Regulating Secondary Loan Markets: Evidence from Small Business Lending *

Brittany Almquist Lewis†, Manisha Padi ‡

[Click here for latest version]

Abstract

Rules governing the structure of securitized loan pools can shift lenders' relative cost of pooling different loans, reallocating access to capital. Utilizing novel data on government-backed loan securitization, we study the impact of tightening secondary market regulation on loan characteristics, using an instrumented difference-in-differences approach. Reform exposure decreases secondary market sale prices, and results in shorter maturities and lower loan defaults. The reform reallocates capital away from industries needing long-term capital investments, causing real economic effects. Our results suggest that making loans more similar within securitized pools can restrict access to capital for more costly or hard-to-pool loan types.

Keywords: Regulation, Government-Backed, Maturity, Minimum Maturity Ratio, Securitization, Lending, Small Business, SBA
JEL Classification: G20, G21, G23, G28, G30, G32, G38, C26, L51, L52

*We thank Spring Zhou and Kara (Jiayi) Wei for excellent research assistance. We thank the seminar participants at the University of Zurich and ETH Zurich, UCSD-Rady, Washington University-St. Louis-Olin, and UC-Berkeley. We also thank conference participants at the Olin-Gothenburg Conference and the American Law and Economics Association Conference. We gratefully acknowledge the Wells Fargo Advisors Center for Finance and Accounting Research (WFA CFAR) for funding support. Any errors in this manuscript are the authors' own.

†WUSTL. E-mail: **b.almquist.lewis@gmail.com**, website: **brittanylewis.org**

‡UC - Berkeley. E-mail: **mpadi@berkeley.edu**, website: **manishapadi.com**

1 Introduction

Small businesses are widely considered the backbone of the US economy, currently comprising nearly 60% of net new jobs and 44% of GDP (Gopal and Schnabl, 2022).[1] The total small business debt in the United States is valued at over $1.4 trillion.[2] Small Business Administration (SBA) loans, which are partly guaranteed by the federal government, are a significant fraction of the total market, with outstanding balances totaling more than $400 billion. SBA programs aim to expand credit access for borrowers with limited private market options, a role that is especially important given the relationship-based nature of small business lending (Berger and Udell, 1995) and evidence that even established relationships may not ensure credit during crises (Berger, Bouwman, et al., 2024). The SBA supports securitization in a secondary market, where lenders can sell the guaranteed portion of loans into a pool, which then passes loan payments through to investors who buy and hold tranches of the security.[3] As in other government-backed loan pools like GSE mortgage pools, there are regulatory requirements on pool composition.[4]

The SBA imposes a "minimum maturity ratio," or MMR, requirement on pools to ensure that the shortest and longest maturities within the pool are close to each other. Loan maturity is a key variable in small business lending, since short-term loans typically finance working capital while long-term loans finance the purchase of fixed assets like machinery and commercial real estate, and, holding all else equal, shorter maturity loans are easier to price (Berger, Espinosa-Vega, et al., 2005). A tight MMR could potentially restrict access to secondary markets for loan types with costly or hard-to-pool maturities, while a loose MMR could allocate more capital to those sectors. Understanding these forces requires data on how loans are originated and allocated into pools, as well as an identification strategy that causally isolates the effect of secondary market regulation and traces it to primary market loan outcomes.

We fill this gap using novel Freedom of Information Act (FOIA) requested data to study a 2017 SBA reform that tightened the minimum maturity ratio, or the lower bound on the ratio between the shortest and longest maturity of loans in a pool. In July 2017, the SBA announced a change in MMR applicable to all loans securitized as of October that year. There are two types of SBA securities, Weighted Average Coupon (WAC) and Standard pools, and the change shifted the MMR differently for these pool types: increasing from 76%

[1] See, e.g., https://advocacy.sba.gov/2019/01/30/small-businesses-generate-44-percent-of-u-s-economic-activity/

[2] Consumer Financial Protection Bureau, Key Dimensions of The Small Business Lending Landscape (May 10, 2017), https://www.consumerfinance.gov/data-research/research-reports/key-dimensions-small-business-lending-landscape/.

[3] Nearly 50% of the SBA 7(a) loan market is securitized.

[4] For example, Freddie Mac imposes limits on loan maturity and Fannie Mae limits interest rates. https://guide.freddiemac.com/app/guide/series/6000; https://selling-guide.fanniemae.com/sel/c3-2-01/determining-eligibility-loans-pooled-mbs.

to 94% on WAC pools and from 80% to 94% on Standard pools. For example, pre-reform WAC pools that included a 10 year maturity loan could also include a 7.6 year loan, but post-reform could only include a 9.4 year loan as the shortest maturity. After the reform, therefore, all loans securitized in a pool had to share very similar maturities, with WAC pools experiencing a bigger treatment effect than Standard pools, while no such reform impacted unsecuritized loans. To first establish the impact of the maturity ratio reform on loans more-treated by MMR reform, we compare WAC to Standard pools. We then trace the effect of the reform to primary market small business loan originations by comparing securitized loans – comprised of both WAC and Standard – to loans held on lender balance sheets. We then assess whether secondary market reforms yield real economic effects by estimating, first, a lender level analysis to show that the documented effects caused aggregate shifts in lender origination and pooling behavior, and second, a county level analysis to establish whether more-treated counties experience differential changes to their economic health.

The 2017 SBA maturity ratio reform acts as a natural experiment to assess the causal effect of secondary market regulation. It was enacted during non-crisis times and intended to help the SBA effectively structure its guarantee payouts, not as an endogenous response to macroeconomic conditions or with the intent to alter originations. We use this natural experiment to study whether tightening requirements for pooling across maturities increases (or decreases) lender costs to securitize loans and the ensuing effects on credit supply. We FOIA request novel SBA data on loan characteristics at the point of sale into the secondary market. We augment these data by merging on the universe of 7(a) loans originated, both those securitized and unsecuritized, previously released by SBA and used extensively by researchers. We first document a new stylized fact: following the policy change, the volume and number of more intensely treated WAC loans fell sharply relative to Standard loans. While Standard loans increased in volume and number post-reform, they did not fully compensate for the decrease in WAC loans, causing the pre-period upward trend in total SBA securitized lending to plateau following the policy change. The data suggest that WAC pools shifted toward shorter-term loans, while Standard pools shifted toward slightly longer-term loans.

To causally establish the effect of MMR reform on more exposed loans, we estimate an instrumental variable difference-in-differences (IVDID) research design, adapted from Ye et al. (2023). We center the design at the reform and use loans originated during 2014Q4-2019Q4. A traditional DID would compare the effect of the policy change on loans actually pooled into more-treated WAC pools relative to those actually pooled into the less-treated Standard pools in the post- relative to the pre-period. However, this design suffers from the concern that the reform may also change loan selection into the treated WAC group. To remedy this concern, we create an instrument for being placed in a WAC pool - the propensity for that loan's lender and pool assembler to place loans in WAC pools throughout the pre-treatment period. This instrument relies on a loan's designation as WAC or Standard being

heavily driven by lenders' underwriting guidelines and pool assemblers' specialization with particular investors.

The IVDID instruments for post-period actual WAC assignment using the pre-period predicted intensity of WAC exposure. Thus, it uses the change in predicted exposure post- versus pre-reform to instrument for the change in actual WAC status post- versus pre-reform. In practice, the design instruments for the key DID interaction term between treatment and post using predicted treatment interacted with post. The instrumented DID isolates the causal effect of the reform by removing the effect of ex-post selection of loans into treatment. The estimated coefficient should be interpreted as the effect of the maturity ratio reform on complier loans, those that were more likely to be assigned to WAC pools due to their lender and assembler's pre-period predicted dependence on WAC lending. Intuitively, this method requires that lender-assembler pairs with high and low fractions of WAC lending in the pre-period would have had their outcomes evolve in parallel if the 2017 MMR reform had not been implemented. The exclusion restriction allows the instrument to have a direct effect on the level of the outcome variable, as long as it does not have a direct effect on the trend in the outcome, in the absence of treatment. We map Ye et al. (2023)'s assumptions to the continuous treatment setting and argue that the relevance and exclusion restrictions are likely to hold given the institutional setting.

The results show that increased exposure to the minimum maturity ratio significantly decreases loans' sale prices into the secondary market by 1.54 percentage points, which in turn decreases fee revenue to the SBA by 66 basis points on each loan. Increased exposure to the reform also decreases loan maturities by 67 months and increases the originator fees taken by more treated lender-assembler pairs by 98 basis points, consistent with a larger mismatch between loan and pool interest rates, since originator fees can be taken to adjust loan interest rates down to the pool's interest rate. The tighter maturity ratio increased net interest rate spread, above a base rate, for more exposed loans by 24 basis points – consistent with lenders passing increased costs of securitization through to borrowers. Taken together, the evidence indicates that intensity of maturity ratio treatment increases the cost to securitize loans and impacts the pooling of loans in the secondary market.

To understand whether the minimum maturity ratio reform affected loan originations in the primary market, we again estimate an instrumented difference-in-differences regression using the SBA's 7(a) data, which includes both securitized and unsecuritized loans. Since the reform only affected securitized loans, these data allow us to study how the reform affected securitized loans relative to their unsecuritized counterparts. We instrument for exposure to the policy change by predicting whether a loan is securitized. To predict securitization, we estimate a lender's propensity to securitize loans throughout the pre-period and use the lender identity to predict securitization for all loans both pre- and post-reform. Lenders have different propensities to securitize due to their business model and the instrument therefore

isolates the effect of exposure to the reform on loan outcomes driven by the business model of the lender shifting a loan into securitization.

The IVDID instruments post-period actual securitization with post-period predicted securitization. We utilize a similar design to that used for the secondary market, except rather than predicting WAC status, we predict securitization status – since securitized loans are exposed to the reform while unsecuritized loans are not. This regression design estimates the causal effect of the reform on loans whose actual post-period securitization status is shifted by predicted securitization. Intuitively, this method assumes that lenders with high and low pre-period securitization would have experienced parallel outcome trends absent the 2017 MMR reform. The exclusion restriction permits the instrument to affect the level of the outcome variable as long as it does not directly affect the trend in the outcome, in the absence of treatment. While the policy was unlikely to be salient to borrowers, the instrument removes potential confounding from ex-post differential borrower selection into securitization.

The results show that a post-period increase in securitization, instrumented by predicted securitization, decreases loan term by almost 18 months and decreases charge-off, or default, by almost 2 percentage points, consistent with theories that shorter debt maturity is associated with lower levels of asymmetric information (Ortiz-Molina and Penas, 2008). Since the SBA only allows long-term loans for loans used to purchase real estate or physical capital, we classify an industry as high-capital-intensive if its average pre-period maturity is longer than the average pre-period maturity across all industries. We show that a post-period increase in securitization, instrumented by predicted securitization, decreases lending to high-capital-intensive sectors by 3 percentage points. The results are consistent with the maturity ratio reform lowering the supply of long-term high-capital-intensive loans, relative to short-term low-capital-intensive loans, likely unintentionally. The results suggest that in the pre-treatment period, the ability to pool longer-term with shorter-term loans lowered the cost of originating longer-term loans in our setting. More generally, our results suggest that restricting maturities that can be pooled together will shift lending toward the least costly maturity to originate if reallocation of loans across pools is not frictionless.

The IVDID results document a causal effect of the reform on loan outcomes both for more-treated WAC loans and for securitized loans. However, this secondary market effect could have two different implications for the primary market: (1) although loan characteristics change for marginal "complier" loans, those loans may not shift aggregate market averages, or (2) the impacts on marginal "complier" loans may mirror average changes across lenders' portfolios. In order to assess whether the policy change has an effect on the average primary market loan origination, we aggregate the data to the lender-quarter level and study aggregate outcomes. That is, we average across a lender's entire portfolio of both WAC and Standard or both securitized and unsecuritized loans and compare post- relative to pre-reform for more- versus less-exposed lenders. We define lender treatment-intensity, as

a lender's pre-period exposure to either WAC or securitized loans, in a traditional treatment-intensity difference-in-differences research design. This specification is akin to an intent-to-treat research design because we study the effect of the reform on a lender's entire loan portfolio, including both WAC and Standard loans, or both securitized and unsecuritized loans, post- relative to pre-period. Thus, if the results above on complier loans were diluted by infra-marginal loans, we should find a null result in this analysis. For example, if the marginal loan securitized in the post-treatment period due to a lender's dependence on securitization had a shorter maturity, but the same lender originated other loans that were longer maturity, the average maturity in the post-period would not be significantly different from the pre-period.

The results indicate that the loan level secondary market effects of the reform are driven by average changes in origination behavior. Specifically, we find that a 10% pre-period increase in lender WAC exposure drives a 13 bp higher "originator fee" across a lender's whole loan portfolio in the post-period, consistent with more treated lenders placing loans in Standard pools with a 13 bp higher difference between the loan's interest rate and the lowest interest rate in that pool. We also find the same increase in lender pre-period exposure decreases the lender's average price by 12 bp for loans sold into the secondary market in the post-period. We also find that a 10% increase in pre-period lender WAC exposure drives a 3.6 bp decline in SBA fee revenue, which is only earned on loans with a sale price above 110%.

The results also indicate that the loan level primary market effects of the reform are driven by changes in origination behavior. Specifically, a 10% increase in pre-period lender securitization rate drives a 1 month decrease in average loan maturity across all of a lender's loans, both securitized and unsecuritized. This suggests that exposed lenders are originating shorter maturity loans across their portfolio, rather than simply for marginal loans. A 10% increase in pre-period lender exposure drives a 0.15 pp decline in the average charge-off rate across all loans in the lender's portfolio in the post-period, consistent both with shorter debt maturities being associated with lower levels of asymmetric information as well as with decreased credit access to harder to screen borrowers. More-exposed lenders also shift their originations toward smaller loans. Specifically, a 10% increase in lender pre-period securitization drives the average post-period share of loans above $150,000 to decline by 0.5 pp and the share below $150,000 to increase by 0.5 pp. A 10% increase in lender pre-period securitization exposure also decreases the fraction of loans originated to high-capital-intensive industries by 0.3 pp in the post-period. To decompose this change, we examine two 2-digit NAICS industries: a high-capital-intensive sector (Agriculture, Forestry, Fishing, and Hunting) and a low-capital-intensive sector (Administrative Support, Waste Management, and Remediation Services). A 10% increase in lenders' pre-period securitization rate reduces lending to the high-capital-intensive sector by 0.1 pp and increases lending to the low-capital-intensive sector by 0.2 pp, relative to unsecuritized loans in the post-period.

Finally, we study real effects of the reform. We aggregate the data to the county-quarter level to understand establishment level effects for counties exposed to high-capital-intensive industries. We utilize the Bureau of Labor Statistics (BLS) Quarterly Census of Employment and Wages (QCEW) data to understand whether high capital-intensive-sectors were able to substitute SBA funding with alternative credit options. We calculate each county's fraction of establishments categorized as high-capital-intensive industries using our mapping of NAICS codes as high- versus low-capital-intensive. We estimate a treatment-intensity difference-in-differences research design, centered around the policy change, where treatment exposure is defined as the fraction of county establishments designated as high-capital-intensive. The results show that higher exposure to pre-period capital intensive industries drives significant and disproportionate declines in employment, establishments, and total wages following the 2017Q3 policy change. These results suggest that high-capital-intensive establishments reliant on SBA funding have limited alternative access to credit and were not frictionlessly able to substitute away from SBA funding following the policy change. Moreover, the results are consistent with the minimum maturity ratio reform enacting an implicit "industrial policy," which shifted the industries receiving government subsidized funding away from high-capital-intensive industries and toward low-capital-intensive industries.

Taken together, the results show that tightening the maturity ratio requirement increases the cost of originating longer-term loans but decreases overall default rates. Our analysis has several implications. First, it shows that secondary market regulation that changes the relative profitability of selling different loan types into pools can significantly impact originations. In our setting, short maturity loans are less likely to be subject to adverse selection than long maturity loans, such that pooling the two together can reduce costs of originating longer maturities. Removing this subsidy by standardizing maturities in a pool reduces originations of harder-to-originate long-term loans. The results imply that other rules that incentivize standardizing loan products, such as the CFPB's 1071 rule, may also shift originations.

Second, our analysis shows that regulating secondary markets can shift credit differentially across industry sectors, with wider implications for local economies. An active debate exists about the appropriate design of secondary market regulation in high profile markets like mortgage markets.[5] For liquidity, lenders depend on securitization in secondary markets. Stringent rules can increase the cost of pooling loans and potentially decrease liquidity. Recent Executive Orders to make loans more affordable for borrowers have led lawmakers to consider loosening secondary market regulations.[6] However, the causal effect of these regulatory changes, first on secondary market liquidity, and then on primary market

[5]See e.g., Housing and Insurance Subcommittee Examine the Role of the Secondary Mortgage, Feb. 11, 2026, https://financialservices.house.gov/news/documentsingle.aspx?DocumentID=411028.

[6]See e.g., "Promoting Access to Mortgage Credit" Executive Order Mar. 13, 2026, https://www.whitehouse.gov/presidential-actions/2026/03/promoting-access-to-mortgage-credit/.

is at baseline challenging to predict and further complicated by confounders present amidst historical reforms, like Dodd-Frank's mortgage-backed securities regulation, which endogenously responded to macroeconomic conditions. Our setting provides a natural experiment in non-crisis times that helps inform the debate on how regulation can affect primary loan markets via tightening or loosening constraints on loan pools. The results have implications for other government-backed loan pools, suggesting that secondary market regulations can change the relative cost of originating loans to different types of borrowers. For instance, GSE mortgage pools impose tight constraints on the range of loan interest rates. Relaxing these constraints may make it more profitable for mortgage lenders to originate riskier, high interest rate loans.

Literature Review

Our work builds on several lines of scholarship, including the literature discussing the role of secondary markets in increasing liquidity versus decreasing monitoring in the primary market. As background, early empirical work has shown that banks offer special services on their lending side (see e.g., James, 1987; Lummer and McConnell, 1989) and traditional theories of financial innovation suggest in part that bank loans should be illiquid to create these special services, such as monitoring and certifying, by alleviating information asymmetry (Diamond, 1984; Diamond, 1991; Boyd and Prescott, 1986). However, when banks began selling loans in the 1980's a number of theoretical models arose to study the benefits and costs of loan resale in the context of banks' traditional theoretical roles as delegated monitors and liquidity providers. On the positive side, loan resale benefits the lender and can facilitate risk management, which can lead to price concessions in the primary market (see e.g. Güner, 2006). However, on the negative side, it can change the original lender's role from certifier and monitor to originator and distributor (Gorton and Pennacchi, 1995; Parlour and Plantin, 2008).

On the positive effects of loan resale, while secondary markets are thought to be an auxillary market to the primary market, a significant body of literature finds that secondary market liquidity impacts primary market yields and pricing (see e.g., Kamstra, Roberts, and Shao, 2014; Gupta, Singh, and Zebedee, 2008; Lewis, 2023; Lewis, 2021). However, new work finds that the unprecedented policy support to corporate bond markets in 2020 had limited real impacts on firm outcomes such as investment (Li and Ringgenberg, 2022; Darmouni and Siani, 2025). We innovate relative to this work by showing that changes in the secondary market have real effects on loan maturity, size, and performance and create implicit "industrial policy effects" by changing access to credit among high- and low-capital intensive firms.

Regarding potential negative effects of loan resale such as diminished monitoring, im-

portant work around the Global Financial Crisis established that the development of securitization contributed to the expansion of the originate-to-distribute intermediation model, making lending less reliant on balance sheet financing (DeMarzo, 2005). Financial services have become unbundled by securitization (Hamdi et al., 2023), leading to a large literature on the costs and benefits of the originate-to-distribute model (see, for example, Keys et al., 2010). Our paper contributes to this literature by studying the effect of standardizing maturities on securitization.

We also contribute to the small but growing literature on maturity and the information it conveys. Van Soom et al. (2019) documents that aggregating different maturity loans into a single unit of study obscures relevant information about the individual loans when maturity embeds information about the loan type. Huh and Y. S. Kim (2023) shows that pooling loans with low and high prepayment risk lowers the cost of originating loans with high prepayment risk. Our results suggest that standardizing maturities favors short-term maturities, likely due in part to difficulties screening longer term maturities (Ortiz-Molina and Penas, 2008; Berger, Espinosa-Vega, et al., 2005), which diminish feasibility of originating and pooling several long-term loans conforming with the minimum maturity ratio. More generally, our results suggest that expanding the range of maturities that can be pooled together expands cross-subsidization of loans that may be more difficult to originate.

Within the broader literature on secondary markets, our work draws parallels to similar work on the structure of mortgage-backed securities, such as GSE securitization, and their secondary markets (DeFusco and Paciorek, 2017; Alexandrov, Conkling, and Koulayev, 2024; Huh and Y. S. Kim, 2023). We also draw on literature about small business lending (Petersen and Rajan, 1994; Petersen and Rajan, 1995; Berger and Udell, 1995; Gopal and Schnabl, 2022) and the SBA 7(a) loan program (see for example, Bachas, O. S. Kim, and Yannelis, 2021; G. Pan, Z. Pan, and Xiao, 2021; Kalmenovitz and Vij, 2021; Cespedes et al., 2024; Hotchkiss, Iverson, and Zheng, 2024; Stillerman, 2024; Brown et al., 2024). Bickmore, MacKinlay, and Tellez, 2024 studies the role that online lenders play in small business lending and uses the MMR change as a shifter to credit supply of online lenders, who are more reliant on securitization. Relative to this literature, we innovate by carefully documenting the comprehensive impacts of tightening the minimum maturity ratio on the SBA market, including loan maturity and loan characteristics such as loan default. We then establish the implicit "industrial policy" effects of the change, which channel lending away from more-capital intensive industries and toward less-capital intensive industries.

We also contribute by introducing a new causal inference method, instrumented difference-in-differences adapted from Ye et al., 2023, to the empirical corporate finance setting. Outside of biostatistics, it has been used to study economic history (Coluccia, 2025) and education (Lloyd and Yang, 2025). We innovate relative to the literature by mapping the Ye et al., 2023 assumptions to a continuous treatment setting.

2 Data and Institutional Details

2.1 Data

SBA 1086 and 1454 Data. We submitted a Freedom of Information Act (FOIA) request for data from forms 1086 and 1454. Form 1086 is used to document the initial transfer of the loan from the originator to the pool assembler in the secondary market. The form also collects information recording the sale of the guaranteed portion of the loan. These data allow us to observe pricing details of the loans sold into the secondary market. The data include each loan's sale price, SBA user fee, and net spread. Form 1454 is used to collect essential details from pool assemblers on SBA-guaranteed loan pools, which allows us to identify loans sold into the same pool. We use these data to study how the maturity ratio reform affects the sale of SBA loans into the secondary markets.

We merge the 1086 and 1454 data using an exact match on the maturity date and original face amount. We require that the pool creation date (or issue date) minus primary sale date is greater than or equal to 30 days – under the assumption that a loan must be sold to the pool assembler before a pool can be issued. Table 1 reports summary statistics of loans in our sample.

[Table 1 about here.]

SBA 7(a) Data. Our data come from the Freedom of Information Act (FOIA) data listing all 7(a) loans, obtained from the SBA. We limit to 2014Q4-2019Q4 around the 2017 reform in order to minimize exposure to market changes due to COVID-19. For each loan, we observe information about borrower, such as zip and NAICS code, the identity of the lender, and loan characteristics including maturity in months (sometimes referred to below as loan term) and initial interest rate. The data include charge offs by 2024. Charge off is defined as a loss written off by the SBA, meaning that the lender has been made whole under the SBA guarantee and interest in the loan has passed to the Treasury, where collection attempts are made to cover the SBA's losses. Most importantly, the data include an indicator for the loan being securitized, or sold into the secondary market.

Merged 1086, 1454, and 7(a) Data. To study how secondary market pricing and loan terms interact at the loan level, we construct a fully merged dataset by linking the 1086 and 1454 data to the 7(a) loan data. The merge is restricted to loans flagged as securitized in the 7(a) data. Because no common loan identifier spans all three datasets, we perform a fuzzy merge using several loan characteristics.

The merge is conducted as follows. Exact equality is required between the 7(a) gross approval amount and the 1086 original face amount. When duplicates remain after applying these criteria, we apply sequential tie-breaking using the following criteria in order. We first minimize the percentage difference between the SBA guaranteed approval amount and the 1454 loan balance, requiring the closest match (as a share of the form 1454 value).[7] We use the match that jointly minimizes origination and maturity date discrepancies within a six-month window. Finally we utilize the match that minimizes the gap between the 7(a) initial interest rate and 1454 interest rates. The 1086/1454 data are used as the reference frame throughout.

2.2 Institutional Details

Our institutional setting is the SBA 7(a) program, which supports a variety of loan types and allows, but does not require, lenders to securitize their loans. Loans are underwritten, originated, and funded by private lenders, but each loan is guaranteed up to a cap by the SBA. Lenders typically retain the unguaranteed portion on their balance sheet limiting their potential loss to the unguaranteed portion of the loan, which must be greater than or equal to 15% of total loan balance. Loans may be a maximum of 10 years, or 120 months, unless they finance real property or machinery, in which case they may have a term of up to 25 years, or 300 months.[8]

Securitization of 7(a) loans occurs when pool assemblers, private third parties approved to create loan pools, purchase the guaranteed[9] portion of the loan and combine it with their portfolio to create a pool. The pool's maturity is set to the longest maturity of the loans in that pool. Pools must satisfy a number of criteria, including a minimum total volume, maximum concentration in loan size and parallel interest rate reset patterns, discussed in more detail below. Among the criteria is the minimum maturity ratio, which is defined as the ratio between the shortest and longest maturity loan in a particular pool.

The SBA announced on July 19, 2017 that, effective on October 1, 2017, all loans in a pool would be required to have a minimum maturity ratio of at least 94% for both Standard pools and WAC pools. The SBA Secondary Market Program and Securitizations Guide states that:

> For pools formed from October 2005 through September 2017, the MMR was

[7] The mean absolute difference between these two fields is 1.4% with a standard deviation of 9%.

[8] See e.g. SBA Terms, Conditions, and Eligibility: https://www.sba.gov/partners/lenders/7a-loan-program/terms-conditions-eligibility or bank guidelines such as CBB Bank's https://www.cbb-bank.com/en/blog/InsightsView?News=2024-10-30%5ESBA%20Loans%5EDetailed%20Overview%20of%20SBA%207(a)%20Loans.html. Note that lenders may choose their own underwriting criteria beyond SBA requirements and those are not observed in the data.

[9] Recently some successful securitizations have occurred of the unguaranteed portion of loans, which is authorized by the SBA but uncommon.

> 80%. For WAC pools that began in January 2009 up until to September 2017, the MMR was 76%. For all pools formed in fiscal year 2018 the MMR was 94%. -SBA Secondary Market Program and Securitizations Guide pg. 20

The reform was intended to lower the SBA's costs associated with its timely payment guarantee. The timely payment guarantee requires that the SBA cover timely payments to investors even if a loan defaults. Note that none of the rule-making around MMR suggests that this reform was intended to change primary market lending behavior, or even to significantly impact liquidity in the secondary market. In fact, the SBA's announcement of the policy change states that:

> "SBA has monitored Pools formed over the last 6 months, and has observed that many existing Pools have a minimum maturity ratio of at least 94%." -Federal Register, Vol. 82, No. 137, Wednesday, July 19, 2017, Notices

Loans originated in the SBA's 7(a) program can be securitized into two types of pools, Standard pools or Weighted Average Coupon (WAC) pools. The policy change affected WAC and Standard pools differently: the MMR increased from 80% to 94% for Standard pools, but from 76% to 94% for WAC pools. Both for WAC and Standard pools, the underlying loans in a pool must be either all fixed rate or all variable rate loans, and if the pool has all variable rate loans, all loans must have the same base rate (i.e., Wall Street Journal Prime Rate, LIBOR Base Rate). While WAC and Standard pools have slightly different minimum number of loans in a pool, the median and mean number of loans in all pools are well above the minimum. All pools are closed-end securities. No loans may be added to a pool once the pool has been issued and substitution of loans in pools already established is also prohibited, such that underlying loans that prepay or default cannot be replaced.

Standard pools appeal to investors looking for more consistent cash flows. The initial coupon interest rate on a Standard pool certificate (pool rate) is equal to the lowest borrower's note rate (less all fees) on an underlying loan in the pool. If a loan has a higher net rate than the pool rate, either the originator or the pool assembler is able to take an "originator fee," or a fee on the loan that adjusts the interest rate down to the initial net rate of the pool, so that the guaranteed portions of the loans in a pool have the same effective rate.

In contrast, WAC pools can have more volatile cash flows but they are likely to pay out a larger fraction of the borrowers' total interest payments to investors. The coupon of the pool is calculated using the weighted average coupon (WAC) or interest rate of the loans in a pool, weighted by principal balance. There is a 75 basis point maximum differential between the lowest net coupon rate and the highest net coupon rate for all underlying loans in a

WAC pool. This differential gives pool assemblers the flexibility to pool loans with slight differences in the net interest rate yet prevents large swings in the pool coupon due to the prepayment or default of any one of the loans in the pool. Since prepaid or defaulted loans cannot be replaced, the 75 basis point maximum differential helps ensure that investors' coupon does not swing wildly, for example, if the largest loan in the pool prepays and the coupon is recalculated based on the remaining loans' interest rates. Conditional on these requirements being met, the total interest paid into the pool is paid out to investors, net administrative fees.

WAC pools are therefore more attractive to investors who can value and absorb more variable cash flows, while Standard pools are better suited to a more risk averse investor.

2.3 Stylized Facts

Whether the introduction of the MMR policy reform reorganizes the secondary market – and thus lays the groundwork for changes to be passed along to the primary market – is an empirical question. The diagram in Figure 1 creates a simplified example that illustrates the structure of the SBA 7(a) secondary market in the pre-period (on the left) and potential shifts that the minimum maturity ratio may cause in the market in the post-period (on the right). The left hand side pre-period shows two potential pools, consisting of four loans with loan terms of 120, 120, 150, and 157 months. Both pools were in compliance with the minimum maturity ratios of 76% for WAC pools and 80% for Standard pools. The post-period outcomes on the right focus on the reform's possible effects on loan maturity, or term, to illustrate potential real effects of the reform.[10]

The top panel on the right of Figure 1 shows one potential outcome for the loans originated in the post-period. In this scenario, the same loans are originated and simply reshuffled into different pools, with no change on the primary market originations.

[Figure 1 about here.]

The middle panel on the right shows a second alternative. Loans with different maturities are originated in the post-period and shorter-term loans are originated on average. In this scenario, the lender pools the original two 120 month loans with each other to reach a 100% minimum maturity ratio. Then it originates a 127 month loan to partially accommodate its borrowers requesting long-term loans while maintaining its option of pooling the loan with a 120 month loan and satisfying the 94% minimum maturity ratio. Once the lender originates

[10]Since WAC and Standard pools both have the same minimum maturity ratio in the post-period, the diagram abstracts away from whether what would have been WAC loans in the pre-period were put into Standard pools in the post-period, or vice versa, while this is also an interesting question.

the 127 month loan, it may be willing to originate a 135 month loan, which now satisfies a 94% minimum maturity ratio when pooled with the 127 month loan. This second panel on the right hand side shows a shortening of loan maturities on average in the post-period.

The last panel on the right shows a third alternative. Loans with different maturities are originated in the post-period, and longer-term loans are originated on average. In an analogous way to the middle panel, the lender now starts with its two longer term loans, the 150 and 157 month loans and pools those together to reach a 95.5% minimum maturity ratio. Since it has a 150 month loan originated, it may be willing to originate a 141 month loan, maintaining its option of pooling that loan with a 150 month loan to reach a minimum maturity ratio of 94%. After it has the 141 month loan originated, it may be willing to originate a 133 month loan, which satisfies a 94% minimum maturity ratio when pooled with the 141 month loan. This third panel on the right hand side shows a lengthening of loan maturities on average in the post-period.

In order to understand how the policy change affects the sale of small business loans into the secondary market, and thus its potential to affect the primary market, we utilize our novel 1086 and 1454 data, which allow us to study loans sold into securitized pools. The 1454 data allow us to determine which loans are sold into the same pool and therefore enables us to calculate pool level maturity ratios.

Using the raw data, Figure 2(a) reports the standard deviation of maturity within a pool pre- versus post-policy change, separately for WAC and Standard pools. The standard deviations should decline in the post-period since the MMR change was intended to standardize the maturities of loans in a pool. Consistently, the figure shows that post-reform, the standard deviation of maturities within a pool declines for both Standard and WAC pools, however it declines disproportionately more for WAC pools. The sharp decline among WAC pools suggests that pre-reform, loans in WAC pools were more varied in term and thus, following the change, needed more reform to meet the tighter post-period maturity ratio.

[Figure 2 about here.]

Figure 3(a) plots the average maturity ratios for both WAC and Standard pools in the pre- and post-period. The figure shows that the average maturity ratio in the pre-period for WAC pools was close to 94% and increased sharply to about 98% in the post-period. For Standard pools, the average maturity ratio was close to 98% in the pre-period and rose to 99% in the post-period. However, in Figure 3(b), we show that the minimum of maturity ratios for WAC pools appears to be exactly at their constraint of 76% in the pre-period, suggesting that the constraint binds for at least some pools. Standard pools show slightly more slack, with their minimum maturity ratio rising above the 80% minimum at points in the pre-period. If indeed the majority of pools had a maturity ratio of at least 94% – as the

Federal Register's quote above suggests – and few pre-period pools were at the pre-period minimum constraint, the reform should have limited effects on the secondary market, and therefore limited effects on the primary market.

[Figure 3 about here.]

However, Figure 4(a) plots the distribution of pool maturity ratios pre- and post-reform for WAC versus Standard pools. Red represents WAC pools, and green represents Standard pools. The light shade of each color indicates the pre-period and the dark shade indicates the post-period. We show that over 40% of WAC pools, a significant portion, were at the 76% minimum maturity ratio constraint in the pre-period. This suggests that a significant fraction of pools were below the 94% minimum maturity ratio and would thus be exposed to substantial reorganization of loans in pools in the post period.

[Figure 4 about here.]

Figure 4(b) plots the distribution of loan maturities for WAC versus Standard loans pre- and post-reform. We report the total number of loans in each category, which reveals that the number of loans in WAC pools almost halves in the post period, shedding close to 9,000 loans. In contrast, Standard loans increase in volume in the post-period, partially substituting the loss of WAC loans but are an incomplete substitute and do not fully compensate for the number of WAC loans lost. The majority of the WAC pool decline is concentrated among longer-term loans of 200 to 300 months, while the Standard pool increase is concentrated among 120 month loan terms. These descriptive statistics suggest that post-reform, there are fewer longer-term loans sold into the secondary market.

Figure 5 plots the volume of WAC versus Standard loans originated during 2014Q4 through 2019Q4, both by total number and total loan balance. Panels (a) and (c) show that prior to the reform, total volumes moved in parallel to each other for WAC and Standard loans. WAC loans accounted consistently for a larger volume than Standard loans. Following the reform, originations decline meaningfully for WAC loans, measured both by number and total balance of loans originated. The decrease in WAC originations is partially offset by an increase in loans pooled into Standard pools. Following the policy change, Standard loans account for a larger volume than WAC loans by both metrics. Panels (b) and (d) plot the total loan volumes across both WAC and Standard loans. They show that prior to reform, SBA total loan volume was on an increasing trend. However, the policy change coincided with a plateauing or decrease in total SBA loan volume.

[Figure 5 about here.]

To understand the direction and magnitude of the maturity ratio reform's effect on the primary market, we first document stylized facts about loan maturities across both securitized and unsecuritized loans in the 7(a) data. Figure 6(a) shows that maturities for securitized loans shifted downward during 2014Q4 through 2019Q4, while maturities for unsecuritized loans shifted upward, converging closer to securitized loans. The downward shift in maturities of securitized loans is also observed in Figure 6(b), which shows that securitized and unsecuritized maturities converged post-2017, especially toward 10-year, 120-month, loan terms. Specifically, for securitized loans the mass at 300 month maturities shrank while the mass at 120 month maturities increased. Conversely, pre-2017, unsecuritized loans had larger mass at shorter loan terms, those at or below 100 months, which declined post-reform and was partially offset with longer term loans, such as 300 month loans.

Anecdotally, many SBA loans fit into two categories, working capital and real estate/machinery loans. Real estate or machinery loans typically have longer maturities, usually over 120 months, while working capital loans typically have shorter maturities. MMR reform can have significant real impacts on small business lending, since it can impact the mix of loans available and ultimately provide more funding to a subgroup of borrowers.

[Figure 6 about here.]

3 Secondary Market Analysis

3.1 Estimation Strategy

We first estimate how the minimum maturity ratio (MMR) reform impacted loans sold into the secondary market. To do so, we exploit differential exposure of loans placed in WAC pools prior to the reform, relative to loans placed in Standard pools, as discussed in Section 2.2. WAC pools experience a larger tightening of the minimum maturity ratio policy change, moving from 76% to the post-period minimum maturity ratio, while Standard pools move from 80% to the post-period ratio. A standard difference-in-differences analysis comparing WAC to Standard pool loans, however, would not isolate the effect of MMR on loans' secondary market outcomes, since the reform could also impact the selection of loans into the treated WAC group.

Constructing the Instrument

To remedy this issue, we calculate lenders' and pool assemblers' pre-period share of WAC loans and use this as a shifter of a loan being in a WAC pool after the reform, following

the instrumented difference-in-differences design discussed in Ye et al., 2023. This research design identifies the effect of MMR on "complier" WAC loans, which were put into WAC pools due to lender and pool assembler's general propensity to engage in WAC lending rather than due to the individual loan's characteristics.

To implement the instrumented difference-in-differences, we first predict WAC by regressing an indicator for WAC loan, (i), on lender and assembler fixed effects, utilizing only pre-period data. We estimate the following regression:

$$WAC_i = \alpha_a + \delta_j + \varepsilon_i. \tag{1}$$

Where WAC_i is an indicator equal to one if loan i was sold into a WAC pool, α_a are fixed effects for assembler a, and δ_j are fixed effects for lender j. Lender fixed effects control for heterogeneous funding costs and other demand side differences across lender business models. Standard errors are heteroskedasticity-robust.

We then predict the $\widehat{WAC_i}$ status of all loans, both pre- and post-reform, using only the coefficients on the lender and assembler fixed effects, to ensure our predictions utilize WAC lenders' business model prior to the policy change. Figure 7 plots a histogram of our predicted $\widehat{WAC_i}$.

[Figure 7 about here.]

Appendix Equation 15 estimates a robustness check for Equation 1. It estimates the same regression, on the pre-period data, except that it includes controls alongside lender and assembler fixed effects. The prediction then uses only lender and assembler fixed effects. Figure A2 plots the predicted WAC generated by both Equations 1 and 15 and shows that they are highly correlated and all of the results, in the remainder of this section, hold with either prediction measure.

Instrumented Difference-in-Differences Approach

Next, we estimate an instrumental variable (IV) difference-in-differences regression that instruments the difference-in-differences term $WAC_i \times Post_t$, the actual WAC status interacted with the post-period, with our predicted $\widehat{WAC_i} \times Post_t$, as suggested by Ye et al., 2023. Like a traditional difference-in-differences, this design measures the differential change in outcome variables for WAC loans (treated group) relative to Standard loans (control group), post- relative to pre-policy change. The IV removes potential confounding from

ex-post selection of different types of loans into treated WAC pools. It is unaffected by post-reform differential selection into WAC pools, since treatment is instrumented by pre-period predicted exposure. The IV, or two-stage least squares (2SLS) approach, recovers the causal effect of the MMR reform on complier WAC loans—those assigned to WAC pools because of pre-period lender and assembler business models or dependence on WAC lending. The estimated coefficient should thus be interpreted as the effect of the MMR reform on complier loans.

The first stage regresses the interaction term between actual WAC_i and post-period on the interaction term between predicted $\widehat{WAC_i}$ and post-period, and controls for actual WAC_i, the post-period, predicted $\widehat{WAC_i}$, and fixed effects for borrower zip code. Results showing a positive correlation between the instrument and the endogenous variable in the first stage are reported in Appendix Table A1. We then estimate the fitted value $\widehat{WAC \times Post}_{it}$, predicted using $\widehat{WAC_i} \times Post_t$, and use the fitted value in the second stage. We utilize the following regression specifications:

$$WAC_i \times Post_t = \hat{\beta}\widehat{WAC_i} \times Post_t + \hat{\pi}WAC_i + \hat{\mu}Post_t + \hat{\sigma}\widehat{WAC_i} + \hat{\gamma}_z + \hat{u}_i \tag{2a}$$

$$Y_i = \beta\widehat{WAC \times Post}_{it} + \pi WAC_i + \mu Post_t + \sigma\widehat{WAC_i} + \gamma_z + u_i. \tag{2b}$$

At the loan level (i), the dependent variable consists of $Term_i$, a loan's maturity, $\log(GrossApproval_i)$, the logged loan amount, $NetSpread_i$, the net interest rate charged above the base rate on a loan, $OriginatorFee_i$, the originator fee charged on Standard loans to allow higher interest rate loans to be added to a lower interest rate pool, $PricePaid_i$, the price an assembler pays the lender to purchase a loan, and $SBAUserFee_i$, a fee that the SBA can charge on loans with a price paid by the assembler above 110% of par.[11] We utilize our fully merged 1086, 1454, and 7(a) loan level data. $\widehat{WAC_i}$ is the predicted probability of being a WAC loan, predicted based on lender and assembler fixed effects in Equation 1. $Post_t$ is an indicator variable for whether a loan was originated in or after 2017Q3, the period following the minimum maturity ratio reform announcement (inclusive). $\widehat{WAC \times Post}_{it}$ denotes the fitted values from Equation 2a. The coefficient of interest, β in Equation 2b, identifies the causal effect of $\widehat{WAC \times Post}_{it}$, the post-period WAC, instrumented by $\widehat{WAC_i} \times Post_t$. γ_z and $\hat{\gamma}_z$ represent fixed effects for borrower zip code. Standard errors are clustered at the lender level to account for correlation in outcomes within lender.

To be a valid estimate of the causal impact of exposure to the minimum maturity ratio on WAC loans, the assumptions for valid instrumented differences-in-differences specified in Appendix B must hold. Note that instrumenting the interaction term converts $WAC_i \times Post_t$

[11] According to Form 1086, the SBA user fee is a fee that the SBA is entitled to that is equal to 50% of the portion of the sale price in excess of 110 percent of the outstanding principal amount of the loan's guaranteed portion.

into a continuous probability, $\widehat{WAC \times Post_{it}}$. This includes both WAC and Standard loans in the post-reform period, but assigns each the probability of being in a WAC pool based on the lender and assembler's pre-period portfolio. Since the instrumented value is continuous, the second stage utilizes all loans in the post-period, regardless of whether they are WAC or Standard loans, meaning the estimated effect is driven by lender-assembler level changes rather than by reorganization within lender-assembler.

The key assumption in Appendix B is Assumption 2, the modified IVDID exclusion restriction. The exclusion restriction requires that the instrument, $\widehat{WAC_i} \times Post_t$, affects our second stage dependent variables only through its effect on the likelihood that a given loan is placed in a WAC pool in the post-period, conditional on the included controls. The design conditions on the lender's predicted WAC exposure, and identifies changes in likelihood of placing a loan in a WAC pool in the post-period. A violation of the exclusion restriction would occur, therefore, if for example, the *difference* in price paid for WAC relative to Standard loans in the secondary market, after versus before 2017Q3, was driven directly by a lender-assembler pairs' pre-period likelihood of originating WAC loans. The base levels of price paid on WAC and Standard loans may indeed be different in the pre-period, and can fluctuate without violating the exclusion restriction as long as they trend in parallel. We assume, therefore, that lenders and assemblers with different pre-period WAC shares would have similar changes to their outcomes for WAC, relative to Standard loans, after 2017Q3, except for the introduction of the MMR reform. Moreover, we assume that there were no other changes in 2017Q3, concurrent with MMR reform, that differentially impacted lender-assembler pairs with different WAC shares and would have generated changes in loan outcomes for those two groups.

The institutional details suggest that the exclusion restrictions are satisfied. Lenders and assemblers were not likely to select their pre-period WAC shares in anticipation of future changes in the minimum maturity ratio. Changes to the ratio were infrequent and unexpected prior to 2017. The minimum maturity ratio had never changed since its 2008 inception for WAC pools and for Standard pools, it had not changed since 2005. We utilize the announcement date of July 2017 to begin our post-period, however, the change was not effective until October 2017. It was passed without notice-and-comment and we have found no evidence suggesting that the change was anticipated prior to July. Moreover, we spoke with government officials, lenders, and pool assemblers about possible concurrent changes in 2017 but were not made aware of any other reform that would have shifted outcome differences between WAC and Standard loans differentially for lender-assembler pairs with high pre-period WAC share. Finally, the decision to engage in WAC or Standard lending depends on the lender's underwriting standards and the pool assemblers' target investors. When a pool assembler is building a WAC pool due to high demand from investors such as insurance companies, who can take on the high risk and high returns associated with WAC pools, they can target lenders whose underwriting guidelines allow for more WAC lending.

The relevance condition requires that the instrument $\widehat{WAC_i} \times Post_t$ is correlated with $WAC_i \times Post_t$. The F-statistic reported in Table 2 is above 3,900, indicating that $\widehat{WAC_i} \times Post_t$ is a strong instrument for $WAC_i \times Post_t$. We report first stage results and discuss remaining assumptions in Appendix B.

3.2 Results on Secondary Market Outcomes

The relative decrease in standard deviations of maturity within WAC pools is consistent with the MMR reform imposing larger costs on creating WAC pools. The increase in homogeneity of loan terms suggests that there are spillovers among loans within a pool post reform. Not only do a single borrower's characteristics matter for originating a loan, but the characteristics of other borrowers it may be pooled with also matter. In order to establish the effect that this has on loan characteristics and the price that assemblers are willing to pay for loans, we study loan level data at the point of a loan's sale into the secondary market – or sale from the originator to the pool assembler.

Table 2 and Figure 8 report the results from Equation 2b and its dynamic equivalent. Figure 8(a) shows that the dynamic pre-period coefficients are small, statistically insignificant, and demonstrate parallel trends across all specifications. A change in the instrumented post-period WAC status from 0 to 1 causes a significant 67 month decline in loan term, consistent with lenders shortening maturities on loans in response to the tighter maturity ratio. Panel (b) shows that Net Spread, or net interest rate margin above the base rate, increases significantly by 0.24 percentage points following the reform. Panel (c) shows that originator fees increase by 0.98 percentage points in the post-period, consistent with treated lender-assembler pairs generating larger mismatches between Standard pool and loan interest rates. Panel (d) shows that following the reform, the instrumented WAC status significantly decreased price paid as a percent of par by 1.54 pp. Panel (e) shows that SBA user fees decreased by 0.66 percentage points. The lower SBA user fee is consistent with lower prices paid for the loans. This is because the SBA can only collect an SBA user fee on loans with a sale price above 110% of par, driving SBA user fees down as the price declined. The raw data reported in Figure A1(e) also shows that SBA user fees charged on actual WAC loans declined relative to Standard loans in the post-period. These results indicate that the tighter maturity ratio disproportionately decreased loan term and increased interest rates on loans, consistent with lenders passing increased costs of securitization through to borrowers. Tighter maturity ratios also changed the composition of Standard pools, with lender-assembler pairs placing higher interest rate loans in lower interest rate pools and taking larger originator fees. Finally, tighter MMR resulted in lower fee revenues for the SBA due to the lower prices paid in the secondary market. The results suggest that while the policy change was passed to reduce the SBA's costs, it had a countervailing effect that decreased its revenue as well.

[Figure 8 about here.]

[Table 2 about here.]

The effect on originator fee in Figure 8(c) indicates that exposure to treatment drives lender-assembler pairs to pool higher interest rate loans into lower interest rate Standard pools. This results in an interest rate differential, which would have been paid to investors, to instead be kept by lenders or assemblers. As background, the lender or assembler can take the "originator fee" on Standard pool loans based on the difference between the loan's interest rate and the pool's interest rate–which is determined by the loan with the minimum interest rate in the pool. Consistent with this, Appendix Figure A1(c) shows that all loans actually pooled into WAC pools, both pre- and post-reform, have an originator fee equal to zero. Loans originated by lender-assembler pairs with high pre-treatment WAC propensity – and therefore loans more exposed to variation from the instrument – will have higher originator fees after treatment if they are placed in Standard pools where they have a larger differential from the minimum interest rate in the pool, compared to the pre-period.

If lenders internalize the reform's effect on their ability to sell a loan in the secondary market, they may distort loan maturities or other characteristics in their primary market originations to increase the probability that loans satisfy the new pooling requirements, as depicted in Figure 1. The above results have shown how loan characteristics change for loans with instrumented WAC versus Standard status, within securitized loans. To examine whether these changes in the secondary market influence primary market originations among securitized loans relative to unsecuritized loans, we study what we call "the origination margin," or the effects on loan originations in the primary market.

4 Primary Market Analysis

In this section, we test whether originators internalize the effect of the reform on their ability to sell loans into the secondary market, and change their primary market lending behavior in response. If the MMR reform changes lenders' behavior in the primary market for securitized loans relative to unsecuritized loans, the finding would suggest that lenders are forward looking and internalize changes in their ability to sell loans in the secondary market. If lenders are not forward looking, do not depend on secondary market liquidity, or are able to frictionlessly shift pooling practices, the SBA's maturity ratio reform may have no impact on the primary lending market.

If lenders internalize the effect of the minimum maturity ratio change on their ability to sell a loan into the secondary market, the magnitude and direction of the effect are theoretically uncertain, as depicted in Figure 1. A tighter maturity ratio may cause lenders

to decrease maturity, if it is easier to match maturities among shorter-term loans, or increase maturity if the opposite is true. The effect of MMR on primary-market maturities therefore reveals how maturity is valued in the secondary market: by revealed preference, a maturity shortening implies that lenders view longer-maturity loans as harder to sell in secondary markets. However, even if the reform changed maturities of securitized loans, there may be a countervailing effect on unsecuritized loans, if the unsecuritized market compensates for changes in the securitized market. In this way the magnitude of the effect on the primary market is also ambiguous.

4.1 Estimation Strategy

To assess whether the minimum maturity ratio reform affects the primary market, we compare loan originations of securitized relative to unsecuritized loans. We utilize an instrumented difference-in-differences regression, analogous to Section 3.1. Since the choice of a lender to securitize a loan is not random, to identify the effect of the MMR reform on loan originations, holding constant securitization behavior, we calculate a loan's predicted securitization.

Constructing the Instrument

To do this, we first estimate the following regression using only pre-period loan originations, during 2014Q4-2017Q2:

$$Securitized_i = \delta_j + \epsilon_i. \tag{3}$$

Where $Securitized_i$ is an indicator equal to one if loan i was securitized and δ_j are fixed effects for the j^{th} lender on a loan and standard errors are clustered at the borrower zip code level.

We use the lender fixed effects from this regression to predict a given loan's pre- and post-period securitization propensity. By predicting securitization given lender fixed effects, δ_j, we capture predicted securitization driven by supply side factors without selection on loan characteristics. Once we predict securitization using lender fixed effects, we isolate the part of securitization that is influenced by the lender's need to securitize a loan due, for example, to a lender's cost of capital and need for the additional liquidity that the secondary market provides. We plot a histogram of our predicted securitization measure in Figure 9.

[Figure 9 about here.]

As a robustness check for Equation 3, we estimate the same regression including lender fixed effects as well as controls in Appendix Equation 16 on the pre-period data. Figure A3

plots the predicted securitization generated by both Equations 3 and 16 and shows that they are highly correlated and all of the results in the remainder of the paper hold with either prediction measure.

Instrumented Difference-in-Differences Approach

In order to understand the maturity ratio reform's implications for borrowers' access to credit supplied by the secondary markets, we test whether loans that are predicted to be securitized experience shifts in maturity and performance following the reform. We estimate an instrumented difference-in-differences regression using a loan's predicted securitization status interacted with the post-period to instrument for a loan's actual securitization status interacted with the post-period. By predicting securitization, the specification removes any potential confounding effect of observable characteristics that may be correlated with securitization, mitigating concerns that results may be driven by different loans selecting into securitization.

Specifically, we instrument $Securitized_i \times Post_t$ in a traditional difference-in-differences structure with our predicted $\widehat{Securitized}_i \times Post_t$. This IV setting isolates the portion of variation in $Securitized_i \times Post_t$ that is driven by $\widehat{Securitized}_i \times Post_t$ and studies its effect on outcome variables.

The first stage regresses the interaction term between actual securitization and post-period on the interaction term between our instrument and post-period, controlling for actual securitization, the post-period, predicted securitization, and fixed effects for borrower ZIP code. Results showing a positive correlation between the instrument and the endogenous variable are reported in Table A2. We then estimate the fitted value $\widehat{Securitized \times Post}_{it}$, predicted using $\widehat{Securitized}_i \times Post_t$, and use the fitted value in the second stage. We estimate the following regressions on the Small Business Administration 7(a) data:

$$\begin{aligned} Securitized_i \times Post_t = \hat{\beta}\widehat{Securitized}_i \times Post_t + \hat{\kappa}Securitized_i + \hat{\mu}Post_t \\ +\hat{\mathbf{\Gamma}}\boldsymbol{X_i} + \hat{\rho}\widehat{Securitized}_i + \hat{\rho}_l + \hat{\gamma}_z + \hat{u}_i \qquad (4a) \\ Y_i = \beta\widehat{Securitized \times Post}_{it} + \kappa Securitized_i + \mu Post_t \\ +\mathbf{\Gamma}\boldsymbol{X_i} + \rho\widehat{Securitized}_i + \rho_l + \gamma_z + u_i. \qquad (4b) \end{aligned}$$

Where Y_i is $Term_i$, the maturity of loan i, or $ChargeOff_i$, an indicator for whether loan i defaults, $HighCapitalIntensive_i$, an indicator equal to one if a loan is made to a high-capital-intensive industry — defined as a 3-digit NAICS industry with a pre-period average maturity longer than the average across industries in the 7(a) data. $Post_t$ is an indicator

variable for whether a loan was originated in or after 2017Q3 (inclusive), the period of the minimum maturity ratio reform announcement,[12] and $Securitized_i$ is an indicator variable for whether the loan was securitized. $\boldsymbol{X_i}$ is a vector that contains: $\log(GrossApproval_i)$, the logged loan amount, $InterestRate_i$, the interest rate on a loan, $JobsSupported_i$, the number of jobs created and retained by loan i, and fixed effects for lender zip code. $\widehat{Securitized}_i$ is the predicted probability of a loan being securitized, based on lender j fixed effects. Where $\widehat{Securitized \times Post}_{it}$ denotes the fitted values from Equation 4a. The coefficient of interest, β in Equation 4b, identifies the causal effect of post-period securitization, instrumented by $\widehat{Securitized \times Post}_{it}$. The F-statistic is above 355,000, indicating that $\widehat{Securitized}_i \times Post_t$ is a strong instrument for $Securitized_i \times Post_t$. ρ_l and $\hat{\rho}_l$ represent fixed effects for lender zip code. γ_z and $\hat{\gamma}_z$ represent fixed effects for borrower zip code. Standard errors are clustered at the borrower ZIP code level to account for borrower correlation within ZIP code.

The key assumption in Appendix B is Assumption 2, the modified IVDID exclusion restriction. The exclusion restriction requires that the instrument, $\widehat{Securitized}_i \times Post_t$, affects our second stage dependent variables only through its effect on the likelihood that a given loan is securitized in the post-period, conditional on the included controls. The design conditions on the lender's predicted securitization exposure, and identifies changes in likelihood of securitizing a loan in the post-period. A violation of the exclusion restriction would occur, therefore, if for example, the *difference* in maturity for securitized relative to unsecuritized loans, after versus before 2017Q3, was driven directly by a lender's pre-period likelihood of securitizing loans. The base levels of maturity on securitized and unsecuritized loans may indeed be different in the pre-period, and can fluctuate without violating the exclusion restriction, as long as they trend in parallel. We assume, therefore, that lenders with different pre-period securitization rates would have similar changes to their outcomes for securitized, relative to unsecuritized loans, after 2017Q3, except for the introduction of the MMR reform. Moreover, we assume that there were no other changes in 2017Q3, concurrent with MMR reform, that differentially impacted lenders with different securitization rates and generated changes in loan outcomes for those two groups.

The institutional details suggest that the exclusion restrictions are satisfied. Lenders were not likely to select their propensity to securitize in anticipation of future changes in the minimum maturity ratio, as discussed above. Moreover, the fraction of a lender's portfolio that is securitized is a key decision that determines the cost and source of funds for a lender, but once that decision is made, outcomes such as loan characteristics are likely to evolve in parallel across lenders.

The relevance condition requires that the instrument $\widehat{Securitized}_i \times Post_t$ is correlated with $Securitized_i \times Post_t$. The F-statistic reported in Table 3 is above 355,000, indicating that $\widehat{Securitized}_i \times Post_t$ is a strong instrument for $Securitized_i \times Post_t$. We report first

[12] We also estimate the equivalent dynamic versions of Equations 4a and 4b.

stage results and discuss remaining assumptions in Appendix B.

4.2 Results on Primary Market Outcomes

Table 3 and Figure 10 report the results from Equation 4b and its dynamic equivalent. Table 3 and Figure 10(a) report the results for $Term_i$. Table 3 column 1 is our preferred specification including the instrumental DID terms and borrower zip and lender zip code fixed effects to remove geographic trends in borrower demand as well as lender specific characteristics. This regression shows that following the policy change, a shift in actual post-period securitization from 0 to 1, instrumented by predicted post-period securitization, causes the maturity on securitized loans to decrease significantly and sharply by 16.6 months. Table 3 column 2 reports the most saturated specification shown in Equation 4b, also controlling for interest rate, logged loan amount, and jobs supported. The results remain similar in size and significance across both specifications. The figure shows that pre-period coefficients are small, statistically insignificant, and demonstrate parallel trends. Figure 10(a) plots β_t, the coefficient of interest on the interaction between securitized and post period coefficients from the dynamic version of Equation 4b, excluding $\boldsymbol{X_i}$. The figure shows that an instrumented shift in actual securitization interacted with the post period causes a sharp and significant decline in loan term, consistent with Table 3 column 1. The results indicate that lenders shorten maturities on securitized loans in response to the tighter maturity ratio.

[Figure 10 about here.]

[Table 3 about here.]

Table 3 and Figure 10(b) report the results for $ChargeOff_i$. Table 3 column 3 shows that following the policy change, a shift in actual post-period securitization from 0 to 1, instrumented by predicted post-period securitization causes the charge-off rate to decline significantly by 2 pp relative to unsecuritized loans. This specification includes fixed effects for borrower and lender zip code, removing geographic trends in borrower demand and lender-specific characteristics. The result remains similar in size and significance in the most saturated specification in column 4, adding controls for interest rate, logged loan amount, and jobs supported. Figure 10(b) plots the β_t coefficients of interest from the dynamic version of Equation 4b and shows that pre-period coefficients are small, statistically insignificant, and demonstrate parallel trends between securitized and unsecuritized loans. The figure shows that immediately following the reform, loans with higher instrumented post-period securitization experience a sharp and significant 2 pp decline in charge-off rates. The decrease in default as maturity decreases is consistent with theories that shorter debt maturity is associated with lower levels of asymmetric information (Ortiz-Molina and Penas, 2008).

Thus shorter maturities allow lenders to screen more effectively – consistent with lenders shifting toward loans that are easier to screen.

The results document that the maturity ratio reform significantly decreased maturities for securitized relative to unsecuritized loans. Different industries may depend on certain maturity loans, and the SBA guidelines only allow loan maturities greater than 10 years if the loan is used to fund real property or machinery with a useful life longer than 10 years. Therefore, we study whether the policy change changed access to capital for low-capital-intensive relative to high-capital-intensive industries.

To do so, we classify industries as high- or low-capital-intensive. Our $HighCapitalIntensive_i$ indicator equals one if a loan is in a 3-digit NAICS subsector that is categorized as high-capital-intensive, which are subsectors with average pre-period maturity longer than the average maturity across all loans in the pre-period. This generates a mapping between 3-digit NAICS codes and high-capital-intensive industries that we apply across our whole data set, both pre- and post-reform. We estimate our instrumented difference-in-differences regression in Equation 4b, as well as its dynamic equivalent, with $HighCapitalIntensive_i$ as the outcome in order to document the effect of the policy change on lending to high-capital-intensive industries.

Table 3 and Figure 10(c) report the results for $HighCapitalIntensive_i$. Table 3 column 5, our preferred specification, including borrower and lender zip code fixed effects, shows that following the policy change, a shift in post-period actual securitization, instrumented by post-period predicted securitization, decreases the probability of originating a loan in a high-capital-intensive industry by 3 pp. The result remains significant and similar in magnitude in the most saturated specification in column 6, which controls for interest rate, logged loan amount, and jobs supported alongside lender and borrower zip code fixed effects. Figure 10(c) plots the β_t coefficients of interest from the dynamic version of Equation 4b and shows that pre-period coefficients are small, statistically insignificant, and demonstrate parallel trends. The figure shows that immediately following the reform, there is a large and significant relative decline in securitized loan originations to high-capital-intensive industries, consistent with the tighter MMR constraining the maturities available to borrowers in capital-intensive sectors that disproportionately demand longer-term financing, and redirecting securitized credit toward industries with shorter maturity needs. These results are consistent with the policy change reallocating SBA lending away from high-capital-intensive, and towards low-capital-intensive industries.

5 Aggregate Effects

5.1 Aggregate SBA Lender Results

To study the aggregate effect of the policy change on lender behavior, we aggregate the data to the lender by quarter level.

Aggregate Secondary Market Effects

The results in Section 3 establish that WAC loans are differentially exposed to the shock relative to Standard loans. In order to causally establish reform driven aggregate effects on lender origination behavior for lenders who are exposed to the reform, we need to rule out the possibility that treated loans in the IVDID approach drove no shift in lenders' overall portfolio.

To do this, we study lenders' total loan portfolios each quarter for more- versus less-exposed lenders. We create lender level pre-period exposure to the reform by estimating Equation 5 on the pre-period data to estimate lender level fixed effects $LenderWACRate_j$:

$$WAC_i = LenderWACRate_j + \varepsilon_i. \tag{5}$$

Where WAC_i is an indicator variable for whether each loan is a WAC loan and $LenderWACRate_j$ are fixed effects for each lender j. These fixed effects measure each lender's pre-period average rate of WAC lending, subtracting out the overall sample mean rate of WAC lending for the whole pre-period sample average. These fixed effects can be interpreted to proxy for how dependent a particular lender was on WAC lending prior to treatment.

We then aggregate the data to the lender-quarter level and estimate the following treatment-intensity difference-in-differences research design. The regression calculates the total average effect for lenders who are more exposed to WAC loans in the pre-period. This is akin to an intent-to-treat research design. Specifically, it measures the average post-period change across both WAC and Standard loans in a lender's portfolio for lenders who are more treated. If, for example, loans whose WAC status was predicted by lenders' pre-treatment propensity to do WAC lending comprised a small part of the lender's overall portfolio, there may be no significant difference in that lender's overall portfolio average outcome, relative to a lender with a lower pre-treatment WAC propensity. A significant β indicates that the reform drives an effect on the lender's overall origination behavior – establishing that relative to lenders with lower pre-period WAC exposure, lenders with higher exposure change their aggregate origination behavior across both WAC and Standard loans in the post-period.

We estimate the following regression:

$$Y_{j,t} = \beta LenderWACRate_j \times Post_t + \pi LenderWACRate_j + \mu Post_t + u_{j,t} \quad (6)$$

Where $Y_{j,t}$ represents $OriginatorFee_{j,t}$, the average originator fee charged on all loans originated by lender j in quarter t, $PricePaid_{j,t}$, the average price paid as a percentage of par for all loans originated by lender j in quarter t, and $SBAUserFee_{j,t}$, the average SBA user fee charged on all loans originated by lender j in quarter t. $Post_t$ is an indicator for 2017Q3 and the following quarters. $LenderWACRate_j \times Post_t$ captures whether lenders with higher pre-period WAC loan exposure experience differential changes in secondary market pricing and fee outcomes following the reform.

Table 4 reports the results of Equation 6 estimated at the lender-quarter level and shows that lenders with 10% higher pre-period WAC exposure experience a statistically significant 13 basis point increase in average originator fee across their whole loan portfolio in the post-period. Therefore, lenders with high propensity to engage in WAC lending pre-treatment are more likely to put loans into Standard pools that have a more mismatched interest rate after treatment. Since originator fees allow lenders or assemblers of Standard pools to claim part of the interest that would accrue to investors in WAC pools, this result suggests that lenders and/or assemblers received a larger fraction of interest payments in the post-period.

A 10% increase in pre-period lender exposure to WAC loans drives the average price paid for all loans in the lender's portfolio to decline by 0.12 percentage points, consistent with exposure to the maturity ratio reform reducing the average liquidity of a lender's portfolio. Similarly, SBA user fees decline by 0.04 percentage points for lenders with a 10% higher pre-period WAC exposure. This is because the SBA user fee can only be charged on loans with a price at or above 110% of par, and as price declines, so too do the fees the SBA can collect on loans. Together, these aggregate results indicate that lender exposure to the maturity ratio reform decreases the average liquidity of lenders' loan portfolios in the secondary market – driving a lower average price paid as a percent of par across both Standard and WAC loans sold into the secondary market by a lender. The reform also drives a shift of previously WAC-destined loans into Standard pools and lowers the aggregate fee revenue collected by the SBA, despite the reform being implemented to decrease SBA costs.

[Table 4 about here.]

Aggregate Primary Market Effects

The results in Section 4 establish that securitized loans are differentially exposed to the shock relative to unsecuritized loans. In order to causally establish reform driven aggregate

effects on the primary market for SBA lending for lenders who are exposed to the reform, we need to rule out the possibility that lenders frictionlessly reallocate securitized loans to pools with more granular maturity ranges in the post-period with no change to underlying loans originated.

To do this, we study lenders' total loan portfolios for more- versus less-exposed lenders each quarter. We create lender level pre-period exposure to the reform by estimating Equation 7 on the pre-period data to estimate lender level fixed effects $LenderSecuritizedRate_j$:

$$Securitized_i = LenderSecuritizedRate_j + \varepsilon_i. \tag{7}$$

Where $Securitized_i$ is an indicator for whether each loan is a securitized loan and $LenderSecuritizedRate_j$ are fixed effects for each lender j. These fixed effects measure each lender's pre-period average rate of securitized lending, subtracting out the overall sample mean rate of securitized lending for the whole pre-period sample average. The fixed effects can be interpreted to proxy for how dependent a particular lender was on securitized lending prior to treatment.

To study whether following the policy change, lenders with higher securitization exposure disproportionately change their lending relative to their pre-period lending, we estimate the treatment-intensity difference-in-differences research design in Equation 8. Similar to Section 5.1 this is akin to an intent-to-treat research design. Specifically, the β coefficient on the interaction term of interest measures the average post-period change, across both securitized and unsecuritized loans in a lender's portfolio, for lenders who are more treated. A significant β indicates that, relative to less exposed lenders, more exposed lenders change their aggregate lending behavior across both securitized and unsecuritized loans in response to the reform.

$$Y_{j,t} = \beta LenderSecuritizedRate_j \times Post_t + \pi LenderSecuritizedRate_j + \mu Post_t + u_{j,t} \tag{8}$$

Where $Y_{j,t}$ is $Term_{j,t}$, the average loan maturity in months across the j^{th} lender's entire portfolio of securitized and unsecuritized loans in quarter t, $ChargeOff_{j,t}$, the average charge-off rate across all lender j's loans in quarter t, $HighCapitalIntensive_{j,t}$, the fraction of lender j's loans in quarter t made to high-capital-intensive industries —where high-capital-intensive industries are defined as in the variable description of Equation 4b, $> \$150KLoans_{j,t}$, the fraction of all lender j's loans in quarter t that are above \$150,000, $< \$150KLoans_{j,t}$, the fraction of all lender j's loans in quarter t that are below \$150,000 in a given quarter, $Agriculture\&Forestry_{j,t}$, the fraction of all lender j's loans in quarter t to the 2-digit NAICS code Agriculture Forestry Fishing and Hunting, and $Administrative\&WasteMgmt_{j,t}$, the fraction of all lender j's loans in quarter t to the 2-digit NAICS code Administrative Support, Waste Management and Remediation. $LenderSecuritizedRate_j$ is a lender's pre-period securitization rate generated in Equation 7 and assigned to the lender-quarter.

$LenderSecuritizedRate_j \times Post_t$ captures whether lenders with higher pre-period exposure to securitized loans experience differential changes in primary market outcomes following the reform. Standard errors are calculated using heteroskedasticity-robust estimators.

Table 5 reports estimates of Equation 8 at the lender-quarter level. The results show that moving from 0% to 10% pre-period lender securitization exposure drives a significant 1 month decline in average loan term in the post-period relative to the pre-period, consistent with the loan-level results and confirming that the reform shortened maturities across the entire lending portfolio – including both securitized and unsecuritized loans – of more-exposed lenders. The same shift in pre-period securitization exposure drives a significant 0.15 pp decline in average charge-off rates, across both securitized and unsecuritized loans, consistent with the reform shifting exposed lenders toward shorter-term, lower-risk loans. More-exposed lenders also shift their originations toward smaller loans. Specifically, the average share of loans above $150,000 declines by 0.5 pp while the share of loans below $150,000 increases by a symmetric 0.5 pp in the post-period.

Table 5 also shows that, relative to lenders with low securitization exposure, lenders with 10% higher pre-period exposure experience a 0.3 pp decline in their share of lending to high-capital-intensive industries – across both their securitized and unsecuritized loans – following the reform. To further decompose the change in lender behavior as a result of the MMR reform, we study two example industries at the two-digit NAICS sector level. One is categorized as high-capital-intensive – Agriculture Forestry Fishing and Hunting – because it has an average pre-period loan term above 120 months, available only to loans purchasing assets with useful lives over 10 years, such as real estate or large capital investments. The other industry is categorized as low-capital-intensive – Administrative Support Waste Management and Remediation Services – and has an average pre-period loan term below 120 months, indicating that the majority of loans in the sector are below the SBA's 10 year term cutoff for loans that do not purchase physical capital with a useful life longer than 10 years. The results show that a 10% increase in lender pre-period exposure to securitization drives the fraction of loans made to the high-capital-intensive sector – Agriculture, Forestry, Fishing and Hunting – to decline by 0.1 pp and the fraction of loans made to the low-capital-intensive industry – Administrative Support, Waste Management and Remediation – to increase significantly by 0.2 pp, relative to less-exposed lenders in the post-period.

Taken together, the lender-quarter results confirm that the reform changes lenders' origination behavior in the primary market and drives aggregate effects: reorienting exposed lenders toward shorter-maturity, smaller, low-capital-intensive loans. Unsecuritized loans are not able to fully compensate for changes in securitized loans – because if they were, we should see a null result for more exposed lenders – in other words, their unsecuritized loans changed to compensate for changes in securitized loans, yielding no change in aggregate average lending for more-treated lenders. Thus, our results show that secondary market reforms

can cause significant distributional consequences for the primary market.

[Table 5 about here.]

5.2 Aggregate Results Across SBA and Non-SBA Lenders

Section 5.1 demonstrates that the maturity ratio reform decreases securitized SBA lending for longer-term high-capital-intensive loans, and unsecuritized SBA lending is not fully able to compensate for this decline. Craig, Jackson III, and Thomson (2007) finds that SBA-guaranteed lending has an observable and significant impact on local economic performance and growth, suggesting that local market outcomes are affected by changes in SBA lending. Additionally, SBA programs are intended to facilitate access to capital for borrowers with limited alternative private market options.[13] Taken together, this suggests that MMR reform, which differentially impacts high- and low-capital-intensive industries, may have real effects on local economies depending on whether a particular county has more exposure to those industries. In this section we explore whether counties with large high-capital-intensive industry shares, which were more exposed to the decline in SBA funding, experienced changes in real outcomes as a result.

We estimate a treatment-intensity difference-in-differences research design that studies business outcomes at the county level for high-capital-intensive relative to low-capital-intensive industries. We define treatment intensity as the fraction of high-capital-intensive establishments in a county in the pre-period, because these are the establishments most likely affected by the policy change. Specifically, these counties are both more likely exposed to longer-term loans and to persistent capital policies making it difficult to pivot toward short-term industries. This analysis provides suggestive evidence on the local economic impacts of MMR reform – if impacted industries were able to substitute into other forms of credit and there were no other concurrent forces differentially impacting more treated counties, there should be no difference in the evolution of outcomes in treated relative to control counties.

We utilize our designation of NAICS codes as either high-capital-intensive or low-capital-intensive, discussed following Equation 4, and the analysis covers all NAICS codes receiving SBA loans. We calculate the fraction of establishments in each county that are high-capital-intensive during the pre-period, using the Bureau of Labor Statistics' Quarterly Census of Employment and Wages (QCEW).[14] In Figure 11, we show that the counties defined as high-capital-intensive in the QCEW data are likely to be high-capital-intensive in SBA data as well, suggesting that SBA industries are largely representative of the larger population of establishments in that county.

[13] For a list of targeted business types, see e.g., https://www.sba.gov/business-guide/grow-your-business.
[14] See: https://www.bls.gov/cew/downloadable-data-files.htm#NAICS_BASED

[Figure 11 about here.]

We then study how outcomes vary post- relative to pre-reform across high- versus low-capital-intensive industry counties. $Post_t$ is an indicator equal to one in and following 2017Q3. We estimate the following regression:

$$Y_{c,t} = HighCapitalIntensive_c \times Post_t + HighCapitalIntensive_c + \gamma_s + \mu_t + \epsilon_{c,t} \quad (9)$$

Where $Y_{c,t}$ represents $SBA_HCIfraction$, the fraction of SBA loans in that county originated to high-capital-intensive industries in a given quarter, $\log(Employment_{c,t})$, the logged employment in a county each quarter, $\log(Establishments_{c,t})$, the logged number of establishments in a county each quarter, and $\log(TotalWages_{c,t})$ the logged total wages in a county and quarter. γ_s are state fixed effects, and μ_t are year-quarter fixed effects.

To validate this approach, we first look at $SBA_HCIfraction$ in the SBA data as an outcome. If MMR reform differentially shifts the allocation of SBA lending across QCEW high-capital-intensive industries and low-capital-intensive industries, we can use the QCEW county designation as a proxy for intensity of treatment by MMR. The results are reported in Table 6. They confirm that counties with high HCI share in the pre-treatment period, as defined in the QCEW data, experienced a disproportionate drop in lending to high-capital-intensive industries, consistent with high HCI fraction being a valid shifter of exposure to MMR in Census data.

[Table 6 about here.]

We then turn to real impacts on the local economy, using total employment, total establishments, and quarterly wages as outcomes. Table 7 reports the results of Equation 9 estimated at the county-quarter level using QCEW data. The coefficient of interest, $HCI\ Fraction \times Post$, captures whether counties with a higher share of high-capital-intensive establishments experience differential changes in employment, number of business establishments, and wages following the SBA's minimum maturity ratio reform. The results show that a 10 percentage point increase in a county's high-capital-intensive industry share drives a statistically significant 0.4% decline in employment, a 0.4% decline in the number of establishments, and a 0.4% decline in total quarterly wages in the post-period. These real economic effects are consistent with the SBA lending channel documented above: the reform disproportionately reduced SBA credit access for high-capital-intensive industries, and this credit contraction propagated into lower employment, business activity, and wages in the counties most exposed to those industries. Taken together, these results suggest that

the MMR reform did not merely reshuffle loan maturities in the SBA secondary market, or across SBA securitized and unsecuritized loans, with primary market originations left unchanged and non-SBA credit stepping in to compensate. Instead, it appears to have generated measurable real economic consequences in counties disproportionately reliant on high-capital-intensive firms, which were impacted by the SBA MMR reform.

[Table 7 about here.]

5.3 Discussion

The results of our analysis shed light on the mechanisms by which secondary market regulation impact primary markets. The evidence is consistent with lenders being forward looking and strategic in originations, since maturities, as well as other loan and borrower characteristics, shifted with the MMR reform. The decrease in maturities suggests that short maturity loans are relatively less costly to originate or pool than long maturity loans. Changes in loan characteristics demonstrate that lenders reprice in response to MMR reform, and either implicitly or explicitly target different borrower populations as a result.

The SBA's minimum maturity ratio regulation provides a case study where changing the relative cost of securitization of different loans can shift originations towards less costly sectors. However, it comes at the expense of decreased incentive to lend to borrowers that are more costly to *pool*, but just as profitable to *originate* – such as small business loans with longer maturity. Secondary market structure and regulation can distort primary market incentives, therefore, beyond well studied effects associated with altering incentives to originate-to-distribute.[15] Future regulations may implicitly increase the relative cost of originating certain types of small business loans by altering standardization requirements, such as the CFPB's 1071 rule, and these may have even larger impacts on re-allocating access to capital. [16,17]

Our results shed light on the potential impacts of similar regulations in other markets, such as rules changing the cost of securitizing certain loan types in the market for Government-Sponsored Enterprise (GSE) mortgages. A rule that limited the maturity of loans included in GSE pools would likely have significant effects on mortgage originations, shifting maturities toward more common, less costly, or easier to screen loans. Our results

[15]The SBA market requires lenders to retain a portion of the loan on lenders' balance sheet, therefore alleviating concerns associated with the "originate-to-distribute" model.

[16]Recent rule making pursuant to Section 1071 of Dodd Frank requires standardized reporting of small business loans. Questions of standardization are deeply relevant to securitization of small business loans, which have different sources of collateral and highly varied risk across industries (*U.S. Department of the Treasury Releases Policy Brief on Small Business Financing* 2025).

[17]Whether servicing fees are set at the loan level or at the pool level can also impact loan performance. Fees that are uniform across a pool interact with the amount of pool standardization to impact loan outcomes (Lewis and Padi, 2025).

further suggest that current restrictions on loan characteristics in GSE mortgage pools, such as the rule limiting the spread of interest rates in a Fannie Mae pool to be within 87.5 basis points of each other, may be significantly impacting mortgage loan originations. Relaxing this constraint, and allowing higher interest rate loans to be pooled with lower interest loans, may result in the re-allocation of mortgage loan supply towards higher interest rate borrowers, which often include high risk or vulnerable households. Similar impacts may also occur if rules were imposed on non-guaranteed markets, such as asset-backed securities pooling private-label mortgages, auto loans, student loans, corporate loans, or other assets.

6 Conclusion

This paper provides causal evidence that secondary market regulation can have significant real effects on primary market lending. We exploit novel FOIA data and an instrumented difference-in-differences research design to study the 2017 SBA reform that tightened minimum maturity ratios within securitized loan pools as a natural experiment. We document that requiring more homogeneous maturities within a pool increases the cost of originating longer-term loans. Our findings show that constricting the range of maturity ratios that can be pooled together in the SBA setting decreases liquidity in the secondary market. Moreover, it shifts the composition of credit away from high-capital-intensive industries toward shorter-term working capital borrowers, functioning as an implicit form of "industrial policy." Instrumented difference-in-differences estimates show that more-exposed lenders originate shorter-maturity loans with higher net spreads and lower secondary market prices post-reform. Default rates fall — consistent both with reduced adverse selection as well as reduced access to credit for harder-to-originate borrowers. Aggregate declines in county level employment, establishments, and wages in areas concentrated in exposed industries suggest that SBA maturity reforms had real impacts on local economies – indicating that firms had limited ability to substitute toward alternative credit access. More broadly, our results suggest that pooling heterogeneous maturities shifts the relative cost of securitizing different loan types, which both shifts loan characteristics and re-allocates access to capital across borrowers, with real economic consequences.

References

Alexandrov, Alexei, Thomas S. Conkling, and Sergei Koulayev (Oct. 2024). "Changing the Scope of GSE Loan Guarantees: Estimating Effects on Mortgage Pricing and Availability". en. In: *The Journal of Real Estate Finance and Economics* 69.3, pp. 409–451. ISSN: 1573-045X. DOI: 10.1007/s11146-022-09910-3. URL: https://doi.org/10.1007/s11146-022-09910-3 (visited on 03/18/2025).

Bachas, Natalie, Olivia S Kim, and Constantine Yannelis (2021). "Loan guarantees and credit supply". In: *Journal of Financial Economics* 139.3, pp. 872–894.

Berger, Allen N, Christa HS Bouwman, et al. (2024). "Piercing through opacity: Relationships and credit card lending to consumers and small businesses during normal times and the COVID-19 crisis". In: *Journal of Political Economy* 132.2, pp. 484–551.

Berger, Allen N, Marco A Espinosa-Vega, et al. (2005). "Debt maturity, risk, and asymmetric information". In: *The Journal of Finance* 60.6, pp. 2895–2923.

Berger, Allen N and Gregory F Udell (1995). "Relationship lending and lines of credit in small firm finance". In: *Journal of business*, pp. 351–381.

Bickmore, Elizabeth, Andrew MacKinlay, and Yessenia Tellez (2024). "Old Program, New Banks: Online Banks in Small Business Lending". In: *New Banks: Online Banks in Small Business Lending (March 31, 2024)*.

Boyd, John H and Edward C Prescott (1986). "Financial intermediary-coalitions". In: *Journal of Economic theory* 38.2, pp. 211–232.

Brown, J David et al. (2024). *How Big Is Small? The Economic Effects of Access to Small Business Subsidies*. Tech. rep. IZA Discussion Papers.

Cespedes, Jacelly et al. (2024). "Branching out inequality: The impact of credit equality policies". In: *Available at SSRN*.

Coluccia, Davide M (2025). "Gatekeepers of Growth: Patent Examiners, Innovation, and Industrial Growth in the United States, 1918–1939". In: *Working Paper*.

Craig, Ben R, William E Jackson III, and James B Thomson (2007). "Small firm finance, credit rationing, and the impact of SBA-guaranteed lending on local economic growth". In: *Journal of small business management* 45.1, pp. 116–132.

Darmouni, Olivier and Kerry Y Siani (2025). "Bond market stimulus: Firm-level evidence". In: *Journal of Monetary Economics* 151, p. 103728.

DeFusco, Anthony A. and Andrew Paciorek (Feb. 2017). "The Interest Rate Elasticity of Mortgage Demand: Evidence from Bunching at the Conforming Loan Limit". en. In: *American Economic Journal: Economic Policy* 9.1, pp. 210–240. ISSN: 1945-7731. DOI: 10.1257/pol.20140108. URL: https://www.aeaweb.org/articles?id=10.1257/pol.20140108 (visited on 03/18/2025).

DeMarzo, Peter M (2005). "The pooling and tranching of securities: A model of informed intermediation". In: *The Review of Financial Studies* 18.1, pp. 1–35.

Diamond, Douglas W (1984). "Financial intermediation and delegated monitoring". In: *The review of economic studies* 51.3, pp. 393–414.

— (1991). "Monitoring and reputation: The choice between bank loans and directly placed debt". In: *Journal of political Economy* 99.4, pp. 689–721.

Gopal, Manasa and Philipp Schnabl (Nov. 2022). "The Rise of Finance Companies and FinTech Lenders in Small Business Lending". In: *The Review of Financial Studies* 35.11, pp. 4859–4901. ISSN: 0893-9454. DOI: 10.1093/rfs/hhac034. URL: https://doi.org/10.1093/rfs/hhac034 (visited on 03/04/2026).

Gorton, Gary B and George G Pennacchi (1995). "Banks and loan sales marketing nonmarketable assets". In: *Journal of monetary Economics* 35.3, pp. 389–411.

Güner, A Burak (2006). "Loan sales and the cost of corporate borrowing". In: *The Review of Financial Studies* 19.2, pp. 687–716.

Gupta, Anurag, Ajai K Singh, and Allan A Zebedee (2008). "Liquidity in the pricing of syndicated loans". In: *Journal of Financial Markets* 11.4, pp. 339–376.

Hamdi, Naser et al. (2023). "The Rise of Nonbanks in Servicing Household Debt". In: *Available at SSRN 4550175* 2023/08.

Hotchkiss, Edith, Benjamin Iverson, and Xiang Zheng (2024). "Can Small Businesses Survive Chapter 11?" In: *Available at SSRN*.

Huh, Yesol and You Suk Kim (2023). "Cheapest-to-deliver pricing, optimal MBS securitization, and welfare implications". In: *Journal of Financial Economics* 150.1, pp. 68–93.

James, Christopher (1987). "Some evidence on the uniqueness of bank loans". In: *Journal of financial economics* 19.2, pp. 217–235.

Kalmenovitz, Joseph and Siddharth Vij (2021). "Regulatory Risk Perception and Small Business Lending". In: *Management Science, forthcoming (2025)*.

Kamstra, Mark J, Gordon S Roberts, and Pei Shao (2014). "Does the secondary loan market reduce borrowing costs?" In: *Review of Finance* 18.3, pp. 1139–1181.

Keys, Benjamin J et al. (2010). "Did securitization lead to lax screening? Evidence from subprime loans". In: *The Quarterly journal of economics* 125.1, pp. 307–362.

Lewis, Brittany Almquist (2021). "The Impact of Collateral Value on Mortgage Originations". In: *Available at SSRN 4423818*.

— (2023). "Creditor rights, collateral reuse, and credit supply". In: *Journal of Financial Economics* 149.3, pp. 451–472.

Lewis, Brittany Almquist and Manisha Padi (2025). "The Cost of Servicing Debt Pools". In: *Available at SSRN 5386507*.

Li, Jixing and MC Ringgenberg (2022). "Does secondary market liquidity affect the economy". In: *Unpublished working paper, University of Utah*.

Lloyd, Thomas and Dean Yang (2025). *The Long Shadow of Early Education: Evidence from a Natural Experiment in the Philippines*. Tech. rep. National Bureau of Economic Research.

Lummer, Scott L and John J McConnell (1989). "Further evidence on the bank lending process and the capital-market response to bank loan agreements". In: *Journal of financial economics* 25.1, pp. 99–122.

Ortiz-Molina, Hernan and Maria Fabiana Penas (2008). "Lending to small businesses: The role of loan maturity in addressing information problems". In: *Small Business Economics* 30, pp. 361–383.

Pan, Guangqian, Zheyao Pan, and Kairong Xiao (2021). "The Shadow Cost of Collateral". In: *Available at SSRN 3984585*.

Parlour, Christine A and Guillaume Plantin (2008). "Loan sales and relationship banking". In: *The Journal of Finance* 63.3, pp. 1291–1314.

Petersen, Mitchell A and Raghuram G Rajan (1994). "The benefits of lending relationships: Evidence from small business data". In: *The journal of finance* 49.1, pp. 3–37.

— (1995). "The effect of credit market competition on lending relationships". In: *The Quarterly Journal of Economics* 110.2, pp. 407–443.

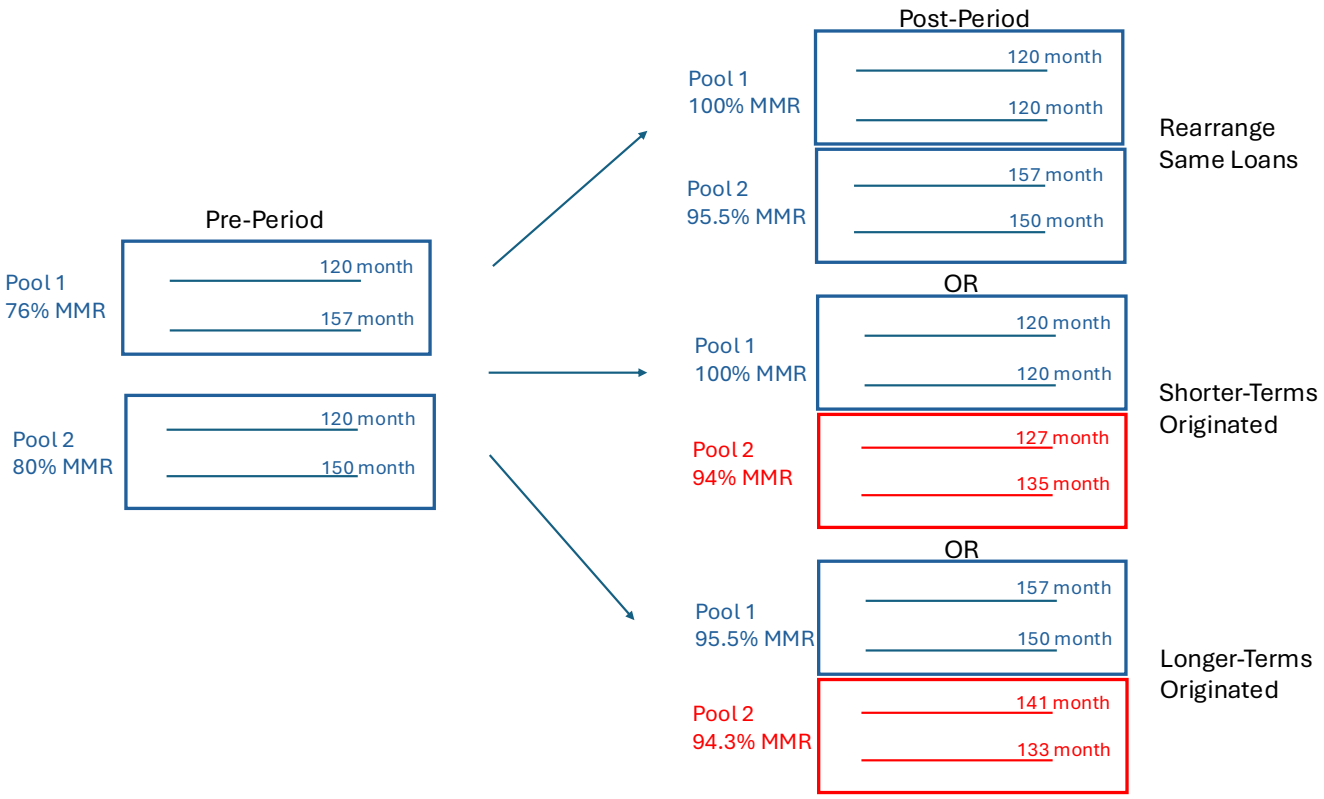
Stillerman, David (2024). "Loan guarantees and incentives for information acquisition". In: *Available at SSRN 4411553*.

U.S. Department of the Treasury Releases Policy Brief on Small Business Financing (Feb. 2025). en. URL: https://home.treasury.gov/news/press-releases/jy2781 (visited on 03/18/2025).

Van Soom, Marnix et al. (2019). "Loan maturity aggregation in interbank lending networks obscures mesoscale structure and economic functions". In: *Scientific reports* 9.1, p. 12512.

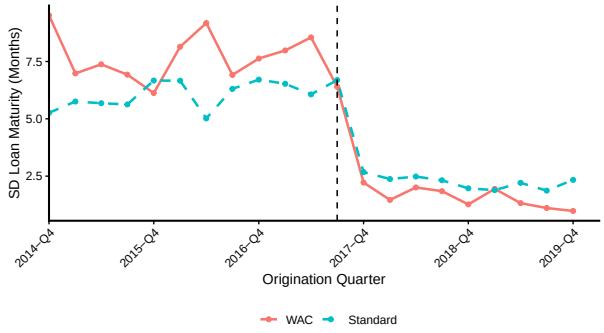
Ye, Ting et al. (2023). "Instrumented difference-in-differences". In: *Biometrics* 79.2, pp. 569–581.

Figure 1. SBA Secondary Market Pooling Structure



Notes: This figure illustrates the structure of the SBA 7(a) secondary market. It shows two potential pools in the pre-period that were both in compliance with the minimum maturity ratios. It then shows potential outcomes for the loans in the post-period. The same loans could be originated and simply reshuffled into different pools. Or different types of loans could be originated in the post-period. The blue pools indicate pools whose loan maturities have not changed from the pre-period. The red pools indicate pools with loan maturities that have changed from the pre-period.

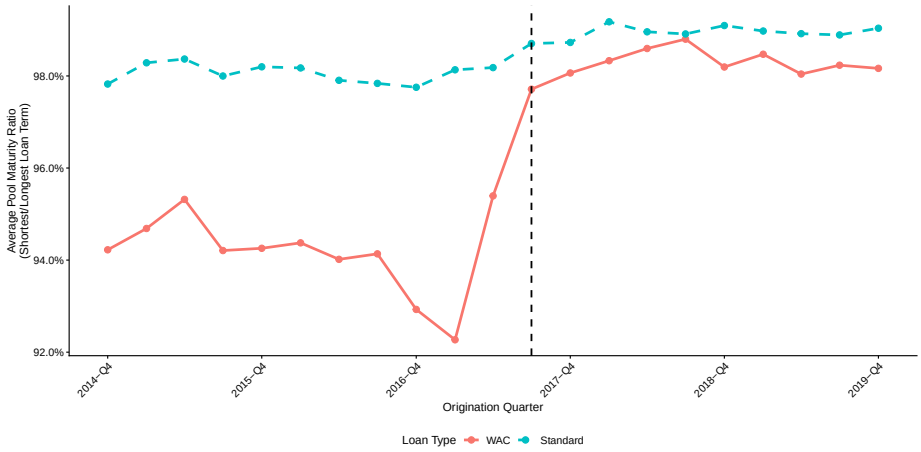
Figure 2. WAC vs Standard Pool Maturity



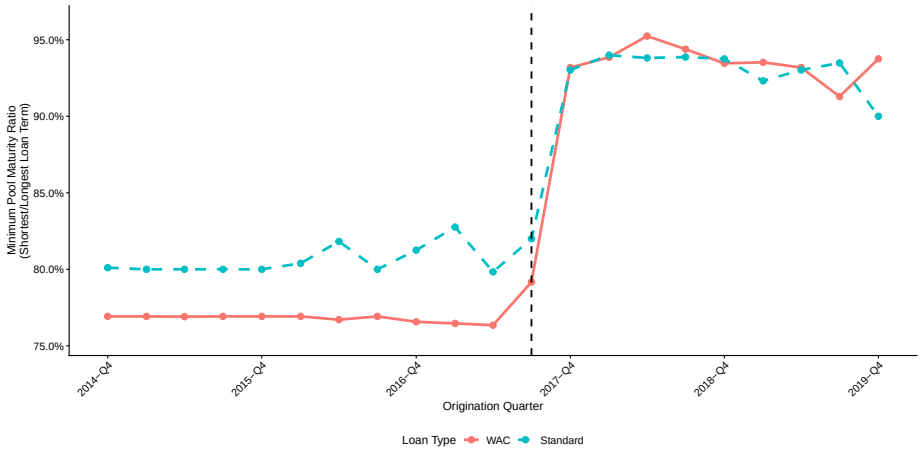
Standard Deviation of Maturity - Data

Notes: This figure presents summary statistics on the dispersion of loan maturity for WAC and Standard pools during 2014Q4–2019Q4. The figure shows the standard deviation of loan maturity, computed at the pool level from loan-level data drawn from SBA Forms 1086 and 1454 and aggregated by pool issue year–quarter and pool type. The vertical dashed line marks the implementation of the 2017 policy change.

Figure 3. Maturity Ratio: WAC vs Standard Pools



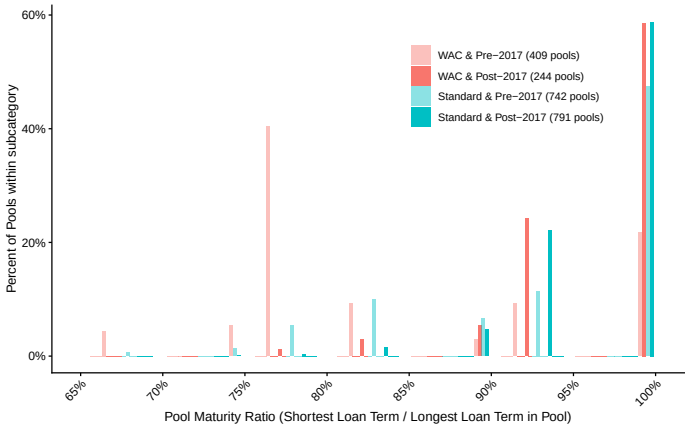
(a) Average Maturity Ratio



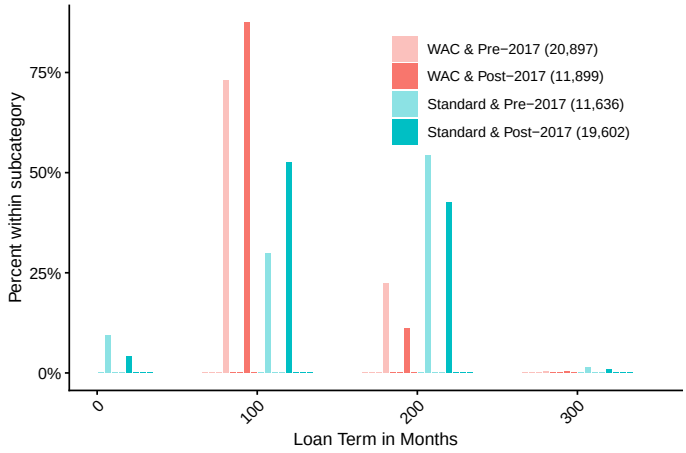
(b) Minimum Maturity Ratio

Notes: This figure shows the average (panel a) and minimum (panel b) maturity ratio for WAC and Standard pools over time. The data are drawn from SBA Forms 1086 and 1454. `pool_id` is assigned using a function in R to generate a unique integer identifier for each group in a dataset. Function `dplyr::group_indices()` is used over ten pool-level fields from SBA Form 1086: Pool Assembler Name, Pool Assembler Address, Pool Interest Rate, Pool Type, Pool Weighted Average Coupon, Pool Maturity Date, Pool Cap, Pool Floor, Pool Issue Date, and Pool Settlement Date. Loans matching on all ten fields are assigned the same `pool_id`; any mismatch generates a new `pool_id`. The vertical dashed line marks the implementation of the 2017 MMR policy change. The horizontal dashed line marks the 94% MMR threshold.

Figure 4. WAC vs Standard Pool Distributions



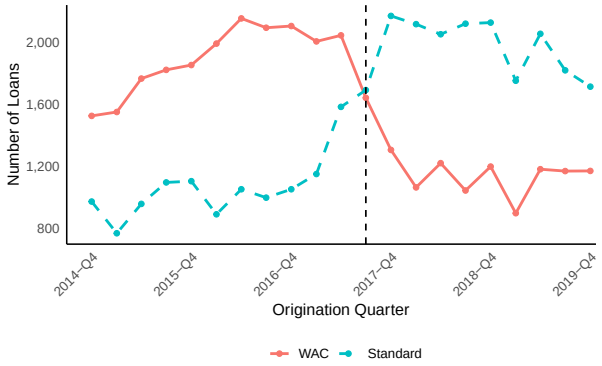
(a) Pool Maturity Ratio Distribution



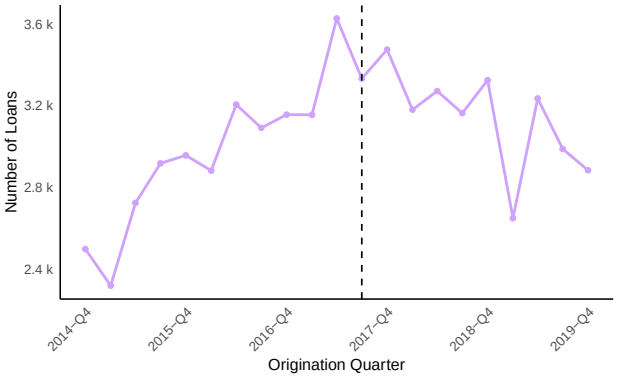
(b) Loan Maturity Distribution

Notes: Panel (a) shows the distribution of maturity ratios (MMR) for WAC and Standard pools pre- and post-reform. The light color indicates the pre-period and dark color indicates the post-period. There is a large pre-period mass at the SBA's lower bound of 76% for WAC pools. A small fraction of pre-period pools have an MMR below the SBA's lower bound in both WAC and Standard pools, potentially due to sparse data entry errors or exceptions. Panel (b) shows the density of loan maturities grouped by whether the loan was in a WAC or Standard pool. The plot uses a bin width of 100 months, meaning loan maturities between 100 and 199 months are grouped into the 100-month bin. The data are drawn from SBA Forms 1086 and 1454. `pool_id` is assigned using a function in R to generate a unique integer identifier for each group in a dataset. Function `dplyr::group_indices()` is used over ten pool-level fields from SBA Form 1086: Pool Assembler Name, Pool Assembler Address, Pool Interest Rate, Pool Type, Pool Weighted Average Coupon, Pool Maturity Date, Pool Cap, Pool Floor, Pool Issue Date, and Pool Settlement Date. Loans matching on all ten fields are assigned the same `pool_id`; any mismatch generates a new `pool_id`.

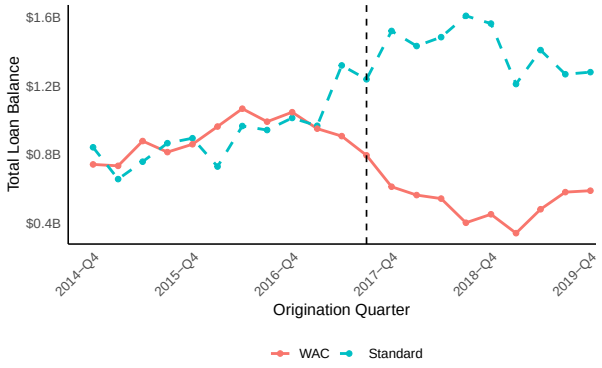
Figure 5. WAC vs Standard Pool Loan Volume



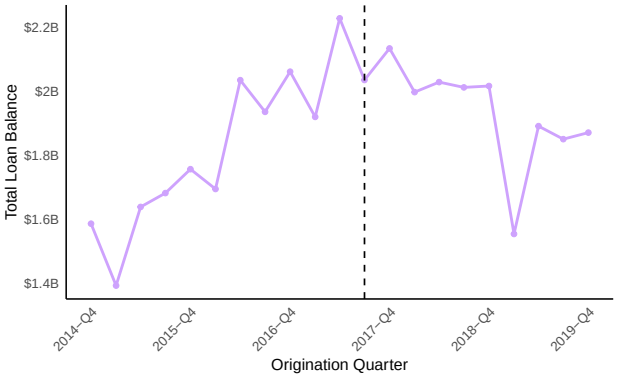
(a) Number of Loans (WAC vs Standard)



(b) Total Number of Loans



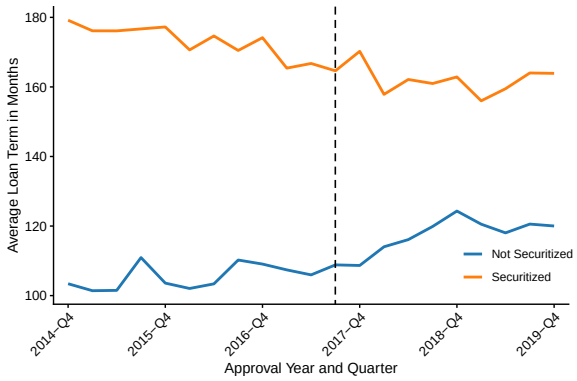
(c) Loan Balance (WAC vs Standard)



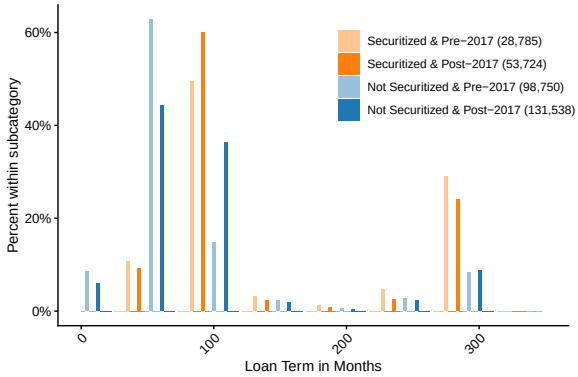
(d) Total Loan Balance

Notes: This figure presents the total number of loans and total loan balance originated from 2014Q4 to 2019Q4 in WAC versus Standard pools as well as the sum across both types, centered around the policy change. The data are drawn from SBA Forms 1086 and 1454.

Figure 6. Descriptive Statistics on 7(a) Loans



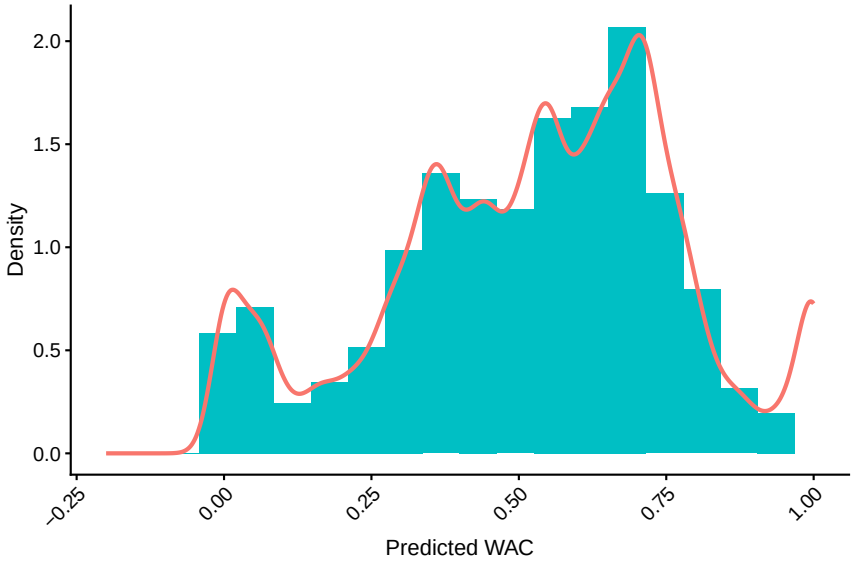
(a) Average Loan Maturity by Securitization



(b) Loan Maturities by Securitization and MMR

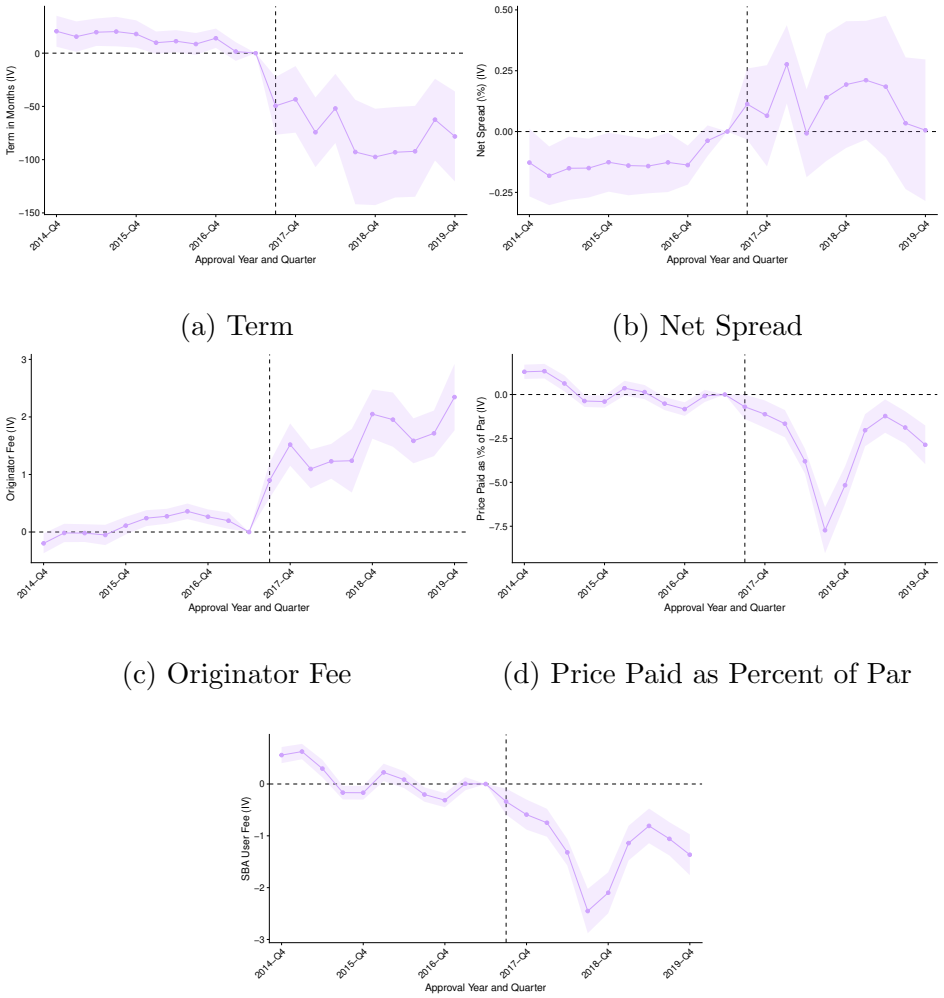
Notes: This figure presents loan characteristics for all loans approved in the period 2014Q4-2019Q4 from the SBA 7(a) data. Panel (a) shows the average loan maturity on the quarterly time series grouped by whether the loan was securitized. Panel (b) shows the density of loan maturities grouped by whether the loan was securitized and whether the loan was originated after the MMR reform. Shorter term loans are more likely to be working capital loans which may not be secured while longer term loans are more likely to be real estate loans, secured by the real estate asset.

Figure 7. Predicted WAC



Notes: This figure shows the density of point estimates for WAC_i from Equation 1 for all loans originated during 2014Q4-2019Q4, drawn from the fully merged 1086, 1454, and 7(a) data.

Figure 8. IVDID: Minimum Maturity Ratio Effect on WAC Loans



(a) Term

(b) Net Spread

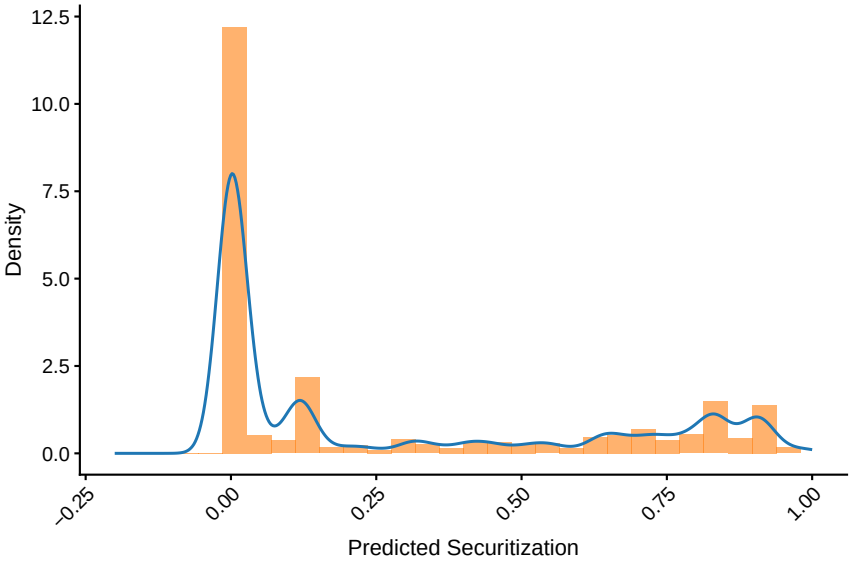
(c) Originator Fee

(d) Price Paid as Percent of Par

(e) SBA User Fee

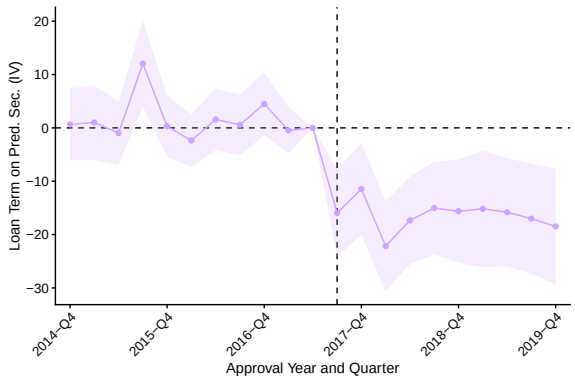
Notes: Figure plots the dynamic IV estimates of the coefficient of interest β_t from the dynamic equivalent of Equation 2b, where $\widehat{WAC}_i \times \mathbb{1}_{t=T}$ instruments for $WAC_i \times \mathbb{1}_{t=T}$. Predicted WAC is constructed from assembler and lender fixed effects estimated on pre-period data only. Data are from SBA Forms 1086 and 1454 FOIA-requested from the SBA, merged with the 7(a) data. Standard errors are clustered at the lender level.

Figure 9. Predicted Securitization

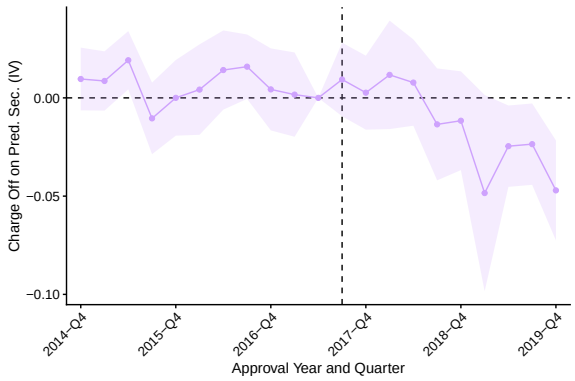


Notes: This figure shows the density of point estimates for $Securitized_i$ from Equation 3 for all loans originated during 2014Q4-2019Q4 from the SBA 7(a) data.

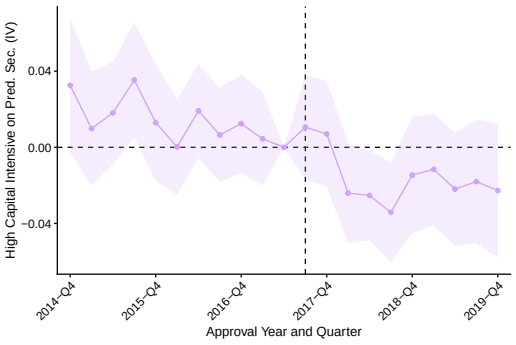
Figure 10. IVDID: Minimum Maturity Ratio Effect on Securitized Loans



(a) Loan Maturities



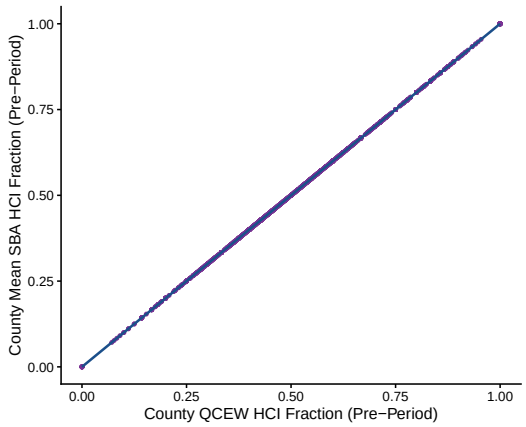
(b) Default Loan Status (ChargeOff)



(c) High Capital Intensive Industry

Notes: Figure plots the dynamic IV estimates of the coefficient of interest β_t from the dynamic equivalent of Equation 4b, where $\widehat{Securitized}_i \times \mathbb{1}_{t=T}$ instruments for $Securitized_i \times \mathbb{1}_{t=T}$. Predicted securitization is constructed from lender fixed effects estimated on pre-period data only. Data cover loan originations during 2014Q4-2019Q4 from the SBA 7(a) data. 95% confidence intervals are shown for each quarterly point estimate; standard errors are clustered at the borrower zip code level. The vertical dashed line marks 2017Q3, the announcement of the reform.

Figure 11. Correlation between SBA and QCEW Definitions of High Capital Intensive County



Notes: Figure plots the raw correlation between counties' designation as high-capital-intensive based on SBA data and based on QCEW data. SBA HCI fraction is defined as the fraction of loans made in that county during 2014Q4–2017Q2 within a 3-digit NAICS industry with a pre-period average maturity longer than the average across industries in the 7(a) data. QCEW HCI fraction is defined as the fraction of establishments in that county during 2014Q4–2017Q2 operating in the same high-capital-intensive 3-digit NAICS industries, as defined by SBA loans that have above-average maturities.

Table 1 Summary Statistics Tables

Panel A. 1086				
Variable	Mean	Median	10%	90%
Certificate Interest Rate	1.83	2.08	0.86	2.62
Price Paid (% of Par)	111.10	111.16	107.55	114.64
SBA Program User Fee (%)	0.87	0.58	0.00	2.32
Age at Sale (days)	99.44	41.00	15.00	255.00
Panel B. 1454				
Variable	Mean	Median	10%	90%
Pool: Number of Loans	121.63	48.00	16.00	246.00
Pool: Total Loan Balance	25,786,504	14,898,064	3,011,142	62,320,133
Pool: Maturity (Months)	165.29	118.54	82.31	293.32
Pool: Avg Net Spread	2.56	2.47	1.70	4.25
Panel C. 7(a)				
Variable	Mean	Median	10%	90%
Loan Term	125.36	120.00	60.00	300.00
Charge Off	0.06	0.00	0.00	0.00
Securitized	0.26	0.00	0.00	1.00
Interest Rate	6.81	6.50	5.00	9.45
Loan Amount	404,511	136,000	20,000	1,104,000
SBA Guaranteed Loan Amount	296,595	87,805	10,000	831,060
Jobs Supported	10.00	4.00	0.00	25.00

Notes: This table reports summary statistics—mean, median, 10th percentile, and 90th percentile—for SBA loan samples during 2014Q4–2019Q4. Panel A reports statistics for 1086 loans (after merging with 1454 data), Panel B for 1454 pools (after merging with 1086 data), and Panel C for 7(a) loans.

Table 2 IVDID: Minimum Maturity Ratio Effect on WAC Loans

Variable	Term in Months	Net Spread (%)	Originator Fee	Price Paid as % of Par	SBA User Fee
$\widehat{WAC \times Post}$	−66.9724***	0.2429***	0.9802***	−1.5445***	−0.6601***
	(13.7598)	(0.0695)	(0.1200)	(0.3111)	(0.1113)
WAC	2.3164	−0.0177	−2.5212***	1.7099***	0.4055***
	(6.5508)	(0.0455)	(0.0532)	(0.1830)	(0.0620)
Post	11.1572	−0.0459	−0.2337***	−0.5241***	−0.2019***
	(6.9316)	(0.0420)	(0.0546)	(0.1780)	(0.0603)
$\widehat{WAC}$	−28.8891***	0.1857***	0.4869***	0.2867***	0.0922***
	(4.4235)	(0.0358)	(0.0470)	(0.1091)	(0.0269)
Borrower Zip FE	Yes	Yes	Yes	Yes	Yes
R^2	0.16	0.06	0.54	0.13	0.12
N	60,172	60,172	60,172	60,172	60,172
First-stage F	3919.31	3919.31	3919.31	3919.31	3919.31

Notes: This table reports two-stage least squares (2SLS) estimates of the causal effect of actual WAC pool status on loan-level outcomes. $\widehat{WAC}_{i(p)} \times Post_t$ instruments for $WAC_{i(p)} \times Post_t$, where predicted WAC is constructed from assembler and lender fixed effects estimated from Equation 1 on pre-period data only. Regressions are estimated at the pool or loan level using data from SBA Forms 1086 and 1454 FOIA-requested from the SBA, merged with the 7(a) data. The post-treatment indicator corresponds to the implementation of the 2017 MMR policy change. All specifications include borrower zip code fixed effects. Standard errors clustered at the lender level are reported in parentheses. ***, **, and * represent 1%, 5%, and 10% significance levels, respectively.

Table 3 IVDID: Minimum Maturity Ratio Effect on Securitized Loans

	Term in Months		Charge-off		High Cap. Intensive	
Variable	(1)	(2)	(3)	(4)	(5)	(6)
$\widehat{Securitized} \times Post$	−17.8315***	−17.0988***	−0.0169*	−0.0183**	−0.0271***	−0.0261***
	(4.4406)	(3.8584)	(0.0091)	(0.0089)	(0.0092)	(0.0081)
$Securitized$	42.2474***	19.1500***	0.0435***	0.0480***	0.0363***	0.0018
	(6.7514)	(3.6304)	(0.0164)	(0.0157)	(0.0134)	(0.0109)
Post	11.3941***	9.6142***	−0.0122***	−0.0246***	−0.0056**	−0.0042
	(2.6359)	(2.2462)	(0.0028)	(0.0032)	(0.0027)	(0.0033)
$\widehat{Securitized}$	60.8182***	37.2459***	−0.0159	−0.0073	0.1102**	0.0697
	(12.3054)	(11.6099)	(0.0174)	(0.0152)	(0.0428)	(0.0439)
Interest Rate		−0.6790		0.0110***		−0.0049***
		(0.7527)		(0.0018)		(0.0016)
Loan Amount Logged		29.4925***		−0.0066***		0.0473***
		(1.2438)		(0.0018)		(0.0035)
Jobs Supported		−0.4328***		0.0000		−0.0017***
		(0.0272)		(0.0000)		(0.0001)
Borrower Zip FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank Zip FE	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.29	0.49	0.04	0.05	0.10	0.12
N	308,412	308,412	308,412	308,412	308,412	308,412
First-stage F	355615.37	355509.70	355615.37	355509.70	355615.37	355509.70

Notes: This table reports two-stage least squares (2SLS) estimates of the causal effect of actual securitization status on loan-level outcomes. $\widehat{Securitized}_i \times Post_t$ instruments for $Securitized_i \times Post_t$, where predicted securitization is constructed from lender fixed effects from Equation 16 estimated on pre-period data only. Regressions are estimated at the loan level using data from the SBA 7(a) program over the period 2014Q4–2019Q4. The post-treatment indicator corresponds to the 2017Q3 MMR policy change. Standard errors clustered at the borrower zip code level are reported in parentheses. ***, **, and * represent 1%, 5%, and 10% significance levels, respectively.

Table 4 DID: Lender-Quarter Level Secondary Market Outcomes

Variable	Originator Fee	Price Paid as % of Par	SBA User Fee
$LenderWACRate \times Post$	1.2979***	−1.1776***	−0.3637***
	(0.1452)	(0.3209)	(0.1083)
$LenderWACRate$	−1.5401***	1.1446***	0.2556***
	(0.0904)	(0.2275)	(0.0810)
Post	0.0317	−0.8247***	−0.3194***
	(0.0863)	(0.1915)	(0.0639)
R^2	0.19	0.11	0.11
N	6,703	6,703	6,703

Notes: This table reports difference-in-differences estimates of the effect of predicted WAC exposure on lender-quarter level secondary market outcomes. $LenderWACRate_j$ is the exposure of a lender to WAC pools. Regressions are estimated at the lender-quarter level over the period 2014Q4–2019Q4. The post-treatment indicator corresponds to the implementation of the 2017 MMR policy change. No fixed effects are included. Heteroskedasticity-robust standard errors are reported in parentheses. ***, **, and * represent 1%, 5%, and 10% significance levels, respectively.

Table 5 DID: Lender-Quarter Level Primary Market Outcomes

Variable	Loan Term	Charge Off	High Capital Intensive	>$150K Share	<$150K Share	Agriculture & Forestry	Administrative & Waste Mgmt
LenderSecuritizedRate × *Post*	−10.4408***	−0.0146***	−0.0344**	−0.0518***	0.0518***	−0.0122***	0.0170***
	(2.5661)	(0.0052)	(0.0138)	(0.0144)	(0.0144)	(0.0039)	(0.0053)
LenderSecuritizedRate	91.6630***	0.0263***	0.1375***	0.4601***	−0.4601***	−0.0081***	−0.0245***
	(1.7453)	(0.0041)	(0.0094)	(0.0097)	(0.0097)	(0.0028)	(0.0034)
Post	7.5002***	−0.0138***	0.0060	0.0621***	−0.0621***	0.0011	−0.0064**
	(0.9057)	(0.0022)	(0.0059)	(0.0067)	(0.0067)	(0.0021)	(0.0026)
R^2	0.21	0.01	0.01	0.13	0.13	0.00	0.00
N	21,744	21,744	21,744	21,744	21,744	21,744	21,744

Notes: This table reports difference-in-differences estimates of the effect of predicted securitization exposure on lender-quarter level loan outcomes. *LenderSecuritizedRate* is the exposure of a lender to securitization constructed from lender fixed effects estimated on pre-period data only. *LenderSecuritizedRate* × *Post* captures the differential post-reform change for lenders with higher securitization exposure. Regressions are estimated at the lender-quarter level over the period 2014Q4–2019Q4. The post-treatment indicator corresponds to the implementation of the 2017 MMR policy change. No fixed effects are included. Heteroskedasticity-robust standard errors are reported in parentheses. ***, **, and * represent 1%, 5%, and 10% significance levels, respectively.

Table 6 High-Capital-Intensive Industry Share and SBA Lending Allocation

Dependent Variable:	SBA HCI Fraction
Model:	(1)
Variables	
QCEW HCI Fraction$_c$	0.9441***
	(0.0135)
QCEW HCI Fraction$_c$ × Post	-0.6732***
	(0.0192)
Fixed-effects	
State FE	Yes
Quarter FE	Yes
Fit statistics	
Observations	32,222
R^2	0.16640

IID standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Notes: This table reports difference-in-differences estimates of the effect of county-level high-capital-intensive industry share on SBA lending share to high capital industries. The definition of high-capital-intensive industry is the share of establishments in the Bureau of Labor Statistics Quarterly Census of Employment and Wages (QCEW) data over the period 2014Q4–2019Q4 in a particular county which are in high-capital-intensive industries. *HCI Fraction* × *Post* captures the differential post-MMR change for counties with higher exposure to high-capital-intensive industries. All specifications include year-quarter and state fixed effects. Standard errors clustered at the state level are reported in parentheses. ***, **, and * represent 1%, 5%, and 10% significance levels, respectively.

Table 7 High-Capital-Intensive Industry Share and Employment Outcomes

Variable	Log Employment	Log Quarterly Establishment	Log Total Wages
HCI Fraction × Post	-0.0395**	-0.0420***	-0.0386*
	(0.0182)	(0.0156)	(0.0195)
HCI Fraction	-0.7192***	-0.6675***	-0.7906***
	(0.1675)	(0.1476)	(0.1767)
Quarter FE	Yes	Yes	Yes
State FE	Yes	Yes	Yes
N	58,455	58,455	58,455
R^2	0.21876	0.24593	0.23124

Notes: This table reports difference-in-differences estimates of the effect of county-level high-capital-intensive industry share on employment and establishment outcomes using Bureau of Labor Statistics Quarterly Census of Employment and Wages (QCEW) data over the period 2014Q4–2019Q4. $HCI\ Fraction$ denotes the fraction of establishments in a county classified as high-capital-intensive. $HCI\ Fraction \times Post$ captures the differential post-MMR change for counties with higher exposure to high-capital-intensive industries. All specifications include year-quarter and state fixed effects. Standard errors clustered at the state level are reported in parentheses. ***, **, and * represent 1%, 5%, and 10% significance levels, respectively.

Online Appendix

A Trends in Raw Data

Figure A1 plots the unprocessed secondary market data from the fully merged 1086, 1454, and 7(a) data. These data depict the trends followed by loans that are actually selected to be in WAC versus Standard pools pre- and post- policy change. The patterns observed in the data combine multiple effects: a change in exposed lender origination behavior in the primary market following the reform, a change in the way exposed lenders and assemblers allocate loans into WAC versus Standard pools, and the composition of lenders and assemblers changing in the post-period.

The instrumented difference-in-differences regression in the main text removes any potential effect of different post-period lender and assembler composition or new entrants. The lender-quarter treatment-intensity difference-in-differences regression calculates the total average effect for lenders who are more exposed to WAC loans in the pre-period. This is akin to an intent-to-treat research design. Specifically, it measures average post-period change across both WAC and Standard loans in a lender's portfolio for lenders who are more treated. Thus, an economically and statistically significant β rules out the possibility that the IVDID results showed the impact of MMR on just a small population of "complier" loans which behaved very differently from the rest of the lender's portfolio. A significant β indicates that the reform drives an effect on lender origination behavior – consistent with lenders with different pre-period WAC exposure changing their origination behavior on average in the post-period.

[Figure 12 about here.]

Figure A1 plots the mean values of the secondary market outcome variables over time, separately for WAC and Standard pools, using data from SBA Forms 1086 and 1454 and merged with the 7(a) data. Panel (a) shows the average $Term_i$, or loan maturity in months, by pool type and issue quarter. Pre-reform WAC pools contain loans with shorter average maturities than Standard pools. Following the reform, mean loan maturity within WAC pools contracts substantially, while Standard pool maturities contract only slightly — reflecting the more binding constraint the 94% MMR imposes on WAC pools. Panel (b) plots mean $NetSpread_i$, the net interest rate margin above the base rate, over time. Prior to the reform, WAC and Standard pool loans exhibit broadly similar spreads. In the post-period, spreads on WAC pool loans rise relative to Standard pools, consistent with lenders passing the higher costs required to meet the tighter maturity ratio standard through borrowers via higher interest rates. Panel (c) plots mean $OriginatorFee_i$. Originator fees for WAC loans equal zero throughout both the pre- and post-reform periods, reflecting SBA rules that prohibit lenders from charging originator fees on loans sold into WAC pools. In contrast,

Standard pool loans exhibit consistently positive originator fees over the sample period, generally ranging between roughly 1 and 2.5 percent. Following the reform, originator fees on Standard loans remain elevated and display modest fluctuations over time, while WAC loan fees continue to stay at zero, consistent with Standard pools being comprised of a larger variance in interest rates after the reform.

Taken together, Figure A1 documents descriptive patterns in characteristics that motivate the subsequent causal analysis: relative to Standard pools, WAC pools — which faced a more binding post-reform maturity constraint — exhibit systematically different trajectories in maturity, loan balance, net spread, price paid, and time to sale following the 2017Q3 reform. The instrumented difference-in-differences estimates in Table 2 and Figure 8 formalize these results.

Panel (d) plots mean $PricePaid_i$, the price paid by the assembler per unit of par value, over time. Prior to the reform, price paid is higher for WAC loans, consistent with the WAC assemblers paying more for these loans. Price paid declines for both WAC and Standard pools following the reform, but disproportionately more so for WAC pool loans. Panel (e) plots mean $SBAUserFee_i$, the SBA user fee charged on loans with a price paid by the assembler above 110 percent of par. SBA user fees are higher for WAC loans than Standard loans in the pre-period, consistent with WAC loans receiving higher secondary-market prices. Following the reform, SBA user fees decline more sharply for WAC loans, mirroring the decline in price paid and suggesting that the reform reduced the secondary-market premium associated with WAC pool loans.

B Identifying Assumptions for Instrumented Differences in Differences

This section adapts the setup in Ye et al. (2023) to our context. For clarity, we fix our outcome variable to maturity and our treatment to securitization, with our shifter being the lender's pre-period securitization propensity. This provides an example for discussing the assumptions below. These assumptions should hold for every outcome-treatment pair presented in the body of the paper.

Setup

Let each observation be a small-business loan. Let

- $T = 0$ indicate the pre-period, before 2017Q3;
- $T = 1$ indicate the post-period, after 2017Q3 (inclusive);

- $D = 1$ indicate that the loan is WAC or securitized, and $D = 0$ otherwise;
- Z denote a continuous predicted probability of being a WAC loan or securitized, based on the lender's average pre-2017Q3 propensity to originate a WAC loan or securitize;
- Y denote outcomes, like the maturity of the loan; and
- X denote controls, including ZIP code fixed effects.

In contrast to Ye et al. (2023), our setting uses a continuous instrument Z. Throughout, let $D_t(z)$ denote the potential securitization status of a loan at time t if the loan were assigned instrument value z, and let $Y_t(d)$ denote the potential maturity of the loan at time t if the loan's securitization status were set to d. Below we adapt Assumption 2 from Ye et al. (2023) to the continuous treatment setting.[18]

Assumption 1: Trend Relevance

With continuous Z, this assumption can be written as

$$E[D_1(z) - D_0(z) \mid X] \tag{10}$$

varies with z.

In a regression implementation, this requires that the coefficient on $T \times Z$ in the first-stage equation for securitization be nonzero:

$$E[D \mid T = 1, Z, X] - E[D \mid T = 0, Z, X] \tag{11}$$

must have a nonzero slope in Z. We test this assumption by running the first stage regression and reporting the first stage F statistic.

Assumption 2: Independence and Exclusion Restriction

With continuous Z, this can be written as

$$Z \perp \big(\{D_t(z) : z \in \mathcal{Z},\ t = 0, 1\}, Y_1(0) - Y_0(0), Y_t(1) - Y_t(0), t = 0, 1\big) \mid X. \tag{12}$$

Assumption 3: No Unmeasured Common Effect Modifier

For a continuous Z, for two instrument values $z' > z$, the condition can be written as

$$\text{Cov}\left(D_t(z') - D_t(z), Y_t(1) - Y_t(0) \mid X\right) = 0, \qquad t = 0, 1. \tag{13}$$

[18] We assume Assumption 1 from Ye et al. (2023) is satisfied.

Assumption 4: Stable Treatment Effect Over Time

The original condition in Ye et al. (2023) is

$$E[Y_1(1) - Y_1(0) \mid X] = E[Y_0(1) - Y_0(0) \mid X]. \tag{14}$$

Interpreting Assumptions - Example

Assumption 1 The change in securitization after 2017Q3 must differ across loans from lenders with different pre-2017Q3 securitization propensities, conditional on controls X.

Assumption 2 After controlling for ZIP code and other observed characteristics, lenders with higher pre-2017Q3 securitization propensities should not have had systematically different post-2017Q3 maturity trends except through their induced change in securitization. This is weaker than a conventional exclusion restriction in IVs, since Z may be associated with maturity levels, and may even have direct level effects, as long as it has no direct effect on the change in maturities over time and does not modify the treatment effect.

Assumption 3 Separately for the pre- and then for the post-period, among loans with the same observed controls X, the loans whose securitization status is most shifted by Z should not be loans with systematically larger or smaller treatment effects of securitization on maturity. This condition says that unobserved factors that make a loan more likely to be securitized by a high-propensity lender should not also determine how much securitization changes the maturity for that loan. Put differently, conditional on X, the "first-stage responsiveness" of securitization to lender securitization propensity should not be correlated with the loan-specific maturities. The assumption is plausible if, after conditioning on controls and within the pre- and post-period separately, the variation in lender propensity to securitize shifts securitization for reasons that are relatively mechanical or institutional – such as warehouse funding relationships, underwriting and statutory guidelines, and external investor preferences – rather than because lenders select loans into securitization, in the absence of the reform, based on loan-specific maturity differences for loans that are observably the same on all characteristics.[19]

[19]Separately for the pre- and then the post-period, this assumption measures the correlation between propensity to securitize and differences in outcome variables, conditional on observables in a given period. From speaking with practitioners, the decision to securitize or place a loan in a WAC pool is made based on lender's business model, lender-assembler relationships, and assembler preferences – conditional on observables in that period. These decisions are made separately from the outcome variables which are dependent on underwriting guidelines and external investors' preferences (i.e. over assets or characteristics like maturity).

Assumption 4 In this application, the average conditional causal effect of securitization on maturity must be the same before and after 2017Q3. Conditional on ZIP code and other controls, the maturity average change caused by securitization must be stable over time. That is, the average difference between the maturity a loan would receive if securitized and the maturity it would receive if not securitized must be the same in the pre-2017Q3 and post-2017Q3 periods. This is a strong assumption but more likely to hold since the estimation window around 2017Q3 is short and securitization is stable during this time period.[20]

[Table 8 about here.]

[Table 9 about here.]

C Predicted Securitization Robustness

As a robustness to Equation 1, we estimate the following regression on the pre-period data:

$$WAC_i = \delta_j + \alpha_a + \nu LoanBalance_i + \omega NetInterestRate_i + \lambda NetSpread_i + \eta FixedRate_i + \varepsilon_i. \tag{15}$$

Where δ_j are fixed effects for lender j and α_a are fixed effects for assembler a. $LoanBalance_i$ is the loan amount, $NetInterestRate_i$ denotes the net interest rate on loan i, $NetSpread_i$ is the spread over the base rate, and $FixedRate_i$ is an indicator equal to one if the loan has a fixed interest rate. These controls capture observable loan characteristics that may influence WAC status. Lender fixed effects control for heterogeneous funding costs and other demand side differences across lender business models. Standard errors are heteroskedasticity-robust.

Although Equation 15 estimates whether an individual loan is WAC, we save the coefficients on the lender fixed effects and use only those to predict whether the loan is WAC or Standard across the entire sample, both in the pre- and post-period. Thus, the predicted $\widehat{WAC_i}$ status only varies at the lender-assembler level. Since Equation 15 regresses actual WAC status on observable characteristics as well as lender and assembler fixed effects, and only lender and assembler fixed effects are used to predict WAC, we isolate only the effect of lender business model on WAC status – for example, cost of capital or need for the additional

[20] For a brief period in 2018Q4-2019Q3, the minimum maturity ratio was tightened further by 1 pp to 95%, however this change affected both WAC and Standard loans the same. In 2019Q4 the ratio was adjusted back down to our initial 94%, again affecting both WAC and Standard loans the same. Since this change brief, small, and affected all securitized loans the same we do not expect it to violate the requirement that average difference between securitized and unsecuritized loans is the same pre and post-reform. Furthermore Ye et al., 2023 suggests that this assumption is sufficient but not necessary by presenting an example in which it may not hold and yet the treatment effect is robust.

liquidity that the secondary market provides – and remove factors that may be driven by macro-economic or demand side factors.

Figure A2 plots the predictions generated by both Equation 15 and Equation 1 and shows that they are highly correlated. Thus we use Equation 1 as our main specification.

[Figure 13 about here.]

As a robustness to Equation 16, we estimate the following regression on the pre-period data:

$$\begin{aligned} Securitized_i &= \delta_j + \omega InterestRate_i + \upsilon GrossApproval_i + \lambda JobsSupported_i + \eta_{3DigNAICS} \\ &+ \theta_t + \gamma_z + \epsilon_i. \end{aligned} \tag{16}$$

Where $Securitized_i$ is an indicator variable equal to one if loan i was securitized, δ_j are fixed effects for the j^{th} lender on a loan, $InterestRate_i$ is the interest rate on a loan, $GrossApproval_i$ is the logged loan amount, $JobsSupported_i$ is the number of jobs created and retained by loan i, $\eta_{3DigNAICS}$ are fixed effects for the 3-digit NAICS sub-sector that a loan is in, θ_t are fixed effects for the quarter of loan origination, and γ_z are fixed effects for the borrower zip code. Standard errors are clustered at the borrower ZIP code level.

By regressing actual securitization on these observable characteristics as well as dealer fixed effects, and then using only dealer fixed effects to predict securitization, we remove factors that may be driven by borrower demand.

Figure A3 plots the predictions generated by both Equations 3 and 16 and shows that they are highly correlated. Thus we use Equation 16 as our main specification.

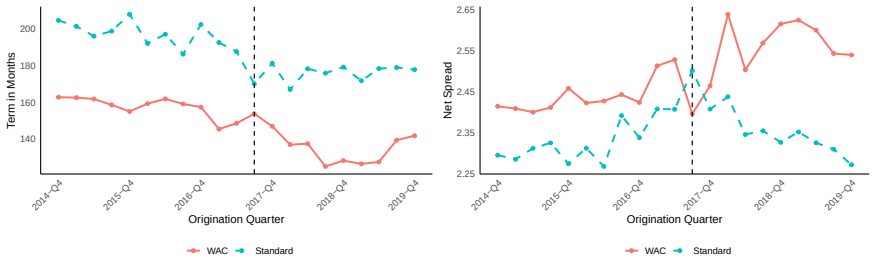
[Figure 14 about here.]

D Validating Census Analysis

The raw data indicates that high-capital-intensive counties, as designated by the QCEW data, experience a disproportionate decrease in HCI SBA lending in the post-treatment period, relative to low-capital-intensive counties by the QCEW definition. Figure A4 plots the raw data, split by whether the QCEW high-capital-intensive fraction is above or below the nationwide mean. The figure suggests that QCEW HCI fraction is accurately capturing exposure to MMR treatment that causes a reallocation of capital away from high-capital-intensive industries.

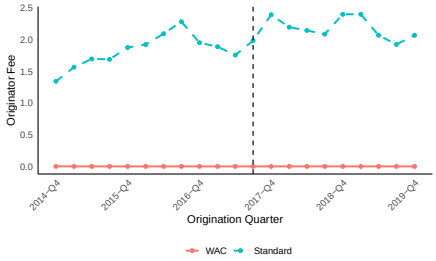
[Figure 15 about here.]

Figure A1. WAC versus Standard Loan Characteristics Over Time

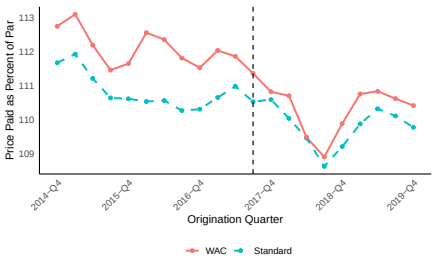


(a) Term

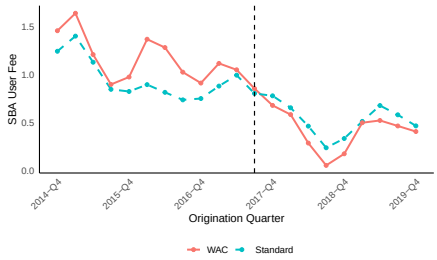
(b) Net Spread



(c) Originator Fee



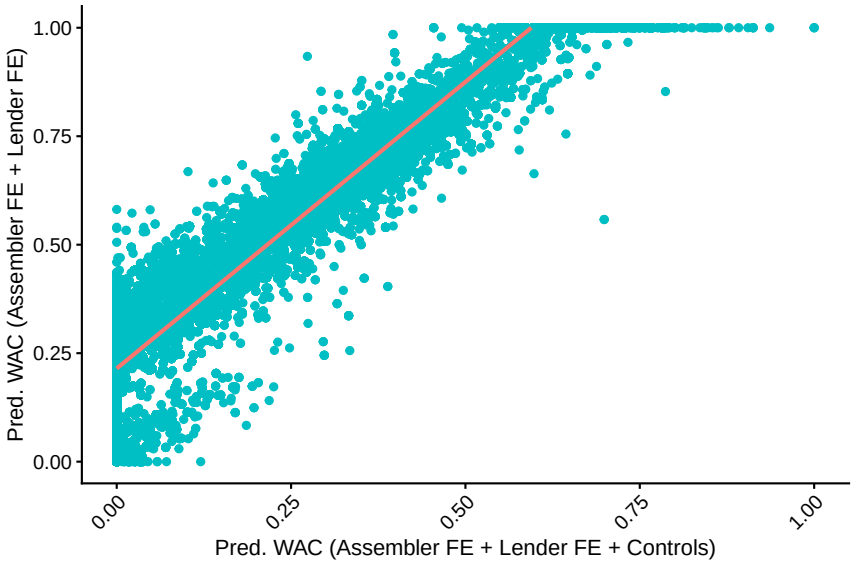
(d) Price Paid as Percent of Par



(e) SBA User Fee

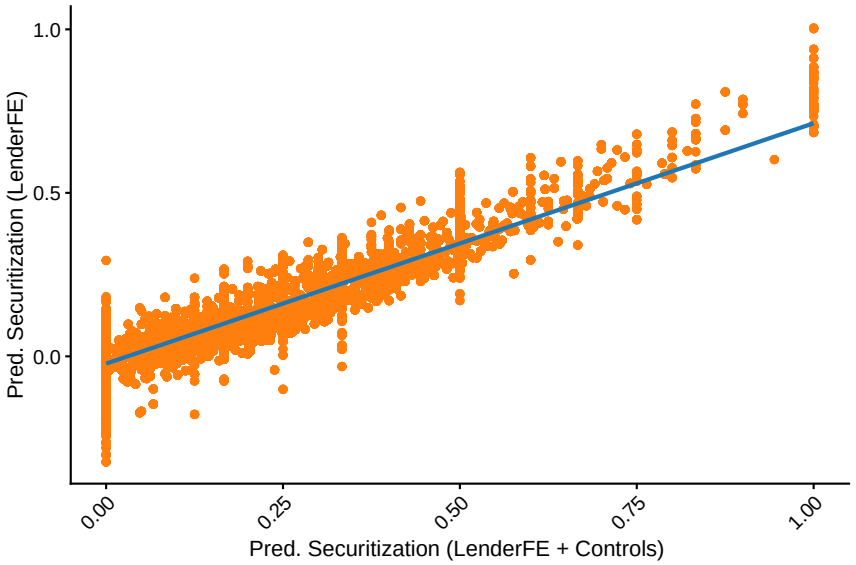
Notes: Figure plots mean loan-level characteristics over time for WAC and Standard secondary market loans in the merged SBA 7(a), Form 1086, and Form 1454 dataset. The vertical dashed line indicates the implementation of the Minimum Maturity Ratio reform in 2017.

Figure A2. Predicted WAC Measure Comparison



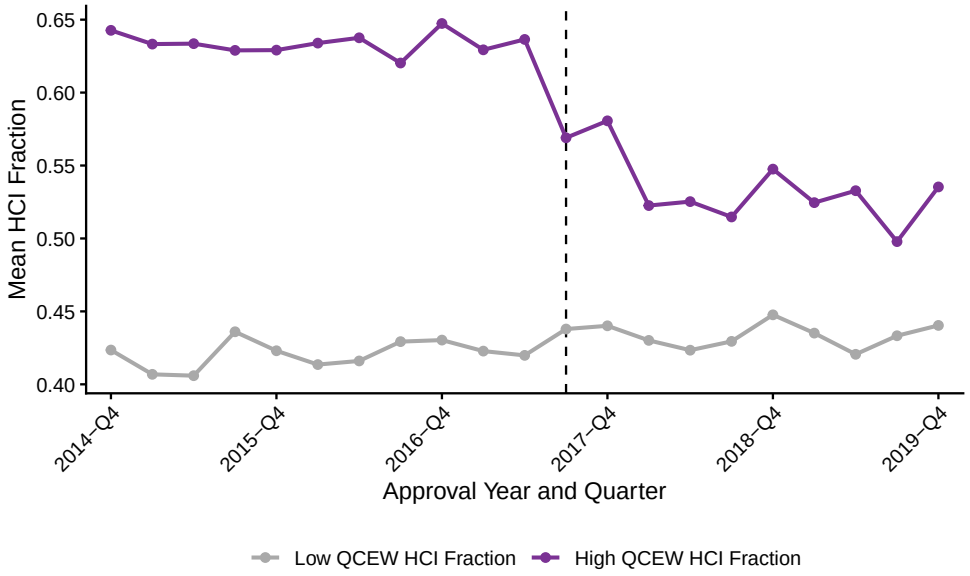
Notes: This figure shows the point estimates for WAC_i from Equation 15 and Equation 1 for all loans originated during 2014Q4-2019Q4 in the merged SBA 7(a), Form 1086, and Form 1454 dataset. The Equation 1 estimation controls for assembler and lender fixed effects only. The Equation 15 estimation additionally controls for loan balance, net interest rate, net spread, and an indicator for fixed-rate loans.

Figure A3. Predicted Securitization Measure Comparison



Notes: This figure shows the point estimates for $Securitized_i$ from Equation 16 and Equation 3 for all loans originated during 2014Q4-2019Q4, drawn from the SBA 7(a) data. The Equation 3 estimation controls for lender fixed effects only. The Equation 16 estimation controls for lender fixed effects, the quarter of loan origination fixed effects, NAICS sub-sector fixed effects, and loan borrower zip code fixed effects.

Figure A4. Average HCI by QCEW HCI Fraction Counties



Notes: Figure plots mean county-level SBA HCI fraction over time for counties defined as high-capital-intensive based on QCEW fraction of high-capital-intensive establishments being above the nationwide average, relative to low-capital-intensive counties based on the QCEW definition. The vertical dashed line indicates the implementation of the Minimum Maturity Ratio reform in 2017.

Table A1 First Stage: WAC

Variable	WAC × Post
$\widehat{WAC} \times Post$	0.5670***
	(0.0212)
WAC	0.5489***
	(0.0205)
Post	0.1520***
	(0.0090)
$\widehat{WAC}$	-0.5679***
	(0.0224)
Borrower ZIP FE	Yes
R^2	0.69686
N	60,172
First-stage F	0.16386

Notes: This table reports the first-stage regression corresponding to Equation 2a. The dependent variable is $WAC_i \times Post_t$. $WAC_i \times Post_t$ is instrumented by $\widehat{WAC}_i \times Post_t$, where predicted WAC is constructed from lender and assembler fixed effects estimated on pre-period data only. The regression controls for actual WAC_i, $Post_t$, and predicted $\widehat{WAC}_i$, and includes borrower ZIP fixed effects. Standard errors clustered at the lender level are reported in parentheses. ***, **, and * represent 1%, 5%, and 10% significance levels, respectively.

Table A2 First Stage: Securitization

Variable	Securitized × Post	
$\widehat{Securitized} \times Post$	0.9596***	0.9593***
	(0.0020)	(0.0020)
Securitized	0.5090***	0.5079***
	(0.0025)	(0.0025)
Post	0.0081***	0.0047***
	(0.0006)	(0.0006)
$\widehat{Securitized}$	-0.4656***	-0.4654***
	(0.0064)	(0.0064)
Initial Interest Rate		0.0028***
		(0.0002)
Log Gross Approval		0.0010***
		(0.0003)
Jobs Supported		-4.6×10^{-5}**
		(1.97×10^{-5})
Borrower ZIP FE	Yes	Yes
Lender ZIP FE	Yes	Yes
R^2	0.83494	0.83503
N	308,412	308,412
First-stage F	51.387	51.325

Notes: This table reports the first-stage regression corresponding to Equation 4a. The dependent variable is $Securitized_i \times Post_t$, which is instrumented by $\widehat{Securitized}_j \times Post_t$, where predicted securitization is constructed from lender fixed effects estimated on pre-period data only. Both columns control for actual $Securitized_i$, $Post_t$, and predicted $\widehat{Securitized}_j$. Column (1) reports the main specification without loan-level controls, mirroring the second-stage regressions in the main text. Column (2) adds loan-level controls including initial interest rate, log gross approval amount, and jobs supported. Both columns include borrower ZIP and lender ZIP fixed effects. Standard errors clustered at the borrower ZIP level are reported in parentheses. ***, **, and * represent 1%, 5%, and 10% significance levels, respectively.