Bank Supervision and Managerial Control Systems: The Case of Minority Lending

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Abstract

This paper investigates how bank supervisors' enforcement decisions and orders (EDOs) influence the allocation of mortgage lending across demographic groups underlying a banks' borrower base. Specifically, we investigate how banks' mortgage lending to minority borrowers relative to white borrowers changes following the resolution of severe EDOs. We hypothesize that improvements in management control systems imposed by EDOs serve as channels through which EDOs affect a bank's borrower base generally, and minority lending specifically. We empirically examine how changes in loan policies and internal governance mechanisms specified in EDOs influence banks' mortgage lending decisions. We find that relative to white borrowers, mortgage lending to minority borrowers significantly increases following the resolution of EDOs, where this positive effect increases with the strictness of bank supervisors and severity of the EDO. Consistent with management controls serving as channels for this change, there is a more pronounced effect on minority lending when an EDO mandates improvements in lending policies and stronger internal governance over lending decisions.

JEL Classification: G21, G28, G38
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1. Introduction

An important question in banking is how supervision affects bank lending.[1] Recent research exploits variation in the strictness of bank supervision to examine its effects on credit supply (Agarwal et al., 2014; Granja & Leuz, 2022). Supervisory activities can influence loan supply not only by scrutinizing banks' loan loss recognition but also by identifying deficiencies in banks' management practices, including operating procedures and policies and internal governance structures. For example, following a shift to a more rigorous supervisory regime, Granja & Leuz (2022) document significant changes in banks' internal management practices. They find that banks that experienced significant changes in internal practices following a supervisory regime shift exhibit a more pronounced increase in complex lending, such as lending to small businesses.[2] That is, in addition to impacting the amount of lending, supervisory pressure can also fundamentally influence the types of borrowers to which banks lend.

In this paper, we extend this literature by investigating how U.S. bank supervisors' enforcement decisions and orders (EDOs) against financial institutions influence the allocation of mortgage lending across demographic groups underlying a banks' borrower base. Specifically, we investigate how banks' mortgage lending to minority borrowers relative to white borrowers changes following the resolution of severe EDOs. The intuition for our study is that credit risk assessment is more complex for minority borrowers who may lack credit scores or other standard sources of credit information. Therefore, if stricter bank supervision facilitates more complex lending (as Granja & Leuz, 2022, find) then these benefits of supervision should also extend to other types of borrowers whose credit risk is more challenging to evaluate, such as minority borrowers. We are particularly interested in examining the extent

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[1]A large literature analyzes the impact of bank regulation and supervision on lending (e.g., Eisenbach et al., 2022; Hirtle et al., 2020; Kandrac & Schlusche, 2021; Altavilla et al., 2020).

[2]Lending to small and medium enterprises (SME) is complex because their credit risk is harder to evaluate. For example, Schwert (2018) and Cortés et al. (2020) find that SME borrowers are more likely to borrow from well-capitalized banks because capital-constrained banks have a harder time evaluating SME borrowers.

to which administrative controls, in the form of loan and internal governance policies and adherence to such policies, serve as mechanisms through which EDOs transmit their effect on lending outcomes. Recent research finds some support for this mechanism, showing that racial disparities can derive from the biases of individual loan officers and limitations on the scope of borrowers' information used in the lending decision (Di Maggio et al., 2022; Jiang et al., 2022).

A longstanding and growing literature in accounting considers the role of managerial control systems in shaping firm performance by aligning the behaviors and decisions of employees with an organization's objectives (Brickley et al., 2015; Grabner & Moers, 2013; Langfield-Smith, 1997; Malmi & Brown, 2008; Tucker et al., 2009). Administrative controls are an important element of managerial control systems that span standard operating procedures and policies and internal governance structures (Abernethy & Chua, 1996; Simons, 1987). Administrative controls direct employee behavior by establishing action protocols, specifying how tasks are to be performed, and ensuring adherence to policies (Malmi & Brown, 2008; Merchant & Van der Stede, 2007; Simons, 1987). However, our understanding of the impact of administrative controls on banks' lending decisions is limited. Understanding the impact of improvements in banks' administrative controls on their credit allocation decisions is crucial and has critical socio-economic implications.[3]

We hypothesize that improvements in banks' administrative controls that are imposed through EDOs could affect a bank's borrower base generally and minority lending specifically. A primary objective of supervisors in issuing EDOs is to correct specific deficiencies by forcing banks to make fundamental changes in operational processes, including changes in administrative controls. Changes to administrative controls can include the introduction of new loan policies that require loan officers to consistently follow best practices in making

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[3]For example, banks' mortgage lending decisions influence homeownership. Owning a home conveys a number of social and economic benefits, such as the ability to accumulate wealth, access to credit by building home equity, higher educational attainment, and a lower likelihood of incarceration (Aaronson, 2000; Blau & Graham, 1990; Collins & Margo, 2001; Di et al., 2007; Green et al., 1997; Newman & Holupka, 2016; Shapiro, 2006; Wainer & Zabel, 2020).

lending decisions, and the strengthening of internal governance mechanisms that monitor regulatory compliance and adherence to internal bank policies. Such changes may increase lending to minorities by limiting the discretion of individual loan officers to bias lending decisions against minority borrowers (Frame et al., 2022).[4] Innovations in loan policies could also expand the scope of credit risk assessments to incorporate information beyond metrics like credit scores that may put minority borrowers at a disadvantage. In this regard, recent research on FinTech lending platforms provides evidence that incorporating alternative data into traditional bank lending models can significantly increase credit access to applicants with a low credit score (Di Maggio et al., 2022).

EDOs are issued against financial institutions for unsafe or unsound practices; breaches of fiduciary duty; and violations of laws, rules, or regulations. We study EDOs because they often contain provisions that require banks to improve their administrative controls. Regulators bring enforcement actions against problem banks as a measure of last resort and exercise some discretion in issuing EDOs. If a bank fails to satisfy the requirements of the order, regulators can enforce the order in U.S. district courts, terminate deposit insurance, or take further actions that might lead to bank closure.[5] While a few EDOs directly reference fair lending practices, EDOs are generally not concerned with banks' adherence to fair lending laws. A separate and distinct supervisory process oversees compliance with fair lending laws.

We begin by examining the extent to which EDO banks' lending to minority borrowers changes in the five years following the resolution of the EDO. We find that EDO banks significantly increase their mortgage lending to minority borrowers relative to white borrowers following the termination of an enforcement order. This result also holds if we define

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[4]There are two proposed models for observed discrimination: taste-based (or prejudice-based) and statistical discrimination. Taste-based discrimination presumes some form of animus directed toward members of particular groups. Statistical discrimination presumes stereotyping based on group membership due to imperfect information (see Guryan & Charles, 2013, for a detailed discussion and summary of the literature).

[5]Upon completion of the required actions and improved ratings from bank examiners, supervisors issue a termination order. If a bank fails, a formal termination order is issued. If a bank is acquired or merges with another bank, the EDO remains under the original name of the bank and is only terminated once the regulators are satisfied that the new entity has met the requirements of the original order. Sometimes supervisors modify EDOs to include additional conditions or requirements.

minority borrowers as nonwhite borrowers or consider lending to Black or African-American borrowers relative to white male borrowers. Specifically, the share of residential mortgage lending to minority borrowers in EDO banks' total residential mortgage portfolio, measured at the county level, increases by 2% to 7% after EDO termination. We also estimate changes in the market shares of EDO banks in the counties where they operate. Specifically, we find that EDO banks increase their market shares of mortgage lending to minorities relative to all banks in a given county following EDO termination. Relative to the pre-EDO period, EDO banks' market share of mortgage lending to minorities increases by 0.58%–0.62%. On average, EDO banks' market share of lending to minorities in the residential mortgage market is 0.41%, making the increase economically significant. It is important to note that our results are not mechanical, as the EDOs considered in our analyses are not directly associated with fair lending laws.

An important concern is that changes in the demand for mortgages or economic changes that affect all banks could be driving the relative increase in lending to minorities. To mitigate this concern, we include the number of loan applications to control for changes in the demand for mortgage loans. We also control for bank-specific characteristics and county-level employment growth and include year and bank effects to control for any unobserved heterogeneity due to macroeconomic conditions and time-invariant bank characteristics. Furthermore, our market share analysis encompasses all banks' lending to minorities in a county, mitigating concerns that general economic trends drive our findings.

Our main analysis uses a staggered difference-in-differences research design to study changes in EDO banks' portfolio and market shares of lending to minorities relative to all other banks. Recent studies have shown that estimates from the staggered difference-in-differences analysis could be biased due to the combination of staggered treatment timing and dynamic treatment effects (Baker et al., 2022; Barrios, 2021; Goodman-Bacon, 2021; Sant'Anna & Zhao, 2020; Sun & Abraham, 2021). The problem is more severe with a smaller sample size when almost all units are treated and with considerable treatment het-

erogeneity (Baker et al., 2022). However, in our sample, most banks are not treated, and there is limited heterogeneity in treatment, making the problem less pronounced.[6] Nonetheless, consistent with suggestions in the literature (Baker et al., 2022; Cengiz et al., 2019; Sun & Abraham, 2021), we conduct additional analysis to further mitigate this concern. Specifically, we repeat our analysis in stacked subsamples by matching treated (EDO) banks with control (non-EDO) banks based on size and geography. Our results indicate that, relative to non-EDO banks (all non-EDO banks and a matched sample), EDO banks significantly expand their lending to minority borrowers.

Having established that EDO banks increase their mortgage lending following the termination of the EDO, we next examine channels that explain this increase in lending. We conjecture that EDOs force banks to resolve fundamental deficiencies in internal bank management practices that expand minority borrowers' access to mortgage loans. To test this conjecture, we extract information about the corrective actions specified by supervisors from the text of the EDOs themselves. In particular, we create two variables designed to capture improvements in administrative controls specifically related to changes in lending policies and internal governance. The first variable reflects whether the EDO requires the bank to revise or formally establish a written loan policy. The second captures whether the order requires the bank to develop written internal audit procedures that monitor regulatory compliance and adherence to internal bank policies. We find that increases in minority lending are significantly higher for EDOs that specify revisions of loan policies and or implement more formal internal governance procedures in counties with a higher proportion of subprime borrowers.

We conduct additional analyses to further tie our results to the supervisory enforcement process. Specifically, we find that the increase in minority lending is greater for banks with stricter regulators. We also find that banks with more severe EDOs or with low CRA ratings

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[6]Only 14% of our sample banks receive EDOs. Also, we restrict our analysis to only severe EDOs, limiting the treatment heterogeneity.

expand their minority lending more after exiting EDOs.[7] These results are consistent with banks having more severe operational deficiencies also exhibiting more scope for improvement in their lending practices.

We next explore how corrective actions directly influence loan approval decisions. We find that mortgage loan denial is 9.6% more likely for minority borrowers relative to white borrowers prior to an EDO. However, following EDO termination, the likelihood of denial decreases by five percentage points for minority borrowers. Turning to specific loan denial reasons, we find that, relative to the pre-EDO period, the rejection of minority loan applications due to borrower credit history is 3.4% less likely following EDO termination. Banks use non-price terms, such as credit history, collateral, and debt-to-income ratios, to ration credit (Stiglitz & Weiss, 1981). Minority borrowers are more likely to be constrained by these non-price terms because they are also more likely to have lower wealth (Acolin et al., 2016; Bostic, 1997; Gyourko et al., 1999).

Our result shows that banks rely less on non-price terms in determining whether to reject residential mortgage loan applications from minorities following EDO termination. Lower reliance on non-price terms is consistent with EDOs forcing corrective actions that improve loan policies and credit assessment processes that disproportionately benefit minority borrowers. For example, adherence to written loan policies and procedures reduces the discretion afforded to loan officers, and improved credit assessment may cause banks to process additional sources of information and thus reduce reliance on non-price terms. Bolstering this interpretation, we find no evidence that this increase in minority lending is a consequence of a shift towards riskier lending as we do not find increases in nonperforming assets, the market share of risky loans, or lending by the Federal Housing Administration (FHA).[8]

Finally, we examine alternative explanations. We find no evidence that banks expand

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[7]Enacted in 1977, the Community Reinvestment Act (CRA) serves to encourage credit availability in low- and moderate-income areas. Regulators rate banks based on their record in meeting the credit needs of communities in which they operate.

[8]FHA loans have lower down-payment requirements and are generally offered to riskier borrowers.

residential mortgage lending to minority borrowers to improve their capital ratios or that increased competition from non-EDO banks drives EDO banks to lend more to minority borrowers. Overall, we provide robust evidence that banks increase lending to minority borrowers relative to white borrowers following the resolution of EDOs. This increase is consistent with corrective actions improving banks' administrative controls and thus facilitating profitable lending to minority borrowers.

Our paper makes several contributions to the literature. First, we complement and extend research on the crucial role played by bank supervisors in improving banks' lending and risk management decisions (Agarwal et al., 2014; Granja & Leuz, 2022; Hirtle et al., 2020). Specifically, we highlight that improvements in banks' loan policies due to the supervisory enforcement process can enhance access to credit for borrowers whose credit risk is more challenging to evaluate, such as minority borrowers. Our results complement Granja & Leuz (2022), who find that stricter regulators are associated with more SME lending. Credit risk in both SME and minority lending is more difficult to assess and may benefit from improved internal and managerial controls. Second, we extend the managerial accounting literature by providing large sample empirical evidence consistent with an important aspect of managerial control systems (administrative controls) having a positive, first-order effect on mortgage lending decisions (Grabner & Moers, 2013; Ittner & Larcker, 2001; Langfield-Smith, 1997; Malmi & Brown, 2008; Zimmerman, 2001). Third, we contribute to the literature examining the impact of EDOs on banks (e.g., Delis et al., 2017, 2020; Danisewicz et al., 2018; Kleymenova & Tomy, 2022; Roman, 2016, 2020). To the best of our knowledge, we are the first to investigate the effect of the supervisory enforcement process on changes in banks' borrower bases and to study the channels through which it manifests.

Finally, we contribute to the literature on mortgage lending to minority borrowers. A large body of work in this area finds disparities in credit access. However, this literature has not reached a consensus on whether non-economic factors, such as race and gender, influence lenders' decisions to extend credit (Holmes & Horvitz, 1994; Munnell et al., 1996;

Horne, 1997; Blanchflower et al., 2003; Asiedu et al., 2012). Our findings suggest that EDOs result in greater access to lending for minority communities through improvements in banks' internal operations, even for enforcement actions unrelated to fair lending laws. Our work has implications for the enforcement of fair lending laws, which often rely on outcome-based measures such as banks' share of lending to minorities in a region (e.g., Walter, 1995). Specifically, we emphasize the possibility that improvements in banks' administrative controls can play an important role in enhancing access to credit for minority borrowers.

2. Data and sample

Our data come from various sources. We identify all enforcement actions issued by bank regulators starting from 1997 using the S&P Global SNL Financial database. Several types of enforcement actions exist, and they vary by degree of severity. Similar to other research using EDOs (Delis et al., 2017; Kleymenova & Tomy, 2022), we restrict our analyses to the most common and severe EDO types that require banks to take corrective actions: cease and desist (C&D) orders, formal or supervisory agreements, consent orders, and prompt corrective action (PCA) orders. C&D orders are enforceable, injunction-type orders that may be issued to a bank when it engages, has engaged, or is about to engage in an unsafe or unsound banking practice or violation of the law. Formal agreements prescribe restrictions and remedies that banks must take to return to a safe and sound condition. PCA orders require banks to take measures to protect or raise the level of their regulatory capital. Our main sample consists of 1,350 unique severe EDOs issued by all federal bank regulators for the years 1997 to 2013, and we use the first EDO that a bank receives.[9] Our analyses focus on the three years before an EDO is received, the period when a bank is subject to the EDO,

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[9]Among the 1,350 EDO banks in our sample, 981 have only one EDO; 293 have two; 67 have three; seven have four; and only two banks have five. In our sample, C&D orders are the most common, with 769 EDOs, followed by formal agreements and consent orders (537) and PCA orders (44). We use EDOs from the Federal Deposit Insurance Corp. (FDIC), the Federal Reserve System, and the Office of the Comptroller of the Currency (OCC).

and the five years that follow the EDO's termination.[10]

We focus our empirical analyses on commercial banks and obtain their financial data from the Federal Financial Institutions Examination Council (FFIEC) call reports. Table 1, Panel A shows the summary statistics for our sample of EDO banks using quarterly call report data. On average, 65.3% of EDO banks' assets are in total loans, and 10.2% of total assets are residential mortgages. Total loans are, on average, 78.6% funded by deposits.

For our main analyses of residential loan mortgage portfolios and their composition, we use the Home Mortgage Disclosure Act (HMDA) data that provides transaction-level disclosure of residential mortgage loan applications and underwritten loans, as well as reasons for denial of an application. These data are available annually. Table 1, Panel A also shows that the percentage market share of residential mortgage lending to minorities in a given county is 0.41%. Table 1, Panel B shows the breakdown of the number of loans originated and the number of applications denied by applicants' race and gender and loan type and purpose. On average, EDO banks deny 33.8% of all applications. However, minority and female borrowers represent a smaller portion of originated loans and a higher portion of denials (34.5% for minorities and 28.4% for females). We use the reported race and gender of the primary applicant and define minority borrowers as applicants whose race was specified in the loan disclosure documents as nonwhite.[11] As can be seen from Panel B of Table 1, the majority of originated loans are for nonminority and male borrowers. We winsorize all of the continuous variables at the 1% and 99% tails of their respective distributions in each sample year and provide detailed definitions of all variables used in our analyses in Appendix A.

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[10]We start our sample in 1997 so that the three-year pre-EDO period begins in 1994 when the Summary of Deposits data begins. We stop our EDO sample in 2013 so that the post-termination period is five years for all EDO banks.

[11]Minorities are defined as reporting the following races on the application: American Indian or Alaska Native, Asian, Black or African American, or Native Hawaiian or Other Pacific Islander. Nonwhite Hispanics are also included in this definition. Among originated loans, 12.7% do not report race, and 9.2% do not report gender.

3. EDO banks' loans to minority borrowers

We begin our analyses by examining the extent to which EDO banks' lending to minority borrowers changes following the resolution of the EDO. Specifically, we estimate variations of the following staggered difference-in-differences model.

$$Portfolio\ shares_{itc} = \beta_0 + \beta_1 During\ EDO_{it} + \beta_2 Post\ EDO_{it} + \gamma X_{i(t-1)c}$$
$$+ \alpha_i + \delta_t + \eta_c + \epsilon_{itc}, \tag{1}$$

where i indexes the bank, t the year, and c the county. The dependent variable, *Portfolio shares*, represents residential mortgage loans to minorities as a share of banks' total residential mortgage loans at the bank-county level. *During EDO* is an indicator that equals one for the period an EDO is in effect and zero otherwise; *Post EDO* is an indicator that equals one for the five years after the termination of the EDO and zero otherwise; X is a vector of lagged control variables, and includes size, profitability, liquidity, capital ratio, nonperforming assets, county-level employment growth as a control for local economic conditions, and the number of mortgage loan applications scaled by county population as a control for loan demand; and α_i, δ_t and η_c are bank, year, and county effects, respectively. The benchmark period is three years prior to the issuance of the EDO. The sample includes all EDO and non-EDO banks. For EDO banks, we only retain data for the benchmark period, the duration of the EDO, and five years after the termination of the EDO. We apply this restriction to all of our specifications. If EDO banks increase their portfolio share of lending to minorities following EDO termination, we expect β_2 to be positive and significant.

The dependent variable (*Portfolio shares*) contains many zero values because banks do not lend to minorities in all counties where they operate.[12] Prior studies have used Tobit models to analyze data in cases where the dependent variable has many zeros. For example,

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[12]As can be seen in Table OA1 of the online appendix, EDO banks lend to minorities in only 29% (6/21) of the counties where they are active during the EDO. This figure increases to 35% (11/31) in the five years after EDO termination.

Yermack (1995) uses a Tobit specification to analyze CEO stock option awards because, in close to 45% of firm-years, there is no CEO stock option award resulting in a mass of observations at zero. Rosen & Wu (2004) model the portfolio shares of investment in certain asset classes using a random-effects Tobit estimator. Poterba & Samwick (2003) also use a Tobit specification to model portfolio shares of financial assets held by households.[13] Following the literature, we estimate Equation 1 using a Tobit regression model (Tobin, 1958; Boulton & Williford, 2018; Keele & Miratrix, 2019).

We present our results from this estimation in Table 2, Panel A. Column (1) shows that the share of residential mortgage loans to minorities in banks' total residential mortgage portfolio increases by a relative 2% following EDO termination. While column (1) shows changes in the portfolio shares for all minority borrowers, column (2) focuses on Black or African American borrowers. Consistent with the result for all minorities, EDO banks increase their portfolio shares of residential mortgage loans to Black or African American borrowers by 2.4% following EDO termination. Column (3) presents the results for portfolio shares of loans to Black or African American borrowers relative to white males and shows a 7% increase in lending to this group following the termination of the enforcement action. Our results are robust to excluding enforcement actions issued specifically for violations of fair lending laws.[14]

We conduct additional analyses to mitigate concerns that the increase in lending to minorities may be driven by changes in loan demand or underlying local economic conditions that affect all commercial banks, including those that did not receive an EDO. In our main analysis described above, we use a staggered difference-in-differences research design to study changes in EDO banks' portfolio shares of lending to minorities relative to all other banks. Our analysis includes the total number of loan applications scaled by the population at the

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[13]For other examples of studies that use a random effects Tobit specification, please see Borokhovich et al. (2000); Haigh & List (2005); Edwards (2008) and Chay & Suh (2009). Also, a Tobit specification assumes that the zero and positive observations are generated by the same mechanism (Silva et al., 2015).

[14]In our sample, only 18 EDOs relate to the lack of compliance with fair lending laws. Fair lending laws are examined and enforced through a separate mechanism.

county-year level as a control for changes in loan demand. In additional robustness tests, we study changes in the market shares of residential mortgage loans to minorities. Specifically, we create a variable *Market shares*, which is loans to minority borrowers granted by EDO banks as a share of total loans to minority borrowers made by all banks in a given county. We reestimate Equation 1 using *Market shares* as the dependent variable. This approach allows us to estimate changes in lending to minorities by EDO banks relative to all other banks operating in a county.[15] As before, given many zeros in *Market shares*, we employ a Tobit regression model in our estimations.

Column (4) of Table 2, Panel A, presents the results of this estimation. The sample in this column includes all counties where EDO banks lend at least once in the sample period. The table shows that EDO banks significantly expand lending to minorities in the years following EDO termination. Relative to the pre-EDO period, the market share in mortgage lending to minorities increases by 0.62%. On average, as reported in Panel A of Table 1, EDO banks have a market share of 0.41% in mortgage lending to minorities over our sample period, suggesting that the changes in market shares are economically significant. In column (5), *Market shares* is redefined to include only Black or African American borrowers. The column shows that EDO banks' market shares of loans to Black or African American borrowers increase by 0.58% following the termination of the enforcement action. These results mitigate concerns that macroeconomic changes in the local market could have driven EDO banks' increase in lending to minorities because, relative to non-EDO banks operating in the county, EDO banks disproportionately expand their lending to minority communities. One concern with the market share analysis is that the counties are equally weighted, which may overweight smaller counties and obscure the economic significance. Therefore, we weight

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[15]An alternative approach to account for local economic conditions is to use transaction-level data and county × year fixed effects (Buchak et al., 2018; Fuster et al., 2019). A drawback of this approach in our setting is that multiple banks in a county could receive EDOs during overlapping time periods. This approach would result in all transactions of non-EDO banks (at the county level) being repeated multiple times in the dataset, quickly inflating our sample. Therefore, we believe that in our setting, our current approach using market shares is a better-suited and clearer way to account for changes in local economic conditions.

our regressions by county size using county-level population as a robustness check. Results from this estimation are presented in Table OA2 of the online appendix and show that our inferences continue to hold.

Recent work has pointed out several issues with estimates from staggered difference-in-differences analyses (Baker et al., 2022; Barrios, 2021; Goodman-Bacon, 2021; Sant'Anna & Zhao, 2020; Sun & Abraham, 2021). Specifically, the combination of staggered treatment timing and dynamic treatment effects can result in biased estimates due to a "bad comparisons" problem. The issue is particularly severe for smaller sample sizes in which predominantly all units are treated and when there is considerable heterogeneity in treatment (Baker et al., 2022). Therefore, this concern is less pronounced in our analyses because the majority of banks in our sample (86%) are not treated (i.e., did not receive an enforcement action). Furthermore, we have limited heterogeneity in treatment because we restrict our sample of enforcement actions to only severe EDOs. Nonetheless, we conduct additional analyses to allay this concern.

One of the recommendations to deal with the issue of bias in staggered difference-in-differences regressions is to create stacked cohorts of separate subsamples of treated and control units by events (Cengiz et al., 2019; Sun & Abraham, 2021). In additional analyses, we follow this approach by creating subsamples for each treated (EDO) bank matched to a control sample of non-EDO banks. We match the control banks on size and geography (county), stack the subsamples, and estimate the following specification:

$$
\begin{aligned}
Portfolio\ shares_{itc} = {} & \beta_0 + \beta_1 During\ EDO_{it} + \beta_2 Post\ EDO_{it} \\
& + \beta_3 During\ EDO_{it} \times Treatment_i + \beta_4 Post\ EDO_{it} \times Treatment_i \quad (2) \\
& + \gamma X_{i(t-1)c} + \alpha_i + \delta_t + \eta_c + \epsilon_{itc},
\end{aligned}
$$

where *Treatment* is an indicator that takes the value of 1 for EDO banks and 0 otherwise. The remaining variables are as defined before. If EDO banks increase lending to minorities following EDO termination, we expect β_4 to be positive and significant. Table 2, Panel B

shows the results from estimating Equation 2. Consistent with our main findings, EDO banks significantly increase lending to minorities relative to the matched sample of control banks.

4. Economic channels

Having established that EDO banks increase mortgage lending following EDO termination, we next examine the economic channels that explain this increase in lending. Similar to Granja & Leuz (2022), one plausible explanation is that EDOs force banks to resolve fundamental deficiencies in internal bank management practices that expand minority borrowers' access to mortgage loans. For example, enforcement actions may require loan policies that specify standards for assessing credit risk, require an internal review of loans, establish a loan committee, or spell out the committee members' responsibilities. Such changes in loan policies could improve credit assessment as banks follow established standards and procedures. Improvements in credit assessment may also lead to EDO banks better analyzing alternative sources of information and thereby reducing their reliance on a single metric, such as a credit score. Minority borrowers are more likely to be denied a loan based on credit scores because they tend to have lower wealth and are more prone to income shocks. These factors impede their ability to build a strong credit history, which is an important determinant of credit scores. Enforcement actions may also improve internal audit procedures that require compliance with applicable statutes and regulations and with policies prescribed by the management or board. Such changes improve the internal governance at EDO banks as they increase compliance with regulation and internal bank policy. Finally, written loan and internal audit procedures may also reduce the subjectivity afforded to individual loan officers, which may disproportionately benefit minority borrowers.

To evaluate our conjecture, we estimate variations of the following model:

$$
\begin{aligned}
Portfolio\ shares_{itc} = {} & \beta_0 + \beta_1 During\ EDO_{it} + \beta_2 Post\ EDO_{it} + \beta_3 Treatment_i \\
& + \beta_4 During\ EDO_{it} \times Treatment_i + \beta_5 Post\ EDO_{it} \times Treatment_i \quad (3) \\
& + \gamma X_{i\tau-1} + \alpha_i + \delta_t + \eta_c + \epsilon_{itc},
\end{aligned}
$$

where *Treatment* represents variables associated with greater improvements in internal governance and administrative controls following the receipt of an enforcement action. The remaining variables are as defined before.

We construct our first two measures of *Treatment* by analyzing EDOs' text and identifying the specific details of the corrective actions supervisors require banks to take. Using the textual content of enforcement orders, we identify EDOs that explicitly require a bank to establish or revise a loan policy or develop written internal audit procedures. We create two variables to reflect such improvements. The first, *Loan policy*, is an indicator of whether the enforcement order requires revising or establishing a loan policy. The second, *Internal audit*, is an indicator if the order requires the affected bank to develop written internal audit procedures.[16]

Column (1) of Table 3 shows no change in the portfolio share of loans to minorities following EDO termination for enforcement orders that require changes in loan policy. However, in column (2), we interact *Post EDO × Treatment* with *Subprime share*, which is the percentage of borrowers in the county with FICO scores of 619 or below.[17] The results in column (2) indicate that loan policy-related improvements are associated with an increase in lending to minority borrowers located in regions with a greater share of low credit scores.

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[16]In Appendix B.2 of the online appendix, we provide excerpts from an enforcement order that required changes to loan policy and internal audit procedures.

[17]A FICO score is a credit score created by the Fair Isaac Corporation. We source FICO scores from the CoreLogic Loan-Level Market Analytics dataset. We aggregate the loan origination data to the ZIP code and origination year level. We then convert ZIP-code-level FICO scores to the county level by using a crosswalk file from the Department of Housing and Urban Development, which contains the fraction of all addresses in a given ZIP code belonging to a county. Our definition of subprime is based on Keys et al. (2010).

In terms of the economic magnitude, at the 75th percentile of *Subprime share*, EDO banks with loan policy changes experience a 6.2% increase in lending to minorities relative to EDO banks without loan policy changes.

We find similar results based on our second measure of whether the enforcement order required written internal audit procedures. These results are presented in columns (3) and (4) of Table 3. Column (4) shows that EDO banks that had to implement written internal audit procedures increased lending to minorities in counties with a greater share of borrowers with low credit scores. In terms of the economic magnitude, at the 75th percentile of *Subprime share*, EDO banks with internal audit changes experience a 16.2% increase in lending to minorities relative to EDO banks without internal audit changes.

In cross-sectional analyses, we further investigate the lending behavior of banks that are likely to have witnessed greater improvements in their internal governance due to the enforcement process. In our first set of tests, we reestimate Equation 3 with *Treatment* representing the strictness of the regulator. We expect that EDO banks in states with stricter regulators are likely to improve more as a result of receiving an EDO. We use the measure developed by Agarwal et al. (2014), who find that, due to institutional differences, varying incentives, and resource constraints, state and federal banking regulators are inconsistent in implementing the same supervisory rules. Specifically, based on regulatory ratings, Agarwal et al. (2014) find that federal regulators are generally stricter than state regulators, and there is variation across states in their level of strictness. Although this measure pertains to state regulators, federal and state regulators collaborate in issuing enforcement actions to state-chartered banks.

We present our results from this analysis in column (1) of Table 4. The sample only includes state-chartered banks, as the Agarwal et al. (2014) measure applies only to state-chartered banks by construction. Our results indicate that EDO banks with stricter regulators expand their portfolio shares of lending to minorities by 7.6% following EDO termination. Next, we estimate Equation 3 with *Treatment* representing the severity of the

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enforcement action, measured as the length of time it takes a bank to exit an EDO from its issuance to resolution. Banks with more severe enforcement actions have problems on several fronts that must be resolved before the regulator will terminate the enforcement action. Therefore EDO banks with more severe enforcement actions are more likely to improve their operations following EDO termination, relative to the pre-EDO period. Column (2) of Table 4 shows that banks with more severe EDOs significantly increase lending to minorities after the EDO. Specifically, for these banks, lending to minorities increases by 3.1% following EDO termination.

We also conduct tests using banks' CRA ratings. The CRA was enacted by Congress in 1977 to encourage credit availability in low- and moderate-income areas. Regulators rate banks based on their record in meeting the credit needs of communities in which they operate. These ratings are used to evaluate banks' applications for deposit facilities which include new charters, deposit insurance, mergers or acquisitions, opening a new branch, or the relocation of a branch or home office. Therefore, banks need to maintain a satisfactory CRA rating if they plan to expand or make any substantial changes to their operations. Furthermore, if banks' failure to comply with the CRA is correlated with the racial makeup of underserved neighborhoods, intentional discrimination can be inferred (Schwemm, 1994). If the supervisory process improves banks' internal processes then banks with low pre-EDO CRA ratings should show greater improvements in lending to minorities following the enforcement action. It is important to note that noncompliance with the CRA and low CRA ratings do not result in formal enforcement actions.[18]

CRA rating changes are relatively infrequent and take one of four possible values: outstanding, satisfactory, needs to improve, and substantial noncompliance. The majority (75%) of bank-year observations in our sample of EDO banks have a rating of outstanding or satisfactory. Column (3) of Table 4 shows that banks with a low CRA rating (needs to improve

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[18]In 1994, the Department of Justice issued an opinion that formal EDOs, such as C&D or civil money penalties, do not fall into the scope of CRA (for more details, please see "Community Reinvestment Act: Challenges Remain to Successfully Implement CRA" (Chapter Report, 11/28/95, GAO/GGD-96-23)).

or substantial noncompliance) in the pre-EDO period expand their lending to minority borrowers by 9.8% in the post-EDO period relative to EDO banks that had an outstanding or satisfactory rating. Overall, our findings suggest that improvements in banks' operations due to enforcement are associated with increased lending to minorities. These results are consistent with banks having more severe operational deficiencies also exhibiting more scope for improvement in lending practices.

Our findings thus far allow us to tie the increase in lending to minorities to the supervisory enforcement actions which require changes in administrative controls such as lending policies and internal governance improvements. To further support our findings of increased mortgage lending to minorities due to the supervisory enforcement process, we next explore how corrective actions directly influence loan approval decisions.

5. Changes in mortgage application denials for minorities

We evaluate changes in the loan approval process by investigating changes in denials of mortgage loan applications and the reasons banks list for denying an application from minority borrowers. In particular, we estimate the following OLS model:

$$
\begin{aligned}
Denial_{it} = \beta_0 &+ \beta_1 During\ EDO_{it} + \beta_2 Post\ EDO_{it} + \beta_3 Minority_i \\
&+ \beta_4 During\ EDO_{it} \times Minority_i + \beta_5 Post\ EDO_{it} \times Minority_i \\
&+ \gamma X_{i(t-1)c} + \delta_t + \alpha_i \times \eta_c + \epsilon_{itc},
\end{aligned}
\tag{4}
$$

where $Denial$ is an indicator variable if a loan application is denied or if it is denied for a specified reason. The remaining variables are as described before. We include year and bank $\times$ county fixed effects and therefore account for local economic conditions faced by the same bank lending in different counties.

In our sample of mortgage loan applications, 33.8% get denied (Table 1, Panel B). The more frequent reasons for denial include a lack of collateral (32.2% of all cases), a poor credit history (17.8%), and a high debt-to-income ratio (8.4%) (untabulated). Mortgage

application requirements, such as collateral, credit history, and debt-to-income ratios, are nonprice terms that lenders use to ration credit and to limit moral hazard or adverse selection (Stiglitz & Weiss, 1981). Borrowers who do not meet the thresholds for these terms may not receive credit, even if they are willing to pay higher interest rates. Minority borrowers are more likely to be constrained by nonprice terms because they are more likely to have lower wealth (Acolin et al., 2016; Bostic, 1997; Gyourko et al., 1999). For example, Bostic (1997) finds that minority applicants are rejected more often if debt-to-income ratios are used in credit assessment because they have lower incomes and are, therefore, prone to default in case of income shocks.

Table 5 presents the results from estimating Equation 4. Consistent with prior studies (Black et al., 1978; Duca & Rosenthal, 1993; Munnell et al., 1996; Wheeler & Olson, 2015), the coefficient on *Minority* in column (1) indicates that minorities are 9.6% more likely to be denied loans relative to white borrowers in the pre-EDO period. However, following EDO termination, loan denials for minority borrowers decline by a relative five percentage points. Much of this decline is driven by lower denials due to credit history (a nonprice term). Specifically, EDO banks are 3.4% less likely to deny loans to minorities relative to white borrowers due to their credit history following EDO termination. These results are consistent with EDO banks changing their credit assessment processes to rely less on nonprice terms following an enforcement action. For example, improvements in loan policies and credit risk assessment may allow banks to process additional sources of hard information better to assess borrowers' creditworthiness, as opposed to relying solely on their credit scores.

The lack of a strong credit history is reflected in borrowers' credit scores. For example, FICO scores consider various aspects of individuals' credit history—the length of their credit history as well as how long they have gone without negative credit events, such as bankruptcies, foreclosures, or delinquencies. Building a credit history requires access to a line of credit, which minority borrowers may find harder to get because they are more likely to have less wealth than white borrowers. Minority borrowers are also more likely to face income

shocks and therefore negative credit events. If, following enforcement actions, EDO banks can better process and use alternative sources of hard information, such as utility payments, rental histories, and remittance histories (Brevoort et al., 2016; Schneider & Schutte, 2007), they may deny fewer loan applications based on nonprice terms. Therefore, the decline in denials should be concentrated among borrowers with low credit scores.

We do not have information on borrowers' credit scores; therefore, we proxy for it using the average transaction-matched credit scores at the census tract level. Specifically, we create a subprime indicator (*Subprime*) using FICO scores for originated loans from CoreLogic's Loan-Level Market Analytics dataset. We calculate average FICO scores from the CoreLogic dataset at the level of the census tract, loan origination year, loan type, loan purpose, and occupancy status of the property. Based on these characteristics, we merge the average FICO scores with the transactions in our sample. *Subprime* takes a value of 1 if the average transaction-matched FICO score is 619 or below and 0 otherwise.[19] We lose 9% of our sample by including the subprime measure because the CoreLogic data does not cover all census tracts for which we have transaction-level data from HMDA. Our results (presented in Table OA3 of the online appendix) indicate that minority borrowers in subprime regions are 5.4% less likely to be denied a mortgage loan application based on nonprice terms, such as collateral requirements. These results are consistent with changes in EDO banks' loan policies and credit risk assessment leading to less reliance on nonprice terms and, as a result, higher access to residential mortgage loans by minorities.

Our analyses offer insights into why lending to minorities increases following EDO termination. We find that EDO banks are less likely to deny loans to minority applicants based on nonprice terms, indicating changes in credit assessment procedures. Reduced reliance on nonprice terms, such as collateral requirements and credit histories, disproportionately affects lending to minorities because this category of borrowers is more likely to be constrained

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[19]In additional robustness tests, we define *Subprime* as FICO scores of 669 and below and find consistent results.

by such terms (Acolin et al., 2016; Bostic, 1997; Gyourko et al., 1999).

6. Changes in risk

Next, we investigate whether increased lending to minority borrowers is associated with a rise in risky lending along several dimensions of risk, including nonperforming assets, the market share of risky loans, and changes in FHA lending. If EDO banks were to increase lending to less creditworthy customers, such an increase would result in higher nonperforming assets. Accordingly, we study the changes in EDO banks' nonperforming assets in the years following EDO termination relative to the pre-EDO period by estimating the following model:

$$NPA_{it} = \beta_0 + \beta_1 During\ EDO_{it} + \beta_2 Post\ EDO_{it} + \gamma X_{it-1} + \alpha_i + \delta_t + \epsilon_{it}, \qquad (5)$$

where NPA is the total and residential nonperforming loans scaled by total loans. The remaining variables are as defined before.

Table 6, Panel A, presents our findings from estimating Equation 5. Columns (1) and (2) show changes in total nonperforming assets during and following the termination of an EDO relative to the period prior to the EDO. Column (1) does not include bank-level controls, while column (2) does. Total nonperforming assets increase during an EDO, consistent with regulators inducing banks to recognize previously hidden nonperforming loans. However, nonperforming assets revert to their pre-EDO levels following EDO termination. In column (3), the dependent variable is nonperforming assets for residential mortgages. Due to data restrictions, we can only analyze NPAs for residential mortgages starting from 2001. Consistent with the results for total nonperforming assets, column (3) shows that NPAs for residential mortgages do not increase following EDO termination. Overall, these findings suggest that EDO banks do not witness an increase in their nonperforming assets in the years following EDO termination.

Next, we study changes in the market shares of risky mortgage loans originated by EDO banks at the county level. Specifically, we reestimate Equation 5, where the dependent vari-

able (*Market shares of risky loans*) is defined as EDO banks' share of higher-priced, closed-end mortgages as a percentage of such residential mortgage loans made by all commercial banks at the county level. Loans are classified as higher priced if the annual percentage rate (APR) exceeds the average prime offer rate (APOR) for loans of a similar type by at least 1.5 percentage points for first-lien loans or 3.5 percentage points for junior-lien loans. Given data limitations, this analysis starts from 2004. Panel B of Table 6 presents the results from these analyses. Column (1) includes the full sample, whereas column (2) uses the sample conditional on whether the EDO bank makes at least one such risky loan in the county. The dependent variable in column (1) consists of many zeros because EDO banks do not make such loans in all counties where they operate. Accordingly, we use a Tobit specification in estimating column (1). The dependent variable in column (2) contains only positive values for the market share of risky loans. Therefore we estimate column (2) using OLS. Our results indicate a decrease or no change in the market shares of risky loans following EDO termination, suggesting that the increase in lending to minority borrowers is not associated with an increase in risky lending.

We also assess whether EDO banks grant fewer FHA loans. FHA loans have lower down-payment requirements and may be offered to borrowers with pre-existing high debt or low credit scores. Therefore, FHA loans tend to be given to riskier borrowers than conventional mortgages (Fuster et al., 2019). As further evidence of banks decreasing risky lending following EDO termination, we find a decline in FHA loans to minorities originated by these banks. Specifically, Panel C of Table 6 shows that FHA loans to minorities decline by 4.7%–5.6% following EDO termination. Overall, our findings in this section suggest that the increase in minority lending following EDO termination is not associated with an increase in risky lending. This result is consistent with the enforcement process improving credit risk assessment processes at EDO banks.

7. Alternative mechanisms

Next, we investigate two alternative mechanisms for the increase in lending to minorities following EDO termination. First, EDO banks may have expanded residential mortgage lending to improve their capital ratios, and this expansion would be possible by only lending to previously underserved borrowers. Second, increased competition from non-EDO banks may have resulted in EDO banks expanding their lending to minority borrowers.

7.1. Improving capital ratios

Because secured loans have relatively lower risk weights, EDO banks could increase their capital ratios by expanding residential mortgage lending. However, an increase in this kind of lending may be possible only if EDO banks expand lending to previously underserved categories of borrowers, such as minorities. To test this hypothesis, we reestimate Equation 3 where *Treatment* represents low capital, measured as an indicator for EDO banks in the lowest tercile of regulatory capital in the period prior to receiving an EDO. We present our findings from this estimation in column (1) of Table 7. The results do not suggest that EDO banks expand lending to minorities to manage their capital following the termination of their enforcement actions.

7.2. Competition from non-EDO banks

We also investigate whether competition from banks that did not receive enforcement actions leads EDO banks to expand their lending to minorities. Increased competition could result in greater lending to minority borrowers for two reasons. First, because EDO banks lose deposits and likely face reputational costs due to the public disclosure of EDOs, they may lose their more profitable customers to their competitor non-EDO banks. This might force EDO banks to expand their reach to new borrowers who previously did not qualify for a loan. Second, because competition erodes excess margins, it increases the cost of discriminating. If banks were previously engaged in taste-based discrimination (Becker, 1957), they would have had to pay a cost for the utility derived from not lending to specific groups of borrowers. An

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increase in competition reduces banks' ability to pay this cost, resulting in greater lending to minority borrowers. This argument is consistent with prior work that finds increased competition results in a more equitable distribution of rents (Ashenfelter & Hannan, 1986; Black & Brainerd, 1999; Black & Strahan, 2001).

To evaluate whether competition from non-EDO banks drives the increase in lending to minorities, we study the impact of market concentration in the deposits and residential mortgage markets on EDO banks' lending. If, driven by competition from non-EDO banks, EDO banks were to increase their lending to minorities, the increase should be higher in counties where EDO banks face greater competition for deposits and loans. Accordingly, we reestimate Equation 3, where *Treatment* represents a highly competitive environment for an EDO bank. Our proxy for higher competition is a measure of the deposit or loan market concentration based on the lowest tercile of the Herfindahl-Hirschman index (HHI) measured in the year prior to the EDO issuance in a given county.

We present the results from this analysis in columns (2) and (3) of Table 7. The coefficient for *Treatment* indicates that lending to minorities forms a greater share of banks' lending portfolios in highly competitive counties, supporting the validity of our measures (Ashenfelter & Hannan, 1986; Black & Brainerd, 1999; Black & Strahan, 2001). However, we do not find that EDO banks in high-competition counties increase lending to minorities more following the termination of their enforcement actions, suggesting that an increase in competition from non-EDO banks does not drive our results.

Our findings in Section 6 that banks do not experience an increase in the riskiness of loans following EDO termination are also inconsistent with the competition channel. If, driven by a loss of better customers to competitors, EDO banks were to increase lending to less creditworthy customers, the increase should result in higher nonperforming assets or an increase in risky lending. Overall, our results suggest that competition from non-EDO banks is unlikely to drive our findings.

8. Supplemental analyses: Lending to women

To further support our hypothesis, we explore lending to another category of borrowers whose credit risk was historically difficult to evaluate: women who are primary or solo mortgage borrowers. Women, in general, tend to have lower wealth and shorter credit histories, putting them at a disadvantage if banks rely on summary measures of credit risk, such as the credit history. Similar to our analyses for minority borrowers, we explore whether EDO banks expand their lending to women. Specifically, we reestimate Equation 1 with the dependent variables representing lending to female borrowers.

Table 8 presents the results from this analysis. The dependent variable in column (1) represents lending to women as a share of banks' portfolio of residential mortgage lending at the bank-county level. Consistent with our results for minority borrowers, EDO banks expand their portfolio share of lending to women by 6.1% following EDO termination. We also find an increase of 3.4% in mortgage lending to women during the time the EDO is in effect. Column (2) of Table 8 shows the market shares results. Banks significantly expand lending to women following EDO termination. Relative to the pre-EDO period, EDO banks' market share in mortgage lending to women increases by 0.72%. The results in Table 8 indicate that similar to our findings for minority borrowers, EDO banks also expand lending to women who are primary or solo borrowers. Our findings are consistent with improvements at the bank due to the enforcement process driving access to credit for borrowers whose credit risk is more difficult to evaluate.

9. Conclusion

Recent research exploits variation in the strictness of bank supervision to examine the effects of supervision on credit supply (Agarwal et al., 2014; Granja & Leuz, 2022). Supervisory activities can influence loan supply by identifying deficiencies in banks' management practices, including operating procedures and policies and internal governance structures. We hypothesize that improvements in management control systems imposed by EDOs serve

as channels through which EDOs affect a bank's borrower base generally, and minority lending specifically. Management controls can serve an important role in aligning the behavior of employees with an organization's objectives by establishing action protocols and directing employees to adhere to policies (Abernethy & Chua, 1996; Malmi & Brown, 2008; Merchant & Van der Stede, 2007; Simons, 1987). We empirically examine how changes in loan policies and internal governance mechanisms specified in EDOs influence banks' mortgage lending decisions.

Our focus on minority lending builds on research showing that racial disparities can arise from the biases of individual loan officers and limitations of the scope of borrowers' information used in lending decisions (Di Maggio et al., 2022; Jiang et al., 2022). In this regard, changes in management controls that improve loan policies, operating procedures and employees' adherence to such policies and procedures, could disproportionately benefit minority borrowers by reducing discretion in lending decisions. Furthermore, improvements in credit assessment procedures could direct the use of additional sources of hard information, reducing reliance on single metrics such as credit scores. Minority borrowers are less likely to have a line of credit for building a credit history and are more prone to income shocks; therefore, they are more likely to be disadvantaged by banks' reliance on metrics, such as credit scores (Acolin et al., 2016; Bostic, 1997; Brevoort et al., 2016; Gyourko et al., 1999; Schneider & Schutte, 2007).

We find that, following the termination of enforcement actions, banks significantly increase residential mortgage lending to minorities and increase their market share of lending to this group of borrowers within the counties where they operate. Our results are robust to excluding enforcement actions received for violating fair lending laws. We identify EDOs that focus on lending policies and internal governance improvements and find stronger results, particularly in regions with a greater proportion of subprime borrowers. The effect is also stronger for banks likely to have experienced greater improvements—those with stricter bank supervisors, more severe EDOs, and low CRA ratings in the pre-EDO period.

In studying how such corrective actions can influence the loan approval process, we find that the rejection of minority loan applications due to non-price terms is less likely following termination of the enforcement order. Non-price terms such as credit history, collateral, and debt-to-income ratios are more likely to constrain minority borrowers because these borrowers are more likely to have lower wealth. Therefore, improvements in credit assessment could allow banks to process additional sources of hard information and rely less on non-price terms, disproportionately benefiting minority borrowers.

We find no evidence that the increase in mortgage lending to minorities is associated with diminished loan performance risk. We also find no support for the alternative explanations that low capital or competition from non-EDO banks may be driving our results. Finally, we find similar increases in lending to another class of borrowers whose credit risk was historically difficult to evaluate—women who are primary or solo borrowers—consistent with process improvements at EDO banks increasing access to credit for marginalized borrowers.

While previous literature considers the effects of bank supervision on credit supply (e.g., Agarwal et al., 2014; Granja & Leuz, 2022), we extend this literature by investigating how EDOs influence the allocation of mortgage lending across demographic groups underlying a banks' borrower base. We also highlight the critical role of improvements in management control systems in shaping banks' lending behavior. We show that supervisory enforcement, through its impact on banks' internal management procedures, results in greater access to credit for minority borrowers, even for enforcement actions unrelated to fair lending laws. Although our analysis focuses on poorly managed banks relative to the general population of banks, our sample of banks receives enforcement actions as a measure of last resort, our findings highlight important policy implications. Specifically, we underscore the importance of proper administrative controls at the bank as a critical factor in enhancing access to credit for minority borrowers. We study extreme examples of banks' weak administrative controls, allowing us to identify improvements in banks' lending policies and internal operating procedures. We look forward to future research studying the impact of prudential bank

supervision on minority borrowers in other settings.

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Appendix A. Variable definitions

Variable	Definition	Source	Code
Dependent Variables			
Denial	Indicator variable, which takes the value of 1 if a mortgage application is denied by a financial institution and 0 otherwise	HMDA	Action Taken = 3
Market shares	Total residential mortgage loans to minorities (women) for EDO banks in a county / Total residential mortgage loans to minorities (women) for all banks in the county	HMDA and authors' calculations	
Portfolio shares	Total residential mortgage loans to minorities (women) for a given bank/ Total residential mortgage loans	HMDA and authors' calculations	
Independent Variables			
Conventional Loans	Indicator variable, which takes the value of 1 if the loan type is conventional and 0 otherwise. Conventional loans are any loans other than FHA, VA, FSA, or RHS loans	HMDA	Loan Type = 1
During EDO	Indicator variable, which takes the value of 1 from the year EDO was issued to the year EDO was terminated and 0 otherwise.	SNL and authors' calculations	
EDO Length	EDO length in years	SNL	
FHA-insured Loans	Indicator variable which takes the value of 1 if loan type is FHA(Federal Housing Administration) -insured loans and 0 otherwise.	HMDA	Loan Type = 2
FSA/RHS Loans	Indicator variable, which takes the value of 1 if the loan type is FSA/RHS (Farm Service Agency or Rural Housing Service) and 0 otherwise.	HMDA	Loan Type = 4

High Competition	Indicator variable, which takes the value of 1 for the lowest deposit or residential mortgage market HHI tercile in a given county and 0 otherwise.	Summary of Deposits and authors' calculations	
Home Improvement, Non-Owner occupied	Indicator variable, which takes the value of 1 if the loan purpose is a home improvement and the property is not owner-occupied and 0 otherwise.	HMDA	Loan Purpose = 2 & Owner-Occupancy = 2
Home Improvement, Owner occupied	Indicator variable, which takes the value of 1 if the loan purpose is a home improvement and the property is owner-occupied as a principal dwelling and 0 otherwise.	HMDA	Loan Purpose = 2 & Owner-Occupancy = 1
Home Purchase, Non-Owner occupied	Indicator variable, which takes the value of 1 if the loan purpose is home purchase and the property is not owner-occupied and 0 otherwise.	HMDA	Loan Purpose = 1 & Owner-Occupancy = 2
Home Purchase, Owner occupied	Indicator variable, which takes the value of 1 if the loan purpose is home purchase and the property is owner-occupied as a principal dwelling and 0 otherwise.	HMDA	Loan Purpose = 1 & Owner-Occupancy = 1
Internal Audit	Indicator variable, which takes the value of 1 if the text of an EDO requires improvements in internal audit procedures.	SNL, FDIC, OCC, and FRB	
Loan Policy	Indicator variable, which takes the value of 1 if the text of an EDO requires improvement in loan policy.	SNL, FDIC, OCC, and FRB	
Low Capital	Indicator variable, which takes the value of 1 if an EDO bank is in the lowest tercile of capital ratio in the period prior to receiving an EDO.	Call Reports	RCFD3210 / RCFD2170
Low CRA	Indicator variable, which takes the value of 1 if an EDO bank receives a CRA rating of 3 (Needs to Improve) or 4 (Substantial Noncompliance) at least once in the 3 years of pre-EDO period and 0 otherwise.	FFIEC Interagency CRA Ratings Database	
Male	Indicator variable, which takes the value of 1 if a mortgage applicant is male and 0 otherwise.	HMDA	Sex = 1

Minority	Indicator variable, which takes the value of 1 if a mortgage applicant is non-white and 0 otherwise.	HMDA	Race = 1, 2, 3, or 4
Post EDO	Indicator variable, which takes the value of 1 for the five years after the EDO was terminated and 0 otherwise.	SNL and authors' calculations	
Refinancing, Non-Owner occupied	Indicator variable, which takes the value of 1 if the loan purpose is refinancing and the property is not owner-occupied and 0 otherwise.	HMDA	Loan Purpose = 3 & Owner-Occupancy = 2
Refinancing, Owner occupied	Indicator variable, which takes the value of 1 if the loan purpose is refinancing and the property is owner-occupied as a principal dwelling and 0 otherwise.	HMDA	Loan Purpose = 3 & Owner-Occupancy = 1
Regulatory Strictness	Indicator variable, which takes the value of 1 for the lowest regulatory leniency tercile in the year before EDO and 0 otherwise. Regulatory leniency measure of Agarwal et al. (2014) measured as the difference between the average regulatory ratings of federal and state regulators.	Agarwal et al. (2014)	
Subprime share	Percent of borrowers at the county level with FICO scores of 619 and below.	CoreLogic and authors' calculations	
VA-guaranteed Loans	Indicator variable, which takes the value of 1 if the loan type is VA (Veterans Administration)-guaranteed loans and 0 otherwise.	HMDA	Loan Type = 3
Control Variables			
Capital Ratio	Total equity as a proportion of total assets.	Call Reports	RCFD3210 / RCFD2170
Employment Growth	The growth of employment level (Total employment is defined as the number of jobs)	Bureau of Economic Analysis	(Total Employment - Lagged Total Employment) / Lagged Total Employment
Liquidity Ratio	Ratio of cash and cash equivalents to total assets, where cash is defined as the sum of interest-bearing balances, noninterest-bearing balances, and currency and coin.	Call Reports	(RCFD0071 + RCFD0081) / RCFD2170

Nonperforming Assets Ratio (NPA)	The sum of nonaccruing loans and accruing loans past 90 days divided by net total loans.	Call Reports	(RCFD1403 + RCFD1407) / (RCFD1400 - RCFD3123 - RCFD2123)
Number of loan applications	The number of mortgage loan applications in a given county.	HMDA	
Return on Assets (ROA)	Net income divided by average total assets	Call Reports	RIAD4340 / RCFD2170
Size	Natural logarithm of total assets	Call Reports	log(RCFD2170)

Table 1: Descriptive statistics

This table presents the summary statistics for the variables we use in our analyses. Panel A shows bank-level variables using quarterly call report data and county-bank-level portfolio and market shares using annual HMDA data. Panel B shows the breakdown of loans originated and applications declined. To mitigate the effects of extreme observations, all continuous variables are winsorized at the 1% and 99% tails of their respective distributions in each sample year. All variables are defined in Appendix A.

Panel A: Bank and county-level data

	N	Mean	Std	P1	P25	Median	P75	P99
Bank-Level Variables								
Total loans / Assets	41,015	0.653	0.137	0.259	0.573	0.673	0.753	0.891
Residential mortgages / Assets	41,015	0.179	0.106	0.004	0.102	0.165	0.237	0.500
Deposits / Assets	41,015	0.837	0.077	0.567	0.804	0.854	0.889	0.939
Total loans / Deposits	41,012	0.786	0.181	0.319	0.676	0.794	0.902	1.225
Size	41,015	11.917	1.268	9.363	11.056	11.825	12.628	15.767
Return on Assets	41,015	0.001	0.011	-0.043	0.000	0.003	0.006	0.022
Liquidity Ratio	41,015	0.067	0.064	0.008	0.027	0.045	0.083	0.328
Capital Ratio	41,015	0.103	0.042	0.036	0.082	0.096	0.114	0.265
Nonperforming Assets Ratio	41,015	0.029	0.034	0.000	0.006	0.017	0.040	0.168
County-Level Variables								
Residential Mortgage Portfolio Shares (of loans to minorities)	162,769	6.542	19.871	0.000	0.000	0.000	0.000	100.000
Residential Mortgage Market Shares (of loans to minorities)	497,594	0.408	3.936	0.000	0.000	0.000	0.000	9.721

Table 1: Descriptive statistics, continued

Panel B: The number of loans originated or denied

	Number of Loans Originated	Number of Applications Denied	% denied
Total	2,772,382	1,414,587	33.8%
Race			
Majority	2,156,439	621,376	22.4%
Minority	264,161	139,329	34.5%
Gender			
Male	1,883,706	567,325	23.1%
Female	632,973	250,883	28.4%
Loan Type			
Conventional	2,401,190	1,330,381	35.7%
FHA-insured	251,607	61,429	19.6%
VA-guaranteed	100,965	18,203	15.3%
FSA/RHS	18,620	4,574	19.7%
Loan Purpose & Owner-occupancy			
Home Purchase: Owner-occupied	885,538	275,244	23.7%
Home Purchase: Not-owner-occupied	233,856	74,891	24.3%
Home Improvement: Owner-occupied	194,062	169,741	46.7%
Home Improvement: Not-owner-occupied	24,440	10,029	29.1%
Refinancing: Owner-occupied	1,244,578	826,978	39.9%
Refinancing: Not-owner-occupied	187,144	57,271	23.4%
Others	2,764	433	13.5%

Table 2: Lending to minorities for EDO banks

This table shows changes in EDO banks' lending to minorities. Panel A presents a county-level analysis of banks' portfolio allocation and market shares of residential mortgage lending to minorities. Columns (1)–(3) present the results from a staggered difference-in-differences analysis, whereas columns (4) and (5) analyze changes in EDO banks' market shares at the county level. The dependent variable in column (1) is banks' residential mortgage loans to minorities as a share of their total residential mortgage portfolios. In column (2), it is banks' residential mortgage loans to Black or African American borrowers as a share of their total residential mortgage portfolios, whereas in column (3) it is banks' residential mortgage loans to Black or African American borrowers scaled by residential mortgage loans to white males. In column (4), the dependent variable is EDO banks' market shares of residential mortgage loans to minority borrowers, whereas in column (5) it is EDO banks' market share of residential mortgage loans to Black or African American borrowers. Panel B presents the county-level analysis of banks' portfolio shares of residential mortgage loans to minorities using a control sample of non-EDO banks, matched on size and geography (county). The dependent variable is banks' residential mortgage loans to minorities as a share of their total residential mortgage portfolios. *Treatment* is an indicator variable that takes a value of 1 for EDO banks and 0 otherwise. In both panels, the indicator *During EDO* refers to the actual time a bank is subject to an EDO, and *Post EDO* is an indicator variable for the five years after an EDO's termination. All regressions include lagged bank-level control variables (size, profitability, liquidity, capital ratio, and NPA) and county-level variables (employment growth and the number of loan applications). To mitigate the effects of extreme observations, all continuous bank-level variables are winsorized at the 1% and 99% tails of their respective distributions in each sample year. All variables are defined in Appendix A. Standard errors are calculated using a bootstrap. The z-statistics are presented in parentheses; $^*p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$ (two-tailed).

Panel A: Changes in EDO banks' portfolio and market shares

	Portfolio shares (Minorities)	Portfolio shares (Black or African American)	Portfolio shares (Black or African American relative to white males)	Market shares (Minorities)	Market shares (Black or African American)
	(1)	(2)	(3)	(4)	(5)
During EDO	-0.684*	-0.520	1.991***	-0.005	-0.035
	(-1.905)	(-1.412)	(5.249)	(-0.146)	(-0.792)
Post EDO	1.950***	2.389***	7.373***	0.616***	0.584***
	(5.600)	(6.584)	(20.940)	(19.151)	(14.029)
Observations	1,721,997	1,721,997	1,416,949	690,864	596,203
Wald χ^2	5733***	9225***	17330***	9666***	6986***
Estimation method	RE Tobit	RE Tobit	RE Tobit	RE Tobit	RE Tobit
Controls	Yes	Yes	Yes	Yes	Yes
Year, County, Bank RE	Yes	Yes	Yes	Yes	Yes
Years	1994–2018	1994–2018	1994–2018	1994–2018	1994–2018

Table 2: Lending to minorities for EDO banks, continued

Panel B: Matched sample analysis: Lending to minorities by EDO banks

	Portfolio shares
	(1)
During EDO	-0.037
	(-0.071)
Post EDO	-0.146
	(-0.288)
During EDO × Treatment	-0.051
	(-0.069)
Post EDO × Treatment	1.429**
	(2.012)
Observations	316,133
Wald χ^2	1230***
Estimation method	RE Tobit
Controls	Yes
Year, Bank, County RE	Yes
Years	1994–2018

Table 3: Improvements at EDO banks and minority borrowers

This table presents a county-level analysis for EDO banks' portfolio allocation of residential mortgage lending to minorities. The dependent variable, *Portfolio shares*, is banks' allocation of credit to minorities within their county-level residential loan portfolios, and *Treatment* is an indicator variable associated with process improvements at EDO banks. *Subprime share* is the percent of borrowers at the county level with FICO scores of 619 and below. The table shows the impact of requiring a written loan policy (Columns (1)–(2)) and written internal audit procedures (Columns (3)–(4)). The indicator *During EDO* refers to the actual time a bank is subject to an EDO, and *Post EDO* is an indicator variable for the five years after an EDO's termination. All regressions include lagged bank-level control variables (size, profitability, liquidity, capital ratio, and NPA) and county-level macro variables (employment growth and the number of loan applications). To mitigate the effects of extreme observations, all continuous bank-level variables are winsorized at the 1% and 99% tails of their respective distributions in each sample year. All variables are defined in Appendix A. Standard errors are calculated using a bootstrap. The z-statistics are presented in parentheses; $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$ (two-tailed).

	Treatment = Loan policy	Treatment = Loan policy	Treatment = Internal audit	Treatment = Internal audit
	Portfolio shares	Portfolio shares	Portfolio shares	Portfolio shares
	(1)	(2)	(3)	(4)
During EDO × Treatment	-0.727	3.363*	-2.629**	2.319
	(-0.631)	(1.775)	(-2.077)	(1.063)
Post EDO × Treatment	-0.359	-0.033	0.839	-3.305
	(-0.312)	(-0.018)	(0.660)	(-1.538)
During × Treament × Subprime share		-32.064**		-88.765***
		(-2.116)		(-5.431)
Post EDO × Treatment × Subprime share		51.911***		85.510***
		(3.403)		(5.118)
Observations	151,748	151,559	151,748	151,559
Wald χ^2	537***	590***	618***	708***
Reg Type	RE Tobit	RE Tobit	RE Tobit	RE Tobit
Controls	Yes	Yes	Yes	Yes
Year, County, Bank RE	Yes	Yes	Yes	Yes
Years	1994–2018	1994–2018	1994–2018	1994–2018

Table 4: Scope for improvements at EDO banks and minority borrowers

This table presents a county-level analysis for EDO banks' portfolio allocation of residential mortgage lending to minorities. The dependent variable, *Portfolio shares*, is banks' allocation of credit to minorities within their county-level residential loan portfolios, and *Treatment* is an indicator variable associated with process improvements at EDO banks. *Subprime share* is the percent of borrowers at the county level with FICO scores of 619 and below. The table shows changes at banks with stricter regulators (column (1)), longer EDOs (column (2)), and low CRA ratings (column (3)). The indicator *During EDO* refers to the actual time a bank is subject to an EDO, and *Post EDO* is an indicator variable for the five years after an EDO's termination. All regressions include lagged bank-level control variables (size, profitability, liquidity, capital ratio, and NPA) and county-level macro variables (employment growth and the number of loan applications). To mitigate the effects of extreme observations, all continuous bank-level variables are winsorized at the 1% and 99% tails of their respective distributions in each sample year. All variables are defined in Appendix A. Standard errors are calculated using a bootstrap. The z-statistics are presented in parentheses; $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$ (two-tailed).

	Treatment = Regulatory Strictness	Treatment = EDO Length	Treatment = Low CRA Rating
	Portfolio shares	Portfolio shares	Portfolio shares
	(1)	(2)	(3)
Treatment	3.436**	-1.528***	5.277*
	(1.996)	(-4.554)	(1.846)
During EDO	0.457	-5.950***	-0.916
	(0.440)	(-5.311)	(-1.492)
Post EDO	-6.268***	-5.172***	1.458**
	(-5.969)	(-4.559)	(2.501)
During EDO × Treatment	-2.517	2.312***	-2.681
	(-1.465)	(5.329)	(-0.924)
Post EDO × Treatment	7.589***	3.074***	9.750***
	(4.169)	(7.136)	(3.400)
Observations	77,379	162,769	162,769
Wald χ^2	276***	519***	497***
Reg Type	RE Tobit	RE Tobit	RE Tobit
Controls	Yes	Yes	Yes
Year, County, Bank RE	Yes	Yes	Yes
Years	1994–2018	1994–2018	1994–2018

Table 5: Loan denials by EDO banks

This table presents coefficient estimates from a linear probability model for the reasons EDO banks give when they deny a loan application. The dependent variable in column (1) is an indicator of whether a loan application is denied. The dependent variables in columns (2)–(10) are indicators for reasons for denial, conditional on a loan application being denied. The indicator *During EDO* refers to the actual time a bank is subject to an EDO, *Post EDO* is an indicator variable for the five years after an EDO's termination, and *Minority* is an indicator taking the value of one if an application is by a minority borrower. All regressions include lagged bank-level control variables (size, profitability, liquidity, capital ratio, and NPA) and a county-level macro variable (employment growth). To mitigate the effects of extreme observations, all continuous bank-level variables are winsorized at the 1% and 99% tails of their respective distributions in each sample year. All variables are defined in Appendix A. The t-statistics are presented in parentheses; $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$ (two-tailed).

	Denial	Denial: Debt to income	Denial: Employment history	Denial: Credit history	Denial: Collateral	Denial: Insufficient cash	Denial: Unverifiable information	Denial: Incomplete application	Denial: Mortgage insurance denied	Denial: Unspecified
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
During EDO	0.000	-0.008	-0.003	0.018	-0.018	-0.006**	-0.022*	0.016	0.003	0.003
	(0.020)	(-0.366)	(-1.125)	(0.951)	(-1.011)	(-1.975)	(-1.804)	(0.876)	(1.409)	(0.089)
After EDO	0.026	0.018	-0.006	0.014	0.031	-0.000	-0.008	0.001	0.002	-0.064*
	(1.217)	(0.481)	(-1.275)	(0.577)	(0.841)	(-0.068)	(-0.777)	(0.030)	(1.190)	(-1.779)
Minority	0.096***	-0.003	0.000	0.049***	-0.001	0.005*	-0.002	-0.013**	0.000	-0.016
	(4.453)	(-0.290)	(0.207)	(6.085)	(-0.028)	(1.868)	(-0.770)	(-2.195)	(-0.162)	(-1.514)
Minority × During EDO	0.015	-0.003	-0.002	-0.001	-0.028	-0.000	0.001	0.019	-0.001	0.017
	(1.349)	(-0.340)	(-0.833)	(-0.103)	(-1.482)	(-0.052)	(0.279)	(1.360)	(-0.723)	(1.173)
Minority × After EDO	-0.050*	0.011	0.000	-0.034***	-0.005	-0.006**	0.004	0.015**	0.000	0.004
	(-1.798)	(1.019)	(0.175)	(-3.104)	(-0.215)	(-2.135)	(1.501)	(2.227)	(0.089)	(0.417)
Observations	3,084,846	629,789	629,789	629,789	629,789	629,789	629,789	629,789	629,789	629,789
Adjusted R^2	0.170	0.134	0.052	0.357	0.151	0.026	0.035	0.340	0.031	0.303
Estimation method	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank × County FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank
Years	1994-2018	1994-2018	1994-2018	1994-2018	1994-2018	1994-2018	1994-2018	1994-2018	1994-2018	1994-2018

Table 6: Loan portfolio quality for EDO banks

This table presents banks' loan portfolio quality changes during an EDO and after its termination. The dependent variables in Panel A refer to bank-level nonperforming assets. The dependent variable in Panel B is risky mortgages (defined as higher-priced closed-end mortgages) as a share of total residential mortgages at the bank-county-level, and in Panel C is an indicator for whether the originated loan is FHA-insured. The indicator *During EDO* refers to the actual time a bank is subject to an EDO, and *Post EDO* is an indicator variable for the five years after an EDO's termination. All regressions include lagged bank-level control variables (size, profitability, liquidity, and capital ratio) and a county-level macro variable (employment growth). Panel B also includes the county-level number of loan applications. In addition, model (3) of Panel A includes lagged bank-level NPA scaled by total loans. Column (1) Panel B includes year, county, and bank random effects, whereas column (2) of Panel B includes year and bank × county fixed effects. To mitigate the effects of extreme observations, all continuous bank-level variables are winsorized at the 1% and 99% tails of their respective distributions in each sample year. All variables are defined in Appendix A. Standard errors in column (1) of Panel B are calculated using a bootstrap. The t-statistics for the OLS models and z-statistics for the Tobit models are presented in parentheses; $^*p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$ (two-tailed).

Panel A: Nonperforming assets of EDO banks

	Total NPA / Total loans	Total NPA / Total loans	NPA for residential mortgages / Total loans
	(1)	(2)	(3)
During EDO	0.016***	0.011***	-0.001*
	(13.732)	(10.743)	(-1.929)
Post EDO	0.002	0.002	-0.000
	(1.241)	(1.186)	(-0.713)
Observations	41,010	41,010	37,322
Adjusted R^2	0.552	0.612	0.851
Reg Type	OLS	OLS	OLS
Controls	No	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes
Cluster	Bank	Bank	Bank
Years	1994–2018	1994–2018	2001–2018

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Table 6: Loan portfolio quality for EDO banks, continued

Panel B: County-level share of risky lending by EDO banks

	Market shares of risky loans	Market shares of risky loans
	(1)	(2)
During EDO	-2.473***	-0.198
	(-14.324)	(-0.304)
Post EDO	-1.780***	-1.135
	(-10.740)	(-1.162)
Observations	105,860	24,688
Adjusted R^2		0.589
Wald χ^2	2374***	
Reg Type	RE Tobit	OLS
Controls	Yes	Yes
Year, County, Bank effects	Yes	Yes
Years	2004–2018	2004–2018

Table 6: Loan portfolio quality for EDO banks, continued

Panel C: Changes in FHA loans of EDO banks

	FHA loan	FHA loan
	(1)	(2)
During EDO	0.003	0.004
	(0.344)	(0.672)
After EDO	-0.004	0.000
	(-0.266)	(0.017)
Minority	0.071***	0.066***
	(4.865)	(3.823)
Minority × During EDO	-0.037	-0.024
	(-1.376)	(-1.066)
Minority × After EDO	-0.056***	-0.047**
	(-3.261)	(-2.420)
Observations	2,356,796	2,356,796
Adjusted R^2	0.207	0.273
Estimation method	OLS	OLS
Controls	Yes	Yes
Year FE	Yes	Yes
Bank FE	No	Yes
Bank × County FE	No	Yes
Cluster	Bank	Bank
Years	1994-2018	1994-2018

Table 7: Alternative explanations: Low capital and local market competition

This table presents changes in EDO banks' residential mortgage loans to minority borrowers. The dependent variable is banks' allocation of credit to minorities within their county-level residential loan portfolios. The indicator *During EDO* refers to the actual time a bank is subject to an EDO, *Post EDO* is an indicator variable for the five years after an EDO's termination, *Low capital* is an indicator variable for the banks in the lowest tercile of regulatory capital before an EDO, *High Competition (deposits)* corresponds to the lowest deposit market HHI tercile in a given county, and *High Competition (loans)* corresponds to the lowest residential mortgage loan market HHI tercile in a given county. All regressions include lagged bank-level control variables (size, profitability, liquidity, capital ratio, and NPA) and county-level macro variables (employment growth and the number of loan applications). To mitigate the effects of extreme observations, all continuous bank-level variables are winsorized at the 1% and 99% tails of their respective distributions in each sample year. All variables are defined in Appendix A. Standard errors are calculated using a bootstrap. The z-statistics are presented in parentheses; $^*p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$ (two-tailed).

	Treatment=Low capital	Treatment=High competition (deposits)	Treatment=High competition (loans)
	Portfolio shares	Portfolio shares	Portfolio shares
	(1)	(2)	(3)
Treatment	10.045***	18.672***	27.441***
	(9.371)	(21.084)	(25.280)
During EDO	-0.370	-2.159**	-1.086
	(-0.490)	(-2.483)	(-1.122)
Post EDO	0.536	0.561	2.762***
	(0.731)	(0.653)	(2.860)
During EDO × Treatment	-0.298	2.063**	0.196
	(-0.275)	(2.034)	(0.176)
Post EDO × Treatment	0.451	0.590	-0.928
	(0.398)	(0.567)	(-0.797)
Observations	156,913	156,808	156,874
Wald χ^2	430***	1610***	1464***
Estimation method	RE Tobit	RE Tobit	RE Tobit
Controls	Yes	Yes	Yes
Year, County, Bank RE	Yes	Yes	Yes
Years	1994–2018	1994–2018	1994–2018

Table 8: Supplemental analysis: EDO banks and loans to women

This table presents a county-level analysis of EDO banks' portfolio allocation and market shares of lending to women. Column (1) shows EDO banks' allocation of credit to women within their county-level residential loan portfolios, whereas column (2) shows EDO banks' county-level market shares of residential mortgage lending to women. The indicator *During EDO* refers to the actual time a bank is subject to an EDO, and *Post EDO* is an indicator variable for the five years after an EDO's termination. All regressions include lagged bank-level control variables (size, profitability, liquidity, capital ratio, and NPA) and county-level macro variables (employment growth and the number of loan applications). To mitigate the effects of extreme observations, all continuous bank-level variables are winsorized at the 1% and 99% tails of their respective distributions in each sample year. All variables are defined in Appendix A. Standard errors are calculated using a bootstrap. The z-statistics are presented in parentheses; $^*p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$ (two-tailed).

	Portfolio shares (Women)	Market shares (Women)
	(1)	(2)
During EDO	3.391***	0.035
	(6.090)	(1.399)
Post EDO	6.068***	0.724***
	(11.792)	(30.424)
Observations	162,769	521,313
Wald χ^2	939***	17168***
Reg Type	RE Tobit	RE Tobit
Controls	Yes	Yes
Year, County, Bank RE	Yes	Yes
Years	1994–2018	1994–2018

Appendix B. Online Appendix to "Bank Supervision and Managerial Control Systems: The Case of Minority Lending"

Appendix B.1. Additional Tables

Table OA1: Number of counties with lending to minorities

This table presents a county-level analysis for the number of counties covered by EDO banks in which they lend to minorities. The indicator *During EDO* refers to the actual time a bank is subject to an EDO; *Pre EDO (year)* and *Post EDO (year)* correspond to indicator variables for the years before an EDO and after EDO termination.

	Average number of distinct counties where EDO banks are active (per bank)	Average number of distinct counties where EDO banks lend to minorities (per bank)	Of which: minority population greater than 50% of county population
	(1)	(2)	(3)
Pre EDO (year -3)	22	6	3
Pre EDO (year -2)	22	7	3
Pre EDO (year -1)	22	7	3
During EDO (annualized, on average)	21	6	3
Post EDO (year 1)	25	8	3
Post EDO (year 2)	27	9	3
Post EDO (year 3)	29	9	4
Post EDO (year 4)	31	10	4
Post EDO (year 5)	31	11	4

Table OA2: Robustness: Lending to minorities by EDO banks (county population-weighted estimation)

This table presents a county-level analysis for EDO banks' market shares of residential mortgage lending to minorities. The dependent variable is EDO banks' county-level market shares of residential mortgage loans to minorities. In column (1), the bank-county-level regressions are weighted by the natural logarithm of the county population, whereas in column (2), the regressions are weighted by the county's share of the total U.S. population. The indicator *During EDO* refers to the actual time a bank is subject to an EDO, whereas *Post EDO* corresponds to indicator variables for the one to five years after EDO termination. All regressions include lagged bank-level control variables (size, profitability, liquidity, capital ratio, and NPA) and a county-level macro variable (employment growth). To mitigate the effects of extreme observations, all continuous bank-level variables are winsorized at the 1% and 99% tails of their respective distributions in each sample year. All variables are defined in Appendix A of the manuscript. The z-statistics are presented in parentheses; $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$ (two-tailed).

	Market shares	Market shares
	(1)	(2)
During EDO	-0.026**	-0.026
	(-2.109)	(-0.612)
Post EDO	0.979***	0.407***
	(87.381)	(10.342)
Observations	489,709	489,709
Wald χ^2	106165***	2005***
Reg Type	RE Tobit	RE Tobit
Controls	Yes	Yes
Year, County, Bank RE	Yes	Yes
Years	1994–2018	1994–2018

Table OA3: Loan denials by EDO banks (interaction with subprime)

This table presents coefficient estimates from a linear probability model for the reasons EDO banks give when they deny a loan application. The dependent variables in columns (1)–(9) are indicators for a reason for denial, conditional on a loan application being denied. The indicator *During EDO* refers to the actual time a bank is subject to an EDO, *Post EDO* corresponds to an indicator variable taking the value of one for the five years after an EDO's termination, *Minority* is an indicator taking the value of one if an application is by a minority borrower, and *Subprime* is an indicator taking a value of one if the average transaction-matched FICO score at the level of the census tract, loan origination year, loan type, loan purpose, and occupancy status of the property is 619 or below. All regressions include lagged bank-level control variables (size, profitability, liquidity, capital ratio, and NPA) and a county-level macro variable (employment growth). To mitigate the effects of extreme observations, all continuous bank-level variables are winsorized at the 1% and 99% tails of their respective distributions in each sample year. All variables are defined in Appendix A. The t-statistics are presented in parentheses; $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$ (two-tailed).

	Denial: Debt to income	Denial: Employment history	Denial: Credit history	Denial: Collateral	Denial: Insufficient cash	Denial: Unverifiable information	Denial: Incomplete application	Denial: Mortgage insurance denied	Denial: Unspecified
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
During EDO × Minority	-0.010*	-0.002	-0.002	-0.010	-0.001	-0.001	0.024	-0.001	0.016
	(-1.829)	(-0.918)	(-0.193)	(-1.469)	(-0.308)	(-0.397)	(1.522)	(-0.694)	(1.035)
Post EDO × Minority	0.001	-0.001	-0.031***	0.020**	-0.008***	0.002	0.018**	-0.000	0.001
	(0.092)	(-0.886)	(-3.066)	(2.349)	(-3.589)	(0.772)	(2.582)	(-0.104)	(0.116)
During EDO × Minority × Subprime	-0.013	-0.001	-0.059***	0.025	0.020	-0.005	0.000	0.002	0.018
	(-0.527)	(-0.119)	(-2.875)	(1.008)	(1.024)	(-0.411)	(0.008)	(1.215)	(0.574)
Post EDO × Minority × Subprime	-0.010	0.003	0.023	-0.054**	0.003	-0.018***	-0.012	-0.001	0.056**
	(-0.437)	(0.351)	(0.968)	(-2.358)	(0.391)	(-2.945)	(-1.368)	(-0.435)	(2.209)
Observations	571,655	571,655	571,655	571,655	571,655	571,655	571,655	571,655	571,655
Adjusted R^2	0.133	0.0568	0.321	0.150	0.0271	0.0332	0.342	0.0320	0.302
Estimation method	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank × County FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank
Years	1994-2018	1994-2018	1994-2018	1994-2018	1994-2018	1994-2018	1994-2018	1994-2018	1994-2018

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Appendix B.2. Excerpts from an enforcement order requiring changes to internal audit and

loan policy

In the Matter of
HAMPTON BANK
HAMPTON, MINNESOTA
(Insured State Nonmember Bank)
ORDER TO CEASE AND DESIST
FDIC-97-43b

Hampton Bank, Hampton, Minnesota ("Bank"), having been advised of its right to a Notice of Charges and of Hearing detailing the unsafe or unsound banking practices and violations of law and/or regulations alleged to have been committed by the Bank and of its right to a hearing on such alleged charges under section 8(b) of the Federal Deposit Insurance Act ("Act"), 12 U.S.C. § 1818(b), and having waived those rights, entered into a STIPULATION AND CONSENT TO THE ISSUANCE OF AN ORDER TO CEASE AND DESIST ("CONSENT AGREEMENT") with counsel for the Federal Deposit Insurance Corporation ("FDIC"), dated ____, 1997, whereby solely for the purpose of this proceeding and without admitting or denying any unsafe or unsound banking practices or violations of law and/or regulations, the Bank consented to the issuance of an ORDER TO CEASE AND DESIST ("ORDER") by the FDIC.

The FDIC considered the matter and determined that it had reason to believe that the Bank had engaged in unsafe or unsound banking practices and had violated laws and/or regulations. The FDIC, therefore, accepted the CONSENT AGREEMENT and issued the following:

[.14] 14. (a) No more than 30 days from the effective date of this ORDER, the Bank shall develop a written internal audit procedure to improve internal controls, accounting practices and recording. The procedure shall require, at a minimum:

(i) a determination that the records of the {{12-31-97 p.C-4414}}Bank are complete and adequate, and that transactions are promptly and properly recorded in the accounts;

(ii) a check for compliance with applicable statutes and regulations;

(iii) a review for compliance with policies prescribed by management and/or the board of directors, including verification that loans and securities have been properly approved;

(iv) a review of electronic data processing procedures and controls, as well as reviewing source documents to ensure that sensitive customer master file change requests have supervisory approval;

(v) an appraisal of the performance of personnel in accomplishing assigned internal control functions and responsibilities, including tracing transactions to final disposition to ensure there are adequate audit trails;

(vi) an appraisal of the policies and practices for wire transfer activities including dual controls, segregation of duties, and internal audit coverage;

(vii) the preparation of a proper and complete set of working papers covering each audit; and

(viii) the establishment and maintenance of an operating manual describing the specific procedures and techniques to be used by the auditor or auditing staff in performing the audit function.

[.8] 8. No more than 30 days from the effective date of this ORDER, the Bank shall revise its written loan policies which revision shall include, among other things, provisions to address the deficiencies described on pages 8.4 through 8.7 of the FDIC's Report of Examination of the Bank as of January 13, 1997. The revised written loan policies and any subsequent modification thereto shall be submitted to the Regional Director and the Minnesota Commissioner of Commerce for review and comment. No more than 30 days after the receipt of any comment from the Regional Director, the board of directors shall approve the written loan policies and/or any subsequent modification thereto which approval shall be recorded in the minutes of the board of directors. Thereafter, the Bank and its institution-affiliated parties shall follow the written loan policies and/or subsequent modification thereto.

[.9] 9. (a) Within 60 days from the date of this ORDER, the Bank shall establish an internal loan review and grading system ("System") to periodically identify, categorize, and monitor the Bank's potential problem extensions of credit. At a minimum, the System shall provide for:

(i) assessing the overall quality of the Bank's portfolio of extensions of credit;

(ii) the identification and amount of each delinquent extension of credit;

(iii) (A) the identification of each extension of credit warranting the special attention of Bank management, and (B) a statement of the amount and the reason(s) why each extension of credit so identified merits special attention;

(iv) credit and collateral documentation exceptions;

(v) the identification and status of each extension of credit in violation of law, rules and regulations;

(vi) the identification of each extension of credit not in conformity with the Bank's written lending policy, and any exception to such policy; and

(vii) the identification of each extension of credit to any institution-affiliated party.