Regulatory Spillovers in Common Mortgage Markets

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Abstract

We document a surprising and economically important spillover effect of Section 302 of the Sarbanes-Oxley Act (SOX) on the supply of mortgage credit and housing market outcomes. Section 302 requires all public companies to evaluate their internal control effectiveness and take remedial actions upon discovery of material weaknesses. Banks required to rectify material weaknesses experience a 10.9% reduction in mortgage approval rates after SOX. This spill overs to untargeted banks that lend in the same county, causing them to increase their approval rates to seize the market shares of targeted banks. These shifts disrupt the general equilibrium within the common mortgage market, causing an increase in the aggregate supply of mortgage credit, house prices and home foreclosure rates.

JEL classification: E51, G21, G38, R31

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1. Introduction

Would implementing a new regulation create spillover effects to unintended audience? This question is extremely important because failures to account for potential spillover effects could render a regulation ineffective, or worse, result in countervailing effects.[1] Yet, the finance literature so far has been silent on this issue. Our paper aims to bridge this gap. We document a surprising and economically important spillover effect of the *Sarbanes-Oxley Act* (SOX)–one of the most important securities legislations in American business history–on the supply of mortgage credit and housing market outcomes.

In the wake of high-profile corporate accounting scandals in the early 2000s, Congress passed the SOX act in July 2002 with the aim to improve the integrity of information supplied by public companies to the financial markets. One of the cornerstones of SOX, Section 302, requires management to evaluate the effectiveness of the firm's internal control. Firms that discover to have material internal control weaknesses are required to address them while those with no material weakness do not need to take any further action.

Exploiting this provision, we uncover two intriguing sets of results. First, complying with SOX 302 not only causes a reduction in the mortgage approval rates of banks with material weaknesses (as a result of higher compliance costs), it also indirectly causes untargeted banks that lend in the same county to increase approval rates to seize the market shares of targeted banks. Second, these regulatory-induced shifts disrupt the general equilibrium within the common mortgage market, causing an increase in the aggregate supply of mortgage credit, higher house prices, and subsequently leads to a higher rate of home foreclosures during the 2008 crisis.

Our results have several important implications. First, the SOX Act did not specifically target banks nor the mortgage market. It was motivated by a series of accounting

[1] A recent example is the Indian government's policy to cease the circulation of 500 and 1000 INR banknote. While achieving its original intention of preventing money laundering, the regulation produced substantial spillover effects to the economy by disrupting the operations of retailers who were accustomed to making cash transactions. This results in significant inconvenience, delays, and contract cancelations (What Indian's Demonetizations Mean for Investors, Bloomberg, February 9 2017).

misconduct occurring at non-financial firms, which led to reforms in internal controls across both financial and non-financial firms. Therefore, our results highlight how a well-meaning regulation aiming to protect investors (or corporate shareholders) can produce far-reaching spillover effects to other market participants, including homeowners. This finding is especially important given the fact that accessible homeownership has been the hallmark of modern American society for nearly a century (Antoniades and Calomiris, 2015). Second, we show how a regulatory intervention that takes place during an economic boom contributes to the subsequent financial crisis. The enactment of SOX 302, fuelled by liberalizing lending attitudes of US banks during the pre-crisis period, inadvertently causes a spillover effect on the mortgage market, which contributes to the housing booms and subsequent home foreclosures during the crisis. Finally, mortgage lending is the most significant activity of a commercial bank, accounting for more than 70% of total lending in a bank's balance sheet. Given the allegation that lax mortgage standards is one of the major causes of bank failures and the financial crisis (Blinder, 2013), it is important to understand how a bank's internal controls influence its mortgage origination behavior.

The empirical setting in our paper overcomes a key challenge that plagues the credible identification of regulatory spillover effects: confounded factors. As firms often operate across multiple product lines and geographical areas, their behavior could be influenced by various industry, regional, or market factors. This makes it difficult to attribute a specific change in the firm's behavior to regulatory spillovers. Our paper analyzes the effects of complying with Section 302 on the mortgage origination behavior of targeted banks and focuses on detecting any spillover effect on untargeted banks that lend in the same county. This within county analysis essentially allows us to hold constant various confounded factors, such as local economic conditions, and produce a clean estimation of the SOX spillover effects.

Our findings have three main blocks. First, we investigate the direct effects of complying with SOX 302 on the lending behavior of banks with material internal control weaknesses (MW banks or targeted banks). Appendix A1 shows an example of Suntrust Banks Inc. re-

porting a material weakness in internal controls related to its Allowance for Loan and Lease Losses (ALLL) account. To address the weakness, Suntrust *'terminated three members of its credit administration division, including its Chief Credit Officer'* and *'established additional remediation plans to address internal control deficiencies associated with the ALLL framework, including additional documentation, training and supervision, periodic testing and periodic updates to the Audit Committee'*.[2]

We hypothesize that the mortgage approval rate at MW banks would reduce after SOX 302 for two main reasons. First, addressing internal control weaknesses imposes significant compliance costs on the bank,[3] causing a depletion in its capital buffer and forcing it to cut lending. Second, a tightened internal control also restricts credit officer's discretion in making lending decisions. They can no longer approve loans, for instance, before obtaining all relevant paperwork from the borrower (Hertzberg, Liberti, and Paravisini, 2010). This sets a higher bar for any given loan to be approved, resulting in a lower approval rate.

To test this conjecture, we compare loans processed by MW banks before and after the effective date of SOX 302. The key advantage of this within-MW bank approach is that it does not compare MW banks with banks untargeted by SOX 302 and thus, can avoid arguments about these banks having differential fundamentals and trends.[4] Our loan data come from the Home Mortgage Disclosure Act (HMDA). This dataset covers 95% of the mortgage market in the US and provides detailed information on the mortgage application (e.g., approval status, loan amount, location) and the mortgage applicant (e.g., sex, race, and income).

We find that, after SOX 302 is enacted, the mortgage approval rate of MW banks de-

[2]Firms on average experience –1.8% abnormal stock returns upon disclosure of material weaknesses under Section 302 (Beneish, Billings and Hodder, 2008)

[3]As illustrated in the example of Suntrust, the bank incurred at least three different types of expenses in complying with SOX. First is labor costs when the firm fires its workers and key executives. Second, it also incurs technology and training expenses in improving its internal control. Finally, Suntrust also has to pay for external auditing services. These costs are substantial relative to a firm's total operating expenses (see Krishnan, Rama, and Zhang (2008)).

[4]For robustness, we use an alternative difference-in-differences (DiD) specification where we compare the post-SOX 302 lending differences between MW banks (treatment group) and non-MW banks (control group). We use nearest neighbor matching to ensure that MW banks are comparable to non-MW banks.

creases by 10.9%. Our tightest specification includes bank-county, regulator and year fixed effects, implying that the coefficient picks up the differences in, for instance, Suntrust Bancorp's mortgage approval rate in Davidson County, Tennessee before and after the enactment of SOX 302. This within-county setting alleviates concerns that our results are driven by unobserved differences across local credit markets or banking supervisors.[5] Overall, our results are consistent with the interpretation that the mortgage approval rate at MW banks decreases as a result of these banks addressing their material internal control weaknesses to comply with SOX 302.

Second, having established that complying with SOX 302 causes MW banks to lower their mortgage approval rates, we shift to the main focus of the paper and investigate whether it also has an indirect effect on the mortgage origination behavior of banks untargeted by SOX 302 (non-MW banks or untargeted banks). We argue that the reduction in MW banks' mortgage approval rates following SOX 302 could inadvertently alter the competitive landscape within the common mortgage market. Specifically, it could encourage non-MW banks that also lend in the same county with MW banks to increase their approval rates to seize MW banks' market shares.[6] Furthermore, the responses of non-MW banks should be stronger in counties where MW banks have a greater presence as these would make up greater gains for them.[7]

We test for the presence of this spillover effect on two groups of non-MW banks: (1) public banks that do not have internal control weaknesses and therefore are not enforced to adjust their lending behavior (non-MW public banks) and (2) all private banks since they

[5]For robustness, we further show that our results are not driven by contemporaneous regulatory changes, including the requirement of majority board independence for firms listed on the NYSE and NASDAQ, the Regulation Fair Disclosure (Reg FD), and the FDICIA Act of 1991. The results are also robust to us extending the timeline to including firms affected by Section 404, a successor of Section 302.

[6]See Di Maggio, Kermani and Korgaonkar (2017) and Gropp, Hakenes, and Schnabel (2011) for a similar argument.

[7]To illustrate, MW banks account for 20% of total mortgage lending in McCracken County, Kentucky but they only account for 1% of total mortgage lending in a nearby county of Graves, Kentucky. After SOX, while McCracken County experiences a sizeable 2.2% (=20% x 10.9%) reduction in mortgage credit, Graves County only experiences a 0.11% reduction. Therefore, non-MW banks are more likely to increase lending in McCracken rather than in Graves County as the former makes up greater gains for them.

are under much less scrutiny by the SEC. These banks have physical footprint in the local credit markets and therefore, will have an advantage in recognizing and responding to the opportunities created by lending cut from MW banks.

We find that non-MW banks respond to MW banks' cutting lending by significantly increasing their mortgage approval rate in counties where MW banks have a large market presence (measured using the fraction of loan volume originated by MW banks). This spillover effect is detected in the sample of non-MW public banks and large private banks, i.e., those banks with sufficient capacity to quickly increase their approval rate to gain new market shares. These findings are robust to including bank-year fixed effects, which sets a high bar for alternative stories as they need to explain why there are differences in the mortgage approval rates of the same non-MW bank in the same year between a county with a high MW bank presence and another county with a low MW bank presence.

To interpret this as spillover effects of SOX 302, we make two key identifying assumptions. The first assumption is that the geographical distribution of counties where MW banks have a high market share has to be random. Indeed, none of the pre-SOX county characteristics or their trends–including demographic, economic, mortgage and housing characteristics–could predict the post-SOX MW bank presence in a given county. The second assumption is that our results are not driven by changes in loan demand. We find that there is no change in the quantity and quality of mortgage applications submitted to (1) MW banks, (2) counties with a high MW bank presence, and (3) non-MW banks in counties with a high MW bank presence.[8] Therefore, the most plausible explanation for the increase in approval rates of non-MW banks is that it captures the effects of these banks seizing market shares of MW banks after SOX 302.

In the final block of the paper, we explore the aggregate effects of SOX 302 spillover on market-wide outcomes. All analyses include county and year fixed effects to exploit within

[8]In addition, we also obtain consistent inferences in alternative specifications where we can include county-year fixed effects, which absorb all demand and time-varying county factors (Gilje, Loutskina, and Strahan, 2016). This further rules out the demand interpretation of the results.

county variation. We first find that counties with a high MW bank presence experience an aggregate increase in mortgage approval rates after SOX 302. This arises from the fact some non-MW banks overact to the rare opportunities to expand market shares and increase their approval rates more than the reduction made by MW banks. Indeed, private banks–the lesser regulated non-MW banks–overact and extend loans to riskier borrowers in counties with a high MW bank presence after SOX 302. Therefore, while trying to make some firms become safer, SOX 302 may encourage others to take on more risk.

We then explore the broader macroeconomic implications of our study, linking them to the theoretical literature that emphasizes the role of lending constraints as a determinant of housing booms (Justiniano, Primiceri, and Tambalotti, 2017) and to the empirical literature that uses geographical variation in the supply of mortgage credit and relates them to house prices (e.g., Di Maggio and Kermani, 2017; Favara and Imbs, 2015). We show using both an OLS and a two-stage least squares (2SLS) estimation that counties with a high MW bank presence experience an increase in house prices after SOX-302. Our 2SLS estimation is similar in spirit to those of Di Maggio and Kermani (2017) and Favara and Imbs (2015). Specifically, we use the spillover effect of SOX in counties with a high MW bank presence as an instrument for mortgage approval which, in turn, explains the increase in house prices.[9]

What are the welfare implications of this spillover effect? While it may allow borrowers to have better access to mortgage credit and buy houses, the fact that some private banks overact and lend to riskier borrowers could pose potential long-term consequences when these borrowers cannot repay their loans. Consistent with this, we find that counties with high MW bank presence experience a higher rate of home foreclosures during the 2007-2009 financial crisis. Thus, there are at least some negative consequences of this spillover to the economy.

Our paper makes several important contributions. We answer whether and how a regu-

[9]Our instrument is likely to meet the exclusion criteria as we show in Appendix A3 that the presence of MW banks is not related with any county characteristic or its trends, including demographic, economic, mortgage and housing characteristics.

latory change spills over to untargeted audiences and the aggregate economy–a question of first-order importance to policy makers, politicians, and the general public.

Our paper can be placed within the banking literature. Gropp, Hakenes, and Schnabel (2011) find that government guarantees do not affect risk-taking by protected banks but instead cause unprotected competitor banks to increase risk. Ongena, Popov, and Udell (2013) show that stricter regulations in domestic markets cause a spillover in the form of increased risk-taking by multinational banks in foreign markets with less strict regulations. More recently, Di Maggio, Kermani, and Korgaonkar (2017) show that financial deregulation granted to OCC banks causes non-OCC banks to engage in greater risk-taking to defend their market shares. We focus on the Sarbanes-Oxley Act, a governance reform aimed at making firms safer, and show that it could in fact lead to riskier outcomes. Our granular data allow us to observe the behavior of targeted and untargeted banks that lend within a common local mortgage market and, therefore, establish one of the first micro-level evidence on the spillover effect of regulatory changes on bank behavior.

Our findings are also related to the SOX literature, which mainly focuses on the direct effects of SOX on the behavior of targeted firms (e.g., Ashbaugh-Skaife et al., 2009; Bargeron, Lehn, and Zutter, 2010; Guo and Masulis, 2015; Iliev, 2010). A recent exception is the study of Duguay, Minnis and Sutherland (2017), which shows that the increased demand for audit services at public firms following SOX dries up the available auditors for non-public entities, forcing them to switch to smaller auditors and pay a higher audit fee. Our paper uncovers an unexpected and economically important spillover of SOX compliance on the mortgage and housing markets. This suggests that a regulatory change can have spillover effects that extend far beyond the originally intended audience. In this way, we broadly contribute to the economic literature on the unintended consequences of government intervention. For instance, DiNardo and Lemieux (2001) show that regulation that increases the minimum legal drinking age, in fact, leads to an increase in marijuana consumption.

Finally, we contribute to the literature on the determinants of the subprime crisis and

more generally, housing market outcomes. Among the causes of the crisis are the increase in subprime and prime lending (e.g., Adelino, Schoar, and Severino, 2016; Mian and Sufi, 2009), securitization (e.g., Keys, Mukherjee, Seru, and Vig, 2010; Keys, Seru, and Vig, 2012), and most relatedly, regulation and credit supply (e.g., Di Maggio and Kermani, 2017; Favara and Imbs, 2015). Favara and Imbs (2015) and Di Maggio and Kermani (2017) show that financial deregulation expands the supply of credit which, in turn, increases house prices. In contrast, our study highlights how a regulation aimed at protecting corporate shareholders inadvertently spillovers to the mortgage market, which contributes to the housing booms and the subsequent home foreclosures during the 2008 crisis.

2. Institutional settings and data

2.1. Institutional settings

In July 2002, the US Congress passed the Sarbanes-Oxley Act (SOX) in response to corporate accounting scandals involving firms such as Enron, Worldcom, and Tyco International. A major aim of SOX was to improve the quality of internal controls and financial reporting of publicly-listed US firms. This aim was achieved through two provisions–Sections 302 and 404 of SOX.

Section 302 of SOX, which became effective on August 29 2002, requires the CEO and the CFO of all publicly-listed US firms to evaluate the effectiveness of the firm's internal controls and report their evaluations to the firm's external auditor and its audit committee. Most firms also report these evaluations in their annual or quarterly reports (e.g., Doyle, Ge, and McVay, 2007a, b).[10] If there is no internal control weakness identified, no further action is required from the firm. In contrast, if a control weakness is discovered during the course of

[10]While there is some ambiguity in whether or not it is mandatory for firms to disclose these evaluations in public annual reports under Section 302, most firms treat it as mandatory and opt to disclose (Doyle, Ge, and McVay, 2007). As an example of this ambiguity, the SEC stated that it would 'welcome disclosure of all material changes to control' (SEC, 2004). At another instance, it stated without reservation that 'a registrant is obligated to identify and publicly disclose all material weaknesses' (SEC, 2004).

the evaluation, the firm then needs to take remedial actions to rectify the weakness. There are three levels of internal control weaknesses ranging from the mildest to the most severe ones: control deficiencies, significant deficiencies, and material weaknesses.[11]

Section 404 of SOX became effective for the fiscal year ending on or after November 15 2004 for firms with a total market capitalization of more than $75 million. Section 404 mandates internal control evaluation to be attested by an external auditor and be disclosed in annual reports (Doyle, Ge, and McVay, 2007). Thus, Section 404 removes any ambiguity in whether firms could choose to disclose their material weaknesses.

Our reading of the SEC guidance suggests that most firms would have the incentive to evaluate their internal control quality and disclose their material weaknesses at the earliest encounter, that is, under Section 302 between September 2002 and December 2004 (see also, Doyle, Ge, and McVay (2007a, b) and Hermanson and Ye (2009)). This is for two reasons. First, early disclosures allow management to get in the front of the issue and send a strong signal to investors that the firm does not have any serious control issue. Addressing the problems early also helps the management to hedge against adverse career consequences when internal control issues manifest into more serious corporate misconduct (Karpoff, Lee, and Martin, 2008).

Second, while disclosing material weaknesses does not carry a legal penalty, knowingly choosing to hide the weaknesses does. Specifically, both the CEO and CFO are required to personally certify in the SEC filings that 1) the financial report reflects the fair and true financial conditions of the firm, and that 2) the quality of the firm's internal control has been thoroughly evaluated and disclosed in the filing. Importantly, anyone wilfully certifies

[11] A control deficiency exists when the design or operation of a control does not allow management or employees, in the normal course of performing their assigned functions, to prevent or detect misstatements on a timely basis (PCAOB, 2004, Appendix 8). A significant deficiency is a control deficiency, or combination of control deficiencies, that adversely affects the company's ability to initiate, authorize, record, process, or report external financial data reliably in accordance with generally accepted accounting principles such that there is more than a remote likelihood that a misstatement of the company's annual or interim financial statements that is more than inconsequential will not be prevented or detected (PCAOB, 2004, Appendix 9). A material weakness is a significant deficiency, or combination of significant deficiencies that results in more than a remote likelihood that a material misstatement of the annual or interim financial statements will not be prevented or detected (PCAOB, 2004, Appendix 10).

a non-compliant financial statement will face up to $5,000,000 fine or up to 20 years in prison or both (Sarbanes-Oxley Act, 2002).[12]

Overall, the potential legal consequences coupled with the ambiguity in SEC requirements would encourage most firms, especially those with material weaknesses to come clean early under Section 302 reporting regimes (Ashbaugh-Skaife, Collins, and Kinney, 2007). This implies that Section 302 should produce a larger effect on targeted firm's behavior compared to Section 404.[13] Therefore, in the main analyses, our treatment group includes banks that report having material weaknesses between September 2002 and December 2004 under Section 302[14] and thus, need to take remedial actions to address their weaknesses.

2.2. Hypothesis developments

Based on the institutional settings, we proceed to develop our hypotheses. We first focus on the direct effect of complying with SOX 302 on the lending behavior of banks with material internal control weaknesses (MW banks).

Appendix A1 shows an example of Suntrust Banks Inc. disclosing its material weakness under Section 302 in its 2004 annual report. Specifically, the bank reports that *in the fourth quarter of 2004, the Company identified a material weakness in internal controls related to establishing the Allowance for Loan and Lease Losses (ALLL).* Suntrust also mentions the remedial actions it takes to rectify the weakness. Among others, the bank *terminated three members of its credit administration division, including its Chief Credit Officer, established additional remediation plans to address internal control deficiencies associated with the ALLL*

[12]On the 13th Jan 2003, the SEC levied their first charges of violation on Calixto Chaves (CEO) and Gina Sequeira (CFO) of Rica Foods for signing off on financial statements knowing that they are not accurate. Chaves eventually received a fine of $25,000 (SEC News Digest, 2003). More importantly, both executives disappeared from the corporate world after the incident.

[13]Consistent with this, the SOX literature finds that Section 302 produces a larger effect on the behavior of targeted firms compared to Section 404. Beneish, Billings and Hodder (2008) show that while firms face significant negative abnormal returns and a higher cost of capital following SOX 302 disclosures, they do not experience any negative abnormal returns or change in the cost of capital following SOX-404 disclosures. More recently, Gupta, Sami and Zhou (2017) find that most firms experience an improvement in their information environment after SOX 302 disclosures but not after SOX 404 disclosures.

[14]For robustness, we also extend the timeline until December 2005 to also include firms that disclose under Section 404.

framework, including additional documentation, training and supervision, periodic testing and periodic updates to the Audit Committee and *'strengthen internal controls surrounding the validation and testing of systems and models relating to the ALLL process'.*

We argue that a bank's remedial actions to address their control weaknesses could result in a reduction in its approval rate via three main channels: (1) higher compliance costs, (1) tightened loan origination processes and (3) improved loan loss estimation processes.

First, the substantial SOX compliance costs (see Solomon (2005)) could cause a depletion in the bank's capital buffer and force it to cut lending. To illustrate, Suntrust incurred at least three different types of expenses in complying with SOX. First is internal labor costs when the firm fires its key executives and workers. Second, it also incurs technology and training expenses when trying to improve its internal control systems. Finally, Suntrust also has to pay for audit expenses. These costs can be substantial relative to a firm's total operating expenses (Krishnan, Rama, and Zhang, 2008) and impose lending constraints on the bank.

Second, remediating internal control weaknesses will result in a more regulated, tightened loan origination process. Credit officers need to obtain various documents from the borrower, including their credit history, outstanding financial obligations and collateral values, in order to evaluate a loan application. Before SOX 302, credit officers at MW banks may exploit the weak internal control systems in the bank to, for instance, approve loans without requiring sufficient paperwork from the borrower [15] (e.g., Hertzberg, Liberti, and Paravisini, 2010; Udell, 1989). After MW banks tighten their internal controls, credit officers now need to follow the standard approval protocols which significantly restrict individual discretion. This raises the bar for any given loan to be approved and results in a lower approval rate.

Finally, internal control weaknesses are also related to the bank's loan loss provisioning process. Altamuro and Beatty (2010) argue that banks with internal control weaknesses

[15]Because of various career or compensation incentives, credit officers may exploit loopholes to approve more loans in order to meet performance targets. (e.g., Cole, Kanz, and Klapper, 2015; Tzioumis and Gee, 2013).

tend to have inaccurate loan loss provisioning practices. These banks have weaknesses in their loan review and credit grading systems, causing them to underestimate their loan losses the most important accrual account in a bank's balance sheet (GAO, 1991; 1994). Upon remediation, these banks need to adjust its provision for loan losses according to the tighter regulation, causing a depletion of its Tier-1 Capital which forces them to cut lending.

Hypothesis 1: *The mortgage approval rate at MW banks drops following SOX-302.*

Our second hypothesis focuses on the spillover effects of SOX 302 on the mortgage origination behavior of untargeted banks. We argue that the reduction in mortgage approval rate at MW banks following SOX 302 could inadvertently alter the competitive landscape in local credit markets. Specifically, it could encourage untargeted banks that lend in the same county with MW banks to increase approval rates to seize the market shares of MW banks. Furthermore, this effect should be particularly salient in counties where MW banks have a greater presence as these make up larger gains for untargeted banks.

This argument is in line with the literature that studies the strategic responses of banks to changes in the competitive landscape. For example, Gropp, Hakenes, and Schnabel (2011) find that government guarantees provoke higher risk-taking by protected banks competitors. Similarly, Di Maggio, Kermani, and Korgaonkar (2017) show that financial deregulation granted to OCC banks causes non-OCC banks to use riskier mortgage contract terms as a best response to the threat of losing market shares.

Hypothesis 2: *Following SOX-302, untargeted banks respond to MW banks cutting lending by increasing their mortgage approvals.*

2.3. Data

Our data on mortgage loans come from the Home Mortgage Disclosure Act (HMDA) database collected by the Federal Financial Institutions Examination Council (FFIEC). The HMDA database covers all mortgage applications that have been reviewed by qualified financial institutions. Specifically, an institution is required to complete an HMDA register

if it has at least one branch office in any metropolitan statistical area and meets the minimum size threshold. In 2002, the year when SOX 302 is enacted, this reporting threshold is $32 million in book assets. As a result of this low reporting threshold, almost all banks are included in the dataset.[16] For each loan application, the dataset provides borrower demographic characteristics (e.g., income, gender, and race), loan characteristics (e.g., loan amount and purpose), property characteristics (e.g., type and location), the decision on the loan application (e.g., approved, denied, or withdrawn) and a lender identifier.

Our sample includes all loan applications reviewed by commercial banks between 1999 (3 years before the enactment of SOX 302 in 2002) and 2007 (3 years after SOX 302 ended in 2004). This timeline covers only the pre-crisis period and therefore, avoids picking up confounded effects from the 2008 financial crisis. We follow the screening procedure in Cortes, Duchin, and Sosyura (2016) to minimize data errors. First, we drop applications that were closed for incompleteness or withdrawn by the applicant before a decision was made. Second, we drop loan applications filed with banks that do not have a branch in the county of the mortgage property. These observations comprise broker-originated applications sent to external processing centers in which the location where the loan decision is made is unclear.

Next, we obtain from the AuditAnalytics 'SOX302 –Disclosure Control' database a sample of banks that disclose material internal control weaknesses between September 2002 (the first month after the enactment of SOX 302) and December 2004 (one month after SOX 302 ended). We then merge AuditAnalytics to the HMDA database in several steps. Specifically, we link AuditAnalystics to Compustat identifiers using the bank's CIK code; Compustat identifiers to FR-Y9C call reports using the PERMCO-RSSD link table from the Federal Reserve Bank of New York; and finally Call Reports to HMDA using the bank's RSSD ID.

There are 29 out of 442 public banks that disclose material weaknesses during this period.

[16]See Cortes, Duchin and Sosyura (2016) for a more detailed description of the HMDA dataset.

Over our sample period of 1999-2007, MW banks lend in a total of 2,743 (out of 3,142 or 87%) counties and, on average, account for 4% of total loans originated in a county. Given that an average US county receives a yearly volume of 6,600 applications for a loan amount of $119,100, a rough estimate indicates that MW banks originate nearly $25 million[17] of mortgage loans in this county.

Table 1 provides summary statistics on loan applications as well as other variables used in this study. The definitions of these variables are provided in Appendix A2. The average borrower earns about $89,000 per year and applies for an $119,100 mortgage loan, implying a 1.35 loan-to-income ratio. The average bank in an average county receives 367 applications a year and approves 79% of the applications they receive.

[Table 1 around here]

Furthermore, when dividing the sample into two subsamples based on whether the proportion of loans originated by MW banks in the county is above the sample median, we find that there is no significant difference in several loan or bank characteristics between the two subsamples.

3. The direct effects of SOX-302 on the lending behavior of targeted banks

We start our analysis by establishing the direct effects of complying with Section 302 on the mortgage approval rates of banks that have material internal control weaknesses (MW banks). Figure A1 plots the mortgage approval rates of MW banks, non-MW public banks, and private banks. We can see a clear reduction the approval rates at MW banks after 2002 relative to other banks. In this section, we formally test this conjecture. We first introduce the main specification and results and then show the results for various alternative specifications and robustness tests.

[17] 6,600 applications x $119,100 x 0.79 approval rate x 4% market shares of MW banks = $24.8 million.

3.1. Specification

To examine the effect of complying with Section 302 on mortgage approvals of MW banks, we estimate a linear fixed effects model explaining mortgage approvals of each bank in each county in each year. The data are aggregated at the bank-county-year level. Our specification is as follows:

$$\begin{aligned} \textit{Mortgage approvals}_{ikt} = \alpha + \beta_1 \textit{Post} + \textit{Bank controls}_{it} + \textit{Borrower controls}_{ikt} \\ + \textit{Fixed effects} + \varepsilon_{itk} \end{aligned} \tag{1}$$

where subscripts $_i$, $_k$, and $_t$ denote bank, county and year respectively. The dependent variable *Mortgage approvals*$_{ikt}$ is a bank-county-year outcome variable which is the number of mortgage applications approved divided by the total number of mortgage applications reviewed. The key independent variable of interest *Post* is a dummy variable that equals one for all years 2003 and later.

Importantly, in this specification, we only include loans processed by MW banks. That is, we exploit *within*-MW banks variation and compare their mortgage approvals before and after the enactment of SOX 302. The key advantage of this approach is that it does not compare MW with non-MW banks and thus, avoid arguments about these banks having different fundamentals. For robustness, we also employ an alternative specification in a traditional DiD setup where we compare the lending behavior of MW banks to those of comparable non-MW banks and obtain consistent findings to the main specification.

We include various controls for bank and borrower characteristics. The vector *Bank controls*$_{it}$ contains Ln(Assets), Ln(Assets)^2, return on assets (ROA), Deposits/Assets, and Loans/Assets. The vector *Borrower controls*$_{ikt}$ contains borrower characteristics that might be correlated with their demand for mortgages and the bank's approval rates: the fraction of minority borrowers, the fraction of female borrowers, and borrower's loan-to-income ratio. Importantly, the inclusion of the borrower's loan-to-income ratio controls for the riskiness of

the loan (a higher ratio implies that the loan is riskier as borrowers are less able to use their income to repay the loan). Therefore, our dependent variable–mortgage approval –measures the bank's willingness to approve similar-risk loans.

We also exploit the granularity of our data to include a vector of fixed effects. Our tightest specification includes up to bank-county, regulator and year fixed effects. This specification allows us to compare the mortgage approval rate of branches of the *same* bank in the *same* county before and after SOX 302 while controlling for supervision intensity and time effects. This rules out the possibility that our results are driven either by differences between MW banks and non-MW banks or by state laws, such as personal property exemptions, foreclosures and predatory lending laws (Agarwal et al., 2014; Di Maggio and Kermani, 2017; Favara and Imbs, 2015).

3.2. Results

Table 2 presents the results. Across all specifications, the point estimates for β_1 are negative and statistically significant at the 1% level, implying that there is a reduction in mortgage approval rate at MW banks following the enactment of SOX 302. The effect is economically substantial. The most conservative estimate indicates that, after SOX 302, the approval rate at MW banks reduces by 7.6 percentage points (or 10.9% relative to the mean approval rate of MW banks[18]). In an average county, MW banks originate 4% of the total mortgage lending, implying that this county would experience a yearly reduction of 0.44%, or $2.7 million,[19] in originated mortgage loans after SOX 302. Overall, our results are consistent with the hypothesis that the mortgage approval rates at MW banks decrease as a result of MW banks taking remedial actions to comply with SOX.

Importantly, this reduction effect is *not* conditional on the riskiness of the loan, measured by a high loan-to-income ratio.[20] Appendix A4 shows that MW banks cut lending equally

[18] 0.076/0.70=10.86%

[19] 6,600 applications x $119,100 x 79% approval rate x 0.44% = $2.7 million.

[20] A high loan-to-income ratio implies that the borrower is less likely to use their income to repay the loan.

across the high and low loan-to-income subsamples.

[Table 2 & 3 around here]

Table 3 shows additional tests to buttress our interpretation of the direct effects of complying with SOX 302 on the mortgage approval rates of MW banks. First, we address the concern that our results could be driven by changes in loan demands at MW banks. That is, following the disclosure of material weaknesses, MW banks may attract lower quality borrowers. We re-estimate Equation (1) using two alternative dependent variables: (1) *Application growth*, the percentage change in the number of submitted loan applications relative to the prior year and (2) *Requested Loan-to-income*, the requested loan amount divided by the annual income of the mortgage applicants. Panel A shows that both coefficient estimates are statistically insignificant, implying that there is no detectable change in the quantity nor quality of the mortgage applicant pool received by MW banks after SOX.

Second, to ensure that our results are not driven by other events occurring in the early 2000s (such as the dot.com bubble burst or Regulation Fair Disclosure (Reg FD)), we replace Post with five year dummies: *2001, 2002, 2004, 2005,* and *2006*. As indicated in Panel B of Table 3, we observe insignificant loadings for *2001* and *2002*, confirming that our results are not driven by events preceding SOX 302.

Next, we use an alternative DiD specification where we compare the post-SOX-302 lending between the treatment group (MW banks) and the control groups of banks that are not targeted by SOX 302: 1) public banks that do not disclose material internal control weaknesses (non-MW public banks); and 2) a combined sample of non-MW public banks and private banks. Under this DiD setting, we can include county-year fixed effects, allowing us to compare the lending behavior of treatment banks with those of control banks that operate in the same county and year. This holds constant demand-side factors as well as other time-varying local economic conditions (Gilje, Loutskina, and Strahan, 2016).

To further ensure that treatment and control banks are comparable, we use nearest-neighbor matching to match treatment and control banks on a host of observable charac-

teristics identified in Equation (1). To ensure a tight match, we require the differences in propensity scores between the matched pairs to be less than 0.01.[21]

Panel C shows the estimation results using the full sample without matching (Columns (1)-(2)) and the matched sample (Columns (3)-(4)). We find that, relative to the mortgage approval rates of the matched control banks, the mortgage approvals at treatment banks (MW banks) significantly decrease following the enactment of SOX 302.

In sum, the fact that our results are consistent and robust across different specifications and model choices imply that they are not dependent on any identifying assumption related to our choice of model or empirical specification. Section 7.1 details additional robustness tests for the main findings in Table 2. We show that our results are not driven by other regulatory changes, including the SEC's majority board independence requirement, the Regulation Fair Disclosure, and the FDICIA Act of 1991. Our results are also not sensitive to choices of event windows surrounding SOX 302 nor definition of MW banks.

4. The spillover effect of SOX on the lending behavior of untargeted banks

Having shown that the mortgage approval rates at MW banks decrease by 10.9% after SOX, we next investigate whether this creates any spillover effect on non-MW banks. We argue that this reduction could inadvertently alter the competitive landscape *within* the common mortgage market. Specifically, it could encourage non-MW banks that also lend in the same county with MW banks to increase their approval rates to seize MW banks market shares.

Furthermore, the responses of non-MW banks should be stronger in counties where MW banks have a greater presence. To illustrate, MW banks account for 20% of total mortgage

[21]For brevity, we do not report the first-step probit estimation used to identify nearest neighbors. These are available upon request.

lending in McCracken County, Kentucky but they only account for 1% of total mortgage lending in a nearby county of Graves, Kentucky. After SOX, while McCracken County experiences a 2.2%[22] (or nearly $14 million) reduction in mortgage credit, Graves County only experiences a 0.11% reduction. Therefore, non-MW banks will be more incentivized to jump into McCracken County (instead of Grave) and increase lending there as it makes up a greater gain for them.[23]

To this end, we investigate the lending behavior of non-MW banks in counties with different levels of MW presence following SOX 302. In our analyses, we distinguish between two types of non-MW commercial banks: 1) public banks that do not have material weaknesses and are not required to change their behavior to respond to SOX 302 (non-MW public banks) and 2) all private banks since they are untargeted by SOX. We focus on commercial banks as they are profit-maximizing entities and also collect deposits and lend through local branches. Having a physical footprint in the local credit markets allows commercial banks to promptly recognize and respond to changes in their competitors lending policies.[24]

As we exploit the geographical distribution of MW banks as a source of variation to test for the spillover effect of SOX 302, we first verify an important identifying assumption that the geographical distribution of MW banks is plausibly random. To do this, we examine whether the presence of MW banks in a given county can be predicted by historical county characteristics or the changes in the county characteristics. If we were to find a correlation, for instance, MW banks are more likely to open branches in counties having deteriorating economic prospects, then geographical distribution of MW banks is not random. This is not the case in our data, as indicated in Appendix A3. Specifically, we do not find any county-level characteristic or its change in 2000 (including population, unemployment, income per

[22] 2.2% =20% x 10.9%

[23] In an average county, MW banks account for nearly 4% of total mortgage lending, implying that this county experiences an aggregate 0.44%, or $2.7 million, reduction in mortgage lending after SOX 302. This represents a substantial amount of extra market shares for non-MW banks. For robustness, we restrict the sample to counties where MW banks account for a significantly higher proportion of total lending in the county and continue to find consistent results.

[24] In Section 7.3, we show that our conclusions remain unchanged even when we take into account non-bank lenders such as credit unions or independent mortgage companies.

capita, house prices, house foreclosures, and mortgage-related characteristics) to significantly predict the market presence of MW banks in 2003.[25]

Furthermore, it is important to highlight that the SOX Act was motivated by a series of accounting scandals occurring in non-financial firms such as Enron or Worldcom and it targeted both financial and non-financial public US firms that have internal control weaknesses. Therefore, the SOX Act is likely to be exogenous to banks and local credit markets. All in all, the geographical distribution of MW banks is likely to give us exogenous variation to test for the spillover effects of SOX 302. We use the following specification to test for the spillover effects of SOX 302:

$$\begin{aligned} \textit{Mortgage approval}_{ikt} = \alpha + \beta_1 \textit{Post} * \textit{MW Presence}_{kt} + \beta_2 \textit{MW Presence}_{kt} \\ + \beta_3 \textit{Post} + \textit{Bank controls}_{it} + \textit{Borrower controls}_{ikt} + \textit{Fixed effects} + \varepsilon_{itk} \end{aligned} \tag{2}$$

where subscripts $_i$, $_k$, and $_t$ denote bank, county and year respectively. The dependent variable $\textit{Mortgage approvals}_{ikt}$ is a bank-county-year outcome variable which is the number of mortgage applications approved divided by the total number of mortgage applications reviewed. The key independent variable of interest *Post* is a dummy variable that equals one for all years 2003 and later. *MW Presence* is the amount of loans originated by MW banks in a given county scaled by the sum of MW banks, non-MW public banks and private banks.

Similar to Equation (1), we estimate this equation separately for our sample of non-MW banks and private banks. The main coefficient of interest β_1 captures the changes in mortgage approval rate of non-MW public banks or private banks conditional on the market share of MW banks following the enactment of SOX b302. We include similar control and fixed-effects as those in Equation (1).

[25] 2003 is the first full year when Section 302 becomes effective.

4.1. Main results

Table 4 presents the results. For non-MW public banks, the coefficient estimates β_1 on *MW Presence*Post* are positive and statistically significant (Columns (1)-(3)). Following SOX, non-MW public banks increase their approval rates by 0.7 percentage points more in counties where MW presence is 9.2% (90th percentile) than in counties where MW presence is only 0.1% (10th percentile).[26] Importantly, MW banks only increase lending in counties with high MW bank presence after SOX, as indicated by insignificant coefficients estimates for *MW Presence*. It is also comforting to observe that *Post* is positive and significant, consistent with an overall increasing trend in the mortgage rates at non-MW banks during the pre-crisis period.

[Table 4 around here]

For private banks, the coefficient estimates β_1 on *MW Presence*Post* are statistically insignificant across Columns (4)-(6). One possible explanation for the differential responses between public and private banks is that private banks are on average smaller and have less liquidity compared to public banks. Therefore, private banks may not be able to instantly increase lending when local opportunities arise. The next section provides evidence confirming this conjecture.

Our findings hold under different sets of two-way fixed effects. In the specification with bank-county fixed effects, β_1 picks up the changes in the mortgage approval rate of, for instance, Fifth Third Bancorp in Oakland County, Michigan, before and after SOX-302. In contrast, in the specification with bank-year fixed effects, we compare Fifth Third Bancorp's approval rate in 2003 in counties high MW presence with Fifth Third Bancorp's approval rate in 2003 in counties low MW presence. This sets a high bar for alternative stories, as they need to simultaneously explain these results.

[26]For robustness, we restrict the sample to counties where MW banks have a significantly higher market share. The results remain robust.

Overall, we find that untargeted banks increase their approval rate in response to MW banks' lending reduction, suggestive of a spillover effect of SOX-302 compliance on local mortgage markets. This effect is particularly strong in counties with higher MW bank presence where the potential gains for untargeted banks are larger.

4.2. What explains the marginally significant responses of private banks?

Next, we seek to understand the causes behind the marginally insignificant coefficient estimate for private banks in Table 4. Our intuition is that private banks are on average smaller and have less liquidity compared to public banks. Therefore, private banks are less able to promptly increase lending when local opportunities arise. If this interpretation is true, we should find a stronger elevated mortgage approval effect in the subsample of large private banks than the subsample of small private banks. To test this, we partition the private bank sample into two subsamples based on whether a bank's total assets are above the sample median.

[Table 5 around here]

As shown in Table 5, the coefficient estimate on *MW Presence*Post* is positive and statistically significant only in the subsample of large private banks (Column (1)) and is insignificant in the subsample of small private banks (Column (2)). This is consistent with our capacity/liquidity interpretation that only larger private banks have sufficient liquidity to respond to the local opportunities arising from the lending reduction at MW banks.

Furthermore, if it is indeed the case that some private banks are not capable of increasing approvals due to their limited capacity, we should expect private banks to increase approvals more aggressively in counties where they face less competition. To test this, we partition the private bank sample into two subsamples based on whether the Herfindahl Index (HHI) of county-level deposit concentration is above the sample median. A higher HHI index indicates a less competitive local banking market. Results, as shown in Columns (3) and (4), indicate

that private banks indeed increase their approval rates in less competitive counties, i.e., those with an above median HHI index.

Overall, our results indicate that all profit-maximizing banks–public and private alike–are enticed to seize the market shares of MW banks. However, due to capacity limitation, only some will respond to the competitive opportunity.

4.3. Robustness tests

Table 6 presents additional tests to support our interpretation of the spillover effects of SOX 302 compliance on the mortgage approvals of untargeted banks. Panel A rules out the demand-side explanation of our spillover results. We re-estimate Equation (2) using two dependent variables measuring loan demand quantity (*Application growth*) and demand quality (*Requested Loan/Income*). The coefficient estimates are statistically insignificant throughout, implying that there is no detectable change in the applicant pool untargeted banks receive in counties with high MW bank presence after SOX. Thus, our spillover effects reflect the supply-side rather than the demand-side effects.

[Table 6 around here]

Panel B assesses the time trend of the baseline results by replacing *Post* with five year dummies: *2001, 2002, 2004, 2005,* and *2006*. As indicated in Panel A, the interaction terms of *2001* and *2002* with *MW Presence* are not significant for both the sample of non-MW public banks (Column (1)) and private banks (Column (2)), confirming that our results are not driven by events preceding SOX 302.

In Panel C, we compare the post-SOX lending behavior between non-MW public banks and private banks in a traditional DiD specification. We include county-year fixed effects to control for demand-side and other time-varying county-level factors. The results in Panel B indicate that, relative to private banks, non-MW public banks make a greater increment in mortgage approvals in counties with a higher presence of MW banks following SOX 302.

In Panel D, we perform a series of placebo tests to rule out the concern that the spillover results documented in Table 4 are driven by omitted events unrelated to MW banks cutting lending following SOX-302. For example, one can argue that our results capture the effects of profitable banks increasing their approval rate in response to unprofitable banks withdrawing from the market. To run our placebo tests, instead of assigning MW banks into the treatment group, we assign the following into the placebo treatment groups: all public banks (Column (1)), small banks whose assets are in the bottom 25% (Column (2)), and unprofitable banks whose ROA is in the bottom 25% (Column (3)).

We construct placebo tests in a manner similar to how the actual tests are constructed. In the actual tests, we look at the mortgage approval rate of non-MW banks in counties with a greater presence of treatment banks (MW banks). For placebo, we look at the mortgage approval rate of private banks (Column (1)), large banks (Column (2)), and profitable banks (Column (3)) in counties with a greater presence of the corresponding placebo treatment banks. As shown in Panel D, none of the coefficients are significant, confirming that our main results in Table 4 reflect the responses of untargeted banks to MW banks cutting lending post SOX 302. The placebo results in Column (1) are of particular importance. It confirms that the treatment banks are not all public banks but instead only include those public banks that have material weaknesses and consequently, need to adjust their lending behavior post SOX 302.

Section 7.2 shows other robustness tests on the spillover effects of SOX. We consider the responses of non-bank financial institutions such as credit unions, use alternative definitions of *MW Presence*, and restrict the sample to counties where MW banks have substantially higher market share.

5. The aggregate effects of SOX 302 spillovers on mortgage originations

So far, we document a series of changes in local credit markets following SOX 302. It starts with a reduction in the mortgage approval rates at MW banks which then triggers untargeted banks to increase their approval rates. Next, we study whether this leads to an aggregate increase in the mortgage approval at the county level. On the one hand, it is possible that the reduction in mortgage approval rate by MW banks is perfectly offset by the increase in approvals by non-MW banks. In this case, credit is simply reallocated between MW banks and non-MW banks in a county and does not lead to an aggregate increase in approval rate. One the other hand, it could be possible that non-MW banks may overact and increase their approval rate more than the cuts made by MW banks.[27] This could lead to an aggregate increase in mortgage approval rate.

Our tests attempt to distinguish between these two scenarios. Before conducting our analyses, it is important to emphasize that *MW Presence*Post* is uncorrelated with both the levels and changes in several county-level characteristics, including demographic, economic, as well as mortgage- and housing-related characteristics. This rules out the possibility that post-SOX-302 changes in mortgage or housing characteristics in counties with high presence of MW Presence are confounded with differential pre-trends or characteristics in these counties.

We aggregate data at the county-year level and exploit within county variation in their degree of exposure to MW bank presence after SOX. The following model is estimated:

[27]This hypothesis is supported by an emerging literature in finance which shows that individuals tend to overact to changes in the external environment. Most recently, Dessaint and Matray (2017) show that managers of firms located in areas affected by hurricanes overact and hold extra cash following the event. Therefore, it plausible to predict that non-MW banks perceive the chance to capture MW banks market share is a rare opportunity and go overboard with their response.

$$\begin{aligned} \textit{County mortgage approval}_{kt} = \alpha + \beta_1 \textit{Post} * \textit{MW Presence}_{kt} + \beta_2 \textit{MW Presence}_{kt} \\ + \beta_3 \textit{Post} + \textit{County controls}_{kt} + \textit{Borrower controls}_{kt} \\ + \textit{Fixed effects} + \varepsilon_{kt} \end{aligned} \tag{3}$$

where subscripts $_k$ and $_t$ denote county and year, respectively. *County mortgage approvals*$_{kt}$ is the number of approved mortgage applications divided by the total number of mortgage applications received in a county in a given year. β_1 is our main coefficient of interest, which captures the changes in mortgage approval rate in counties with large presence of MW banks after SOX 302. All tests include county and year fixed effects as well as several time-varying county-level controls, including population, employment, and income per capita. We also include the HHI of county-level deposit concentration to control for local market structure.

[Table 7 around here]

Table 7 displays the results. The coefficient estimates on *MW Presence*Post* are positive and statistically significant, implying that counties where MW banks a higher market share experience an *increase* in mortgage approval rates after the enactment of SOX 302. This result is after we control for county and year fixed effects and is not driven pre-SOX changes in county characteristics. Thus, mortgage credit is not simply being reallocated between MW banks and non-MW banks but it is in fact being expanded. This result provides the first indication that the spillover effects of SOX 302 matter at the aggregate level.

One possible explanation for this result is that non-MW banks overact to the opportunities to gain market shares and end up increasing their approval rates more than the reduction made by MW banks. To do this, non-MW banks need to lower their mortgage standards and approve riskier loans. To test this idea, we examine whether the elevated mortgage approval rate is concentrated on the group of riskier loans, measured based on whether the borrower's

loan-to-income is above the sample median. A higher loan-to-income ratio indicates that the loan is riskier ex-ante as borrowers are less able to use their income to repay the loan.

[Table 8 around here]

Table 8 displays the results for non-MW public banks (Columns (1)-(2)) and private banks (Columns (3)-(4)). The coefficient estimates on *MW Presence*Post* indicate that, while non-MW public banks increase mortgage approval rates equally across the two subsamples, private banks only increase approval rates in the subsample of riskier loans. Our interpretation is that, since non-MW public banks have a higher priority in seizing good borrowers from MW banks, this leaves private banks with lower quality borrowers. The incentives to compete, coupled with a lower supervision intensity from the SEC, could cause private banks to increase approval rates even among the riskier borrowers.

6. The real effects of SOX-302 spillovers

6.1. The effects of SOX-302 spillovers on house prices

In this section, we explore the broader macroeconomic implications of our study, linking them to the theoretical literature which emphasizes the role of lending constraints as a main driving force behind housing booms (e.g., Justiniano, Primiceri, and Tambalotti, 2017) and to the growing empirical literature that uses geographical variation in the supply of mortgage credit and relate them to house prices. For instance, Favara and Imbs (2015) exploit the passage of the Interstate Banking and Branching Efficiency Act (IBBEA) to show that this deregulation increases the supply of credit in deregulating states, which boosts housing demands and leads to an increase in house prices. Di Maggio and Kermani (2017) exploit a different deregulation event, the federal preemption of national banks in 2004 from local laws against predatory lending, and arrive at a similar conclusion that an increase in credit supply leads to a rise in house prices.

These studies suggest that an exogenous increase in the supply of mortgage credit could generate large impacts on the real economic activities. This section tests this conjecture. Specifically, we examine whether the aggregate increase in mortgage approval rates induced by SOX-302 spillovers causes an increase in house prices; first directly, and then using an instrumental variable approach. Again, we exploit *within* county variation in their degree of exposure to MW bank presence after SOX and estimate the following model:

$$\begin{aligned} Ln(House\ price)_{kt} = \alpha + \beta_1 Post * MW\ Presence_{kt} + \beta_2 MW\ Presence_{kt} \\ + \beta_3 Post + County\ controls_{kt} + Fixed\ effects + \varepsilon_{kt} \end{aligned} \tag{4}$$

where subscripts $_k$ and $_t$ denote county and year, respectively. $Ln(House\ price)_{kt}$ is the natural logarithm of house price in a given county. Following Mian, Sufi, and Trebbi (2015), data on house prices are obtained from *Zillow.com*. β_1 is our main coefficient of interest, which captures the changes in house prices in counties with large presence of MW banks following SOX-302. All models include county and year fixed effects as well as other time-varying county-level controls, including the change in population, employment, income per capita, and the HHI of county-level deposit concentration.

[Table 9 around here]

As shown in Column (1) of Table 9, the coefficient estimate on the interaction term *MW Presence*Post* is positive and statistically significant. The magnitude of the coefficient estimate in Column (3) indicates that, following the enactment of SOX-302, counties with high MW bank presence experience a 1.1% increase in house prices.

To test whether we can indeed attribute the increase in house prices to the credit expansion induced by SOX-302, we employ a two-stage least squares (2SLS) specification. Our set-up is similar in spirit to Favara and Imbs (2015) and Di Maggio and Kermani (2017), who use deregulation events as an instrument for the supply of credit in the house price equation. Specifically, we use *MW Presence*Post* as an instrument to explain the increase in aggre-

gate mortgage approval rate which is then used to explain the increase in house price. The exclusion criteria are likely to be satisfied as Appendix A3 shows that *MW Presence*Post* is not correlated with any county characteristics.

Consider the instrumental variable (IV) estimation of:

$$\begin{aligned} Ln(House\ price)_{kt} = \alpha + \beta_1 \widehat{CountyMortgageApproval}_{kt} + \beta_2 MW\ Presence_{kt} \\ + \beta_3 Post + County\ controls_{kt} + Fixed\ effects + \varepsilon_{kt} \end{aligned} \tag{5}$$

where the predicted increase in $\widehat{CountyMortgageApproval}_{kt}$ is estimated using the first-stage regression Equation (3):

$$\begin{aligned} \widehat{CountyMortgageApproval}_{kt} = \alpha + \beta_1 Post * MW\ Presence_{kt} + \beta_2 MW\ Presence_{kt} \\ + \beta_3 Post + County\ controls_{kt} + Borrower\ controls_{kt} \\ + Fixed\ effects + \varepsilon_{kt} \end{aligned} \tag{6}$$

Column (2) of Table 9 displays the second-stage IV estimation results where we instrument county mortgage approvals with *MW Presence*Post*. As shown in Column (2), the coefficient estimate is positive and statistically significant. The magnitude of the coefficient estimates implies that a 1% increase in mortgage approval is associated with a 2.5% increase in house prices. The F-statistics is well above the critical weak identification value of 10 (see Stock and Yogo (2005)), ruling out the null hypothesis that our instrument is weak. Overall, the findings support the idea that the credit expansion brought about by SOX 302 spillover trigger an increase in house prices.

6.2. The effect of credit expansion on home foreclosures during and after the financial crisis

We have shown that, after SOX 302, counties with a high MW bank presence experience an increase in mortgage approval rates, which then results in an increase in house prices.

But are these outcomes bad? This final section sheds some light on the aggregate welfare implications of SOX 302 spillover.

On the one hand, the SOX 302 spillover could be beneficial on aggregate as it could help borrowers to have better access to mortgage credit and purchase houses. On the other hand, SOX 302 spillover also encourages private banks to make riskier loans where some borrowers receive a larger loan amount more than their ability to repay. This could become problematic particularly during economic downturns when these borrowers cannot repay their loans and have their houses foreclosed.

To empirically test this idea, we examine whether counties that experience larger house price booms induced by the spillover effects of SOX 302 experience a higher rate of home foreclosures during the 2008-2009 financial crisis. We use the following specification:

$$\begin{aligned} Foreclosure_{kt} = \alpha + \beta_1 PostCrisis * MW\ Presence2004_k + \beta_2 MW\ Presence2004_k \\ + \beta_3 PostCrisis + County\ controls_{kt} + Fixed\ effects + \varepsilon_{kt} \end{aligned} \tag{7}$$

where subscripts $_k$ and $_t$ denote county and year, respectively. $Foreclosure_{kt}$ is the percentage of homes foreclosed (out of 10000 homes) in a given county. *MW Presence2004* is the fraction of loans originated by MW banks in a given county in 2004. *PostCrisis* is a dummy variable that equals one for years 2007 and later. Our main coefficient of interest is β_1, which reflects the post-crisis home foreclosure rates in counties with large presence of MW banks (and thus, experience a large house price booms induced by the spillover effects of SOX-302).

[Table 10 around here]

Table 10 reports the results. The coefficient estimates on *MW Presence2004*PostCrisis* are positive and statistically significant even after we control for both county and year fixed effects. This lends support to our conjecture, suggesting that counties with high MW bank presence experience a higher proportion of foreclosed homes during the 2008 financial crisis.

Therefore, at the very least, the result implies that there is *some* negative side to the SOX-302 spillover.

7. Internet Appendix: Additional robustness tests

7.1. Robustness tests on MW banks lending cut following SOX 302

Appendix A5 presents additional robustness tests on the finding in Table 2 of a lower mortgage approval rate among MW banks following SOX 302. We begin by confirming that our results are not driven by confounding events occurring in the early 2000s or other SOX provisions, in particular, the requirement of majority board independence for firms listed on the NYSE and NASDAQ (e.g., Bargeron, Lehn and Zutter, 2010; Duchin, Matsusaka and Ozbas, 2010). If an independent board also contributes to lower mortgage approvals, then we over-estimate the effects of the shock. To check if this is indeed the case, we re-estimate Equation (1) on a subsample of banks that have material internal control weaknesses but are exempted from the independent board requirement.[28] If the baseline results in Table 2 are driven by the board independent requirement, this subsample of banks should exhibit little or no treatment effects. Row (1) of Appendix A5 indicates that *Post* remains statistically significant at the 1% level, ruling out this possibility.

A similar concern is that our results could be driven by Regulation Fair Disclosure (Reg FD), which was implemented in October 2000 and aimed at prohibiting public firms from making selective disclosure to certain groups of investors (Bernile et al., 2016). If the implementation of Reg FD also decreases mortgage approvals, our results could be biased. This is unlikely to be a concern as we already show in Panel A that our results are not driven by events preceding the enactment of the SOX-302 provision in 2002. For robustness, we include an additional control variable *PostRegFD*, which equals 1 for years 1999 and later.

[28]These are banks whose board of directors consists of more than 50% of outside directors in 2001. Therefore, they do not need to make any further adjustment to comply with this listing rule.

Row (2) of Appendix A5 indicates that our key coefficient of interest, *Post*, remains highly significant while *PostRegFD* is indistinguishable from 0.

A third concern is that our results could be confounded by the FDICIA Act of 1991, which requires large U.S. banks to file annual reports with regulators in which management attests the effectiveness of their controls. To show that our results are untargeted by this regulation, we re-estimate the baseline regression on a subsample of banks that have material internal control weaknesses but are exempted from the FDICIA disclosure requirement (i.e., public banks whose book assets are below $500 million). As shown in Row (3) of Appendix A5, we continue to observe a reduction in mortgage approval rate at MW banks following SOX-302. Overall, our results are unlikely to be driven by alternative regulations, confirming that the SOX-302 provision has a first-order, direct effect on the lending behavior of MW banks.

Next, we show that our results are not sensitive to a specific choice of event windows and event types in our empirical design in Rows (4) to (6) of Appendix A5. First, we extend the disclosure window and include banks that disclose material weaknesses under both Section 302 and 404 between September 2002 and December 2005. Second, we move forward our post-SOX indicator from *Post* (which is equal to 1 for years 2003 and onwards) to *Post+1* (which is equals to 1 for years 2004 and onwards) to account for the possibility that some banks may delay taking remedial actions. Third, we expand our sample of MW banks to also include banks that also disclose *significant deficiencies*, a less severe form of control weakness than material weakness. As shown in Rows (4) to (6), our results continues to remain consistent and robust to alternative event dates and weakness definitions.

In Row (7), we include additional controls for county-level variables such as population, income per capita, and unemployment rate as these could affect the demand and approval of mortgages. Our results remain robust, as shown in Row (7).

7.2. Robustness tests on spillover effects of SOX-302 on non-MW banks

Panel A of Appendix A6 presents the additional robustness tests for the findings in Table 4 on the spillover effects of SOX-302 on non-MW banks. We begin by showing in Rows (1) to (4) that our results do not depend on how MW Presence is defined. We use four alternative definitions of *MW Presence*: (1) *Ln(MW Presence)*, the natural logarithms of *MW Presence*; (2) *MW Presence* =1, a dummy that equals to 1 if MW Presence is above the sample median; (3) *MW Presence(deposits)*, the fraction of deposits received by MW banks in a given county and (4) *MW Presence (2000-2003)*, the average fraction of loans originated by MW banks during the pre-SOX-302 period of 2000-2003. As shown in Rows (1) to (4) of Panel A, our results are consistent across alternative definitions.

To further evaluate the economic significance of our spillover effects, we restrict the sample to counties where MW banks have a more noticeable presence. In Row (5), we keep counties where MW banks make at least one mortgage application. In Rows (6) (7), we keep counties whose MW bank presence is above the full sample's median (Row (6)) and 75th percentile (Row (7)). Despite the large shrink in the sample size, the results remain robust.

Finally, we include two additional controls, the HHI of county-level deposit concentration and its interaction with *Post*, and show that our results remain virtually unchanged to the inclusion of these additional controls (Row (8)). That is, our spillover effects capture distinctly different elements of competition from the HHI index.

In Panel B of Appendix A6, we extend our analyses to consider the lending behavior of non-bank lenders, including independent mortgage companies (IMCs) and credit unions. We replace *MW Presence* with *MW Presence scaled by all*, defined as the amount of loans originated by MW banks divided by the sum of loans originated by MW banks, non-MW public banks, private banks, IMCs and credit unions in a given county. As shown in Columns (1) and (2), we obtain similar estimation results for non-MW public banks and private banks when using *MW Presence scaled by all*. Thus, our main results on commercial banks are

untargeted by whether or not we take into account the presence non-bank lenders. Columns (3) and (4) show that while IMCs increase their mortgage approvals, credit unions in fact decrease theirs in counties with high MW bank presence following SOX-302. This could be because credit unions are non-profit entities and choose to stay away from competition.

8. Conclusions

Whether a regulatory change produces inadvertent effects is a question of first-order importance to policy makers, politicians and, of course, to parties could be inadvertently targeted by the changes. However, assessing such an impact is empirically challenging due to various confounded factors. We employ a key piece of legislation that aims to improve financial reporting of public companies, Section 302 of the SOX Act, to investigate how this exogenous event affects the mortgage origination behavior of banks targeted and untargeted by this provision.

We show that the passage of Section 302 of the SOX Act influences the retail credit markets through a direct and indirect spillover channel. We first observe a reduction in mortgage approval rate at banks enforced to improve their material control weaknesses. This triggers regulatory spillovers: in counties where targeted banks have larger market shares, untargeted banks significantly increase their approval rates to compete for targeted banks market shares.

Intriguingly, we do find this to be a perfect credit substitution story where the increase in approval rate by non-MW banks is perfectly similar to the cut by MW banks. Instead, as SOX-302 introduces a one-off competitive opportunity, it causes non-MW banks to take on additional risk by lowering their mortgage standards and as a result, increase their approval rate more than the cut made by targeted banks. Furthermore, we also find evidence suggesting that MW banks attempt to recapture the market shares lost to competitors while non-MW banks seek to defend theirs. All in all, this leads to an aggregate increase in the

supply of credit in counties where MW banks have larger market shares. This further results in an increase in house prices and a higher home foreclosure rates in high MW bank counties, suggesting aggregate negative real effects.

Our findings are consistent with the idea that regulations can have inadvertent consequences and policy makers need to take into account the spillover effects arising from interactions between targeted and untargeted agents. Regulations designed to induce safer practices could unexpectedly result in negative outcomes.

REFERENCES

Adelino, M., Schoar, A., & Severino, F. (2016). Loan originations and defaults in the mortgage crisis: The role of the middle class. *Review of Financial Studies*, 29(7), 1635-1670

Agarwal, S., Amromin, G., Ben-David, I., Chomsisengphet, S., & Evanoff, D. D. (2014). Predatory lending and the subprime crisis. *Journal of Financial Economics*, 113(1), 29-52

Altamuro, J., & Beatty, A. (2010). How does internal control regulation affect financial reporting? *Journal of Accounting and Economics*, 49(1), 58-74.

Antoniades, A. & Calomiris, C. (2015). Mortgage credit conditions and the US Presidential Elections, Working paper

Ashbaugh-Skaife, H., Collins, D. W., & Kinney, W. R. (2007). The discovery and reporting of internal control deficiencies prior to SOX-mandated audits. *Journal of Accounting and Economics*, 44(1), 166-192.

Ashbaugh-Skaife, H., Collins, D. W., Kinney, W. R., & LaFond, R. (2009). The effect of SOX internal control deficiencies on firm risk and cost of equity. *Journal of Accounting Research*, 47(1), 1-43.

Bargeron, L. L., Lehn, K. M., & Zutter, C. J. (2010). Sarbanes-Oxley and corporate risk-taking. *Journal of Accounting and Economics*, 49(1), 34-52.

Beneish, M.D., Billings, M.B. & Hodder, L.D. (2008) Internal control weaknesses and information uncertainty. *The Accounting Review*, 83, 665-703

Bernile, G., Kumar, A., Sulaeman, J., & Wang, Q. E. (2016). Has Local Informational Advantage Disappeared? Working Paper

Blinder, A. (2013). "Global Policy Perspectives: Central Bank Independence and Credibility During and After a Crisis." In Federal Reserve Bank of Kansas City, The Changing Policy Lanscape, Proceedings of the 2012 Jackson Hole Symposium, 2013, 483-491

Cole, S., M. Kanz, & Klapper, L. (2015). Incentivizing calculated risk-taking: Evidence from an experiment with commercial bank loan officers, *Journal of Finance,* 70, 537–575.

Cortés, K., Duchin, R., & Sosyura, D. (2016). Clouded judgment: The role of sentiment in credit origination. *Journal of Financial Economics*, 121(2), 392-413.

Dessaint, O. and Matray, A. (2017). Do managers overact to salient risks? Evidence from Hurricane Strike. *Journal of Financial Economics,* forthcoming.

Di Maggio, M., and Kermani, A. (2017). Credit-induced Boom and Bust. *Review of Financial Studies,* Forthcoming

Di Maggio, M, Kermani. A., Korgaonkar, S. (2017). Partial Deregulation and Competition: Effects on Risky Mortgage Origination. Working Paper.

DiNardo, J. & Lemieux, T. (2001) Alcohol, Marijuana, and American Youth: The Unintended Effects of Government Regulation. *Journal of Health Economics*, 20(6), 991-1010

Doyle, J.T., Ge, W., & McVay, S.E. (2007). Determinants of Weaknesses over Financial Reporting. *Journal of Accounting and Economics* 44, 193-223

Duchin, R. Matsusaka, J.G., and & Ozbas, O. (2010). When are outside directors effective? *Journal of Financial Economics* 96(2): 195-214

Duguay, R., Minnis, M., & Sutherland, A. (2017) Regulatory Spillovers on Common Audit Markets, Working paper

Favara, G., & Imbs, J. (2015). Credit supply and the price of housing. *American Economic Review*, 105(3), 958-992.

Federal Financial Institutions Examination Council (FFIEC). 2006. Interagency Policy Statement on the Allowance for Loan and Lease Losses. December, 2006.

GAO, 1991. Failed banks: accounting and auditing reforms urgently needed. United States General Accounting Office – Report to Congressional Committees.

GAO, 1994. Depository institutions: divergent loan loss methods undermine usefulness of financial reports. United States General Accounting Office – Report to Congressional Committees.

Gilje, E. P., Loutskina, E., & Strahan, P. E. (2016). Exporting liquidity: Branch banking and financial integration. *Journal of Finance*, 71(3), 1159-1184

Gropp, R., Hakenes, H., & Schnabel, I. (2011). Competition, risk-shifting, and public bail-out policies. *Review of Financial Studies*, 24(6), 2084-2120.

Gupta, P.P., Sami, H. & Zhou, H. (2017) Do companies with Effective Internal Controls over Financial Reporting Benefit from Sarbanes-Oxley Sections 302 and 404? *Journal of Accounting, Auditing, and Finance*, forthcoming

Guo, L., & Masulis, R. W. (2015). Board structure and monitoring: New evidence from CEO turnovers. *Review of Financial Studies*, 28(10), 2770-2811.

Hermanson, D.R., & Ye Z. (2009) Why do some accelerated filers with SOX Section 404 material weaknesses provide early warning under Section 302? *Auditing: A Journal of Practice & Theory*, 28(2), 247-271

Hertzberg, A., Liberti, J., & Paravisini, D. (2010). Information and incentives inside the firm: Evidence from loan officer rotation. *Journal of Finance*, 65(3), 795-828.

Iliev, P. (2010). The effect of SOX Section 404: Costs, earnings quality, and stock prices. *Journal of Finance*, 65(3), 1163-1196.

Justiniano, A., Primiceri, G.E., & Tambalotti, A. (2017). Credit Supply and the Housing Boom. Working paper

Karpoff, J., Lee, D.S., & Martin, G.S. (2008). The consequences to managers for financial misinterpretation *Journal of Financial Economics*, 88, 193-215

Keys, B. J., Mukherjee, T., Seru, A., & Vig, V. (2010). Did securitization lead to lax screening? Evidence from subprime loans. *The Quarterly Journal of Economics*, 125(1), 307-362.

Keys, B. J., Seru, A., & Vig, V. (2012). Lender screening and the role of securitization: evidence from prime and subprime mortgage markets. *Review of Financial Studies*, 25(1): 2071-2108

Krishnan, J., Rama, D., and Zhang, Y. 2008 Costs to Comply with SOX Section 404. *AUDITING: A Journal of Practice & Theory*, 27(1): 169-186

Mian, A., & Sufi, A. (2009). The consequences of mortgage credit expansion: Evidence from the US mortgage default crisis. *The Quarterly Journal of Economics*, 124(4), 1449-1496.

Mian, A., & Sufi, A. & Trebbi, F. (2015). Foreclosures, House Prices, and the Real Economy. *Journal of Finance*, 70(6), 2587-2634

Ongena, S., Popov, A., & Udell, G. F. (2013). "When the cat's away the mice will play": does regulation at home affect bank risk-taking abroad?. *Journal of Financial Economics*, 108(3), 727-750.

PCAOB. (2004). Auditing Standard No. 2: An audit of internal control over financial reporting performed in conjunction with an audit of financial statements. PCAOB, March, 9.

Sarbanes-Oxley Act. (2002). Washington, DC.

Stock, J. H., & Yogo, M. (2005). Testing for Weak Instruments in Linear IV Regression. Identification and Inference for Econometric Models: Essays in Honor of Thomas Rothenberg, 80.

Tzioumis, K., & Gee, M. (2013). Nonlinear incentives and mortgage officers' decisions. *Journal of Financial Economics*, *107*(2), 436–453.

Udell, G.F., 1989. Loan quality, commercial loan review and loan officer contracting. *Journal of Banking and Finance*, 13(3), pp. 367-382.

Figure A1: Mortgage Approval Approvals rate of MW and non-MW banks after SOX-302

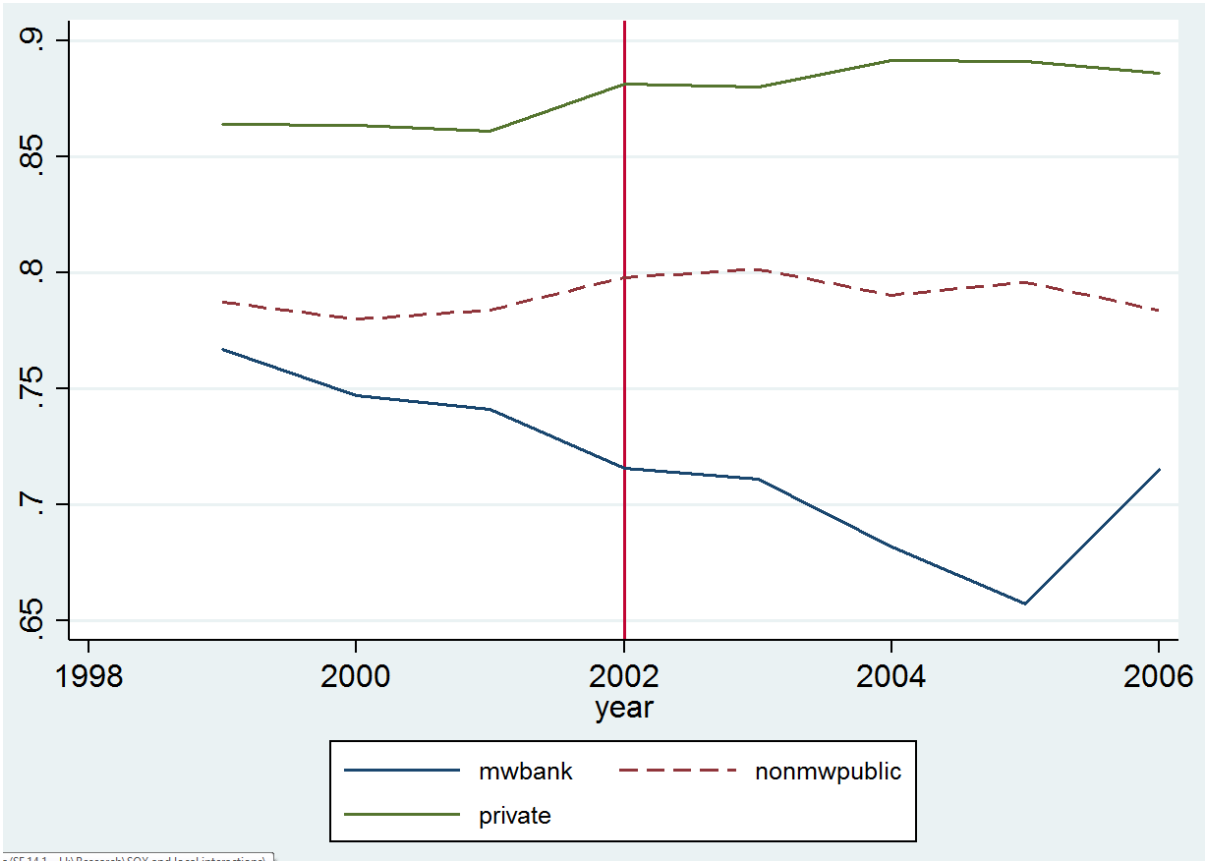

Table 1: Summary Statistics

This table reports summary statistics for bank, borrower, loan, and county characteristics in the sample. Definitions of all variables are included in Appendix A2.

	Full sample						MW Presence>0	MW Presence=0
	N	Mean	Std.	p1	p50	p99	Mean	Mean
Bank characteristics								
Ln (assets)	83,320	16.490	2.798	10.78	16.60	21.27	16.530	16.450
ROA (%)	83,320	1.136	0.560	-0.422	1.171	2.167	1.140	1.132
Lending	83,320	0.650	0.120	0.302	0.669	0.880	0.649	0.650
Deposit	83,320	0.694	0.119	0.379	0.682	0.915	0.693	0.695
Borrower and loan characteristics								
Mortgage approvals	83,320	0.793	0.160	0.286	0.818	1.000	0.799	0.786
Application growth	80,100	2.488	37.750	-0.800	0.004	38.420	2.789	2.195
%female applicants	83,320	0.211	0.106	0.000	0.208	0.500	0.218	0.205
% minor applicants	83,320	0.271	0.236	0.000	0.210	1.000	0.285	0.258
Loan/Income	83,320	1.350	1.885	0.282	1.227	3.865	1.498	1.207
Loan Amount	83,320	119.100	199.400	16.600	84.500	709.600	147.000	92.070
Borrower Income	83,320	89.130	123.400	29.620	68.380	462.600	102.500	76.210
County characteristics								
Ln(Population)	22,890	10.540	1.450	7.559	10.410	14.260	11.210	10.070
Ln(Income per capita)	22,890	10.190	0.236	9.680	10.180	10.860	10.270	10.140
Unemployment rate	22,890	5.103	1.863	2.100	4.800	11.000	5.187	5.045
HHI	22,890	1919.000	1777.000	85.530	1426.000	10000.000	1377.000	2,294.000
Ln(House prices)	10,424	11.770	0.511	10.780	11.710	13.290	11.900	11.590
%Foreclosed houses	3,642	6.787	13.700	0.519	3.901	48.690	6.705	6.990

Table 2: Direct effects of SOX-302 compliance on MW bank's lending behavior

This table reports the OLS estimation results where the dependent variable is *Mortgage approvals,* defined as the number of approved loan applications divided by the total number of applications. The data are from the Home Mortgage Disclosure Act (HMDA) Loan Application Registry and are aggregated at the bank-county-year level. The sample contains loans originated by banks that disclose Material Weakness between September 2002 and December 2004 to comply with the SOX-302 provision (MW banks). *Post* is a dummy variable that equals one for all years 2003 and later. Definitions of other variables are included in Appendix A2. Robust standard errors are clustered at the county-level. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

Dependent variable: Mortgage approvals				
Sample: MW banks				
	(1)	(2)	(3)	(4)
Post	-0.148***	-0.098***	-0.085***	-0.076***
	(-7.680)	(-5.198)	(-5.236)	(-3.077)
Ln(Assets)		0.612***	0.507***	0.406***
		(5.851)	(4.433)	(3.147)
Ln(Assets)^2		-0.020***	-0.016***	-0.013***
		(-6.370)	(-4.701)	(-3.134)
ROA		-0.024**	-0.010	0.023**
		(-2.488)	(-0.968)	(2.013)
Lending		-0.154*	-0.209**	-0.097
		(-1.947)	(-2.399)	(-0.857)
Deposit		-0.066	0.071	0.117
		(-0.622)	(0.653)	(1.116)
Loan/Income			0.002**	0.002**
			(2.043)	(2.066)
%female applicants			-0.093	-0.139***
			(-1.609)	(-2.868)
%minor applicants			-0.375***	-0.420***
			(-9.963)	(-12.217)
Year FE	Yes	Yes	Yes	Yes
Regulator FE	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	No
County-Bank FE	No	No	No	Yes
R-squared	0.186	0.243	0.410	0.282
Observations	2,877	2,877	2,877	2,877

Table 3: Lending behavior of MW banks – Timeline and Alternative Specification

Panel A uses two alternative dependent variables: *Application growth*, the percentage change in the number of submitted loan applications relative to the prior year; and *Requested Loan/Income*, the requested loan amount divided by applicant's income. Panel B tests the dynamic timing effects by replacing the *Post* dummy with a set of dummies: *2001*, *2002*, *2004*, *2005* and *2006*. Panel C presents the estimation results from an alternative specification where we compare the lending behavior after SOX-302 of MW banks (treatment group) with those of 1) non-MW public banks only and 2) non-MW public and private banks. Definitions of all variables are included in Appendix A2. Robust standard errors are clustered at the county-level. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

Panel A: Demand-side explanations		
Dependent variables	Application growth	Requested Loan/Income
	(1)	(2)
MW banks	-8.393	0.148
	(-1.409)	(0.791)
Other controls	Yes	Yes
Year FE	Yes	Yes
Regulator FE	Yes	Yes
County FE	Yes	Yes
R-squared	0.052	0.014
Observations	2,920	2,892

Panel B: Dynamic timing effects of lending behavior of MW banks	
Dependent variable: Mortgage approvals	
	(1)
2001	0.008
	(1.017)
2002	-0.010
	(-1.060)
2004	-0.059***
	(-3.473)
2005	-0.038***
	(-2.649)
2006	0.002
	(0.154)
Other controls	Yes
Year FE	Yes
Regulator FE	Yes
County FE	Yes
R-squared	0.366
Observations	2,246

Panel C: Alternative specification

	Full sample		Matched sample	
Coefficients compare	MW vs (non-MW public + private)	MW vs. non-MW public	MW vs (non-MW public + private)	MW vs. non-MW public
	(1)	(2)	(3)	(4)
MW banks*Post	-0.082***	-0.079***	-0.056***	-0.053***
	(-18.028)	(-17.754)	(-9.054)	(-8.342)
Other controls	Yes	Yes	Yes	Yes
County-year FE	Yes	Yes	Yes	Yes
Regulator FE	Yes	Yes	Yes	Yes
R-squared	0.235	0.250	0.227	0.249
Observations	83,322	69,024	40,322	31,593

Table 4: Lending behavior of non-MW banks

This table reports the OLS estimation results where the dependent variable is *Mortgage approvals*, defined as the number of approved loan applications divided by the total number of applications. The data are from the Home Mortgage Disclosure Act (HMDA) Loan Application Registry and are aggregated at the bank-county-year level. Column (1) includes loans originated by public banks that do not need to disclose and improve their internal controls (non-MW public banks). Column (2) includes loans originated by all private banks. *MW Presence* is the fraction of loans originated by MW banks in a given county. *Post* is a dummy variable that equals one for all years 2003 and later. All models include County, Year, and Regulator fixed effects. Definitions of other variables are included in Appendix A2. Robust standard errors are clustered at the county-level. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

Dependent variable: Mortgage approvals						
Sample include:	Non-MW public banks			Private banks		
	(1)	(2)	(3)	(4)	(5)	(6)
MW Presence*Post	0.125***	0.081***	0.079**	0.027	-0.015	-0.133
	(4.534)	(3.245)	(2.087)	(0.296)	(-0.177)	(-0.772)
MW Presence	-0.054***	-0.004	-0.003	0.063	0.089*	0.142
	(-3.927)	(-0.324)	(-0.190)	(1.232)	(1.879)	(0.989)
Post	0.466***	0.607***	-	-0.167	-0.189	-
	(6.393)	(8.089)	-	(-0.845)	(-0.938)	-
Ln(Assets)	0.001	0.033*	-	0.069***	0.070	-
	(0.114)	(1.701)	-	(2.594)	(1.560)	-
Ln(Assets)^2	-0.000*	-0.001	-	-0.003***	-0.002	-
	(-1.701)	(-1.027)	-	(-3.057)	(-1.092)	-
ROA	-0.013***	-0.011***	-	0.003	0.008**	-
	(-5.601)	(-5.327)	-	(0.610)	(1.972)	-
Lending	0.033**	-0.052***	-	0.022	0.023	-
	(2.369)	(-3.555)	-	(0.994)	(0.816)	-
Deposit	-0.071***	0.014	-	-0.168***	-0.078**	-
	(-3.217)	(0.748)	-	(-4.824)	(-2.305)	-
Loan/Income	0.004**	0.004***	0.004**	0.004**	0.001	0.001
	(2.401)	(3.716)	(2.490)	(2.385)	(0.622)	(0.440)
%female applicants	-0.215***	-0.127***	-0.195***	-0.110***	-0.086***	-0.170***
	(-12.304)	(-7.279)	(-8.677)	(-3.962)	(-3.083)	(-5.002)
%minor applicants	-0.238***	-0.161***	-0.177***	-0.137***	-0.074***	-0.171***
	(-31.390)	(-21.149)	(-13.676)	(-6.863)	(-3.640)	(-6.812)
Year FE	Yes	Yes	No	Yes	Yes	No
Regulator FE	Yes	Yes	No	Yes	Yes	No
County FE	Yes	No	No	Yes	No	No
County-Bank FE	No	Yes	No	No	Yes	No
Bank-Year FE	No	No	Yes	No	No	Yes
R-squared	0.194	0.063	0.058	0.077	0.030	0.039
Observations	66,145	66,145	66,145	14,298	14,298	14,298

Table 5: What explains private bank's marginal responses?

This table examines the heterogeneity in the responses of private banks to local opportunities created by MW banks' cutting lending. The dependent variable is *Mortgage approvals*, defined as the number of approved loan applications divided by the total number of applications. *MW presence* is the fraction of loans originated by MW banks in a given county. *Post* is a dummy variable that equals one for all years 2003 and later. The sample is split by the following factors: (1) *Ln(Assets)*, the natural logarithms of the bank's total assets and (2) *County HHI*, the Herfindahl Index of deposit concentration in a given county. All models include County, Year, and Regulator fixed effects. Definitions of other variables are included in Appendix A2. Robust standard errors are clustered at the county-level. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

Dependent variable: Mortgage approvals				
Sample: Private banks				
Split by:	Ln(Assets)		County HHI	
	Low	High	Low	High
	(1)	(2)	(3)	(4)
MW Presence*Post	-0.007	0.233*	0.029	0.261**
	(-0.050)	(1.954)	(0.223)	(2.024)
MW Presence	0.030	-0.015	0.041	-0.111
	(0.498)	(-0.189)	(0.702)	(-0.791)
Post	4.699*	-0.776**	0.256	-0.859**
	(1.813)	(-2.141)	(1.275)	(-2.362)
Other controls	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
Regulator FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
R-squared	0.049	0.103	0.084	0.081
Observations	6,539	7,759	5,905	8,393

Table 6: Lending behavior of non-MW banks: Timeline, Alternative Specification, & Placebo tests

Panel A uses two alternative dependent variables: *Application growth*, the percentage change in the number of submitted loan applications relative to the prior year; and *Requested Loan/Income*, the requested loan amount divided by applicant's income. Panel B tests the dynamic timing effects by replacing the *Post* dummy with a set of dummies: *2001*, *2002*, *2004*, *2005* and *2006*. Panel C uses an alternative specification where we compare the lending behavior of non-MW public banks with that of private banks in traditional DiD specification with county-year fixed effects. Panel D presents a placebo test. *Placebo presence* where *Placebo* is defined as either: all public banks (Column (1)), small banks whose book assets are in the bottom 25% of size distribution (Column (2)), or unprofitable banks whose ROA is in the bottom 25% (Column (3)). Definitions of all variables are included in Appendix A2. Robust standard errors are clustered at the county-level. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

Panel A: Ruling out demand-side explanations

Sample:	Non-MW public banks		Private banks	
Dependent variables:	Application growth	Requested Loan/Income	Application growth	Requested Loan/Income
	(1)	(2)		
MW Presence*Post	0.293	0.465	-1.153	0.778
	(0.902)	(1.465)	(-1.542)	(0.838)
MW Presence	0.748***	0.238	0.092	0.498
	(3.267)	(1.427)	(0.213)	(0.858)
Post	4.326***	2.996***	1.469	-2.761
	(4.568)	(3.871)	(0.940)	(-1.265)
Other controls	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
Regulator FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
R-squared	0.029	0.019	0.026	0.050
Observations	63,512	66,386	12,968	12,968

Panel B: Timeline

Dependent variable: Mortgage approvals

	Non-MW public banks	Private banks
	(1)	(2)
2001*MW Presence	-0.045	-0.103
	(-1.309)	(-1.162)
2002*MW Presence	0.034	-0.098
	(1.201)	(-1.160)
2004*MW Presence	0.104*	0.382***
	(1.862)	(3.027)
2005*MW Presence	0.163***	0.209
	(2.959)	(1.505)
2006*MW Presence	0.196***	-0.124
	(4.117)	(-0.885)
Other controls	Yes	Yes
County FE	Yes	Yes
Regulator FE	Yes	Yes
Year FE	Yes	Yes
R-squared	0.184	0.068
Observations	51,776	11,173

Panel C: Alternative specification	
Dependent variable: Mortgage approvals	
Coefficient compares:	Non-MW public banks vs. Private banks
	(1)
Non-MW public banks*MW Presence*Post	0.213***
	(2.619)
Non-MW public banks* Post	-0.016***
	(-3.218)
Non-MW public banks	0.016***
	(4.666)
Other controls	Yes
Regulator FE	Yes
County-year FE	Yes
R-squared	0.215
Observations	80,443

Panel D: Placebo test			
Dependent variable: Mortgage approvals			
Placebo banks	All public	Bank size in bottom 25%	Bank ROA in bottom 25%
	(1)	(2)	(3)
Placebo presence*Post	-0.018	0.001	0.000
	(-1.172)	(0.030)	(0.001)
Placebo presence	-0.081***	-0.013***	-0.002***
	(-5.245)	(-2.779)	(-4.030)
Post	-0.149	0.307***	0.243***
	(-0.752)	(5.936)	(5.030)
Other controls	Yes	Yes	Yes
County FE	Yes	Yes	Yes
Regulator FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
R-squared	0.079	0.216	0.219
Observations	14,298	80,796	72,475

Table 7: Aggregate county mortgage origination

This table examines the aggregate mortgage approval in counties with different levels of MW presence after SOX-302. The data are from the Home Mortgage Disclosure Act (HMDA) Loan Application Registry and are aggregated at the county-year level. The dependent variable is *County Mortgage approvals*, the number of approved loan applications divided by the total number of applications reviewed in a county in a given year. *MW presence* is the fraction of loans originated by MW banks in a given county. *Post* is a dummy variable that equals one for all years 2003 and later. Definitions of all variables are included in Appendix A2. Robust standard errors are clustered at the county-level. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

Dependent variables: County mortgage approvals			
	(1)	(2)	(3)
MW Presence*Post	0.078**	0.133***	0.053**
	(2.171)	(4.475)	(2.099)
MW Presence	0.061***	-0.043***	-0.038***
	(5.057)	(-3.493)	(-3.093)
Post	0.604***	0.483***	0.200***
	(7.095)	(6.546)	(2.642)
Ln(Population)	0.022***	-0.002	0.003*
	(17.992)	(-1.034)	(1.843)
Unemployment	0.127***	0.071***	0.003
	(19.687)	(9.862)	(0.359)
Ln(Income per capita)	0.005***	0.006***	-0.000
	(8.121)	(8.430)	(-0.166)
HHI	-0.004	-0.003	0.000
	(-0.433)	(-0.267)	(0.038)
Income/Loan	0.019**	-0.002	-0.006***
	(2.175)	(-1.475)	(-3.454)
%minor applicants	-0.337***	-0.221***	-0.190***
	(-36.540)	(-19.643)	(-16.231)
%female applicants	-0.090***	-0.057***	-0.060***
	(-4.313)	(-2.606)	(-2.804)
County FE	No	Yes	Yes
Year FE	No	No	Yes
R-squared	0.356	0.209	0.236
Observations	22,741	22,741	22,741

Table 8: Why do we observe an aggregate increase in mortgage credits?

Panel A examines the heterogeneity in the responses of non-MW public banks and private banks to local opportunities created by MW banks' cutting lending. The dependent variable is *Mortgage approvals*, defined as the number of approved loan applications divided by the total number of applications. *MW presence* is the fraction of loans originated by MW banks in a given county. *Post* is a dummy variable that equals one for all years 2003 and later. The sample is split by borrower's *Loan/Income,* the average ratio of the requested loan amount in a mortgage application to the applicant's income for applications reviewed in each county-year.. The data are from the Home Mortgage Disclosure Act (HMDA) Loan Application Registry and are aggregated at the bank-county-year level. Definitions of other variables are included in Appendix A2. Robust standard errors are clustered at the county-level. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

Dependent variable: Mortgage approvals				
	Non-MW public banks		Private banks	
Split by: Borrower's Loan/Income	Low	High	Low	High
	(5)	(6)	(7)	(8)
MW Presence*Post	0.108***	0.143***	-0.153	0.403***
	(3.012)	(2.784)	(-1.267)	(2.714)
MW Presence	-0.054***	-0.047	0.025	0.059
	(-2.990)	(-1.415)	(0.431)	(0.659)
Post	0.411***	0.385***	0.298	-0.358
	(4.318)	(2.657)	(0.910)	(-1.271)
Other controls	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
Regulator FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
R-squared	0.247	0.123	0.121	0.060
Observations	39,994	21,162	8,195	6,103

Table 9: Effects of spillover on house prices

This table examines house prices in counties with different levels of MW presence after SOX-302. Data on house prices are from *Zillow.com* and are aggregated at the county-year level. The dependent variable is *ln(House price)*, the natural logarithm of the average house price in the county. *MW presence* is the fraction of loans originated by MW banks in a given county. *Post* is a dummy variable that equals one for all years 2003 and later. Definitions of all variables are included in Appendix A2. Robust standard errors are clustered at the county-level. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

Dependent variables: %Foreclosed houses		
	OLS	2SLS
	(1)	(2)
MW Presence*Post	0.577***	
	(5.035)	
Instrumented mortgage approvals		10.734**
		(2.380)
MW Presence	-0.254***	0.371
	(-4.802)	(1.422)
Post	-1.938***	-6.890***
	(-7.820)	(-3.167)
Ln(Population)	-0.010***	-0.040**
	(-2.797)	(-2.188)
Unemployment	-0.020***	-0.007
	(-7.929)	(-0.708)
Ln(Income per capita)	-0.124***	-0.266***
	(-6.024)	(-2.725)
HHI	-0.047*	-0.086
	(-1.743)	(-0.635)
County FE	Yes	Yes
Year FE	Yes	Yes
F-stats	-	10.314
R-squared	0.720	0.285
Observations	10,433	9,246

Table 10: Home foreclosures during and after the 2007 to 2009 financial crisis

This table examines home foreclosures rates in counties with different levels of MW presence after SOX-302. Data on foreclosure are from *Zillow.com* and are aggregated at the county-year level. The dependent variable is *%Homes foreclosed*, defined as the number of houses closed out of 10,000 homes in the county. *MW presence*$_{2004}$ is the fraction of loans originated by MW banks in a given county in 2004. Definitions of all variables are included in Appendix A2. Robust standard errors are clustered at the county-level. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

Dependent variables: %Home foreclosed			
	(1)	(2)	(3)
MW Presence$_{2004}$*Postcrisis	0.205**	0.288***	0.289***
	(2.253)	(2.675)	(2.682)
Postcrisis	0.034***	0.033***	0.033***
	(6.957)	(6.143)	(6.143)
Ln(Population)		0.001	0.001
		(1.131)	(0.734)
Unemployment		0.003***	0.003***
		(2.655)	(2.664)
Ln(Income per capita)		-0.010	-0.010
		(-1.475)	(-1.477)
HHI			-0.012
			(-1.000)
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
R-squared	0.038	0.041	0.041
Observations	3,583	3,583	3,583

Appendix A1: Suntrust Bancorp Inc.'s disclosure of material weaknesses

Extract A: *Suntrust's* disclosure of material weaknesses

The Company's significant accounting policies are described in detail in Note 1 to the Consolidated Financial Statements and are integral to understanding Management's Discussion of results of operations and financial condition. Management has identified certain accounting policies as being critical because they require management's judgment to ascertain the valuations of assets, liabilities, commitments and contingencies. A variety of factors could affect the ultimate value that is obtained either when earning income, recognizing an expense, recovering an asset, or reducing a liability. The Company has established detailed policies and control procedures that are intended to ensure these critical accounting estimates are well controlled and applied consistently from period to period. In addition, the policies and procedures are intended to ensure that the process for changing methodologies occurs in an appropriate manner. However, in the fourth quarter of 2004 the Company identified a material weakness in internal controls related to establishing the Allowance for Loan and Lease Losses (ALLL). The Controls and Procedures section on pages 64 through 65 provides further discussion surrounding this internal control weakness. The following is a description of the Company's current accounting policies that are considered to involve significant management valuation judgments.

Extract B: *Suntrust's* plans to address the weaknesses

CHANGES IN INTERNAL CONTROL OVER FINANCIAL REPORTING

Management of the Company has evaluated, with the participation of the Company's Chief Executive Officer and Chief Financial Officer, changes in the Company's internal controls over financial reporting (as defined in Rule 13a-15(f) and 15d-15(f) of the Exchange Act) during the fourth quarter of 2004. In connection with such evaluation, the Company has determined that there have been changes in internal control over financial reporting during the fourth quarter that have materially affected or are reasonably likely to materially affect, the Company's internal control over financial reporting. As discussed in Management's Report on Internal Control Over Financial Reporting, in the fourth quarter of 2004, the Company identified a material weakness in internal controls over financial reporting relating to the Company's process of establishing the ALLL that existed during 2004.

As of the end of the period covered by this report, the Company has not fully remediated the material weakness in the Company's internal control over financial reporting relating to the ALLL. However, the Company has taken the following remedial actions:

- The Company terminated three members of its credit administration division, including its Chief Credit Officer.
- The Controller was reassigned to a position in the Company with responsibilities that involve areas other than accounting or financial reporting.
- The Company's ALLL Committee was reconstituted with certain members of senior management.
- The ALLL policies and procedures have been, and are continuing to be, documented and significantly augmented.
- The Company has established additional remediation plans to address internal control deficiencies associated with the ALLL framework, including additional documentation, training and supervision, periodic testing and periodic updates to the Audit Committee. Internal controls surrounding the validation and testing of systems and models relating to the ALLL process have been strengthened.
- Management has taken steps, and intends to take additional steps, to ensure that the Company's conservative credit culture does not interfere with the application of GAAP in the ALLL calculation process.

Other than the changes identified above, there have been no changes to the Company's internal control over financial reporting that occurred since the beginning of the Company's fourth quarter of 2004 that have materially affected, or are reasonably likely to materially affect, the Company's internal control over financial reporting.

Appendix A2: Definitions of variables

Variable	Definition	Source
Definitions of banks		
MW banks	Public banks that disclose material weaknesses between September 2002 and December 2004	AuditAnalytics
Non-MW public banks	Public banks that do *not* disclose material weaknesses between September 2002 and December 2004	AuditAnalytics
Private banks	Non-listed commercial banks	FR Y-9C
Post-event indicators		
Post	Dummy equals one for all years from 2003 onwards after SOX-302 provision becomes effective	-
Post+1	Dummy equals one for all years from 2004 onwards, one year after SOX-302 provision becomes effective	-
PostRegFD	Dummy equals one for all years from 1999 onwards after the Regulation Fair Disclosure becomes effective	-
PostCrisis	Dummy equals one for all years from 2007 onwards	-
MW Presence variables		
MW Presence	The fraction of loans originated by MW banks in a given county	HMDA
Ln(MW presence)	The natural logarithms of MW Presence	HMDA
MW County	Dummy equals one if MW Presence is above the sample median	HMDA
MW Presence (deposits)	The fraction of deposits received by MW banks in a given county	FDIC
MW Presence (2000-2003)	The average fraction of loans originated by MW banks during the pre-SOX-302 period of 2000-2003	HMDA
MW Presence (scaled by all)	The amount of loans originated by MW banks divided by loans originated by all lenders in a given county	HMDA
Non-MW public Presence	The fraction of loans originated by non-MW public banks in a given county	HMDA
Bank characteristics		
Ln(Assets)	Natural logarithm of total assets	FR Y-9C
ROA (%)	Earnings before interest and taxes divided by book value of total assets	CRSP, FR Y-9C
Lending	Total loans divided by total assets	FR Y-9C
Deposit	Total deposits divided by total assets	FR Y-9C
Borrower and loan characteristics		
Mortgage approvals	The number of approved loan applications divided by the total number of applications.	HMDA
Application growth	The percentage change in the number of submitted loan applications relative to the prior year	HMDA
Loan/Income	The average ratio of the requested loan amount in a mortgage application to the applicant's income for applications reviewed in each bank-county-year.	HMDA
%female applicants	The ratio of the number of applications from female applicants to the total number of applications reviewed for each bank-county-year.	HMDA
% minor applicants	The ratio of the number of applications from minority applicants to the total number of applications reviewed for each bank-county-year. Minority applicants include all applicants whose reported race is other than white	HMDA

County mortgage approvals	The number of approved loan applications divided by the total number of applications at the county-level	HMDA
Loan Amount	The requested loan amount in a mortgage reviewed in each bank-county-year.	HMDA
Applicant Income	The applicant's income for applications reviewed in each bank-county-year.	HMDA
County-level characteristics		
Ln (population)	Natural logarithm of the county population	US Census Bureau
ΔPopulation	The percentage change in county's population relative to the prior year	US Census Bureau
Ln (income per capita)	Natural logarithm of the individual's income from wages, investment enterprises and other ventures	US Census Bureau
ΔIncome per capita	The percentage change in county's income per capita relative to the prior year	US Census Bureau
Unemployment rate	Unemployment rate of the county	Bureau of Labor Statistics
ΔUnemployment rate	The percentage change in county's unemployment rate relative to the prior year	Bureau of Labor Statistics
HHI	Herfindahl Index measuring the concentration of deposits at the county-level	FR Y-9C
ΔHHI	The percentage change in county's HHI relative to the prior year	FR Y-9C
Ln(House Prices)	The natural logarithm of the average house price in the county	Zillow.com
%Home Foreclosed	The number of houses closed out of 10,000 homes in the county	Zillow.com

Appendix A3: Is MW bank presence correlated with county characteristics?

This table examines whether the presence of MW banks in a given county can be predicted by historical county characteristics. The dependent variable is *MW Presence*$_{2003}$, the fraction of loans originated by MW banks in a given county in 2003, the complete year after SOX-302 becomes effective. **Panel A** examines the correlation between MW presence$_{2003}$ and the *levels* of various county characteristics, measured in 2000: (1) Ln(Population), (2) Unemployment rate, (3) Ln(Income per capita), (4) HHI of county-level deposit concentration, (5) Ln(House prices), (6)% Home Foreclosed, (7) Ln(mortgage applicants), (8) %female applicant, (9) %minor applicant. **Panel B** examines the correlation between MW presence$_{2003}$ and the *changes* of various county characteristics, measured in 2000: (10) ΔLn(Population), (11) ΔUnemployment rate, (12) ΔLn(Income per capita), (13) ΔHHI of county-level deposit concentration, (14) ΔLn(House prices), (15) Δ Home Foreclosed), (16) ΔMortgage applicants, (17) Δfemale applicant, and (18) Δminor applicant. Definitions of all variables are included in Appendix A1. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

Panel A: The correlation between the levels of county characteristics and MW Presence

Dependent variable: MW Presence$_{2003}$

County characteristic	Ln(Population)$_{2000}$	Unemployment$_{2000}$	Ln(Income per capita)$_{2000}$	HHI$_{2000}$	Ln(House Price)$_{2000}$	%Home Foreclosed$_{2000}$	Ln(mortgage applicants)	%female applicant	%minor applicant
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
County Characteristic	0.002	0.001	-0.000	-0.000	0.005	-0.000	-0.003	0.013	-0.006
	(1.299)	(0.660)	(-0.044)	(-1.534)	(0.845)	(-0.885)	(-1.527)	(1.074)	(-1.169)
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.186	0.186	0.190	0.188	0.201	0.211	0.179	0.179	0.179
Observations	2,639	2,649	2,609	2,650	1,334	373	3,195	3,195	3,195

Panel B: The correlation between the changes in county characteristics and MW Presence

Dependent variable: MW Presence$_{2003}$

County characteristics	ΔPopulation$_{2000}$	ΔUnemployment$_{2000}$	ΔIncome per capita$_{2000}$	ΔHHI$_{2000}$	ΔLn(House Price)$_{2000}$	ΔHome Foreclosed$_{2000}$	ΔMortgage applicants$_{2000}$	Δfemale applicant	Δminor applicant
	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
County Characteristic	-0.006	-0.006	0.017	0.000	-0.067	0.001	-0.000	-0.000	-0.003
	(-0.162)	(-1.449)	(1.143)	(0.529)	(-0.996)	(0.663)	(-0.079)	(-0.119)	(-1.527)
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.186	0.186	0.190	0.188	0.200	0.202	0.179	0.178	0.179
Observations	2,639	2,649	2,609	2,632	1,049	331	3,189	3,115	3,189

Appendix A4: Heterogeneity in the mortgage reduction at MW banks

This table examines the heterogeneity in the reduction in mortgage approval rates at MW banks. The sample is split by Borrower's *Loan/Income*, the ratio of the requested loan amount in a mortgage application to the applicant's income for applications reviewed in each bank-county-year. All models include County, Year, and Regulator fixed effects. Definitions of all variables are included in Appendix A1. Robust standard errors are clustered at the county-level. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

Dependent variable: Mortgage approvals		
Split by: Borrower's Loan/Income ratio	High	Low
	(1)	(2)
Post	-0.120***	-0.060***
	(-4.342)	(-3.139)
Other controls	Yes	Yes
County FE	Yes	Yes
Regulator FE	Yes	Yes
Year FE	Yes	Yes
R-squared	0.380	0.447
Observations	1,203	1,674

Appendix A5: Lending behavior of MW banks – Additional robustness tests

This table presents additional robustness tests on the main results in Table 2. Row (1) restricts the sample to MW banks that are exempted from the majority board independence requirements in 2001. Row (2) includes an additional control, *PostRegFD*, a dummy that equals one for all years after 2000, to control for possible confounded effect of Reg FD. Row (3) restricts the sample to banks whose book assets are below $500 million and thus, exempted from the FDICIA Act of 1991. Row (4) considers banks that disclose Material Weakness between September 2002 and December 2005 (instead of December 2004). Row (5) uses *Post+1* instead of *Post*. Row (6) considers all types of weakness disclosures: material weaknesses and significant deficiencies. Row (7) includes additional county-level location controls: *ln(population), ln(income per capita),* and *unemployment rate*. All models include County, Year, and Regulator fixed effects. Definitions of all variables are included in Appendix A1. Robust standard errors are clustered at the county-level. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

		Coefficient	t-stat	N
(1)	Exclude MW banks targeted by majority board independence	-0.094***	-5.912	2,813
(2)	Control for Regulation FD by including *PostRegFD*	-0.076***	-4.571	2,877
(3)	Exclude MW banks targeted by FDICIA	-0.132*	-1.713	57
(4)	Use banks that disclose MW between Sep 2002 and Dec 2005	-0.062***	-9.567	11,356
(5)	Use *Post+1*	-0.085***	-5.236	2,877
(6)	Include all types of weakness disclosures	-0.047***	-7.028	10,045
(7)	Additional county-level controls	-0.167***	-8.090	2,524

Appendix A6: Lending behavior of non-MW banks – Additional robustness tests

Panel A presents various robustness tests on the spillover effects of the SOX-302 provision on mortgage approvals of untargeted banks. Rows (1)-(4) show that our results are robust to various alternative definitions of *MW Presence*. Specifically, we alternatively use *Ln(MW presence),* the natural logarithms of MW presence (Row (1)); *MW presence=1*, a dummy that equals 1 if MW presence is above the sample median (Row (2)); *MW presence (deposits),* the fraction of deposits received by MW banks in a given county (Row (3)); *MW presence (2000-2003),* the average fraction of loans originated by MW banks during pre-SOX-302 period of 2000-2003 (Row (4)). Rows (5)-(8) keep counties where MW presence is greater than zero (Row (5)), is above the full sample's median (Row (6)) and 75th percentile (Row (7)). Row (8) controls for *HHI*, the Herfindahl Index of county-level deposit concentration. **Panel B** shows estimation results for all lenders. *MW Presence scaled by all* is defined as the amount of loans originated by MW banks divided by the sum of loans originated by MW banks, non-MW public banks, private banks, IMCs and credit unions in a given county. All models include County, Year, and Regulator fixed effects. Definitions of all variables are included in Appendix A1. Robust standard errors are clustered at the county-level. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

Panel A: Additional robustness tests

		Non-MW public banks		Private banks	
		Coefficient	t-stat	Coefficient	t-stat
(1)	Ln(MW presence)	0.147***	4.763	0.023	0.223
(2)	MW Presence =1 if above median	0.007***	2.799	0.001	0.089
(3)	MW Presence (deposits)	0.036**	2.315	-0.052	-1.067
(4)	MW Presence (2000-2003)	0.073***	3.209	-0.065	-0.917
(5)	Only counties where MW presence>0	0.082***	2.866	0.066	0.663
(6)	Only counties where MW presence above sample median	0.073***	3.209	-0.065	-0.917
(7)	Only counties where MW presence above 75th percentile	0.132***	2.959	0.058	0.405
(8)	Control for *HHI* of county-level deposit concentration	0.106***	3.901	0.043	0.460

Panel B: All types of lenders

Dependent variable: Mortgage approvals

Sample include:	Non-MW Public banks	Private banks	IMCs	Credit Unions
	(1)	(2)	(3)	(4)
MW Presence (Scaled by all)*Post	0.237***	0.155	0.222***	-0.238**
	(3.142)	(0.608)	(4.393)	(-2.262)
MW Presence (Scaled by all)	-0.099**	0.191	-0.178***	0.012
	(-2.276)	(1.337)	(-4.716)	(0.230)
Post	0.466***	-0.166	-0.046***	-0.671***
	(6.390)	(-0.841)	(-22.907)	(-5.091)
Other controls	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
Regulator FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
R-squared	0.194	0.077	0.039	0.031
Observations	66,146	14,298	1,501,409	248,755