatial accessibility	An indicator variable of whether benchmark regions' (NUTS2) average motorway and railroad network density (km/ km^2) is lower than the EU median regional motorway and railroad network density.
Underperforming region	An indicator variable equal to one if the percentage difference between the mortgage default rate in a loan's region (NUTS3) and mean default rate in the regions of benchmark mortgages ranks in the upper quartile of this ratio's sample distribution, and zero otherwise.

APPENDIX B

Transparency and changes in borrower characteristics

This table reports the results of univariate tests that compare borrower characteristics in pre- and post-transparency periods. Variables are defined in Appendix A. The values of continuous variables are winsorized at 1% and 99%. ∗∗∗, ∗∗ and ∗ denote significance at the 1%, 5% and 10% levels, respectively.

Variable	*Transparency* = 0 (N = 1,653,695)	*Transparency* = 1 (N= 953,347)	Difference (t-stat)
	(a)	(b)	(b) − (a)
Borrower income (in Euros)	45,895	46,005	111 (0.008)
Borrower income	9.646	9.309	-0.337 (-0.24)
Borrower employment	0.015	0.011	-0.004 (-0.52)
Borrower age (in years)	39.872	43.245	3.374 (1.61)
Borrower age	3.671	3.753	0.082* (1.69)

TABLE 1
Descriptive statistics

Panel A: Sample selection.

	Mortgages	Borrowers
Mortgages in RMBS reported to ED and issued over 2009-2017	3,523,512	2,279,917
Less :		
Mortgages by banks reporting only loans issued in the pre-transparency period	255,559	221,448
Mortgages in restructured RMBS	221,724	76,923
Mortgages in regions (NUTS3) where sample banks scarcely report mortgage issuance volumes	439,187	361,160
Total	2,607,042	1,620,386

Panel B: Number of mortgages by country in the pre- and post-transparency period.

Country	Total mortgages	Pre-transparency	Post-transparency
Belgium	500,324	346,500	153,824
France	653,702	381,756	271,946
Ireland	4,651	2,202	2,449
Italy	71,493	65,837	5,656
Spain	75,627	67,422	8,205
The Netherlands	1,301,245	789,978	511,267
Total	2,607,042	1,653,695	953,347

TABLE 2

Descriptive statistics

This table reports the summary statistics of the variables used in our primary analysis. The values of continuous variables are winsorized at 1% and 99%. Variables are defined in the Appendix A.

Variable	Obs.	Mean	Median	S.D.
Mortgage term divergence				
Interest rate divergence	2,607,042	0.562	0.433	0.459
LTV ratio divergence	2,607,042	2.664	2.864	0.969
Maturity divergence	2,607,042	3.823	3.902	0.956
Interest rate divergence, less-developed regions	447,671	0.541	0.415	0.446
LTV ratio divergence, less-developed regions	447,671	2.749	2.957	0.944
Maturity divergence, less-developed regions	447,671	3.729	3.812	0.900
Interest rate divergence, well-developed regions	705,889	0.539	0.413	0.452
LTV ratio divergence, well-developed regions	705,889	2.601	2.891	1.252
Maturity divergence, well-developed regions	705,889	3.710	3.840	0.989
Mortgage characteristics				
Transparency	2,607,042	0.366	0.000	0.482
Mortgage interest rate	2,607,042	3.588	3.650	1.094
LTV ratio	2,607,042	4.150	4.419	0.822
Mortgage maturity	2,607,042	3.065	3.205	0.475
Mortgage amount	2,607,042	11.260	11.416	1.034
Mortgage guarantee	2,607,042	0.406	0.000	0.491
Borrower characteristics				
Borrower income	2,607,042	9.523	10.594	3.686
Borrower employment	2,607,042	0.013	0.000	0.114
Borrower age	2,607,042	3.701	3.682	0.246
Bank characteristics				
High-income bank	1,541,131	0.193	0.000	0.341
Spatial accessibility	2,236,794	0.353	0.000	0.478
Underperforming region	2,607,042	0.116	0.000	0.320

TABLE 3

Transparency and lending term convergence

This table reports the results of the tests on the effect of transparency on the convergence of lending terms offered by a bank for residential mortgages across different geographic regions. In Panel A, we use all loans in our sample. In Panel B, we restrict our sample to mortgages issued in 2011-2014. In Panel C, we restrict our sample to mortgages issued in the first two quarters of 2013 and compare the credit term convergence of mortgages issued by reporting and non-reporting banks. In Panel D, we restrict our sample to mortgages issued by banks that borrowed from the ECB repo facility before the initiation of the ECB's loan level reporting standards. Across all panels, in specification (1), the dependent variable is the absolute value of the difference between a residential mortgage's interest rate (in percentage points) and the mean interest rate of benchmark mortgages (*Interest rate divergence*). Benchmark mortgages are residential mortgages issued by the same bank for the same purpose (house purchase or home equity) in different regions (NUTS3) within the same country over the previous quarter. In specification (2), the dependent variable is the natural logarithm of the absolute value of the difference between a residential mortgage's loan-to-collateral-value ratio (in percentage points) and the mean loan-to-collateral-value ratio of benchmark mortgages (*LTV ratio divergence*). In specification (3), the dependent variable is the natural logarithm of the absolute value of the difference between a residential mortgage's maturity (in months) and the mean maturity of benchmark mortgages (*Maturity divergence*). The independent variable of interest is an indicator variable of whether a loan is issued after the bank adopted the ECB loan-level reporting (*Transparency)*. All variables are defined in the Appendix A. The values of continuous variables are winsorized at 1% and 99%. OLS regressions are used to estimate the models, with t-statistics reported in parentheses. Year of mortgage origination, bank, property region (NUTS1), purpose (house purchase or home equity) and borrower type (individual, other) fixed effects are included but not tabulated. Standard errors are corrected for heteroskedasticity and clustered at the bank level. ***, ** and * denote significance at the 1%, 5% and 10% (two-sided) levels, respectively.

Panel A: The effect of transparency on lending term convergence.

	Interest rate divergence	*LTV ratio Divergence*	*Maturity divergence*
	(1)	(2)	(3)
Transparency	-0.275***	-0.105**	-0.142***
	(-5.20)	(-2.08)	(-2.73)
Mortgage interest rate		-0.002	0.023
		(-0.19)	(1.46)
LTV ratio	0.021*		-0.036
	(2.00)		(-1.53)
Mortgage maturity	-0.015	-0.068	
	(-0.73)	(-1.57)	
Mortgage amount	-0.027**	-0.103***	-0.048***
	(-2.59)	(-4.53)	(-4.64)
Mortgage guarantee	-0.099***	-0.077	-0.114**
	(-7.05)	(-1.54)	(-2.06)
Borrower income	-0.005***	-0.003*	-0.031**
	(-3.13)	(-1.78)	(-2.29)
Borrower employment	-0.011	0.071**	-0.017
	(-1.02)	(2.42)	(-0.47)
Borrower age	0.022	0.208***	0.305**
	(0.79)	(3.20)	(2.05)
Fixed effects	Yes	Yes	Yes
Obs.	2,607,042	2,607,042	2,607,042
R^2	17.81%	12.58%	16.20%

TABLE 3 (Continued)

Panel B: The effect of transparency on the lending term convergence of mortgages issued in 2011-2014.

	Interest rate divergence	*LTV ratio Divergence*	*Maturity divergence*
	(1)	(2)	(3)
Transparency	-0.215***	0.066	-0.073*
	(-3.258)	(0.988)	(-1.832)
Mortgage interest rate		-0.022**	0.037
		(-2.210)	(1.633)
LTV ratio	0.014		-0.053**
	(1.428)		(-2.307)
Mortgage maturity	-0.011	-0.014	
	(-0.706)	(-0.262)	
Mortgage amount	-0.031**	-0.097***	-0.050***
	(-2.548)	(-3.784)	(-3.597)
Mortgage guarantee	-0.121***	-0.163	-0.086
	(-5.728)	(-1.631)	(-1.079)
Borrower income	-0.005***	-0.006**	-0.035***
	(-2.924)	(-2.047)	(-2.713)
Borrower employment	-0.016	0.063	-0.026
	(-1.194)	(1.383)	(-0.765)
Borrower age	0.024	0.185*	0.318**
	(0.785)	(1.824)	(2.216)
Fixed effects	Yes	Yes	Yes
Obs.	1,274,570	1,274,570	1,274,570
R^2	13.00%	12.64%	9.55%

Panel C: The effect of transparency on the lending term convergence of mortgages originated in the first two quarters of 2013 by reporting and non-reporting banks.

	Interest rate divergence	*LTV ratio Divergence*	*Maturity divergence*
	(1)	(2)	(3)
Transparency	-0.055**	0.074	-0.108**
	(-2.30)	(1.18)	(-2.11)
Mortgage interest rate		-0.030**	0.005
		(-2.27)	(0.12)
LTV ratio	-0.004		-0.084***
	(-0.23)		(-2.89)
Mortgage maturity	-0.062	-0.024	
	(-1.07)	(-0.35)	
Mortgage amount	-0.011*	-0.080**	-0.039*
	(-1.71)	(-2.58)	(-2.02)
Mortgage guarantee	-0.069***	-0.101	0.012
	(-3.36)	(-1.11)	(0.20)
Borrower income	-0.002	-0.007**	-0.014***
	(-0.90)	(-2.22)	(-3.53)

TABLE 3 (Continued)

Panel C: The effect of transparency on the lending term convergence of mortgages originated in the first two quarters of 2013 by reporting and non-reporting banks (continued).

	Interest rate divergence	*LTV ratio Divergence*	*Maturity divergence*
	(1)	(2)	(3)
Borrower employment	-0.001	0.060	-0.038
	(-0.06)	(1.17)	(-0.78)
Borrower age	0.021	0.149	0.376**
	(0.76)	(1.27)	(2.37)
Fixed effects	Yes	Yes	Yes
Obs.	134,310	134,310	134,310
R^2	15.44%	12.95%	7.46%

Panel D: The effect of transparency on lending term convergence for banks that used ECB repo financing before the initiation of the ECBôs loan level reporting standards.

	Interest rate divergence	*LTV ratio Divergence*	*Maturity divergence*
	(1)	(2)	(3)
Transparency	-0.374***	-0.101**	-0.231
	(-6.44)	(-3.10)	(-1.71)
Mortgage interest rate		0.009	0.069***
		(0.96)	(3.24)
LTV ratio	0.032***		-0.068**
	(4.32)		(-2.88)
Mortgage maturity	0.018	0.005	
	(0.45)	(0.10)	
Mortgage amount	-0.053*	-0.087***	-0.059***
	(-1.88)	(-6.01)	(-6.88)
Mortgage guarantee	-0.103***	-0.149***	-0.074**
	(-6.93)	(-7.58)	(-2.50)
Borrower income	-0.001	-0.001	-0.008
	(-0.13)	(-0.23)	(-0.66)
Borrower employment	0.007	0.030	0.008
	(0.53)	(0.99)	(0.35)
Borrower age	-0.023	0.153*	0.153
	(-0.55)	(1.82)	(1.78)
Fixed effects	Yes	Yes	Yes
Obs.	1,093,515	1,093,515	1,093,515
R^2	25.14%	23.31%	17.94%

TABLE 4

Sensitivity analyses

This table reports the results of the tests on the effect of transparency on the convergence of lending terms offered by a bank for residential mortgages across different geographic regions using different model specifications. In Panel A, we measure mortgage term divergence based on benchmark mortgage groups using residential mortgages issued to borrowers with similar income and age (within the same quartile rank) by the same bank for the same purpose (house purchase or home equity) in different regions (NUTS3) within the same country over the previous quarter. In Panel B, we control for borrower fixed effects and restrict the sample to borrowers that took a mortgage both before and after a bank initiated loan-level reporting, with at least three mortgages in total. In Panel C, we use a sample of residential mortgages issued post-transparency and mortgages issued before the bank initiated the loan-level reporting matched on interest rate, loan-to-collateral-value ratio and maturity. The one-to-one propensity score matching of treated mortgages is done in random order and without replacement. Matched mortgages are within a distance ("caliper") of 0.01 of the propensity score of the mortgages in the treatment group. All other model specifications and control variables (untabulated) are the same as in Model 1 (Table 3, Panel A). In Panel B, we exclude bank, region and borrower type fixed effects. *Transparency* is an indicator variable of whether a loan is issued after the bank adopted the ECB loan-level reporting. All variables are defined in the Appendix A. The values of the continuous variables are winsorized at 1% and 99%. OLS regressions are used to estimate the models, with t-statistics reported in parentheses. Standard errors are corrected for heteroskedasticity and clustered at the bank level. ***, ** and * denote significance at the 1%, 5% and 10% (two-sided) levels, respectively.

Panel A: The effect of transparency on lending term convergence based on benchmark mortgages of similar borrowers.

	Interest rate divergence	*LTV ratio divergence*	*Maturity divergence*
	(1)	(2)	(3)
Transparency	-0.274***	-0.097*	-0.080**
	(-5.80)	(-1.73)	(-2.16)
Controls	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes
Obs.	2,196,432	2,196,432	2,196,432
R^2	17.00%	17.10%	13.80%

Panel B: The effect of transparency on lending term convergence controlling for borrower fixed effects.

	Interest rate divergence	*LTV ratio divergence*	*Maturity divergence*
	(1)	(2)	(3)
Transparency	-0.161***	-0.033**	-0.003
	(-4.705)	(-2.448)	(-0.036)
Controls	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes
Obs.	185,584	185,584	185,584
R^2	50.58%	76.46%	50.96%

TABLE 4 (Continued)

Panel C: The effect of transparency on lending term convergence using a matched mortgage sample.

	Interest rate divergence	*LTV ratio divergence*	*Maturity divergence*
	(1)	(2)	(3)
Transparency	-0.244***	-0.084**	-0.217***
	(-6.883)	(-2.225)	(-3.496)
Controls	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes
Obs.	1,305,843	1,305,843	1,305,843
R^2	14.59%	15.68%	12.70%

TABLE 5

Transparency, learning and lending term convergence

This table reports the results of the tests of whether the effect of transparency on lending term convergence is more pronounced in a bank's geographic regions where transparent reporting can facilitate greater learning about the lending practices in different regions in which the bank operates. In Panel A, *Underperforming region* is an indicator variable equal to one if the percentage difference between the mortgage default rate in a loan's region (NUTS3) and mean default rate in the regions of benchmark mortgages ranks in the upper quartile of this ratio, and zero otherwise. Benchmark mortgages are residential mortgages issued by the same bank for the same purpose (house purchase or home equity) in different regions (NUTS3) within the same country over the previous quarter. In Panel B, *Spatial accessibility* is an indicator variable of whether benchmark regions' (NUTS2) average motorway and railroad network density (km/km^2) is lower than the EU median regional motorway and railroad network density. Across both panels, in specification (1), the dependent variable is the absolute value of the difference between a residential mortgage's interest rate (in percentage points) and the mean interest rate of benchmark mortgages (*Interest rate divergence*). In specification (2), the dependent variable is the natural logarithm of the absolute value of the difference between a residential mortgage's loan-to-collateral-value ratio (in percentage points) and the mean loan-to-collateral-value ratio of benchmark mortgages (*LTV ratio divergence*). In specification (3), the dependent variable is the natural logarithm of the absolute value of the difference between a residential mortgage's maturity (in months) and the mean maturity of benchmark mortgages (*Maturity divergence*). *Transparency* is an indicator variable of whether a loan is issued after the bank adopted the ECB loan-level reporting. All variables are defined in the Appendix A. The values of continuous variables are winsorized at 1% and 99%. OLS regressions are used to estimate the models, with t-statistics reported in parentheses. Year of mortgage origination, bank, property region (NUTS1), purpose (house purchase or home equity) and borrower type (individual, other) fixed effects are included but not tabulated. Standard errors are corrected for heteroskedasticity and clustered at the bank level. ***, ** and * denote significance at the 1%, 5% and 10% (two-sided) levels, respectively.

Panel A: The effect of transparency on lending term convergence in underperforming bank regions.

	Interest rate divergence	*LTV ratio divergence*	*Maturity divergence*
	(1)	(2)	(3)
Transparency	-0.262***	-0.096*	-0.095*
	(-4.93)	(-1.84)	(-1.82)
Underperforming region	0.143***	0.073*	0.508
	(2.80)	(1.72)	(1.31)
Transparency x Underperforming region	-0.169**	-0.139*	-0.620
	(-2.55)	(-1.81)	(-1.40)
Mortgage interest rate		-0.002	0.023
		(-0.19)	(1.43)
LTV ratio	0.021*		-0.037*
	(2.00)		(-1.71)
Mortgage maturity	-0.016	-0.069	
	(-0.77)	(-1.57)	
Mortgage amount	-0.027**	-0.103***	-0.048***
	(-2.59)	(-4.53)	(-4.58)
Mortgage guarantee	-0.095***	-0.075	-0.102*
	(-7.14)	(-1.49)	(-1.97)
Borrower income	-0.005***	-0.003	-0.030**
	(-2.97)	(-1.63)	(-2.19)

TABLE 5 (continued)

Panel A: The effect of transparency on lending term convergence in underperforming bank regions (continued).

	Interest rate divergence	*LTV ratio divergence*	*Maturity divergence*
	(1)	(2)	(3)
Borrower employment	-0.010	0.071**	-0.014
	(-0.97)	(2.43)	(-0.40)
Borrower age	0.021	0.208***	0.305**
	(0.78)	(3.19)	(2.04)
Fixed effects	Yes	Yes	Yes
Obs.	2,607,042	2,607,042	2,607,042
R^2	18.13%	12.60%	17.17%

Panel B: The effect of transparency on lending term convergence when benchmark bank regions are not easily spatially accessible.

	Interest rate divergence	*LTV ratio divergence*	*Maturity divergence*
	(1)	(2)	(3)
Transparency	-0.218***	-0.074	0.054
	(-4.22)	(-1.01)	(1.08)
Spatial accessibility	0.079**	0.043	0.151***
	(2.51)	(0.99)	(4.40)
Transparency × Spatial accessibility	-0.097*	-0.036	-0.257***
	(-1.70)	(-0.61)	(-3.56)
Mortgage interest rate		-0.007	0.041**
		(-0.63)	(2.55)
LTV ratio	0.019*		-0.041*
	(1.84)		(-1.93)
Mortgage maturity	-0.017	-0.061	
	(-0.74)	(-1.34)	
Mortgage amount	-0.029**	-0.110***	-0.042***
	(-2.57)	(-4.26)	(-3.67)
Mortgage guarantee	-0.094***	-0.075	-0.138**
	(-6.96)	(-1.19)	(-2.63)
Borrower income	-0.004**	-0.002	-0.030**
	(-2.54)	(-1.12)	(-2.33)
Borrower employment	-0.008	0.071**	-0.024
	(-0.80)	(2.26)	(-0.70)
Borrower age	0.036	0.212***	0.380**
	(1.16)	(2.84)	(2.50)
Fixed effects	Yes	Yes	Yes
Obs.	2,236,794	2,236,794	2,236,794
R^2	14.55%	13.60%	11.89%

TABLE 6

Transparency, regulatory scrutiny and lending term convergence

This table reports the results of the tests of whether the effect of transparency on lending term convergence is more pronounced for banks and geographic regions that are under greater regulatory scrutiny. In Panel A, *High-income bank* is an indicator variable of whether a bank's ratio of annual interest and non-interest income to total assets ranks in the upper quintile of the distribution of this ratio among banks within the same country. In specification (1), the dependent variable is the absolute value of the difference between a residential mortgage's interest rate (in percentage points) and the mean interest rate of benchmark mortgages (*Interest rate divergence*). Benchmark mortgages are residential mortgages issued by the same bank for the same purpose (house purchase or home equity) in different regions (NUTS3) within the same country over the previous quarter. In specification (2), the dependent variable is the natural logarithm of the absolute value of the difference between a residential mortgage's loan-to-collateral-value ratio (in percentage points) and the mean loan-to-collateral-value ratio of benchmark mortgages (*LTV ratio divergence*). In specification (3), the dependent variable is the natural logarithm of the absolute value of the difference between a residential mortgage's maturity (in months) and the mean maturity of benchmark mortgages (*Maturity divergence*). In Panel B, we measure lending standard divergence using the distance between the terms (interest rate, loan-to-collateral-value and maturity in specifications (1), (2) and (3), respectively) of a residential mortgage issued in a less (well-) developed region (NUTS3) and the terms of benchmark mortgages issued in well- (less) developed regions. Less (well-) developed regions are regions (NUTS3) for which annual GDP per capita ranks in the bottom two quintiles (upper quintile) of the distribution of GDP per capita across a country's regions. Across both panels, the independent variable of interest is an indicator variable of whether a loan is issued after the bank adopted the ECB loan level reporting (*Transparency)*. All variables are defined in the Appendix A. The values of continuous variables are winsorized at 1% and 99%. OLS regressions are used to estimate the models, with t-statistics reported in parentheses. Year of mortgage origination, bank, property region (NUTS1), purpose (house purchase or home equity) and borrower type (individual, other) fixed effects are included but not tabulated. Standard errors are corrected for heteroskedasticity and clustered at the bank level. ***, ** and * denote significance at the 1%, 5% and 10% (two-sided) levels, respectively.

Panel A: The effect of transparency on lending term convergence for high-income banks.

	Interest rate divergence	*LTV ratio divergence*	*Maturity divergence*
	(1)	(2)	(3)
Transparency	-0.296***	-0.037	-0.121*
	(-5.03)	(-1.25)	(-1.81)
High-income bank	0.076*	0.132**	0.528***
	(1.87)	(2.48)	(4.84)
Transparency x High-income bank	-0.113*	-0.173*	-0.611***
	(-1.83)	(-2.00)	(-7.27)
Mortgage interest rate		-0.003	0.015
		(-0.28)	(1.02)
LTV ratio	0.022**		-0.042**
	(2.63)		(-2.27)
Mortgage maturity	-0.001	-0.065	
	(-0.05)	(-1.20)	
Mortgage amount	-0.028*	-0.112***	-0.055***
	(-2.06)	(-3.40)	(-7.60)

TABLE 6 (continued)

Panel A: The effect of transparency on lending term convergence of high-income banks (continued).

	Interest rate divergence	*LTV ratio divergence*	*Maturity divergence*
	(1)	(2)	(3)
Mortgage guarantee	-0.095***	-0.112*	-0.072
	(-6.21)	(-2.08)	(-1.56)
Borrower income	-0.006***	-0.003	-0.036**
	(-6.37)	(-1.23)	(-2.56)
Borrower employment	-0.002	0.051*	-0.001
	(-0.30)	(2.00)	(-0.03)
Borrower age	-0.015	0.121*	0.183
	(-0.88)	(1.89)	(1.61)
Fixed effects	Yes	Yes	Yes
Obs.	1,541,131	1,541,131	1,541,131
R^2	17.70%	15.12%	18.82%

TABLE 6 (continued)

Panel B: The effect of transparency on lending term convergence for residential mortgages issued in less (well-) developed regions compared to mortgages issued in well- (less) developed regions.

	Interest rate divergence, less developed regions	*LTV ratio divergence, less developed regions*	*Maturity divergence, less developed regions*	*Interest rate divergence, well-developed regions*	*LTV ratio divergence, well-developed regions*	*Maturity divergence, well-developed regions*
	(1)	(2)	(3)	(4)	(5)	(6)
Transparency	-0.371***	-0.171***	-0.130***	-0.240***	-0.024	-0.028
	(-8.816)	(-4.404)	(-3.520)	(-5.026)	(-0.795)	(-0.482)
Mortgage interest rate		-0.003	0.022		-0.010	0.038**
		(-0.311)	(1.639)		(-0.624)	(2.123)
LTV ratio	0.024**		-0.056***	0.023		-0.031**
	(2.338)		(-3.707)	(1.520)		(-2.066)
Mortgage maturity	0.053	-0.001		-0.044**	-0.154***	
	(1.677)	(-0.012)		(-2.583)	(-2.916)	
Mortgage amount	-0.036**	-0.100***	-0.048**	-0.032*	-0.140***	-0.034*
	(-2.596)	(-3.378)	(-2.533)	(-1.877)	(-4.268)	(-1.859)
Mortgage guarantee	-0.125***	-0.115	-0.088	-0.110***	-0.081	-0.199***
	(-7.451)	(-1.365)	(-1.659)	(-5.182)	(-1.229)	(-3.637)
Borrower income	-0.005***	-0.001	-0.026**	-0.003	-0.004	-0.031**
	(-2.942)	(-0.282)	(-2.199)	(-1.487)	(-1.136)	(-2.029)
Borrower employment	0.014	0.080**	-0.001	-0.018*	0.074***	-0.039
	(0.767)	(2.075)	(-0.034)	(-1.742)	(3.665)	(-1.143)
Borrower age	0.047*	0.058	0.348**	0.027	0.257***	0.344
	(1.689)	(0.719)	(2.310)	(0.739)	(5.110)	(1.601)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	447,671	447,671	447,671	705,889	705,889	705,889
R^2	16.90%	8.47%	8.45%	14.08%	31.52%	9.88%

TABLE 7

Transparency, lending term convergence and banksô financial performance

This table reports the results of the tests on the effect of lending term convergence under the transparent reporting on a bank's financial performance. *High convergence* is an indicator variable of whether at least one of the *Interest rate divergence, LTV ratio divergence* or *Maturity divergence* measures, averaged at the bank-year level, ranks in the bottom quintile of the distribution of these variables. *NPL ratio* is the ratio of non-performing loans to gross loans. *Return on assets* is the ratio of net income to total assets. *Transparency* is an indicator variable of whether a bank reports loan-level data during a year. We control for the natural logarithm of bank's total assets (*Size*), cash to short-term borrowing and deposits (*Liquidity*), gross loans to prior year's gross loans (*Loan growth*) and Tier 1 capital ratio (*Tier 1 capital*). Variables are defined in the Appendix A. The values of the continuous variables are winsorized at 1% and 99%. OLS regressions are used to estimate the models, with t-statistics reported in parentheses. Bank and year fixed effects are included but not tabulated. Standard errors are corrected for heteroskedasticity and clustered at the bank level. ***, ** and * denote significance at the 1%, 5% and 10% (two-sided) levels, respectively.

	NPL ratio	*Return on assets*
	(1)	(2)
Transparency	0.011	0.004*
	(0.64)	(1.83)
High convergence	0.002	0.001
	(0.36)	(1.32)
Transparency × *High convergence*	-0.041***	-0.002
	(-4.15)	(-1.30)
NPL ratio		-0.102***
		(-3.87)
Return on assets	-2.051***	
	(-3.17)	
Size	0.002	0.005
	(0.15)	(0.92)
Liquidity	-0.108	-0.017
	(-1.04)	(-0.72)
Loan growth	0.001*	0.000**
	(1.74)	(2.53)
Tier 1 capital	-0.07	-0.037
	(-1.02)	(-0.82)
Fixed effects	Yes	Yes
Obs.	118	118
R^2	83.20%	38.80%

TABLE 8

Transparency, lending term convergence and borrowing terms

This table reports the results of the tests on the effect of lending term convergence under the transparent reporting on borrowers' mortgage terms. In specification (1), the dependent variable is the mortgage interest rate in percentage points (*Mortgage interest rate). High interest rate convergence* is an indicator variable equal to one if *Interest rate divergence*, averaged at the bank-quarter level, ranks in the bottom quintile of this variable's sample distribution. In specification (2), the dependent variable is the natural logarithm of the loan-to-collateral-value ratio in percentage points (*LTV ratio). High LTV ratio convergence* is an indicator variable equal to one if *LTV ratio divergence*, averaged at the bank-quarter level, ranks in the bottom quintile of this variable's sample distribution. In specification (3), the dependent variable is the natural logarithm of a mortgage's maturity in months (*Mortgage maturity). High maturity convergence* is an indicator variable equal to one if *Maturity divergence* averaged at the bank-quarter level ranks in the bottom quintile of this variable's sample distribution. *Transparency* is an indicator variable of whether a bank reports loan-level data during a year. All variables are defined in the Appendix A. The values of the continuous variables are winsorized at 1% and 99%. OLS regressions are used to estimate the models, with t-statistics reported in parentheses. Year of mortgage origination, bank, property region (NUTS1), purpose (house purchase or home equity) and borrower type (individual, other) fixed effects are included but not tabulated. Standard errors are corrected for heteroskedasticity and clustered at the bank level. ***, ** and * denote significance at the 1%, 5% and 10% (two-sided) levels, respectively.

	Mortgage interest rate	*LTV ratio*	*Mortgage maturity*
	(1)	(2)	(3)
Transparency	-0.780***	0.178	0.0863**
	(-4.43)	(1.07)	(2.57)
High interest rate convergence	-0.0698		
	(-1.63)		
Transparency	-0.106*		
× High interest rate convergence	(-1.93)		
High LTV ratio convergence		-0.223	
		(-1.03)	
Transparency		0.101	
× High LTV ratio convergence		(0.97)	
High Maturity convergence			-0.00600
			(-0.49)
Transparency			0.0783***
× High Maturity convergence			(3.35)
Mortgage interest rate		0.0287	0.0289
		(1.41)	(1.32)
LTV ratio	0.0599		0.0838***
	(1.14)		(4.67)

TABLE 8 (continued)

Transparency, lending term convergence and borrowing terms

	Mortgage interest rate	*LTV ratio*	*Mortgage maturity*
	(1)	(2)	(3)
Mortgage maturity	0.145	0.226***	
	(1.36)	(4.12)	
Mortgage amount	-0.0463*	0.132***	0.0982***
	(-1.92)	(5.01)	(4.54)
Mortgage guarantee	-0.0426	0.127***	-0.00401
	(-1.22)	(3.65)	(-0.14)
Borrower income	-0.00336	0.000965	0.00555**
	(-1.04)	(0.41)	(2.39)
Borrower employment	0.0682***	-0.0549**	-0.0244
	(5.89)	(-2.44)	(-1.43)
Borrower age	-0.210**	-0.332***	-0.392***
	(-2.06)	(-3.52)	(-3.89)
Fixed effects	Yes	Yes	Yes
Obs.	2,607,042	2,607,042	2,607,042
R^2	54.38%	55.61%	51.32%

TABLE 9

Transparency and lending term convergence across banks

This table reports the results of the tests on the effect of transparency on cross-bank mortgage term convergence. Panel A reports the results of the tests on the effect of transparency on the convergence of lending terms offered for residential mortgages by different banks within a geographic region. Panel B reports the results of the tests of whether the effect of transparency on lending term convergence across banks is more pronounced in regions where benchmark banks report a low non-performing loan intensity. Benchmark banks are banks that issue same-purpose (house purchase or home equity) residential mortgages in the same region (NUTS1) over the previous quarter. *High loan quality benchmark banks* is an indicator variable of whether benchmark banks' mean ratio of non-performing loans to total assets ranks in the bottom quintile of the distribution of this ratio across banks within the same country. Panel C reports the results of the tests of whether the effect of transparency on lending term convergence across banks is less pronounced for more developed regions. *Well-developed region* is an indicator variable of whether annual GDP per capita of the region (NUTS1) a mortgage is originated in ranks in the upper quintile of this variable's distribution. Across all panels, in specification (1), the dependent variable is the absolute value of the difference between a residential mortgage's interest rate (in percentage points) and the mean interest rate of benchmark mortgages (*Interest rate divergence*). Benchmark mortgages are residential mortgages issued by different banks for the same purpose (house purchase or home equity) in the same region (NUTS1) over the previous quarter. In specification (2), the dependent variable is the natural logarithm of the absolute value of the difference between a residential mortgage's loan-to-collateral-value ratio (in percentage points) and the mean loan-to-collateral-value ratio of benchmark mortgages (*LTV ratio divergence*). In specification (3), the dependent variable is the natural logarithm of the absolute value of the difference between a residential mortgage's maturity (in months) and the mean maturity of benchmark mortgages (*Maturity divergence*). *Transparency* is an indicator variable of whether a loan is issued after a bank adopted the ECB's loan-level reporting standards. All other variables are defined in the Appendix A. The values of the continuous variables are winsorized at 1% and 99%. OLS regressions are used to estimate the models, with t-statistics reported in parentheses. Year of mortgage origination, bank, property region (NUTS1) (except Panel C), purpose (house purchase or home equity) and borrower type (individual, other) fixed effects are included but not tabulated. Standard errors are corrected for heteroskedasticity and clustered at the bank level. ***, ** and * denote significance at the 1%, 5% and 10% (two-sided) levels, respectively.

Panel A: The effect of transparency on lending term convergence across banks.

	Interest rate divergence across banks	*LTV ratio divergence across banks*	*Maturity divergence across banks*
	(1)	(2)	(3)
Transparency	-0.299***	-0.097*	-0.208**
	(-5.06)	(-1.83)	(-2.09)
Mortgage interest rate		0.006	0.037*
		(0.34)	(1.90)
LTV ratio	0.021**		-0.011
	(2.07)		(-0.43)
Mortgage maturity	-0.015	-0.019	
	(-0.91)	(-0.39)	
Mortgage amount	-0.025**	-0.058***	-0.054***
	(-2.29)	(-4.33)	(-2.90)
Mortgage guarantee	-0.113***	-0.094**	-0.103**
	(-6.08)	(-2.33)	(-2.42)
Borrower income	-0.004	-0.001	-0.030***
	(-1.50)	(-0.86)	(-2.73)

TABLE 9 (continued)

Panel A: The effect of transparency on lending term convergence across banks (continued)

	Interest rate divergence across banks	*LTV ratio divergence across banks*	*Maturity divergence across banks*
	(1)	(2)	(3)
Borrower employment	-0.016	0.052*	-0.065
	(-1.63)	(1.91)	(-1.51)
Borrower age	0.047	0.281***	0.093
	(1.42)	(3.29)	(0.45)
Fixed effects	Yes	Yes	Yes
Obs.	2,607,042	2,607,042	2,607,042
R^2	17.20%	12.67%	12.26%

Panel B: The effect of transparency on lending term convergence across banks when benchmark banks issue higher quality loans.

	Interest rate divergence across banks	*LTV ratio divergence across banks*	*Maturity divergence across banks*
	(1)	(2)	(3)
Transparency	-0.317***	-0.095	-0.271**
	(-4.49)	(-1.32)	(-2.53)
High loan quality benchmark banks	0.087*	-0.053***	0.029
	(1.68)	(-4.36)	(0.21)
Transparency × High loan quality benchmark banks	-0.091**	-0.077*	-0.211
	(-2.11)	(-1.79)	(-1.44)
Mortgage interest rate		0.007	0.033
		(0.39)	(1.05)
LTV ratio	0.014		-0.028
	(1.01)		(-0.56)
Mortgage maturity	-0.010	0.009	
	(-0.63)	(0.15)	
Mortgage amount	-0.028**	-0.053**	-0.054**
	(-2.15)	(-2.58)	(-2.52)
Mortgage guarantee	-0.164***	-0.100*	-0.075
	(-8.81)	(-1.96)	(-1.10)
Borrower income	-0.006***	-0.001	-0.034***
	(-3.91)	(-0.68)	(-5.50)
Borrower employment	-0.016***	0.053	-0.074
	(-2.90)	(1.60)	(-1.32)
Borrower age	0.045	0.255***	0.157
	(0.95)	(2.91)	(0.73)
Fixed effects	Yes	Yes	Yes
Obs.	1,716,290	1,716,290	1,716,290
R^2	21.23%	10.65%	10.74%

TABLE 9 (continued)

Panel C: The effect of transparency on lending term convergence across banks in well- and less-developed regions.

	Interest rate divergence across banks	*LTV ratio divergence across banks*	*Maturity divergence across banks*
	(1)	(2)	(3)
Transparency	-0.329***	-0.126**	-0.309***
	(-5.328)	(-2.481)	(-2.825)
Well-developed region	0.011	-0.049	-0.120**
	(0.915)	(-1.610)	(-2.202)
Transparency			
× *Well-developed region*	-0.004	0.072***	0.170**
	(-0.221)	(2.781)	(2.504)
Mortgage interest rate		-0.009	0.037**
		(-0.442)	(2.080)
LTV ratio	0.011		-0.008
	(1.458)		(-0.402)
Mortgage maturity	-0.007	-0.060	
	(-0.352)	(-1.034)	
Mortgage amount	-0.023**	-0.047***	-0.054***
	(-2.018)	(-3.501)	(-2.855)
Mortgage guarantee	-0.100***	-0.112**	-0.121***
	(-5.866)	(-2.546)	(-3.213)
Borrower income	-0.003	-0.004	-0.030**
	(-1.259)	(-1.142)	(-2.637)
Borrower employment	-0.010	0.094***	-0.068
	(-0.906)	(3.004)	(-1.550)
Borrower age	0.054*	0.235**	0.079
	(1.902)	(2.456)	(0.378)
Fixed effects	Yes	Yes	Yes
Obs.	2,607,042	2,607,042	2,607,042
R^2	17.42%	12.99%	12.54%

TABLE 10

Transparency, competitive pressure and lending term convergence

This table reports the results of the tests of whether the effect of transparency on lending term convergence is more pronounced in competitive regional credit markets. In Panel A, we examine the effect of competitive pressures on within-bank convergence. We measure competitive pressure across a bank's regional branches using an indicator variable of whether the quarterly Herfindahl-index (HHI) of a bank's proximal regional branches (i.e., local branches [NUTS3] belonging to the same wider region [NUTS1]) ranks below the variable's median value within a country (*High within-bank competition*). HHI of a bank's proximal regional branches is estimated based on their quarterly mortgage issuance volume. In Panel B, we examine the effect of competitive pressures on cross-bank convergence. We measure competitive pressure across different banks using an indicator variable of whether a region's (NUTS1) HHI based on banks' quarterly mortgage issuance volume ranks below the variable's median value within a country (*High cross-bank competition*). We augment Model 1 with the *High cross-bank competition* indicator variable and its interaction term with *Transparency*. The dependent variables are the same to the ones used in Table 9. *Transparency* is an indicator variable of whether a loan is issued after the bank adopted the ECB loan-level reporting. All other variables are defined in the Appendix A. The values of continuous variables are winsorized at 1% and 99%. OLS regressions are used to estimate the models, with t-statistics reported in parentheses. Year of mortgage origination, bank, property region (NUTS1), purpose (house purchase or home equity) and borrower type (individual, other) fixed effects are included but not tabulated. Standard errors are corrected for heteroskedasticity and clustered at the bank level. ∗∗∗, ∗∗ and ∗ denote significance at the 1%, 5% and 10% (two-sided) levels, respectively.

Panel A: The effect of transparency on lending term convergence in regions with high within-bank competition.

	Interest rate divergence	*LTV ratio divergence*	*Maturity divergence*
	(1)	(2)	(3)
Transparency	-0.296***	-0.127**	-0.267**
	(-5.23)	(-2.07)	(-2.57)
High within-bank competition	-0.031	-0.010	-0.067
	(-1.61)	(-0.45)	(-1.27)
Transparency x High within-bank competition	0.006	0.059	0.132
	(0.22)	(1.27)	(1.13)
Mortgage interest rate		0.006	0.036*
		(0.33)	(1.86)
LTV ratio	0.021**		-0.008
	(2.11)		(-0.28)
Mortgage maturity	-0.015	-0.019	
	(-0.90)	(-0.38)	
Mortgage amount	-0.024**	-0.058***	-0.055***
	(-2.29)	(-4.34)	(-2.94)
Mortgage guarantee	-0.112***	-0.094**	-0.102**
	(-6.11)	(-2.32)	(-2.39)
Borrower income	-0.004	-0.001	-0.029**
	(-1.51)	(-0.59)	(-2.54)

TABLE 10 (continued)

Panel A: The effect of transparency on lending term convergence in regions with high within-bank competition (continued).

	Interest rate divergence	*LTV ratio divergence*	*Maturity divergence*
	(1)	(2)	(3)
Borrower employment	-0.016	0.051*	-0.065
	(-1.62)	(1.89)	(-1.51)
Borrower age	0.047	0.281***	0.096
	(1.43)	(3.30)	(0.47)
Fixed effects	Yes	Yes	Yes
Obs.	2,607,042	2,607,042	2,607,042
R^2	17.83%	12.60%	16.30%

Panel B: The effect of transparency on lending term convergence in more competitive credit markets.

	Interest rate divergence across banks	*LTV ratio divergence across banks*	*Maturity divergence across banks*
	(1)	(2)	(3)
Transparency	-0.299***	-0.115***	-0.213***
	(-5.038)	(-2.711)	(-2.892)
High cross-bank competition	0.087**	-0.075***	0.006
	(2.012)	(-3.755)	(0.091)
Transparency × High cross-bank competition	-0.011	0.040	0.007
	(-0.484)	(1.355)	(0.062)
Mortgage interest rate		0.005	0.037*
		(0.301)	(1.915)
LTV ratio	0.017**		-0.012
	(2.052)		(-0.452)
Mortgage maturity	-0.015	-0.019	
	(-0.870)	(-0.375)	
Mortgage amount	-0.024**	-0.058***	-0.054***
	(-2.193)	(-4.341)	(-2.890)
Mortgage guarantee	-0.113***	-0.093**	-0.103**
	(-6.086)	(-2.345)	(-2.411)
Borrower income	-0.004*	-0.001	-0.030***
	(-1.870)	(-0.685)	(-2.727)
Borrower employment	-0.016	0.052*	-0.065
	(-1.653)	(1.911)	(-1.499)
Borrower age	0.045	0.281***	0.093
	(1.358)	(3.280)	(0.451)
Fixed effects	Yes	Yes	Yes
Obs.	2,607,042	2,607,042	2,607,042
R^2	17.59%	12.75%	12.26%

TABLE 11

Transparency and lending term convergence: auto-loans

This table reports the results of the tests on the effect of transparency on the convergence of credit terms offered by a lender for auto-loans across different geographic regions. Using a sample of auto-loans in the 2009-2017 period, in Panel A, we replicate our primary transparency tests (similar to the tests in Table 3); in Panel B (C), we replicate the tests of whether transparent reporting can facilitate greater learning about the lending practices in different regions in which the bank operates (similar to the tests tabulated in Table 5, Panel A (B)); in Panel D (E), we replicate the tests of whether the effect of transparency on lending term convergence is more pronounced for banks and geographic regions that are under greater regulatory scrutiny (similar to the tests tabulated in Table 6, Panel A (B)). In Panels A to D, in specification (1), the dependent variable is the absolute value of the difference between an auto-loan's interest rate (in percentage points) and the mean interest rate of benchmark auto-loans (*Interest rate divergence*). Benchmark auto-loans are auto-loans issued by the same lender for the same borrower type (corporate, individual and other) and vehicle condition (new, used, demo and other car) in different regions (NUTS3) within the same country over the previous quarter. In specification (2), the dependent variable is the natural logarithm of the absolute value of the difference between an auto-loan's loan-to-collateral-value ratio (in percentage points) and the mean loan-to-collateral-value ratio of benchmark auto-loans (*LTV ratio divergence*). In specification (3), the dependent variable is the absolute value of the difference between an auto-loan's maturity (in years) and the mean maturity of benchmark auto-loans (*Maturity divergence*). In Panel E, we measure lending standard divergence using the distance between the terms (interest rate, loan-to-collateral-value and maturity in specifications (1), (2) and (3), respectively) of an auto-loan issued in a less (well-) developed region (NUTS3) and the terms of benchmark auto-loans issued in well- (less) developed regions. Less (well-) developed regions are regions (NUTS3) for which annual GDP per capita ranks in the bottom two quintiles (upper quintile) of the distribution of GDP per capita across a country's regions. Across all panels, *Transparency* is an indicator variable of whether a loan is issued after the issuing bank adopted the ECB loan-level reporting. We further control for an indicator variable of whether a borrower made a down-payment on the auto-loan (*Down payment*), whether the auto loan is for a used or new vehicle (*Vehicle condition*), whether the loan is for a vehicle purchase (*Purchase contract*) and an auto-loan's maturity in years (*Loan maturity*). All other variables are defined in the Appendix A. The values of the continuous variables are winsorized at 1% and 99%. OLS regressions are used to estimate the models, with t-statistics reported in parentheses. Year of auto-loan origination, bank, property region (NUTS1) and borrower type (corporate, individual and other) fixed effects are included but not tabulated. Standard errors are corrected for heteroskedasticity and clustered at the bank level. ∗∗∗, ∗∗ and ∗ denote significance at the 1%, 5% and 10% (two-sided) levels, respectively.

Panel A: The effect of transparency on auto-loan term convergence.

	Interest rate divergence	*LTV ratio divergence*	*Maturity divergence*
	(1)	(2)	(3)
Transparency	-0.236**	0.004	-0.062***
	(-2.110)	(0.094)	(-3.452)
Loan interest rate		-0.020	0.030**
		(-1.035)	(2.745)
LTV ratio	-0.090**		-0.019
	(-2.688)		(-1.183)
Loan maturity	-0.096**	-0.079	
	(-2.166)	(-1.271)	
Loan amount	0.059	-0.235***	0.018
	(1.298)	(-4.126)	(0.588)
Down-payment	-0.008	-0.537***	-0.019
	(-0.252)	(-4.131)	(-1.037)
Borrower income	-0.000	-0.004	-0.010
	(-0.000)	(-0.289)	(-1.601)

TABLE 11 (continued)

Panel A: The effect of transparency on auto-loan term convergence (continued)

	Interest rate divergence	*LTV ratio divergence*	*Maturity divergence*
	(1)	(2)	(3)
Vehicle condition	0.034	-0.003	0.055*
	(0.446)	(-0.066)	(1.893)
Purchase contract	-0.148	-0.217	0.088
	(-1.151)	(-1.496)	(1.460)
Fixed effects	Yes	Yes	Yes
Obs.	2,576,234	2,576,234	2,576,234
R^2	15.23%	30.69%	12.24%

TABLE 11 (continued)

Panel B: The effect of transparency on auto-loan term convergence in underperforming bank regions.

	Interest rate divergence	*LTV ratio divergence*	*Maturity divergence*
	(1)	(2)	(3)
Transparency	-0.231**	-0.000	-0.061***
	(-2.110)	(-0.009)	(-3.416)
Underperforming region	0.017	-0.144	0.006
	(0.861)	(-1.717)	(0.486)
Transparency × *Underperforming region*	-0.131***	0.165**	-0.030*
	(-2.894)	(2.223)	(-1.753)
Loan interest rate		-0.020	0.030**
		(-1.035)	(2.744)
LTV ratio	-0.090**		-0.019
	(-2.687)		(-1.183)
Loan maturity	-0.096**	-0.080	
	(-2.162)	(-1.282)	
Loan amount	0.059	-0.234***	0.018
	(1.298)	(-4.118)	(0.585)
Down-payment	-0.008	-0.537***	-0.019
	(-0.260)	(-4.128)	(-1.041)
Borrower income	-0.000	-0.004	-0.010
	(-0.002)	(-0.291)	(-1.602)
Vehicle condition	0.034	-0.003	0.055*
	(0.451)	(-0.072)	(1.895)
Purchase contract	-0.148	-0.216	0.088
	(-1.155)	(-1.489)	(1.458)
Fixed effects	Yes	Yes	Yes
Obs.	2,576,234	2,576,234	2,576,234
R^2	15.26%	30.70%	12.25%

TABLE 11 (continued)

Panel C: The effect of transparency on auto-loan term convergence when benchmark bank regions are not easily spatially accessible.

	Interest rate divergence	*LTV ratio divergence*	*Maturity divergence*
	(1)	(2)	(3)
Transparency	-0.153**	0.075	-0.097***
	(-2.106)	(0.597)	(-3.962)
Spatial accessibility	0.127***	0.026	0.004
	(4.121)	(0.220)	(0.159)
Transparency × *Spatial accessibility*	-0.127**	-0.147	-0.008
	(-2.509)	(-0.835)	(-0.285)
Loan interest rate		-0.041	0.027*
		(-1.415)	(1.722)
LTV ratio	-0.081**		-0.029
	(-2.577)		(-0.963)
Loan maturity	-0.166**	-0.032	
	(-2.120)	(-0.320)	
Loan amount	0.012	-0.233***	0.055
	(0.340)	(-3.676)	(0.984)
Down-payment	-0.035	-0.616***	0.010
	(-1.183)	(-8.492)	(0.427)
Borrower income	0.004	-0.019	-0.006
	(1.434)	(-0.657)	(-1.676)
Vehicle condition	-0.089	-0.035	0.000
	(-1.247)	(-0.484)	(0.013)
Purchase contract	-0.382***	-0.531***	0.048
	(-4.920)	(-4.686)	(0.968)
Fixed effects	Yes	Yes	Yes
Obs.	1,035,048	1,035,048	1,035,048
R^2	16.88%	33.49%	7.50%

TABLE 11 (continued)

Panel D: The effect of transparency on auto-loan term convergence for high-income banks.

	Interest rate divergence	*LTV ratio divergence*	*Maturity divergence*
	(1)	(2)	(3)
Transparency	-0.189*	-0.043	-0.025*
	(-1.698)	(-0.671)	(-1.885)
High-income bank	0.102	-0.495	-0.035
	(0.537)	(-0.947)	(-0.558)
Transparency × *High-income bank*	0.132	0.044	-0.088**
	(1.092)	(0.309)	(-2.163)
Loan interest rate		-0.018	0.037*
		(-1.196)	(2.026)
LTV ratio	-0.182***		-0.045**
	(-3.291)		(-2.354)
Loan maturity	0.023	-0.103	
	(0.231)	(-1.426)	
Loan amount	0.058*	-0.267***	-0.018
	(2.073)	(-4.468)	(-0.914)
Down-payment	-0.009	-0.474***	-0.004
	(-0.251)	(-3.015)	(-0.246)
Borrower income	-0.001	-0.001	-0.014*
	(-0.078)	(-0.047)	(-1.874)
Vehicle condition	0.042	0.024	0.029
	(0.436)	(0.374)	(1.311)
Purchase contract	-0.172	0.065	0.094
	(-1.122)	(0.375)	(1.273)
Fixed effects	Yes	Yes	Yes
Obs.	1,536,799	1,536,799	1,536,799
R^2	27.85%	33.23%	12.25%

TABLE 11 (continued)

Panel E: The effect of transparency on credit term convergence for auto-loans issued in less (well-) developed regions compared to auto-loans issued in well- (less) developed regions.

	Interest rate divergence, less developed regions	*LTV ratio divergence, less developed regions*	*Maturity divergence, less developed regions*	*Interest rate divergence, well-developed regions*	*LTV ratio divergence, well-developed regions*	*Maturity divergence, well-developed regions*
	(1)	(2)	(3)	(4)	(5)	(6)
Transparency	-0.296**	-0.002	-0.070**	-0.135**	-0.003	-0.085***
	(-2.527)	(-0.582)	(-2.106)	(-2.749)	(-0.971)	(-2.691)
Loan interest rate		-0.003**	0.033***		-0.003**	0.021*
		(-2.192)	(2.919)		(-2.098)	(1.954)
LTV ratio	0.017		0.007	-0.011		-0.020
	(0.779)		(0.241)	(-0.346)		(-0.802)
Loan maturity	-0.029	-0.009		-0.145**	-0.006	
	(-0.512)	(-1.178)		(-2.145)	(-0.637)	
Loan amount	0.019	-0.031***	0.065	0.030	-0.022***	-0.024
	(0.514)	(-5.821)	(1.215)	(1.173)	(-3.298)	(-0.796)
Down-payment	-0.013	-0.040***	-0.001	0.029	-0.028**	0.025
	(-0.359)	(-3.869)	(-0.064)	(0.677)	(-2.530)	(1.210)
Borrower income	-0.001	0.001	-0.009	-0.002	0.001	-0.013*
	(-0.187)	(1.571)	(-1.331)	(-0.234)	(0.769)	(-1.856)
Vehicle condition	-0.025	-0.007*	0.054*	-0.006	-0.001	0.056
	(-0.290)	(-1.887)	(1.848)	(-0.086)	(-0.155)	(1.427)
Purchase contract	-0.164	-0.014	0.140*	-0.279**	-0.045***	0.047
	(-1.008)	(-1.143)	(1.902)	(-2.690)	(-3.379)	(0.856)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	358,661	358,661	358,661	499,864	499,864	499,864
R^2	16.81%	18.96%	11.69%	14.27%	23.78%	12.03%

Acknowledgements

We appreciate helpful comments from an anonymous referee at the European Central Bank, participants at INSEAD Accounting Symposium and UIC Accounting Conference, and workshop participants at Bocconi University, Columbia University, the European Central Bank, the Stockholm School of Economics, the University of Amsterdam, the University of Utah, SMU/UTD joint workshop and the University of Southern California. The paper greatly benefited from discussions with analysts in the European Data Warehouse (ED), credit managers in two large European banks and from the comments of Eric Allen, Thomas Bourveau, David Canmann, Elena Carletti, Jean-Edouard Colliard, Olivier Darmouni, Patricia Dechow, Mariassunta Giannetti, Umit Gurun, Victoria Ivashina, Urooj Khan, Tina Lang, Clive Lennox, Vivek Pandey, Stacey Ritter, Kenth Skogsvik, Andrew Sutherland, Sander van Triest, David Veenman, Hannes Wagner and Aner Zhou. Maria Loumioti acknowledges support by the Lamfalussy Fellowship Program sponsored by the ECB. Any views expressed herein are only those of the authors and do not necessarily represent the views of the ECB or the Eurosystem. Jung Koo Kang and Regina Wittenberg-Moerman acknowledge research support from the University of Southern California; Maria Loumioti acknowledges research support from the University of Texas at Dallas. All remaining errors are our own.

Jung Koo Kang
University of Southern California, Los Angeles, United States; email: jungkoo.kang.phd@marshall.usc.edu

Maria Loumioti (corresponding author)
University of Texas at Dallas, Richardson, United States; email: maria.loumioti@utdallas.edu

Regina Wittenberg-Moerman
University of Southern California, Los Angeles, United States; email: reginaw@marshall.usc.edu

© European Central Bank, 2020

Postal address 60640 Frankfurt am Main, Germany
Telephone +49 69 1344 0
Website www.ecb.europa.eu

All rights reserved. Any reproduction, publication and reprint in the form of a different publication, whether printed or produced electronically, in whole or in part, is permitted only with the explicit written authorisation of the ECB or the authors.

This paper can be downloaded without charge from www.ecb.europa.eu, from the Social Science Research Network electronic library or from RePEc: Research Papers in Economics. Information on all of the papers published in the ECB Working Paper Series can be found on the ECB's website.

PDF ISBN 978-92-899-4010-8 ISSN 1725-2806 doi:10.2866/778983 QB-AR-20-019-EN-N