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THE EFFECTS OF FINANCIAL DEREGULATION ON WAGE INEQUALITY

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To my family and ancestors,

who may be glad to see a PhD degree finally in the family's thirty-first century.

博士与博士论文

初弱冠起念 辛卯至 甲午登科 箪瓢褴褛 象牙广厦 劈肝蹀血 战佞焚枉 终逾而立成文 达子丑以鸣

钱神须明鉴 红尘贵公平

虚实导鼎盛 劳资携景行

清天宁地意 经世济国情

御剑寻龙去 无利也无名

This epigraph is my "wulv" poem "PhD and Dissertation". I wrote the second half as a "wujue", originally titled "PhD", after I finished my PhD coursework and before I finished the dissertation proposal. This part addresses my motivation for pursuing the PhD. I wrote the first half while preparing this document. This part addresses the purpose of this dissertation, emphasizing the importance of proper financial regulation, inequality, development and prosperity, the relation between the real and financial economies, and the relation between and within labor and capital.

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Finally, I thank my parents for their enduring support. Too vast is the Pacific Ocean between the Land of Abundance and the Wind City. But too tiny is it in front of unconditional love.

Abstract

This dissertation investigates how financial deregulation affects wage inequality and how this shift within the finance industry transmits into the labor market, both empirically and theoretically.

I utilize staggered implementations of the interstate branching deregulation across US states from 1994 to 2005 as quasi-natural experiments. I find that this financial deregulation increases wage inequality. The increase effect is persistent over time and heterogeneous across dimensions of deregulation.

I empirically show the transmission mechanism of the "finance facilitator": financial deregulation facilitates (preexisting but financially constrained) skill-biased technical change in the labor market. First, within the finance industry, financial deregulation partially substitutes local community banks with national banks, which provide cheaper and more credit. Then, this positive credit supply shock loosens firms' financial constraints, greater for the firms that are young, small, or more profitable. Finally, these previously financially constrained firms scale up by hiring more skilled than unskilled workers. This further shifts skill composition and wage distribution of the labor market, resulting in higher wage inequality.

To illustrate the mechanism theoretically, I endogenize financial constraints and capital-skill complementarity within a span-of-control model. I show that financial deregulation enables previously financially constrained firms to shift towards their optimal production scales and thus towards higher relative demand for skilled workers. Such a shift increases both relative wages and relative employment of skilled workers and consequently drives up inequality.

JEL: G2, G3, E5, D6, J3, F3, O1

Keywords: Macroeconomic effects of finance, financial development, financial deregulation, credit supply, wage inequality, span-of-control, skill-biased technical change, capital-skill complementarity

1 Introduction

A large literature[2] studies the effects of financial deregulation on macroeconomic growth and employment, both theoretically and empirically. It finds beneficial effects, for example, deregulation boosts real growth and reduces unemployment. However, the impact of financial deregulation on inequality is under-investigated, despite the prolonged debate on whether/how the finance industry should be regulated/deregulated and the rapidly growing attention towards inequality in recent decades. What are the effects of financial deregulation on inequality? What is the empirical transmission mechanism of financial deregulation from the financial market to the labor market? Furthermore, how can we understand this mechanism in a theoretical framework?

This paper[3] studies the effects of financial deregulation on wage inequality and the transmission mechanism, both empirically and theoretically. Financial deregulation, a one-time

[2]Seminal works include Townsend (1983), Greenwood and Jovanovic (1990), King and Levine (1993), Townsend and Ueda (2006), and Bekaert et al. (2005, 2007) for cross-country growth studies, and Guiso et al. (2004) for local financial development within a country. This literature further dates back to Bagehot (1873), Schumpeter (1911), and Goldsmith (1969).

[3]I started this research project in the fall of 2016 to study the relationship between financial heterogeneity and inequality, previously under temporary titles including "Who is Overpaid and Why?", "Financial Development Affects Inequality within and across Industries?", "(How) Does Financial Development Relate to Inequality across and within Industries?", and "Financial Heterogeneity and Wage Inequality Variation". The initial focus of the project was the cross-country heterogeneity in financial development and its impact on inequality, inspired by Philippon and Reshef (2012). However, despite the large variation in financial development and the numerous (semi-)natural experiments across countries, the international data, especially the lack of detailed labor data, does not allow accurate or deeper investigation.
Soon, the focus shifted to within-United States analysis and specifically, the effects of the IBBEA interstate branching deregulation of the US on wage and income inequality. The specific shift to the IBBEA was inspired by Rice and Strahan (2010). Sacrificing the large heterogeneity across countries, I was able to analyze more closely the dynamics and mechanism within and between the financial and labor markets. I tried to overcome the lack of a unified finance-macro-labor dataset by collecting and harmonizing numerous datasets, mostly public datasets from US federal agencies.
I started the US analysis emphasizing the cross-industry heterogeneity in financial dependence, financial access, and labor market structure and behavior, which was developed into my third-year paper, "Financial Heterogeneity and Wage Inequality", to satisfy the PhD degree requirement in 2017.
The focus of the paper (the dependent variable) further shifted to the inequality in the overall labor market, which is heterogeneous across states and maybe contributed by financial deregulation, as opposed to the inequality heterogeneity across industries, after I realized the lack of studies in the literature on documenting the effects of financial (de)regulation on inequality and more importantly, on the transmission mechanism between the financial economy and the real economy, specifically the labor market. This idea was finally developed into this thesis.

shift within the finance industry,[4] only directly impacts the finance industry and the financial market. But the financial market and the real economy, specifically the labor market, are interdependent. Financial deregulation can indirectly impact firms, not only those inside the financial market but also firms outside the financial market (they may gain access to finance after deregulation). Then, the purely financial shock can be transmitted into the labor market through firms' capital and labor decisions and become (indirectly) real, which can certainly affect wage inequality.

I specifically study the effects of the interstate branching deregulation of the Riegle-Neal Interstate Banking and Branching Efficiency Act (IBBEA) of 1994 in the United States (US). Following the passage of the IBBEA, states started to deregulate in the following four dimensions: (1) allowing de novo branching (new branches), (2) allowing interstate branch acquisitions, (3) decreasing the required minimum age of the target bank to be acquired (age laws), and (4) increasing the maximum percentage of the total deposits of the target and acquirer in the state (concentration laws). I treat the sharp and staggered state-level implementations of the interstate branching deregulation from 1994 to 2005 as a series of quasi-natural experiments, conditional on labor, political, legal, macroeconomic, and financial variations across states and over time. I implement a difference-in-differences strategy on a state-year panel across 50 states from 1983 to 2007.

I find that the interstate branching deregulation *increases* wage inequality. A state deregulated in all four dimensions has a 6% higher wage ratio between the 90th and the 10th percentiles, the conventional wage inequality measure constructed using the Current Population Survey Outgoing Rotation Group (CPS ORG) data. The increase effect is in sharp

[4]Financial deregulation is a shift within the finance industry so it is a "virtual" shock by definition. An alternative understanding is to view financial deregulation as a "real" shock to firms' financial constraints directly instead of a "virtual" financial shock that indirectly impacts firms. This alternative understanding is also valid for this paper. The financial deregulation studied in this paper is empirically a positive credit supply shock to financially constrained firms. Thus, this indirect and virtual financial shock (my understanding) is equivalent to a direct and real financial constraint shock (the alternative understanding). I will show the equivalence empirically. However, the equivalence is not always the case. For instance, the intrastate branching deregulation in the 1970s and 1980s only provided extra credit to large and public firms (not financially constrained). It was not a direct and real financial constraint shock while it was an indirect and virtual financial shock. See Wei (2020) for detailed empirical evidence.

contrast to the decreased state-level inequality calculated from the raw data. The increase effect is not only persistent in the long run (more than a decade after the deregulation), but also robust to different sets of relevant control variables and fixed effects, alternative time horizons, alternative measures of deregulation and inequality, falsification tests, and different occupations, industries, states, and regions.

Three alternative hypotheses are tested and rejected. The increase effect is not from reverse causality, which does not exist. The increase effect is not from the coincidence between the interstate branching deregulation and any other events that happened to occur during the same period (pure time effects that vary over time only). The increase effect is not from other legal changes (that vary both over time and across states), including labor law changes (minimum wage laws and right-to-work laws) and other financial deregulations (the intrastate branching deregulation and the Dodd-Frank Act[5]).

The increase effect on wage inequality is heterogeneous across the four dimensions of the IBBEA deregulation.[6] While the literature either treats all four dimensions homogeneously or constructs a deregulation indicator variable for each of the four dimensions, I find that allowing de novo branching and allowing interstate branch acquisitions empirically play a pivotal role. However, the other two dimensions that deregulate acquisition restrictions take effect only when interstate (not intrastate) acquisitions are allowed.[7]

Empirical Transmission Mechanism: Finance Facilitator After documenting the

[5]In addition to the regulation sections in the Dodd-Frank Act, half a page in the long document (Sections 613) eliminated restrictions on de novo branching for all states, effective immediately after its passage in 2010.

[6]The subtle timing of the IBBEA is also interesting yet mostly omitted in the literature. The IBBEA (signed into law on September 29, 1994) allowed states (1) to opt out of the acquisition deregulation anytime before June 1, 1997, (2) to opt into the same deregulation anytime after the IBBEA was passed, and (3) to opt into the de novo branching deregulation anytime after the IBBEA was passed. This legal setting generated staggered implementations of interstate branching deregulation. The states that deregulated earlier have a larger positive effect on wage inequality.

[7]While this seems tautological, the state-level acquisition restrictions are for both intrastate and interstate branch acquisitions. So when states deregulated any of these two dimensions without deregulating interstate branch acquisitions, they were de facto deregulating intrastate branching. But this intrastate branching deregulation is carried out under the name of interstate branching deregulation. I call it a "de jure gesture" since it does not de facto deregulate interstate branching.

increase effect, I show the transmission mechanism of the "finance facilitator"[8] - finance facilitates labor market dynamics and trends which are always in place but may be constrained by financial frictions (to be partially lifted by financial deregulation).

I first show that the interstate branching deregulation takes effect within the banking industry using bank regulatory data from the Federal Reserve System (Fed) and the Federal Deposit Insurance Corporation (FDIC). National banks enter a new state through both acquisitions and de novo branching after the deregulation, while local community banks open fewer new branches.

This entry of national banks leads to a positive credit supply shock: interest rates are lower and loan amounts are larger on the most recently approved loans. Both price and quantity effects are more pronounced for small and medium firms, shown with detailed financing data from the Survey of Small Business Finances (SSBF). These firms switch to the entering national banks and become less financially constrained.[9]

Large and public (Compustat) firms experience a similar but insignificant shock, indicating that their financial constraints were mostly not binding before the deregulation. This is not too surprising because before the deregulation, large firms could borrow from the same national banks in a different state and internally move capital across state borders. In addition, facing the competition from out-of-state national banks, local community banks could offer better loan contracts to large firms than the loan contracts to firms without access to out-of-state banks. Both capital movements within large firms and counter offers by local community banks can contribute to the heterogeneity in both financial constraints and deregulation effects across firms.

While the effects on the financial market are as expected, the effects on the real economy are the main driving force behind the increase effect on wage inequality. Heterogeneous

[8]This term is coined during a discussion with Philip Strahan. I would like to thank him for the insightful discussion and the inspiration for a companion paper investigating the heterogeneous effects across deregulations (Wei (2020)).

[9]This also shows that the lending relationship is not broken by bank substitution. After all, firms may continue to work with the same bankers and branches but different banks, as only the branch ownership (and charters) is changed after acquisitions.

effects of the positive credit supply shock across firms result in heterogeneous labor market decisions across small and medium firms. While all these firms receive a significantly positive credit supply shock, some firms benefit more. Young, small, or more profitable firms receive a greater positive credit supply shock, especially through larger loan amounts.

These firms should have had better access to capital and should have been less financially constrained before the deregulation. But they did not due to their non-financial characteristics (like firm ages and sizes) or the insufficient credit in their local financial markets. Their production scales were thus below the optimal. And the skill-biased technical change in the overall labor market was constrained in these firms. Consequently, these firms, especially the young or small firms, hired relatively more unskilled workers than large (and less financially constrained) firms before the deregulation. After the deregulation, their financial constraints are loosened. With the new credit from the positive credit supply shock, they scale up by hiring more skilled workers relative to their previous skill composition, which resulted from financial constraints.

This shift in skill composition (mostly in the young or small firms) is consistent with the overall labor market pattern seen in the data of the Longitudinal Employer-Household Dynamics (LEHD) program of the U.S. Census Bureau. The other (large and public) firms, which are less or not financially constrained before the deregulation, have been close to or have reached their optimal production scales and optimal labor market decisions. Therefore, neither the positive credit supply shock nor the change in skill composition is significant for these large and public firms (in the Compustat data).

Overall, the effects on the previously financially constrained firms dominate in the labor market. The relative demand for skills increases. It is reflected in both increased relative wages and increased relative employment, which are the intensive margin (wages) and the extensive margin (employment) of the wage inequality measure, respectively. Therefore, wage inequality increases.

Theoretical Mechanism To illustrate the theoretical mechanism, I extend the span-of-

control model of Lucas (1978) by adding two elements. 1) Financial constraints. I extend the production function with a capital input factor where the capital could be borrowed and lent in a competitive but frictional financial market. This financial friction limits firms' access to capital so that they have to produce below the optimal production scale. The heterogeneity in financial constraints across firms is modeled through heterogeneous entrepreneurial skills across firms, which could be equivalently understood as heterogeneous productivity across firms. 2) Capital-skill complementarity.[10] Capital complements skilled labor but substitutes unskilled labor, so that financial constraints move firms away from their optimal labor skill composition towards more unskilled labor.

These two extensions together drive the key theoretical mechanism. The first extension endogenizes financial access and financial frictions into production decisions. And the second extension enables a financial shock outside the labor market to impact the labor market in a real and heterogeneous manner. When financial deregulation reduces financial frictions, firms gain better financial access and move closer to their optimal production scales. This improvement in financial access and production scales is heterogeneous across firms, more for those more financially constrained firms before the deregulation. Scaling up with more skill-complementary capital shifts firms' (and thus the overall labor market's) capital-labor structure and skill composition to more skilled production.

This model[11] formalizes the idea of the "finance facilitator" - a better financial market facilitates more efficient production. Finance is the facilitator, not the driver. This facilitation moves the production decisions on capital, skilled labor, and unskilled labor to the optimal ones. Agnostically, it could push inequality either up or down and either significantly or not. It is the embedded production technology, which is capital-skill complementary in this

[10] Despite different theoretical mechanisms, the general idea about the existence of the linkage between capital-skill complementarity and inequality is the same with Krusell et al. (2000).

[11] The model focuses on the production side of the real economy to stress heterogeneous financial inclusion that increases inequality. It abstracts the household side from the educational choice because the decrease effect on inequality from more educational attainment after financial deregulation is dominated by the production-side effect. And it abstracts the financial market to a flat risk-free rate due to the expected results within the financial market.

model, that drives inequality in the certain direction of increase.

Related Literature This paper contributes to the general topic of the real effects of financial development, liberalization, and regulation/deregulation, especially on inequality. This topic is primarily related to three strands of literature: The first strand[12] studies the effects of financial development on growth and inequality, either theoretically or empirically.[13] Specifically on inequality, Black and Strahan (2001) (gender), Levine et al. (2014) (race), and Beck et al. (2010) (within-state) find interesting and significant relations between financial deregulation and inequality in the labor market, but the transmission mechanism is still under-investigated.[14] Black and Strahan (2001) find that the competition brought by national banks into deregulated states suppresses labor market discriminations against female workers in the banking industry. Levine et al. (2014) find that the entry of new firms facilitated by bank deregulation boosts African American workers' relative wages.

This paper is the closest to Beck et al. (2010), which study the *intrastate* branching deregulation in the 1970s and 1980s and find a decrease effect on inequality. I view my contribution as complementary to theirs. This paper studies a different financial deregu-

[12]See general (and more theoretical) discussions (Bagehot (1873), Schumpeter (1911), Goldsmith (1969), Townsend (1983), Greenwood and Jovanovic (1990), and Beck and Levine (2018)), cross-country evidence (mostly on growth: King and Levine (1993), Townsend and Ueda (2006), Bekaert et al. (2005, 2007), and Mian et al. (2017)), and local financial development within a country: Guiso et al. (2004) for Italy, Bertrand et al. (2007) for France, Fonseca and Van Doornik (2019) for Brazil, Caggese et al. (2019) for Sweden and personal credit rating, and especially the US, such as Jayaratne and Strahan (1996) (growth), Beck et al. (2010) (inequality), Rice and Strahan (2010) (loan market), Favara and Imbs (2015) (housing prices), Landier et al. (2017) (housing prices co-movement), Bai et al. (2018) (firm productivity), DAcunto et al. (2018) (flexible prices and leverage), Neuhann and Saidi (2018) (firm risks and productivity), and Mian et al. (2019) (household demand).

[13]Most of the empirical papers, at least as early as the four indicators of the level of financial sector development in King and Levine (1993), utilize cross-sectional legal differences/changes (staggered or not) in panel regressions using international data or more specific settings within a country, though the exogeneity assumption could be more or less strict depending on the specific setting. This paper generally follows this empirical strategy, similar to Black and Strahan (2001), Rice and Strahan (2010), Beck et al. (2010), Levine et al. (2014), and Mian et al. (2019). An earlier version of this paper used the deregulation variable from Rice and Strahan (2010) to measure interstate branching deregulation (currently in Panel B of Appendix Table B7). Around the same time, Trainaor (2018) used the same measure and empirical setting to explain the increase in the college premium, measured as the relative wages between the skilled and unskilled workers.

[14]Beck et al. (2010) have a "preliminary exploration" that I will discuss in detail for comparison. But most papers of this literature (see Demirguc-Kunt and Levine (2009, 2018)) focus on the relation itself, while some papers theoretically incorporate the finance channel, under the framework of Becker and Tomes (1979, 1986), into family consumption-saving decisions.

lation, the *interstate* branching deregulation that impacts the banking industry and credit allocation across states instead of within states, and explores the transmission mechanism extensively, both empirically and theoretically. Additionally, I find[15] that the key difference in the mechanism is that the intrastate branching deregulation does not loosen financial constraints despite being a larger positive credit supply shock than the interstate one, which indicates that the less/non-financially constrained firms receive even more credit after the intrastate deregulation while the financially constrained firms do not benefit from the deregulation.

On the international side of the first strand of literature, financial development is more relevant and has a larger variation. However, data limitation and the large heterogeneity across countries make it difficult to construct clear identification and commensurable comparisons.

The second strand of literature further investigates the financial heterogeneity across economic agents or environments, such as heterogeneous financial dependence/constraints across firms, industries, and economic booms and busts.[16] The third strand is the literature on labor market inequality and premiums, which primarily focuses on labor-related characteristics of individual workers and real frictions in the labor market[17] instead of aggregate economic conditions such as financial market frictions, leaving substantial residual

[15] See Wei (2020) for detailed evidence and comparisons. See also a similar comparison between intrastate and interstate deregulations by Chava et al. (2013) (for innovation). They emphasize that "the nature of financial deregulation and how it affects competition in the credit markets crucially affect potential benefits to the real economy."

[16] Vera and Onji (2010) finds that small businesses received more credit from large banks than small banks after the IBBEA. For more cross-firm evidence, see Moll (2014), Giroud and Mueller (2015, 2016), Mueller et al. (2017b,a), Gavazza et al. (2018), DAcunto et al. (2018), Ma et al. (2019), and Ottonello and Winberry (2019). Rajan and Zingales (1998) provide international cross-industry evidence. They find that financial development reduces costs of external finance and industries with higher financial dependence "develop disproportionately faster in countries with more-developed financial markets." Moreover, these industries also "experience a substantially greater contraction of value added during a banking crisis" (see Kroszner et al. (2007)).

[17] The main focus is on gender, education, race, or other related dimensions such as labor market frictions including search and matching frictions and sub-optimal unemployment insurance programs. Additionally, a large labor literature documents skill premium resulting from skill-biased technological change as the main cause for wage inequality. The mechanism of this paper is also in line with this evidence.

wage inequality[18] unexplained.

The main contribution of this paper is discovering the increase effect of interstate branching deregulation on wage inequality and investigating the underlying transmission mechanism of the "finance facilitator." The increase effect is novel and may be surprising for those that believe finance has no real effect at all and those that believe that the distance between financial regulation and the labor market is too far to allow for the possibility or observation of any effects. The "finance facilitator" mechanism shows (positively with empirical evidence) the increase effect step-by-step from the financial market to the labor market. It also shows (normatively with the model) not only the possibility of the increased inequality given the capital-skill complementary technology but also the possibilities of decreased or unchanged inequality given other technologies. The theoretical mechanism further emphasizes the facilitating (instead of driving) role of finance.

The second contribution is that I primarily focus on the labor market behavior on the production-side of the economy[19] for the transmission mechanism as opposed to the financial market behavior or the behavior on the household-side. On the one hand, the finance literature has deeply studied effects within the financial market and has given results consistent with the commonly held beliefs. This paper also confirms and extends these results. On the other hand, I focus on the production-side because it is empirically more important. Financial deregulation, more generally financial development, is traditionally viewed as financial inclusion that provides more and better financial access to households and firms. This view would hold that inequality should be decreased, because, for example, unskilled households access more student loans and attain more education and skills (also verified in this paper). However, the overall increase effect on inequality indicates that this household-side decrease effect is dominated by the production-side increase effect, which is driven by the underlying

[18] Acemoglu and Autor (2011) and Katz and Autor (1999) document that income inequality could not be completely explained by the heterogeneity in labor characteristics. Even within groups of a specific combination of education, skill, gender, and experience, there still exists substantial residual wage inequality.

[19] This is in line with Black and Strahan (2002), Bertrand et al. (2007), Kerr and Nanda (2009, 2010), Benmelech et al. (2015), DAcunto et al. (2018), Neuhann and Saidi (2018), and Bai et al. (2018), which also focus on the production-side effect.

skill-biased technology.[20] Besides, the focus on production extends the literature of labor (talents) allocation across firms and industries.[21]

Further, in contrast to the international literature, I utilize the sharp and staggered implementations of a US state-level legal change with detailed datasets across states, loans, and firms in a difference-in-differences framework to obtain clear identification and commensurable comparisons. Though less striking than the difference between the US and the Democratic Republic of the Congo[22], the variation across states, such as New York and Colorado, is large enough for identification and more relevant for policy implications. Also, this paper contributes to measuring marginal, instead of average, real effects of finance using the marginal financial deregulation of a state, as there is a lack of both theoretical and empirical evidence on the marginal effects as opposed to average effects[23].

Finally, I strengthen the link between the finance[24] literature and the labor and macroeconomic literature. For labor, this paper expands the consideration set with financial characteristics in addition to conventional labor characteristics.[25] For macroeconomics, this paper presents results on firm dynamics and firms' heterogeneous labor market decisions

[20]This is consistent, more generally, with the overall and long-run "Race between Education and Technology" (see Goldin and Katz (1998, 2008, 2010) and Acemoglu and Autor (2012)), which is "a unified framework for interpreting how the demand and supply of human capital have shaped the distribution of earnings in the U.S. labor market over the twentieth century."

[21]This is emphasized, for example, in Murphy et al. (1991), Katz and Murphy (1992), Hsieh and Klenow (2009), and Hsieh et al. (2019).

[22]The DRC is the least financially developed country/region by the ratio of private credit to GDP according to the World Bank.

[23]See Zingales (2015).

[24]I focus on the financial shock of financial deregulation to study wage inequality rather than the conventional labor characteristics for three reasons: First, macroeconomic policymakers could proactively use macro-prudential industrial policies and financial regulations/deregulations to partially "manage" inequality. Especially in developing economies, this will have much greater policy implications and much larger space for policy improvement than both developed economies and other dimensions of policies. Second, the financial shock is "more exogenous" for the labor market than pure labor shocks such as minimum wage law changes and other real-side shocks such shocks to firm dynamics. See Fonseca and Van Doornik (2019) for a bankruptcy reform in Brazil for an example. Third, besides inequality, removing financial frictions also helps the economy to endure macroeconomic shocks since it weakens the amplification from the balance sheet channel (emphasized by Bernanke and Gertler (1989) and Kiyotaki and Moore (1997)) to reduce output volatility (see Raddatz (2006)), wage cuts, and unemployment.

[25]This adds financial characteristics specifically to the literature of skill-biased technical change and its labor market effects, such as Katz and Murphy (1992) and Berman et al. (1994), and the literature of skill-occupational decisions and wealth distribution, including Banerjee and Newman (1993), Autor et al. (1998), Autor et al. (2003), Buera et al. (2011) and Autor and Dorn (2013).

that are consistent with and complementary to cross-sectional evidence[26] on inequality and pay structure within and across firms. This literature takes financial shocks and constraints as exogenous or does not consider them to focus on firms' "real" behavior. While also considering cross-firm heterogeneity, I focus on heterogeneously financially constrained firms' heterogeneous responses to the credit supply shock.

The remainder of the paper is organized as follows: Section 2 introduces the financial deregulation of the US in the past century and, specifically, institutional details of the IBBEA. Section 3 describes data sources, the construction of datasets, and variable measurements. Section 4 presents the empirical strategy and main results. Section 5 investigates the transmission mechanism of the "finance facilitator" empirically. Section 6 sets up and analyzes a model to illustrate the mechanism theoretically. Finally, Section 7 concludes, followed by an empirical appendix and a mathematical appendix.

2 Financial Deregulation

2.1 US (De)Regulation on Interstate Branch Banking 1920s-2010s

Financial regulation/deregulation of the twentieth century in the United States started with the McFadden Act of 1927.[27] While rechartering the Federal Reserve Banks in perpetuity (the original charters were set to expire in 1934), the Act set fundamental banking and branching rules. A widespread view on the McFadden Act in the literature and among the finance industry practitioners is that it specifically prohibited interstate branching.[28] But the Act (Sections 7) effectively deregulated branch banking by (1) delegating the regulating power on branch banking from the federal level to the state level, while (2) lifting branch

[26] See Moll (2014), Giroud and Mueller (2015, 2016), Mueller et al. (2017b,a), Gavazza et al. (2018), Ma et al. (2019), and Ottonello and Winberry (2019) for cross-sectional evidence.

[27] See Kroszner and Strahan (2014) for a more detailed history of US banking regulation and deregulation dating back to 1789.

[28] See `https://en.wikipedia.org/wiki/McFadden_Act` for one example of this view.

banking restrictions on national banks on the federal level.[29]

With the McFadden Act *de jure* deregulating interstate branching on the federal level, banks still could not open de novo branches, restricted by state regulations. In the 1930s and 1940s, some (national) banks evaded the restrictions by acquiring banks within and across states to *de facto* open branches interstate.

To stop this bypass, the Douglas Amendment to the Bank Holding Company (BHC) Act of 1956 effectively prevented, on the federal level, intrastate and interstate branching by restricting both de novo branching and branch acquisitions.

Starting in the 1970s, states gradually loosened restrictions on *intrastate banking* (also slightly on *interstate banking* generally but not *interstate branching*). This wave of intrastate branching deregulation finally reached federal legislature with the Riegle-Neal Interstate Banking and Branching Efficiency Act (IBBEA) of 1994, which was the first *interstate branching* deregulation on the federal level after seven decades and effectively repealed the BHC Act on interstate branching restriction.[30] To test the effects and mechanisms of financial deregulation, I will use the IBBEA deregulation as a quasi-natural shock to financial frictions in this paper.

Following the IBBEA, each state could choose to deregulate interstate branching in any or all of these four dimensions:

1. allowing de novo branching (DeNovo),

[29]See https://www.federalreservehistory.org/essays/mcfadden_act for more details and views of the Federal Reserve System on the act: "From 1863 through 1927, banks operating under corporate charters granted by the federal government (known as national banks) had to operate within a single building. Banks operating under corporate charters granted by state governments (called state banks) could, in some states, operate out of multiple locations, called branches. Laws concerning branching varied from state to state. The McFadden Act allowed a national bank to operate branches to the extent permitted by state governments for state banks in each state. In a state that prohibited branch banking, for example, national banks could not open branches. In a state that allowed state-chartered banks to operate branches in the same city as their headquarters, a national bank could operate branches in the same city as their headquarters." And see Miller (1985, 1986, 1989) for legal discussions on interstate branching, the Commerce Clause of the US Constitution, and Court rulings.

[30]The restriction on interstate branching after the IBBEA is minor. The IBBEA only requires banks to comply with the Community Reinvestment Act to "meet the needs of borrowers in all segments of their communities, including low- and moderate-income neighborhoods".

2. allowing branch acquisitions (Acquisitions),
3. decreasing the minimum age of the target bank required to be acquired (MinAge), and
4. increasing the maximum percentage of the total deposits of the target and acquirer in the state (DepositCap).[31]

where 3) and 4) loosens age laws and concentration limits on 2).

One feature of the IBBEA omitted in the literature is the timing. The Act did not become effective immediately after Bill Clinton signed the bill on September 29, 1994. The timeline set for all states was a deadline of June 1, 1997 to opt out of the branch acquisition deregulation. States also had the freedom to opt into deregulating acquisitions anytime before the deadline and to opt into deregulating de novo branching anytime before or after the deadline.[32]

2.2 Measuring Financial Deregulation of the IBBEA

The main measure of interstate branching deregulation in this paper, "Deregulated," is an indicator (dummy) variable that takes the value of 1 if a state deregulates either DeNovo or Acquisitions. These two dimensions are stressed because they are ex-ante more important, as the other two dimensions (MinAge and DepositCap) deregulate restrictions on acquisitions. They are also more important empirically: DeNovo and Acquisitions play the pivotal role in affecting inequality while the other two dimensions do not (as we will see in Section 4.4).

For individual dimensions of the interstate branching deregulation, 4 indicator variables[33] are turned on for the 4 dimensions of the deregulation, respectively. I also calculate an overall index for interstate branching deregulation: the variable "Interstate0-4" is the sum of the 4

[31] An interesting case of deregulation in a state could be deregulating 3 and 4 without 2. In this case, the deregulation takes effect only for intrastate acquisitions, but not for interstate ones. It turns out that this case has no effect on inequality, which is why I call it a "de jure gesture". See Section 4.4 and Table 4 for details.

[32] Most recently and the least investigated, the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 (DFA) eliminated, in section 613, the opt-in election by each state to permit de novo branching, effective immediately after Barack Obama signed it on July 21, 2010.

[33] See Table 1 of Rice and Strahan (2010) for the detailed construction of the 4 dimensions.

indicator variables so that it is on a scale of 0, 1,..., 4, where 0 means no interstate branching deregulation and 4 means full interstate branching deregulation, shown in Figure 1.

The IBBEA deregulation features a heterogeneous, sharp, and staggered implementations across states and years[34]. No state had deregulated interstate branching before the IBBEA (1994). Starting 1994, 43 states deregulated their interstate branching laws[35] and 27 states[36] had deregulated either DeNovo or Acquisitions by the end of 2005.[37]

3 Data and Measurements

In this section, I will first overview all datasets used in this paper and then describe details of each.

The primary dataset is a state-year panel from 1983 to 2007 across all US states, constructed mainly from the Current Population Survey (CPS). Alternative sample periods will also be tested for robustness. This time window is chosen to avoid the impact of the Great Recession after 2007 and to avoid the impact of the issue of data quality of the CPS before 1983. Some papers on a similar topic, such as Beck et al. (2010) and Mian et al. (2019), exclude a few states for various reasons. For example, Delaware and South Dakota are dropped in these two papers because they "took advantage of the elimination of usury laws to attract credit card businesses", which happened in the 1980s. This paper focuses on a different period, different deregulation, and a different mechanism (production-side transmission) where the credit card may not be a concern. Therefore, no state is dropped for the main analysis, whereas I run robustness checks (in Section 4.5), dropping these two states

[34]The Dodd-Frank deregulation features a uniform implementation in time series (in effect starting 2010) but still heterogeneous in extent across states since some states had deregulated de novo branching before the Act.

[35]Eight non-deregulated states (following the IBBEA) are Arkansas, Colorado, Iowa, Kansas, Mississippi, Missouri, Montana, and Nebraska.

[36]These states are Alaska, Arizona, Connecticut, District of Columbia, Hawaii, Illinois, Indiana, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, Tennessee, Texas, Utah, Vermont, Virginia, Washington, and West Virginia.

[37]See Panel A of Table 1 for detailed summary statistics.

or, more generally, any state, and obtain almost identical results.

The main measure of wage inequality for a state in a year is the ratio between 90th and 10th percentiles of the wages across all workers in the state-year, $(w^{90}/w^{10})_{i,t}$, the conventional inequality measure in the labor literature. Alternative inequality measures considering other quantiles or moments of the wage distribution and traditional inequality measures (the Gini index and the Theil index) are checked for robustness. Note that the average inequality across states decreased from 7.521 in 1994 to 7.235 in 2005. Alternatively, the average inequality change across states is -3.5%, also a decrease. More details are in see Section 3.1.

The main independent variable in this paper, "Deregulated," and alternative independent variables are detailed in Section 2.2.

Included in the panel is a large set of control variables, which may be correlated with interstate branching deregulation and contribute to wage inequality. The main control set includes labor variables, political, legal, and ideological variables, macroeconomic variables, and banking variables. Control variables are detailed in Sections 3.2 and 3.3.

The ideal dataset for the transmission mechanism is a single unified dataset that includes all information of banks, firms, and households across the financial market and the labor market, to construct the direct relationship between banks and firms in the financial market after the deregulation shock, the causal relationship from the deregulation to the capital and labor market reactions of firms that are shocked, and finally the effects in the labor market between labor supply and demand. However, only datasets for one or two types of agents (such as datasets for both banks and firms) and datasets for single markets (such as the loan market or the labor market), to the best of my knowledge[38], are available.

To overcome this difficulty of data availability, for the transmission mechanism of the "finance facilitator," I unify various datasets to construct two datasets to show within-finance

[38]This is true even for non-US data and international data. The main datasets of Fonseca and Van Doornik (2019) are the closest to the ideal, which studies Brazilian financial development and its labor market and productivity implications. But still, they have to "credit registry data from the Central Bank of Brazil, matched employer-employee data from the Brazilian Ministry of Labor and Employment". The dataset construction of this paper is similar in spirit to their combination.

mechanisms and finance-labor market mechanisms. Both datasets focus on small-medium businesses that were affected more by the deregulation, while the overall market and large firms are also tested.

The financial dataset includes a state-year panel of bank branching and acquisition information to show whether and how this banking deregulation affects banks and a firm-loan-year panel to further show the effects of deregulation on firms through bank loans as a positive credit supply shock. Detailed in Section 3.3, the financial dataset includes a state-year panel of bank branching (1994-2007) and acquisition (1986-2001) and a firm-loan-year panel (1987-2003 with jumps).

The finance-labor dataset includes similar state-year and firm-year panels of wages, employment, and other labor market characteristics to show how affected firms reacted to the financial deregulation shock in the labor market. The finance-labor dataset detailed in Section 3.4.

For the transmission mechanism of the "finance facilitator," two sub-datasets for within-finance mechanisms and labor market mechanisms, respectively, focusing on small-medium businesses that were affected more by the deregulation.

To extend from small-medium businesses to the overall financial and labor market, I construct an overall labor market dataset (Section 3.4) and datasets for public firms (Section 3.5) corresponding to small-medium businesses.

3.1 Inequality Measures and Labor Variables

Labor variables, including wages used to construct the main variable of interest, wage inequality, are from the Current Population Survey Outgoing Rotation Group (CPS[39] ORG[40]). Wages are "earnings of wage and salary workers" who are 16-64 years old and employed. I

[39]CPS ORG data is extracted from CEPR (Version 2.3), which preliminarily cleans and adjusts variables for time-consistency and top-coding.

[40]CPS ORG data is used in this paper instead of the main CPS data (basic CPS) to include variables of earnings and income. CPS ORG data is used instead of CPS Annual Social and Economic Supplement (CPS ASEC or CPS March) for better geographical and time coverage.

also collect their labor characteristics, including education, experience, ages, genders, races, locations, industries, and occupations. For the state-year panel, I aggregate these labor variables to their state-year (weighted) averages, percentiles, or standard deviations using corresponding sampling weights of the CPS.

The main measure of wage inequality for a state in a year is the ratio between 90th and 10th percentiles of the wages across all workers in the state-year, $(w^{90}/w^{10})_{i,t}$, the conventional inequality measure in the labor literature.[41] Panel B of Table 1 presents detailed summary statistics for this measure with wage levels, wage standard deviations, wage various ratios, and Gini and Theil Indices. Note that the mean inequality decreased from 7.521 in 1994 to 7.235 in 2005 (-3.8%). And the average inequality change from 1994 to 2005 across states, $\overline{\Delta_{2005-1994}(w^{90}/w^{10})_i}$ is -3.5%, also a decrease, though with a large standard deviation of 8.6%.[42] Both are opposite to the main result, which is an increase effect of interstate branching deregulation.

I also construct these measures using alternative datasets, the United States Census and the American Community Surveys (ACS) from the Integrated Public Use Microdata Series (IPUMS) USA database (details in Section 4.5.3), which yield both consistent measurements and results and extend the main result from wage inequality to income inequality.

3.2 Main Control Set and Alternative Legal Events

The following large set of variables control covariates that may be correlated with interstate branching deregulation and contribute to wage inequality. The main control set includes labor variables, political, legal, and ideological variables, macroeconomic variables,

[41] Its log term will be used as the main dependent variable to interpret the regression coefficient as a percentage change in inequality.

[42] Both are calculated using raw data. A common narrative is that inequality increased a lot in the recent decades. But that is only true for the national-level inequality measures among some developed countries. The summary statistics here are the (equally-weighted) averages of the state-level inequality across US states, which are corresponding to the main empirical setting in this paper (staggered state-level financial deregulation) and are different from the measures of the common narrative. See Appendix Figure A1 for anecdotal evidence of possible "inequality illusions."

and banking variables.[43]

To control the labor characteristics of a state, I aggregate individual data from CPS to its state-year averages.[44]. Labor variables include racial ratios (three indicator variables for African Americans, Hispanic, and other races that are not white, African American, or Hispanic), gender (an indicator variable for female workers), age (two indicator variables for 16-35 and 36-55 years old because the whole sample has workers 16-64 years old), and Mincer variables, including education (educational attainment in years), experience (in years), and quadratic experience. Political (bipartisan) variables[45] include the party of the governor, the party control of the state senate, the party control of the state house, and, alternatively, the proportion of Democratic or Republican seats in the state senate or house. Legal variables include whether a state has split legislature and whether a state has a split government.[46] Legal variables relating to the finance industry are whether a state had a unit banking law and whether a state changed bank insurance powers.[47] Ideological variables include the proportion of Democratic/Republican population, the proportion of liberal/conservative population, and the policy mood measures.[48] Macroeconomic variables include Gross State Product (GSP) per capita growth, housing price index growth (from the Federal Housing Finance Agency), and the change in unemployment rate.[49]

Additional variables for alternative hypotheses are added into the main panel, including minimum wage law changes from Autor et al. (2016), right-to-work law changes from

[43]See Appendix Tables A1 and A2 for summary statistics.

[44]Each indicator variable is aggregated to a fraction and each continuous variable is aggregated to its state-year weighted average

[45]Political variables and most legal variables are from Carl Klarner (2013) "State Partisan Balance Data" and Carl Klarner (2015) "State Economic and Government Finance Data," which cleaned the US state-year level data from various official sources (state and federal databases).

[46]The District of Columbia does not have house representatives, so when this set of controls in place, D.C. is dropped from the regression.

[47]The last two legal condition measures are from Kroszner and Strahan (1999).

[48]Two leading measures of policy mood in the political science literature are Berry et al. (1998) and Enns and Koch (2013). While they are both trying to measure how "the public' s relative support for New Deal/social-welfare-type policies," the correlation between the two measures is not high in some cases and there has been a long discussion in the literature on validity and accuracy of the two. Both measures are used in this paper to control the tendency of the general public to deregulate interstate branching laws of a state in a year.

[49]Levels (fourth-quarter values) and alternative measures do not change the result.

the Congressional Research Service (Collins (2014)), and other financial deregulations from Kroszner and Strahan (1999) and U.S. Code Title 12 from the Legal Information Institute.[50]

3.3 Financial Data

I use three sets of financial data. The first set includes variables related to the banking industry, which work as controls for the main panel and for the reverse causality analysis (Section 4.3.1). Following Kroszner and Strahan (1999) and Rajan and Zingales (2003), the key variable related to financial deregulation in a state is the relative strength of the interest group of the small (local community) banks. Small banks are defined as banks with assets below the median in each state-year. Their relative strength is measured by the fraction of banking assets in small banks and the capital-to-asset ratio of small banks relative to large banks.[51] Balance sheet and income statement information of US banks is from the Consolidated Reports of Condition and Income (Call Reports) by the Federal Financial Institutions Examination Council (FFIEC).

The other two financial datasets are constructed to investigate the transmission mechanism (on the finance side). The second financial dataset is a state-year panel of bank branching and acquisition activities, for checking within-finance (the banking industry) effects of the deregulation, constructed from the Federal Reserve System (Fed) Bank Mergers and Acquisitions Database (1986-2001) and the Federal Deposit Insurance Corporation (FDIC) Branch Database (1994-2018).

The third financial dataset collects financing information of small-medium businesses using the Survey of Small Business Finances (SSBF) across its all 4 years (1987, 1993, 1998, and 2003) which largely span interstate branching deregulation (1994-2005) with enough preceding time (as the benchmark and the pre-trend). This firm-loan-year panel includes

[50] See https://www.law.cornell.edu/uscode/text/12.

[51] Alternative measures of the relative strength of small banks are calculated as the relative size (total assets, total loans and leases, commercial and industrial loans, total domestic deposits), the relative income (net income, total interest income, total interest income on loans), and the relative employment (number of employees, total salaries and benefits).

information on both price (interest rates) and quantity (loan amounts) of firms' most recent loan with various detailed loan controls, including information on loan contracts, lending relations, and firms' financial situations. In addition, I add in loan market controls for risky and risk-free rates (from Federal Reserve Economic Data (FRED)) and local loan market concentration (from Call Reports).

The full control set[52] for this panel is as follows. Loan Controls include loan terms (in months) of the most recent loan, whether the most recent loan requires a collateral, whether the most recent loan has a floating or fixed interest rates. Loan Market Controls include the prime rate, the corporate bond spread calculated as the spread between BAA-rating corporate bond interest rates and the 10-year Treasury bond yield, the term structure spread calculated as the spread between the 10-year Treasury bond yield and the 3-month Treasury bill rate from the secondary market, and whether the firm is in a concentrated credit market measured by whether the Herfindahl-Hirschman Index of the local-MSA loan market is above 1800. Relationship borrowing controls include the number of financial institutions that provide financial services to the firm (number of relationship lenders), the number of years of the financial institution (the lender) that approved the most recent loan to the firm, whether the lender is a bank, whether the lender is a non-financial institution, whether the firm has a checking or a saving account with the lender, and whether the lender provides any financial services that can be used to monitor financial conditions of the firm. Borrower controls include firm size measured by the log of assets, return on assets, and whether the firm is a C-corporation.

3.4 Labor Data

Besides the main CPS panel, two sets of labor data are constructed to test possible effects and heterogeneity in labor market decisions across small-medium businesses (fewer than 500 employees, from the SSBF) and across all firms (from the Quarterly Workforce Indicators of

[52]See Appendix Table A3 for summary statistics of the variables of the SSBF firm-year panel.

the Longitudinal Employer-Household Dynamics (LEHD-QWI) from the US Census). The first labor dataset, a firm-year panel, links small-medium businesses' financing information (loan price and quantity) with their labor market decisions (mainly payroll and employment). This linkage is the key to the shock transmission from the financial market to the labor market. Firm characteristics, mainly firm ages, sizes, and profitability, are considered for heterogeneous effects across firms.

The second labor dataset, a state-year panel, has much broader coverage across all firms in the labor market with detailed information on payroll, employment, and employment flows but it is reported based on firm characteristics of ages and sizes instead of individual firms. Still, it includes enough information to check the consistency between small-business labor market trends and the overall one.

Skill measures, including workers' routine, manual, and abstract task intensities by occupation, are from Autor and Dorn (2013)[53] and the Dictionary of Occupational Titles (DOT). I aggregate individual skill measures for these three types of tasks to the state-year level and standardize them to mean 0 with a standard deviation of 1. I construct the Abstract Task Index (ATI = log(abstract) - log(manual)) and classify the top tercile of all workers ranked by the ATI as skilled and the bottom tercile as unskilled. Alternatively, I use terciles by wage.

3.5 Public Firms

In addition to the financial and labor data of small-medium businesses from the SSBF and the overall labor market data from LEHD, I construct corresponding state-year panels with consistent variable definitions for financial and labor information of (large) public firms. The accounting and labor information is extracted from Compustat while the loan market information is from DealScan,[54] both more comprehensive than their counterparts of small-

[53] They measure the intensity of each type of tasks in the range of 0 (lowest intensity) to 10 (highest intensity).

[54] I follow Chava and Roberts (2008) to link Compustat and DealScan.

medium businesses.

4 Financial Deregulation and Wage Inequality

This section presents the empirical specification and the main result for the effect of financial deregulation on wage inequality on the main state-year panel from 1983 to 2007 across all states.

4.1 Inequality Effects of Financial Deregulation

To test for the effect of the interstate branching deregulation on wage inequality, Panel A of Table 2 presents the main result from the regression

$$log(w^{90}/w^{10})_{i,t} = \gamma \text{Deregulated}_{i,t} + X_{i,t}'\delta + \alpha_i + \alpha_t + const + \epsilon_{i,t} \quad (1)$$

on the main state (i) - year (t) panel, where α_i and α_t are state and year fixed effects, respectively. The dependent variable is the log ratio of the 90th and the 10th percentiles of wages in a given state-year. $\text{Deregulated}_{i,t}$ is the main measure of interstate branching deregulation. It is equal to 1 if a state deregulates either interstate de novo branching or interstate branch acquisitions. $X_{i,t}$ is the main control set, time- and state-varying and detailed in Section 3.2. The purpose of this control set, together with state and year fixed effects, is to improve the conditional exogeneity of the deregulation, but the large control set may also lead to a bad-control problem[55]. To address this issue, no-control specifications (assuming unconditional exogeneity), partial sets of controls, lagged controls, and pre-deregulation values of the controls are tested and give very similar results.[56] Standard errors are double-clustered

[55]The bad-control problem is the possibility that control variables are also outcomes affected by the deregulation. See Angrist and Pischke (2009) for details.

[56]See Table 2 for no-control and partial-control results. See Appendix Tables B1, B2, and B3 for results using 1- or 5-year lagged control variables and pre-deregulation control variables.

by state and year.[57]

Across all columns in Panel A of Table 2, the coefficients are all significantly positive: Interstate branching deregulation increases inequality, comparing deregulated states with states not yet deregulated. The coefficient 0.042 in the full specification in Column (5) means a state that deregulates either de novo branching or branch acquisition has a 4.2% higher wage inequality. Panel B presents an alternative deregulation measure Interstate0-4 on a scale of 0, 1, ..., 4 (see Section 2.2). The coefficient 0.015 means that a state fully deregulated interstate branching (valued 4) has a $(1.5\% * 4 =)$ 6.0% higher wage inequality.

The significant increase effect (4 to 6%) is in sharp contrast to the decreased inequality across states (-3%) over the same period, as discussed with the raw inequality data in Section 3. This contrast indicates the economic significance of the deregulation effect among other factors that also contribute to inequality.

4.2 Pre-Trend and Persistence

This section utilizes the time-varying effects of the interstate branching deregulation through the years for two tests: (1) the parallel trends before the deregulation and (2) the persistence of the deregulation effects after the deregulation.

I use the local projection technique with the specification[58]

$$log(w^{90}/w^{10})_{i,t=t_0(i)+h \text{ or } t<t_0(i)} = \gamma^h Deregulated_{i,t} + X'_{i,t}\delta^h + const^h + \alpha_t^h + \alpha_i^h + \epsilon_{i,t}, \quad (2)$$

[57] I also consider the limited number of clusters and limited observations within each cluster resulting from 50 states and 25 years. I run regressions both without clustering and with clustering s.e. by state or year only and get similar results. See Bertrand et al. (2004) and Cameron et al. (2011) for detailed econometric discussions.

[58] This specification is in the same spirit of Jorda (2005) whose Equation (1) rewritten into my notation is the impulse response $\gamma^h(t_0, h, Deregulated) = E(y_{t_0+h}|Deregulated_{i,t} = 1; X_{i,t}) - E(y_{t_0+h}|Deregulated_{i,t} = 0; X_{i,t}), h = 0, 1, ...$ The main deviation is that the identification of the impulse response comes from alternating regression samples in both dimensions of states and years in the state-year panel as opposed to alternating vector auto-regression samples of a time-series. I apply similar sample alternations to the alternative hypothesis test on pure time effects, in Section 4.3.2 with similar two-dimensional alternations, and to the placebo tests in Section 4.5.1.

where $h = -10, ..., 0, 1, ..., 10$ and $t_0(i)$ is the year when state i deregulates, which will be infinity for non-deregulated states.

For each year, the coefficient γ^h compares the inequality of the states that have deregulated before (or in) the year with the states that have not deregulated, including the non-deregulated states of all years and the deregulated states in the years before their deregulation. And the reason for running Equation (2) across different h's is that both the treated group and the control group in this test are time-varying.

The conventional method of a single-regression test, with time indicator variables for each year before and after the deregulation, is equivalent to the local projection technique, except for an artificial choice of a benchmark year.[59] Despite this concern, in Appendix Figure B1, single-regression tests across different benchmark years give qualitatively the same results.

4.2.1 Pre-Trend

An important endogeneity concern is that states have higher inequality after the interstate branching deregulation also had higher inequality before the deregulation. To address this concern, I replace the deregulation indicator variable for the deregulated states before the deregulation ($h = -10, -9, ..., -1$) to 1 in Equation (2). The green (left) portion of Figure 2 plots γ^h, which would have been mechanically 0 without this replacement because the deregulation indicator variable is 0 before the deregulation, with its 95% confidence intervals. This portion is insignificantly different from 0: there is no pre-trend of inequality in deregulated states.[60]

[59] The single-regression would be $log(w^{90}/w^{10})_{i,t} = \sum_{h=-10}^{10} \gamma^h 1(t = t_0(i)+h) + X'_{i,t}\delta + const + \alpha_t + \alpha_i + \epsilon_{i,t}$, where $t_0(i)$ is the year when state i deregulates, which will be infinity for non-deregulated states. One of the time indicator variables will be omitted due to perfect collinearity so that the coefficients of other time indicator variables will be relative to the omitted year which serves as the benchmark year.

[60] One possible concern on the pre-trend test could be the seemingly increase of γ^{-1}: the coefficient increases right before the deregulation, higher than all pre-deregulation coefficients $\gamma^h (h < 0)$, in Figure 2. Note that γ^{-1} is still insignificant despite being positive. This can be addressed by the conventional single-regression tests in Appendix Figure B1, which indicates that the insignificant positiveness of γ^{-1} results from different statistical methods or randomness.
Alternatively, the insignificant positiveness may be "real", resulting from the forward-looking behavior of the local businesses and banks. The IBBEA would take effect in June 1997 unless a state opted-out. Thus, if a state had not opted out in 1996 (while they could have had since 1994), then the local businesses

4.2.2 Persistence

The red (right) portion in Figure 2 represents the impulse responses of the interstate branching deregulation for each year starting in the year of deregulation, with 95% confidence intervals. Two dashed lines (green and red) fit the pre-deregulation part and the post-deregulation part of point estimates, respectively. The slope of the line fitting the pre-deregulation part is not significantly different from zero. The slope of the line fitting post-deregulation part is significantly positive (p-value is 0.003). This positive slope indicates an accumulating pattern of the increase effect.

All the impulse responses after the deregulation are significantly positive with a magnitude of around 5% or larger.[61] This shows the persistence of the effects of financial deregulation on wage inequality.

4.3 Alternative Hypotheses

Three alternative hypotheses are tested and rejected in this section: The first is the possible reverse causality that higher wage inequality causes the interstate branching deregulation. The second is the possible time trend in wage inequality that happens to be increasing at the same period of the interstate branching deregulation. And the third is the other time-state varying events that may be correlated with the interstate branching deregulation and drive the results, including labor law changes and other financial deregulations.

4.3.1 Reverse Causality

While considering the effect of financial deregulation on wage inequality, the causality could be the reverse which raises an endogeneity threat to the identification. However, there is

and banks could well expect the IBBEA to take effect in the next year (with the usual durations that the state legislation process takes to pass a bill). Appendix Figure B2 re-runs Figure 2 but drops states that deregulated in 1997 (by themselves or because the IBBEA took effect automatically). Though still positive, γ^{-1} is lower than the highest $\gamma^h(h < 0)$ and lower than the γ^{-1} in Figure 2.

[61] The results using alternative measures of inequality and the deregulation are qualitatively identical. See Appendix Figures B3 and B4.

limited literature on the relationship between financial deregulation (financial development) and inequality for lawmakers to consult. The few papers that discuss this relationship have negative results, which is the opposite direction to the endogeneity concern. And anecdotal evidence[62] shows that higher inequality usually leads to efforts to regulate the finance industry, instead of deregulation.

To check the reverse causality, I follow Kroszner and Strahan (1999) and Beck et al. (2010) to apply the proportional hazards model which they use to test the driving forces behind financial (de)regulations. I add into the model inequality and wage level variables and control variables to test whether higher inequality can increase the likelihood of a state to deregulate interstate branching. The model can be simplified[63] to

$$log(T_{i,t}) = log(w^{90}/w^{10})_{i,t} \cdot \underline{\delta} + X_{i,t} \cdot \underline{\delta}_X + e_{i,t} \tag{3}$$

where e has the type-III extreme value distribution. The vector $X_{i,t}$ controls variables affecting state regulation/deregulation decisions in a given state-year, including ideological, political, legal, and labor market variables. More importantly, variables measuring the relative strength of small banks are included to control the group interest of small banks, which prevents the interstate branching deregulation.[64] Model parameters $(\underline{\delta}, \underline{\delta}_X, \lambda, \kappa)$ are jointly estimated by maximizing the log likelihood, shown in Table 3A.

The reverse causality is rejected. The deregulation is not driven by inequality, higher

[62]While there is no evidence in the literature supporting the reverse causality, anecdotal evidence, such as the 2011 Occupy Wall Street Movement, suggests the opposite direction and thus not an identification threat: higher inequality usually leads to efforts to regulate the finance industry as opposed to deregulation.

The 2011 Occupy Wall Street Movement is a good example of social incentives on financial regulation during a time of rising inequality. Participants endeavored to regulate the finance industry specifically, among other goals, with the slogan "We are the 99%" to stress the "drastically rising" inequality in the US. See https://en.wikipedia.org/wiki/Occupy_Wall_Street and https://www.economist.com/graphic-detail/2011/10/26/the-99-percent?page=1Income.

[63]See Appendix F.1 for the mathematical details.

[64]The hazard model considering the group interest of small banks is from Kroszner and Strahan (1999), which applies this method to empirically show that the group interest of small banks in a state prevented or delayed the intrastate branching deregulation in the 1970s and 1980s. Beck et al. (2010) also apply this method to the same intrastate deregulation to study inequality. Theoretically, with the same spirit, Rajan and Zingales (2003) propose "an interest group theory of financial development where incumbents oppose financial development because it breeds competition." See Section 3.3 for group interest measurement.

or lower.[65] If there is anything, the test result (though insignificant) is consistent with the anecdote that states with higher inequality tend to regulate, not deregulate, the finance industry. This contradicts the endogeneity concern. In Columns (4) and (5), the coefficients are marginally positive, which means that it takes a state with higher inequality (insignificantly) longer time to deregulate.

4.3.2 Pure Time Effects

As the interstate branching deregulation is within a relatively short time window (1994-2005 or 1994-1997 as many deregulated states had deregulated by 1997 as shown in Figure 1), one concern is that the effect of the interstate branching deregulation is purely a time effect. This alternative hypothesis proposes that the effect on inequality comes only from the time fixed effects and that the significant coefficients on the effect interstate branching deregulation is a result of the clustering implementations in the first few years after the IBBEA.

I utilize a local projection strategy similar to Section 4.2 to check if any year of the sample period has a non-deregulation shock that increase inequality. Figure 3 presents the impulse responses to each year, none of which is significantly positive.

A series of panel regression emphasizing time effects is specified as

$$log(w^{90}/w^{10})_{i,t=1994+h \text{ or } t<1994} = \alpha_t^h + \alpha_i^h + X_{i,t}'\delta^h + const^h + \epsilon_{i,t},$$

where $h = -10, ..., 0, 1, ..., 11$, and 1994 is the year that IBBEA was passed.

Local projection regressions are estimated separately for each h using the data of the h-th year after 1994 (to see the impulse response in the year) and that of the years before the deregulation (as a benchmark), in the spirit of Jorda (2005). Given the alternative

[65] This result is robust to using the Cox proportional hazards model with or without the Weibull distribution assumption, or with other distribution assumptions, including exponential, Gompertz, gamma, log-normal, log-logistic. Appendix Table B4 presents the estimates: none gives a significant relationship. Additionally, the main results of Kroszner and Strahan (1999) are confirmed that the deregulation is driven by the relative strength of local community banks, which oppose deregulation because it allows national banks in as competitors.

hypothesis of pure time effects, time fixed effects ($\alpha_t^h, \forall h = 0, 1, ..., 11$) should be significantly positive to explain the result in Table 2. Figure 3 presents the impulse responses to time shock from 1994 to 2005, i.e., the coefficient estimates of $\alpha_t^h, \forall h = 0, 1, ..., 11$, with 95% confidence intervals, along with the 10 years before 1994. None of the impulse responses, especially the responses to the years 1994-1997 when the effect of the interstate branching deregulation is the strongest on the wage inequality, is significantly positive so that the alternative hypothesis of pure time effects is rejected. If there is any result from this exercise, all impulse responses have a negative sign and tend to be more economically and statistically significant at the end of the period, which contradicts the alternative hypothesis even more.

4.3.3 Other Legal Events

The previous section addresses the endogeneity concern of time-varying events (on the federal or international level) but not the events that vary across both time and states. While impossible to exhaust, two categories of such events most related to the inequality effects of the interstate branching deregulation are considered: labor law changes and other financial deregulations.

Labor Law Changes I consider two specific labor law changes and their interactions with the financial deregulation: minimum wage laws and right-to-work laws. Neither cancels the effects of financial deregulation, if not helping. Panel A of Table 3B presents the effects of labor law changes. The setting is the same as Table 2 except for adding in indicator variables for labor law changes, independently and interacted with Deregulated. Columns (1)-(3) show that while minimum wage laws have small insignificantly negative effects on inequality, they have no impact on the effects of interstate branching deregulation, and the interaction term is negligible. Columns (4)-(6) show that right-to-work laws are similar.

Other Financial Deregulations The *intrastate* branching deregulation (which occurred mostly in the 1970s and 1980s) and the Dodd-Frank Act in 2010 are tested: neither has any impacts on the effects of the interstate branching deregulation. Panel B of Table

3B presents the results: Columns (4)-(6) show that the effects of Deregulated remain almost the same when other deregulations are considered. For the intrastate branching deregulation alone, Column (1) replicates and is consistent with the main result of Beck et al. (2010).[66] Column (2) gives a different coefficient and a different significance level due to a slightly different sample, more controls, and clustered standard errors by year besides by state in this paper.

4.4 Heterogeneous Dimensions and Timing of Financial Deregulation

The staggered implementations of the deregulation generate variations across deregulation dimensions and through time to check the heterogeneity of its inequality effects.

4.4.1 Deregulation Dimensions

As the third and fourth dimensions of the deregulation, MinAge and DepositCap, loosen the restrictions on interstate branch acquisitions, the heterogeneity across deregulation dimensions is theoretically obvious. This inspires the construction of the main independent variable, Deregulated, that focuses on branch acquisition and de novo branching.

Table 4 empirically tests the effects of deregulation dimensions, individually and jointly. Columns (1)-(4) and (6) present a decomposition of the overall inequality effect into the four dimensions, which confirms the more important roles of the Acquisition and De Novo dimensions. Columns (3) to (7) consider the interactions among the three dimensions related to branch acquisitions. Loosening restrictions on acquisitions have significant effects only if

[66] See their Column (4) of Table 2. And see Wei (2020) for a detailed comparison between the intrastate and the interstate deregulations. The inequality effect of the intrastate branching deregulation in Columns (1) and (2) in Panel B of Table 3B is consistent with Beck et al. (2010) even with the differences in the specification and panel definition. In contrast, Jerzmanowski and Nabar (2013) concludes an increase effect of the intrastate branching deregulation on inequality using the same CPS data and the same intrastate measure from Kroszner and Strahan (1999) and Black and Strahan (2001). This paper sides with Beck et al. (2010). (In Jerzmanowski and Nabar (2013), the coefficient from regressing wages on the indicator variable for attaining college education is negative.)

interstate branch acquisitions are allowed.[67]

While this seems natural, it is an interesting case that some states deregulated MinAge and DepositCap without allowing interstate branch acquisitions. In this case, these states merely had a "de jure gesture": they only deregulated intrastate acquisitions, not the interstate ones, despite following the IBBEA, an interstate deregulation act.[68]

4.4.2 Deregulation Timing

One feature of the IBBEA omitted in the literature is its timing. The Act did not become effective immediately after Bill Clinton signed it on September 29, 1994. The acquisition deregulation would take effect on June 1, 1997 only if a state had not opted out before this deadline. Yet, states could also opt into this deregulation between September 29, 1994 and June 1, 1997, before it took effect automatically. For deregulating de novo branching, states could opt in anytime after September 29, 1994.[69]

The timing has a real effect. The increase effect of deregulation on wage inequality is greater if a state deregulates earlier, for both branch acquisition and de novo branching deregulations.[70] This result proposes a hypothesis, to be tested in Section 5, that states with larger financial frictions may choose to deregulate earlier and have larger effects on

[67] Appendix Figure B4 presenting the individual effects across dimensions of the interstate branching deregulation as a decomposition of Figure 2 gives the same result.

[68] It is a gesture also because it has no real impact. In the previous two decades, intrastate branch acquisitions did not affect wage inequality (shown in Panel B of Table 3B and Wei (2020)). One reason that states may behave in this way is the relative strength of local communities banks that oppose deregulating interstate branching to avoid the entry of large national banks. Another reason is that they cannot specifically loosen these restrictions only for one type of acquisitions. Earlier acts, such as the McFadden Act and the Bank Holding Company Act, require these restrictions to either apply to or not apply to all bank acquisitions non-discriminatively.

[69] See Sections 102 and 103 of the IBBEA, 12 USC §1831u(a), and 12 USC §36(g) for legal details. Most recently but the least investigated, the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 (DFA) eliminated, in Sections 613, the opt-in election by each state to permit de novo branching, effective immediately after Barack Obama signed it on July 21, 2010. However, this uniform deregulation has an insignificant effect on inequality (see Panel B of Table 3B).

[70] Appendix Table B5 presents the heterogeneous effects of deregulation by different timing of carrying out the legal changes. Column (1) shows that not only allowing acquisitions has a larger effect on wage inequality, but doing it late (first opting out and then deregulating) has no significant effect. The interaction terms in Columns (2) and (3) show that deregulating acquisitions or de novo branches one year earlier increases increase wage inequality by 1% more.

wage inequality because deregulation is more relevant and larger in magnitude in these states.

4.5 Robustness Check

4.5.1 Placebo/Falsification Tests

To show that the results are not driven by random events happening during the period (similar to Section 4.3.2) or among some special states, I run placebo tests by randomly assigning the terminal deregulation variable values across states and years. Appendix Figure B5 shows simulated distributions of the coefficient on Deregulated and confirms the main result.

Further, to show that the effects are not driven by only a few industries, such as the finance industry, I re-run the regressions Column (5) of Table 2 but exclude one industry at a time to test if the result is still significant. Panel A of Appendix Figure B6 represents the T-statistics of the Deregulated coefficient dropping one SIC-1 industry or one SIC-2 industry[71] at a time, which are all significantly positive. Similarly, Panel B of Appendix Figure B6 drops one state at a time. Empirically, no industry or state plays a pivotal role in the increase effect.

4.5.2 Extending Horizons and Accumulative Effects

The robustness check for Table 2 with alternative horizons around the time of deregulation is shown in Appendix Table B6. I extend the sample window from a ±1-year window, which includes one year before to one year after the deregulation so corresponding calendar years vary across deregulated states to ±4-year, ±7-year, and ±10-year windows. The coefficients increase from 0.028 in the ±1-year window up to 0.042 in the ±10-year window, all significant.

[71]The SIC is the Standard Industrial Classification following the 1987 version SIC manual by the US Department of Labor. The SIC system is used in most parts of this paper instead of the North American Industry Classification System (NAICS) to ensure better data consistency across years and across raw datasets.

This verifies the robustness of the main result and further indicates an accumulative pattern of the increase effect on inequality.

4.5.3 Alternative Measures and Datasets

Alternative measures of wage inequality are tested in Appendix Table B7. Various log wage ratios, wage standard deviations, Gini Index with both the deregulation indicator variable (Deregulated) and the discrete deregulation measure (Interstate0-4) give qualitatively identical results.

Alternative datasets include the United States Census and the American Community Surveys (ACS). The measures calculated using CPS data are highly consistent with them: The correlation (on the state-year panel) of wage variables across datasets is over 90% and the correlation between wages and total income is over 99%.[72] Despite these small differences and the limited number of years of the Census[73], Appendix Table B8 presents qualitatively consistent results using the Census and the ACS wage and income inequality measures.

5 Transmission Mechanism: Finance Facilitator

I have shown that the interstate branching deregulation increases wage inequality, which is in sharp contrast to the time trend and most conventional beliefs, and have checked persistence, heterogeneity, alternative hypotheses, and various robustness tests. This section studies the

[72]The inequality measures have lower correlations across datasets but are still in the range of 65% to 80%. The lower correlation comes mainly from the noise in the construction of measures in the Census and ACS. The CPS ORG reports weekly wages and hours both in the previous week right before the survey time, which is more accurate despite smaller sample sizes, while the Census and the ACS report annual wages, annual income, annual numbers of working weeks, and "usual" hours in a week in the previous year.

[73]The limited number of years of the Census and the ACS is the main reason for the choice of the CPS ORG as the main dataset in this paper. For the period of interest, the Census is decennial (1990 and 2000 so that only first-difference specifications are feasible) while the ACS is only available towards the end of the deregulation (after 2000). With few years of observations for each state, utilizing the time-series variations in implementations of interstate branching deregulation is much more difficult to reject the alternative hypothesis of pure time effects such as macroeconomic policy changes and impossible to reject alternative hypotheses of time-state varying confounding factors such as labor law changes and other financial deregulations.

mechanism of how this deregulation, which is supposed to directly affect the finance industry only, transmits into the real economy, especially the labor market.

To have any effects, the interstate branching deregulation has to first affect the banking industry (Section 5.1). Then, through the bank loan market, the deregulation constitutes a positive credit supply shock (Section 5.2). This shock hits the real economy and heterogeneously affects firms (Section 5.3) and their labor decisions (Section 5.4). Finally, the underlying labor market dynamics is facilitated and strengthened (Section 5.6) and inequality increases.

5.1 Banking Industry - Within-Finance Effects

Did the de novo and the acquisition deregulations take effect de facto in the banking industry? This section tests this crucial starting point for the deregulation to have any effects, financial or real.

The literature studying the interstate branching deregulation, however, has not documented this fundamental fact while studying its further impact on banks, firms, markets, etc. The possible reason could be the low frequency of opening new branches and bank acquisitions.[74] This infrequent realization of branching events leads the simply regression of the number of new branches of acquisitions on the deregulation to lack statistical power.

To overcome this statistical difficulty, a hazard model that is very similar to Section 4.3.1 is utilized to consider the hazard (the possibility) of opening new branches and bank acquisitions as opposed to the realizations of such events. For the DeNovo deregulation, the sample of all banks (new branches of new banks in a state) is split into multi-branch banks and unit banks (with only one branch). This split proxies the separation of national

[74]This low frequency is a pattern in the banking industry. In recent decades, few banks enter the industry. An extreme example is that zero de novo bank was chartered in the whole US in 2012 and only one in 2013, and the pattern is independent of the Great Recession. (See McCord and Prescott (2014) for more detailed bank entry data.) Besides the low frequency, most (99.9% from 1994 to 2018) de novo *branches* are branches of existing banks (under the same bank charter so not an interstate entry) as opposed to de novo *banks*. And most branch acquisitions are not interstate, either. From 1986 to 2001, 1205 out of 15172 (7.9%) acquisitions are interstate and not "voluntary liquidation" which indicates interstate entries. Note that this includes national banks acquiring their own subsidiaries (then reorganized into interstate branches).

banks' new entries (all multi-branch) from new local community banks (mostly unit banks). Columns (1)-(2) of Table 5 juxtapose the effects: the DeNovo deregulation delays the expansion of local community banks (Column (1)) and accelerates the entry of multi-branch banks (Column (2)).[75] The acquisition deregulation also de facto takes effect, as shown in Column (3). Since an acquisition must be approved by both the host state (the state of the target bank) and the home state (the state of the acquiring bank), the independent variable is whether both states of a specific acquisition transaction deregulate acquisitions.[76]

Joining Columns (1)-(3), it is obvious that the entry of national banks into a state increases the competition in the banking industry but its effect on the concentration in the banking industry is unclear. The entry through acquisitions may increase concentration, whereas the entry through de novo branching decreases concentration, and fewer new branches of local community banks may decrease concentration. It turns out that acquisitions play the main role. Column (4) shows that the banking industry has higher concentration after the deregulation, where the concentration is measured by the Herfindahl-Hirschman Index of bank deposits in a state-year and the specification is similar to Table 2.

5.2 Financial Deregulation as a Positive Credit Supply Shock

Despite the commonly held beliefs, financial deregulation does not have to provide more/cheaper credit or loosen financial constraints for firms[77]. This section first shows that interstate branching deregulation is indeed a positive credit supply shock and that it increases bank competition notwithstanding the higher concentration in banking industry (the bank loan market) in deregulated states (Column (4) of Table 5). Then, I show that firms, especially more financially constrained ones, benefit from the shock, and the deregulation reduces financial frictions as expected.

[75] Consistent with the interest group theory by Rajan and Zingales (2003).

[76] Whether considering the other two deregulation dimensions (the minimum age and deposit cap restrictions on acquisitions) does not change this result.

[77] For example, Wei (2020) shows that intrastate branching deregulation in 1970s and 1980s was a larger positive credit supply shock than the interstate one but did not loosen financial constraints.

5.2.1 Positive Credit Supply Shock

Table 6 shows that the interstate branching deregulation is a positive credit supply shock. Columns (1)-(4) present effects on the price and quantity of a firm's most-recent-loan. The specification is similar to Equation (1) except it is on the firm-loan–year panel using the SSBF data and weighted by the SSBF survey weights. See Section 3.3 for details of the panel and control variable definitions.

Columns (1) and (2) show the price effect: the interest rate on the most recent loan is more than 1.3 percentage points lower after the deregulation. And Columns (3) and (4) show the quantity effect: the average loan amount significantly increases for about 22%.

Comparing to Rice and Strahan (2010), Column (2) of Table 6 reiterates their main result (Table III). Despite the differences in variable definitions and the set of control variables, the magnitude of Column (2) - full deregulation decreasing interest rates for 1.3 percentage points - is similar to their result of 0.9 percentage point. The quantity effect in Columns (3) and (4), however, is not significant in Rice and Strahan (2010). Despite the same specification difference, the main reason for the difference in the significance level is the definition of the loan amount variable: they use the total (bank) debt of a firm (in their Table VI), which includes all long- and short-term debts in the survey year, as opposed to the loan amount of the most recently approved loan of a firm in Table 6. The latter, which is used in this paper, is more sensitive to a credit supply shock by definition.

Columns (1)-(4) of Table 6 together with Table 5 give the interesting (and unexpected) concurrence of higher competition among banks in the bank loan market (lower prices) and higher concentration in the banking industry (fewer banks). Consider two types of competitions for a credit supplier: the competition from more suppliers and the competition from suppliers with lower prices. The interstate branching deregulation promotes the latter type: national banks provide more loans at lower interest rates with their better geographic risk-diversification on a larger scale.

Further, if it is the deregulation that brings in national banks and the credit supply

shock, firms should switch, at least partially, to these newcomers by forming new lending relations. Appendix Figure 4 confirms this switch by showing the changes in the number and length of lending relations.[78] After the deregulation, firms have more lending relations and the average length of their primary relation is shorter. Together with Table 5, this shows the shift from local community banks to national banks, the new and more competitive supplier of credit.

5.2.2 Loosening Financial Constraints?

Lower prices and larger amounts of credit, however, do not necessarily mean fewer/less financially constrained firms because the extra credit can go to the financially unconstrained firms only.[79] I use whether a firm pays trade credit late as the measure of firms' financial constraints. Trade credit is a much more expensive type of credit but accessible for most firms so that firms should follow the pecking order of using other types of credit first. Whether a firm pays trade credit late or not at all is a good measure of firms' financially constraints.[80] Columns (5)-(7) of Table 6 show that this positive credit supply shock indeed leads to fewer firms paying their trade credit late. And for those that still pay it late, a smaller fraction is paid late relative to firms in non-deregulated states. Accounts payable, which includes trade credit, gives the same result.

5.3 Heterogeneous Effects across Firms

Now I investigate deeper into the real side of the economy to test how firms are hit by this credit supply shock heterogeneously. After entering a state, national banks may either cherry-pick good firms measured by some financial characteristics or pick the firms that should have received credit but did not, due to some non-financial characteristics. Facing

[78] See also Appendix Table C1 for corresponding regression results of the change in lending relationship.

[79] For example, Wei (2020) shows that intrastate branching deregulation in 1970s and 1980s was a larger positive credit supply shock than the interstate one but did not loosen firms' financial constraints.

[80] For more detailed discussions on trade credit and its costs and relation to financial constraints, see Petersen and Rajan (1994, 1995, 1997).

this competition, local community banks may adjust their strategies in a similar way. I consider two types of firms that may benefit more from the shock: more profitable firms (the cherries) and young or small firms (the neglected).[81]

Across firm ages, firm sizes, and profitability, Table 7 confirms the heterogeneity across firms before the deregulation and shows the heterogeneous effects after the deregulation. For firm ages and sizes, the young (less than 10 years old) firms and the small (fewer than 100 employees) firms previously had unfavorable interest rates and loan amounts. After the deregulation, they benefit more than their older and larger counterparts, especially with larger loan amounts. The new firms (0-1 year old) are special: they do not benefit more from the deregulation and they receive even smaller loans after the deregulation.[82]

For profitability, more profitable firms previously had lower interest rates and larger loan amounts. After the deregulation, their interest rates decrease more. And there is a nonlinear effect especially on interest rates: the coefficient on the interaction between Deregulated and profitability is significantly positive while the coefficient on the interaction between Deregulated and profitability squared is significantly negative. This indicates a possible risk-return trade-off for banks. When a firm is more profitable, it may be also riskier. Therefore, only the most profitable firms can receive the most favorable rates and amounts.[83]

[81] Appendix Table C2 extends firm heterogeneity analysis to more financial characteristics and gives results as expected. Before the deregulation, firms with self-report financing problems had higher interest rates and smaller loan amounts. And more leveraged firms had more loans at similar interest rates to other firms. After the deregulation, firms with self-report financing problems benefit with interest rates lower than before but still higher than other firms and (even) smaller loan amounts. More leveraged firms are affected lightly: their loan amounts become larger but interest rates insignificantly decrease.

[82] Appendix Figure C1 shows some anecdotal evidence that most small business loans lend to only firms older than 1 year old.

[83] Profitability, measured by the ratio of profit and assets, is standardized to mean 0 with a standard deviation of 1. Thus, only firms with profitability measures more than 1 standard deviation higher than the mean can borrow with more favorable interest rates, since the first-order coefficient (0.579) is larger than the second-order one (-0.384) in absolute values. These results are in line with heterogeneous effects of the Glass–Steagall Act shown by Neuhann and Saidi (2018).

5.4 Firm Dynamics and Labor Market Decisions

I have shown so far that the deregulation brings in national banks and generates a positive credit supply shock to all firms, among which the young, small, or more profitable firms benefit more. But it will not affect inequality if firms do not adjust their labor market decisions. And how firms respond can be affected by their production technology and their labor market decisions before the deregulation. Suppose[84] that the technology is capital-skill complementary (consistent with the overall skill-biased technical change) and that not all firms are financially unconstrained. Then, when the deregulation loosens firms' financial constraints with more access to (skill-complementary) capital, they will scale up their production with more skilled workers. This is a testable prediction.

Panel A of Table 8A verifies this prediction using average payrolls as a proxy for skill composition. First consider overall effects. Columns (4)-(6) show that all firms have higher average payrolls after the deregulation. Then focus on the firms that benefit more from the deregulation. For their pre-deregulation labor market decisions, Columns (1)-(3) show that the small and the young but not new firms have lower average payrolls before the deregulation. And more profitable firms have higher average payrolls. After the deregulation, all these three types of firms have significantly higher average payrolls as shown with the interaction terms in Columns (4)-(6).

Panel B of Table 8A verifies the prediction for operation scale with log employment as the dependent variable.

Ideally, individual wages and detailed employment information by types of workers are better measures for the change in labor market behavior. And capital intensity is a good measure for testing capital-skill complementarity. But unfortunately, these variables are not available in the dataset.

[84] See the model in section 6 for the detailed theory and discussion.

5.5 Small-Medium Businesses Versus Overall Market

But the shift in labor market decisions of small-medium businesses (though they constitute a large fraction of the total employment) may not be consistent with the overall labor market decision shifts.

5.5.1 Large Firms

I extend all analyses of Tables 6, 7, and 8A on small-medium businesses to public (Compustat) firms with more comprehensive financing and accounting information and richer specifications (due to the better availability).[85] I find neither significant credit supply shock (though it is also positive) nor heterogeneous effects across firms in either the financial market or the labor market. This result is consistent with general cross-firm evidence on their labor market decisions under financial constraints.[86]

5.5.2 All Firms

Further, Table 8B tests heterogeneous labor market decisions in the overall labor market, using the LEHD data covering all firms. For average payrolls, the heterogeneity across firm ages (in years) in Panel A.1 and the heterogeneity across firm sizes (by employment) in Panel A.2 confirm that the heterogeneous labor market decisions of small firms and young but not new firms dominate in the overall labor market. Panel B shows an extra result for employment: Although small-medium businesses, especially the small and young but not new firms, are scaling up, the total employment for these firms decreases, which implies that the expansion brings concentration.

[85] See Appendix Tables C3, C4, and C5.

[86] For example, Giroud and Mueller (2015) studies a positive shock to investment opportunities of one plant within a firm (new airline route to the plant location) and finds significant internal capital and labor re-allocation, but only for financially constrained firms.

5.6 Labor Market Dynamics

The inequality measures in previous sections inevitably focus only on the intensive margin of the labor market by considering wages or income of the employed (labor prices). The extensive margin, employment (labor quantity), is also adjustable for firms and the overall labor market. If firms after the deregulation have more skill-complementary capital in hand, the increased relative demand for skills will increase not only relative wages (wage ratios as inequality measures above: high wages vs low wages) but also the relative employment (another form of wage inequality: positive wages vs zero wage).

5.6.1 Skill Composition

To test the possible changes in relative employment of skills (skill composition), Table 9A shows that the heterogeneous labor market decisions across firms lead to employment structure to shift to more skilled workers. With various measures, the fraction of skilled workers - those performing more abstract tasks, more educated, married, middle-aged, or working in high-skill occupations - significantly increases after the deregulation, whereas the fraction of the opposite side of the labor market decreases significantly.

Panel A presents results for educational attainment and task intensity measures: abstract task measure indicates more skilled jobs while routine and manual measures indicate less-skilled jobs. The three task measures (abstract, manual, and routine task intensities in Columns (1)-(3)) are from Autor and Dorn (2013). I use the CPS occupation information to aggregate individual workers' task intensities to the state-year (weighted) average and standardized them to mean 0 with a standard deviation of 1. Column (4) in Panel A has the log of average educational attainment (measured in years) of a state-year.

Panels B and C present the results of the fractions of relative employment between skilled and unskilled workers. Panel B uses a fraction of workers in the top vs the bottom terciles, ranked either by skill (abstract vs manual jobs) or by wage. The dependent variables are the fractions of workers in a state from the top or bottom terciles of occupations. The terciles are

calculated across all states in a year. Columns (1) and (2) rank occupations by how abstract an occupation is, measured by the Abstract Task Index = log(abstract) - log(manual) using the occupational task intensities (similar to Panel A but across occupations). Similarly, Columns (3) and (4) use occupational wages to rank occupations. Panel C presents the fractions (in percentage points) of married workers and workers in respective age ranges. Married workers and middle-aged workers are not the same as skilled workers but these groups of workers empirically earn more. So the result in Panel C also implies the same direction of the change in skill composition.

5.6.2 Geographic and Social Mobility

While the interstate branching deregulation increases inequality and pushes some unskilled workers out of employment or to become more skilled, this deregulation may also provide opportunities to workers, especially for more skilled ones, and increase geographic and social mobility in the overall labor market.

Table 9B presents results for geographic and social mobility after the deregulation. There is no significant geographic or social mobility after the deregulation. Panel A shows the results of geographic mobility. The specification is same to Equation (1) except for that the dependent variables are fractions (in percentage points) of workers who stay in the same state as the previous year (Stay), move into the state (Move-In), and move out of the state (Move-Out), respectively. Similarly, Panel B shows the results of social mobility. Socially Up is the fraction of workers who moved up (down) more than 5 percentiles comparing to the previous year. And Socially Stay is the fraction of workers who stay within their deciles (smaller changes than 5 percentiles). Workers' percentiles in the wage distribution are with respect to the workers in their own states in a year.

6 Theoretical Mechanism

This section presents a model to illustrate theoretically the transmission mechanism from financial deregulation to wage inequality, or more generally the one from any events of financial development that reduces financial frictions to labor income inequality.

The model is static with 2 periods. The markets of consumption goods, capital, and labor are all competitive. All prices and quantities use the consumption good as the numeraire.

6.1 Households

There are two types of households, H and L, born in the beginning of period 1 with population H and L respectively and $H + L = 1$. At birth, all households are endowed assets with a constant amount a of consumption goods that cannot be used for production. H-type households are endowed with skill $z \in [z_{min}, z_{max}]$, randomly drawn from a distribution with CDF $G(z)$. The structure on households, (H, L, a, z, G), is public information.

In period 2, L-type households can work as an unskilled worker at the market wage rate w_l. H-type households can choose to work as skilled workers earning the market wage rate w_h or to work as entrepreneurs earning the profit of their firms. After production, households consume their labor income (from wages or firm profits) and endowed assets at the end of period 2.

6.2 Technology

In each firm, the entrepreneur with the endowed skill z utilizes three input factors - capital k, skilled labor h, and unskilled labor l:

$$f(z, k, h, l) = z(a_k k^\mu + a_l l^\mu)^{\frac{\alpha}{\mu}} h^\theta$$

where the technology is 1) decreasing-to-scale with $\alpha + \theta < 1$, to allow an optimal scale of production for each level of entrepreneurial skill, 2) capital-skill complementary, with

the multiplicative structure between capital and skilled labor, and 3) capital-unskilled labor substitutable, with a constant elasticity of $\frac{1}{1-\mu}$ between capital and unskilled labor. Capital depreciates at the rate of δ from period 1 to period 2.

6.3 Financial Market and Financial Friction

The financial market is perfectly competitive with a continuum of financial intermediaries providing a risk-free bond at interest rate r (from the end of period 1 to the end of period 2).[87] Intermediaries observe entrepreneurs' skill levels z and post loan contracts $(k(z), R^g)$, where $k(z)$ is the maximum amount of capital they are willing to lend. $R^g = 1 + r$ is the gross return on loans, pinned down by no arbitrage.[88] Intermediaries require entrepreneurs to pledge as a collateral their endowed assets a at the end of period 1 and post-labor revenue at the end of period 2.

Financial friction is modeled with loan contract enforceability. Only $1-\phi$ fraction of the collateral is enforcible, where $\phi \in (0, 1)$.[89] That is, if entrepreneurs default, intermediaries can only get back this $1 - \phi$ fraction of the collateral.

The parameter ϕ models financial friction: The larger the financial friction, the smaller ϕ is. When $\phi = 0$, the financial market is frictionless. Firms (entrepreneurs) are not financially constrained and can borrow until their optimal capital level. When $\phi = 1$, the loan market collapses.

Financial deregulation increases loan contract enforceability and thus decreases ϕ. With a smaller ϕ, firms (entrepreneurs) are less financially constrained.

[87] I abstract the financial market from asset pricing process of credit because empirical results within the banking industry and on the financial market is as expected, though new, as consequences of financial deregulation. See Sections 5.1 and 5.2 for details.

[88] Equivalently, entrepreneurs pay rental rate $R = R^g - (1 - \delta)$ and return un-depreciated capital.

[89] This structure of financial friction facilitates a simple cutoff strategy of intermediaries to lend until an upper bound $\bar{k}$, following Buera et al. (2011), which in addition has a fixed entry cost to control production scales.

6.4 Entrepreneurs' Problem

In period 1, H-type households consider whether to become entrepreneurs after observing their skill levels. As entrepreneurs, they need to borrow working capital k in the competitive financial market and hire skilled and unskilled labor to produce in period 2. After producing and paying labor, entrepreneurs have post-labor revenue $\pi(z,k) = \max_{h,l} z((a_k k)^\mu + (a_l l)^\mu)^{\frac{\alpha}{\mu}} h^\theta - w_l l - w_h h$.

They can choose to repay intermediaries or default. If they repay, entrepreneurs (e) have payoff $c_{e,r}(z,k) = \pi(z,k) - Rk + (1+r)a$. If they default, they run away with the ϕ fraction of post-labor revenue and un-depreciated capital $c_{e,d}(z,k) = \phi(\pi(z,k) + (1-\delta)k)$, while intermediaries collect the remained $1-\phi$ fraction and the assets pledged in period 1 with interests $(1+r)a$. Therefore, entrepreneurs' problem is to choose the optimal amount of capital to borrow by solving

$$\begin{aligned} c_e^*(z) &= \max_k c_{e,r}(z,k), \\ \text{s.t. } c_{e,r}(z,k) &\geq c_{e,d}(z,k) \text{ (IC)}, \end{aligned}$$

where the Incentive Compatibility Condition (IC) avoids default.[90]

Lemma 1 (Financial Friction)**.** *In a financial market with friction ϕ, intermediaries lend to entrepreneurs with skill z at the amount of $\bar{k}(z,\phi)$, which is increasing in z and decreasing in ϕ.*

Proof: See Appendix F.2.

Lemma 1 shows a cutoff strategy of intermediaries in the competitive financial market. They are willing to lend up to $\bar{k}(z,\phi)$ to make it incentive compatible for entrepreneurs to repay and they lend at least $\bar{k}(z,\phi)$ to make it incentive compatible for themselves to prefer repayment than default. For entrepreneurs, they will always borrow at the level of $\bar{k}(z,\phi)$, not less, to maximize their payoffs, which increase in the capital utilized in production.

[90] A similar IC of intermediaries holds for them to also prefer repayment to default.

6.5 Occupational Choice

H-type households choose[91] to become entrepreneurs (e) or (skilled) workers (w) by solving the problem

$$\max_{e,w}\{c_e^*(z), c_w^*(w_h)\}$$

where skilled workers' equilibrium payoff is the sum of the market wage rate and endowed assets with interests $c_w^*(w_h) = w_h + (1+r)a$.

Lemma 2 (Occupational Choice)**.** *There exists a $z^c \in (z_{min}, z_{max})$, such that H-type Households with $z \in [z_{min}, z^c)$ choose to work as skilled workers and H-type Households with $z \in [z^c, z_{max}]$ choose to work as entrepreneurs.*

Proof: See Appendix F.3.

Lemma 2 shows a cutoff strategy of H-type households' occupational choices. They trade off between the constant skilled worker wage rate and entrepreneurial payoffs which is increasing in their skill levels. Therefore, H-type households with higher skill levels choose the entrepreneurial job. This lemma reiterates Lucas (1978), where there is no capital or worker types.

Meanwhile, L-type households become unskilled workers with equilibrium payoff $c_w^*(w_l) = w_l + (1+r)a$.

[91] On the household side, I focus on households' occupational decisions but abstract from their consumption-saving and portfolio decisions as wage inequality is of interest instead of wealth inequality. I also abstract from households' education-work decisions despite the empirical evidence of significantly more educational attainment after the deregulation, because empirically the effects of educational attainment (decreasing inequality) is dominated by the production-side effects (increasing inequality).

6.6 Competitive Equilibrium

Given $(f, G, a, \phi, r, \delta)$, a competitive equilibrium is a wage rate vector (w_h, w_l) that clears the labor markets of skilled and unskilled workers such that

$$H' \equiv HG(z^c) = \int_{z^c}^{z_{max}} h^*(\bar{k}(z,\phi), z) dG(z)$$
$$L = \int_{z^c}^{z_{max}} l^*(\bar{k}(z,\phi), z) dG(z)$$

where h^* and l^* are the optimal labor demand in equilibrium and $\bar{k}$ and z^c are given in Lemmas 1 and 2, respectively. By construction, the financial market and the consumption good market clear automatically.

6.7 Transmission Mechanism

Proposition 1 (Financial Deregulation)**.** *If financial deregulation decreases financial friction (ϕ decreases), then wage inequality increases.*

Proof: See Appendix F.4.

When financial deregulation decreases financial friction, entrepreneurs (intermediaries) are incentive compatible to borrow (lend) more capital, thus previously financial constrained firms produce at larger scales, closer to their optimal production scales. As the technology is capital-skill complementary, this financial shock that scales up production drives up the demand for the skilled workers and drives down the one for the unskilled workers.

Higher demand for the skilled workers drives up their wage rate and thus increases the cut-off skill level z^c. Fewer choose to become entrepreneurs while the highest-skill entrepreneurs operate on larger scales. And the higher skills the entrepreneurs have, the more they scale up after financial deregulation. Lower demand for unskilled workers drives down their wage rate. If the rental rate of capital is low enough, some unskilled workers will be substituted by capital. Both the wage effect (larger dispersion) and the quantity effect (hours and em-

ployment) contribute to higher inequality among labor. All these theoretical mechanisms are consistent with empirical evidence in Sections 4 and 5.

I call the role of financial deregulation in this transmission mechanism as a "finance facilitator", instead of a "finance driver" (finance as the driving force behind labor market trends). Jumping from finance to the labor market, it seems as if financial deregulation plays the role of a skill-biased technical change, but it only facilitates the real effects of skill-biased technical change. The technology/technical change is the "real" driving force, which is in place with or without financial deregulation. It is financial constraints that keep firms away from their optimal production scales and thus keep the labor market away from the labor effects of the skill-biased technical change. When financial deregulation brings a positive credit supply shock to the financial market, financial constraints are loosened heterogeneously across firms, which is modeled by entrepreneurs' heterogeneous skill levels. Firms scale up and move closer to their optimal production scales, capital-skill composition, and skill composition. The technology is modeled as capital-skill complementary, which drives the skill composition towards a higher fraction of skilled workers after the shock and drives up inequality.

But this mechanism is not limited to the sole case of increasing inequality. Suppose another technology or technical change is in place. If it is skill-neutral (such as constant return to scales with respect to skilled and unskilled workers), then inequality will not change at all after the financial deregulation. And if it is "unskilled" biased, the inequality will decrease.

7 Conclusion

In this paper, I find that financial deregulation increases wage inequality and I investigate the transmission mechanism of the "finance facilitator," both empirically and theoretically. The increase effect is persistent over time and heterogeneous across dimensions of deregula-

tion. For the transmission mechanism, I show that finance facilitates the preexisting labor market trend of increasing relative demand for the skilled workers and thus the trend of increasing wage inequality. The interstate branching deregulation takes effect through de novo branching and branch acquisitions, which allows national banks to enter deregulated states and partially substitute local community banks. Firms in the local credit market shift to the new lending relationship with national banks, which provide cheaper and more credit and loosen firms' financial constraints. These financial market effects are as expected. On the real side, financial constraints are more loosened for firms that did not receive enough credit before the deregulation - young but not new, small, or more profitable firms. These firms, which previously produced below their optimal production scales, now have the capacity to increase their production scales with the newly borrowed credit. In this process of scaling up, they hire more skilled workers than unskilled ones, since the production technology is capital-skill complementary. This increases the relative demand for skills, reflected on both relative wages (the intensive margin of the labor market) and the relative employment (the extensive margin), and further increases wage inequality in the overall labor market.

The direction of the deregulation effect is embedded in the production technology, the capital-skill complementary technology. An alternative technology leading the relative demand for skills to decrease would decrease wage inequality through exactly the same transmission mechanism. So instead of driving wage inequality to a certain direction, financial deregulation facilitates the increase trend in wage inequality driven by technical changes, which are skill-biased empirically. That is why I call it the "finance facilitator."

From a birds'-eye view, the interstate branching deregulation provides "*heterogeneous* financial inclusion" that increases wage inequality. Traditional wisdom regards financial deregulation, or more generally financial liberalization or financial development, as a route to improve financial inclusion, which provides households and firms better access to the financial market and reduces financial frictions. In most cases, this decreases inequality. For instance, financial development facilitates student loans and thus facilitates educational

and skill attainment in many developing countries, which pushes up the lower end of the wage/income distribution and thus decreases inequality. In this paper, I show that in the *process* of financial development (before the financial market becomes completely frictionless), the heterogeneous financial inclusion on the production side increases wage inequality and dominates the household-side decrease effect.

This view indicates that incorporating both production-side effects and household-side effects and incorporating both within-finance sector effects and cross-sector effects are crucial for comprehensively analyzing the real effects of finance. For example, Wei (2020) shows that the intrastate branching deregulation provides a larger positive credit supply shock but the shock does not reach financially constrained firms so that its household-side effect dominates and inequality decreases.[92]

This view further calls for "policy packages" of financial development together with fiscal/monetary policies (such as fiscal transfers to the people who lose jobs after the deregulation) to suppress the negative effects while promoting beneficial ones in the process of financial development to ensure social welfare gains.

[92]See Appendix D for a summary of results on the intrastate branching deregulation.

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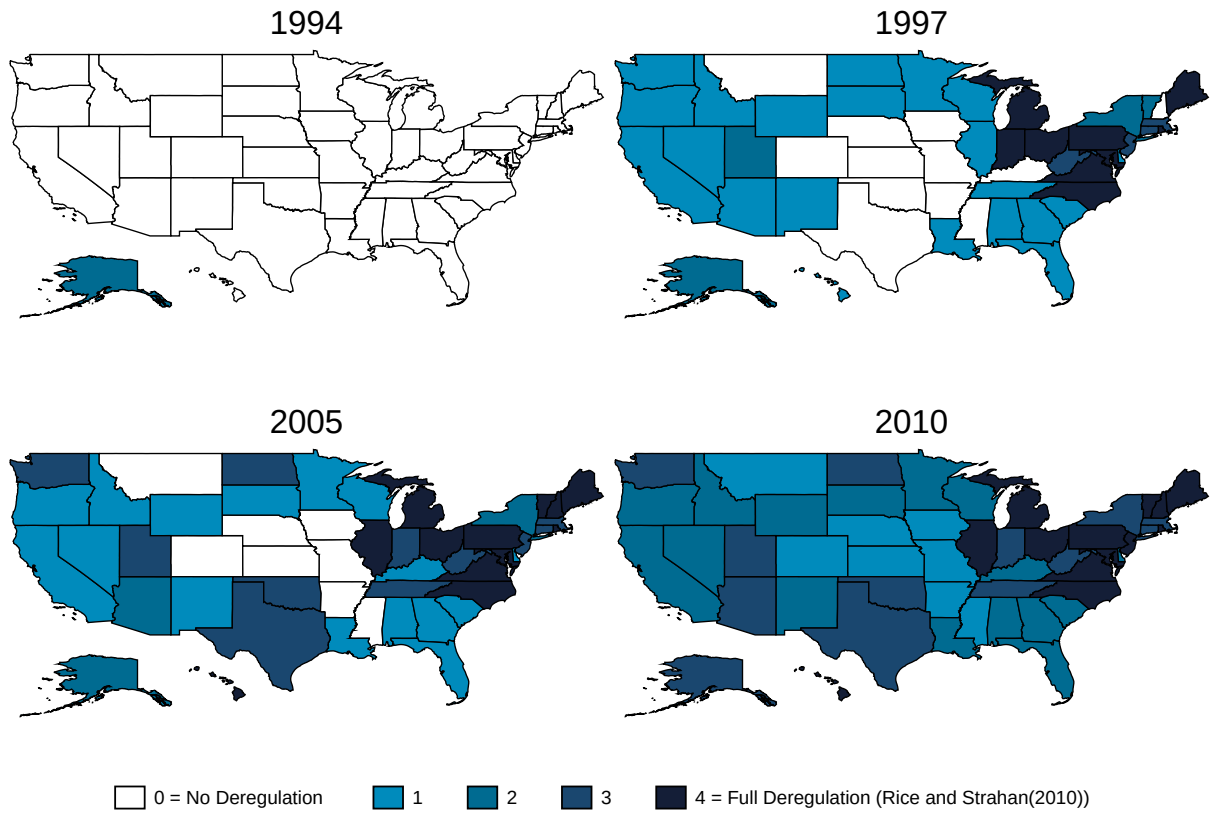


FIGURE 1: THE INTERSTATE BRANCHING DEREGULATION ACROSS STATES AND YEARS

Notes: Figure 1 represents the interstate branching deregulation across states for the IBBEA (1994) and the Dodd-Frank Act (2010). A darker color represents more deregulation. Before IBBEA was passed in 1994, no state had deregulated interstate branching (all blank/white colored). For the 4 panels in the figure, the first state (Alaska) deregulated in 1994; 1997 is the year that the acquisition section of the IBBEA (Section 102 amending 12 USC §1831u(a)(1)) became effective and the last year that states could opt out of the acquisition deregulation; 2005 is the year when the last state (Washington) deregulated following the passage of the IBBEA; and 2010 is the year when the de novo section of the Dodd-Frank Act (Section 613(a) amending 12 USC §36(g)(1)(A)) became effective. This paper focuses on IBBEA implementations from 1994 to 2005. See Section 2 for deregulation history and details.

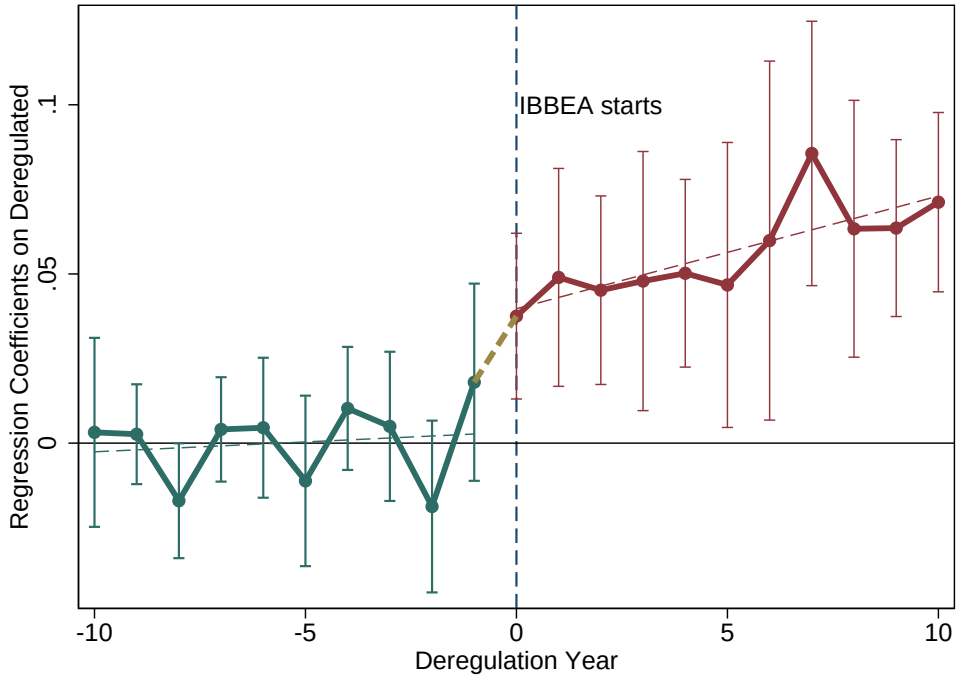


FIGURE 2: PRE-TREND TEST AND PERSISTENT EFFECT OF THE INTERSTATE BRANCHING DEREGULATION

Notes: Figure 2 represents the pre-trend (left/green portion) and persistence (right/red portion) of the effect of the interstate branching deregulation on wage inequality. The figure reports γ^h with confidence intervals from the regression specification $log(w^{90}/w^{10})_{i,t=t_0(i)+h \text{ or } t<t_0(i)} = \gamma^h Deregulated_{i,t} + X'_{i,t}\delta^h + const^h + \alpha_t^h + \alpha_i^h + \epsilon_{i,t}$, where $h = -10, ..., 0, 1, ..., 10$. $t_0(i)$ is the deregulation year of state i for deregulated states and $t_0(i)$ is infinity for non-deregulated states. For each h, γ^h is estimated separately with the sample specified with the time-subscript of the dependent variable. Each point estimate γ^h with its 95% confidence interval compares the states that have deregulated with the ones that have not. For deregulated states before the year of deregulation ($h < 0$), the deregulation indicator variable is replaced to be 1 as a placebo. (Otherwise, $Deregulated_{i,t} = 0$ for all i when $t < t_0(i)$.) Two dashed lines (left/green and right/red) fit the pre-deregulation part and the post-deregulation part of point estimates, respectively. The slope of the line fitting the pre-deregulation part is not significantly different from zero. The slope of the line fitting post-deregulation part is significantly positive (the p-value is 0.003). See Appendix Figure B1 for similar figures using the conventional single-regression test.

FIGURE 3: TIME EFFECT AFTER THE INTERSTATE BRANCHING DEREGULATION

Notes: Figure 3 represents the impulse responses to the time shock, if any, from 1984 to 2005. The figure reports α_t^h with confidence intervals from the regression specification $log(w^{90}/w^{10})_{i,t=1994+h \text{ or } t<1994} = \alpha_t^h + \alpha_i^h + X'_{i,t}\delta^h + const^h + \epsilon_{i,t}$, where $h = -10, ..., 0, 1, ..., 11$, and 1994 is the year that IBBEA was passed. Local projection regressions are estimated separately for each h using the data of the h-th year after 1994 (to see the impulse response in the year) and the data of the years before the deregulation (as a benchmark). This figure is similar to Figure 2. See notes under Figure 2 for more details.

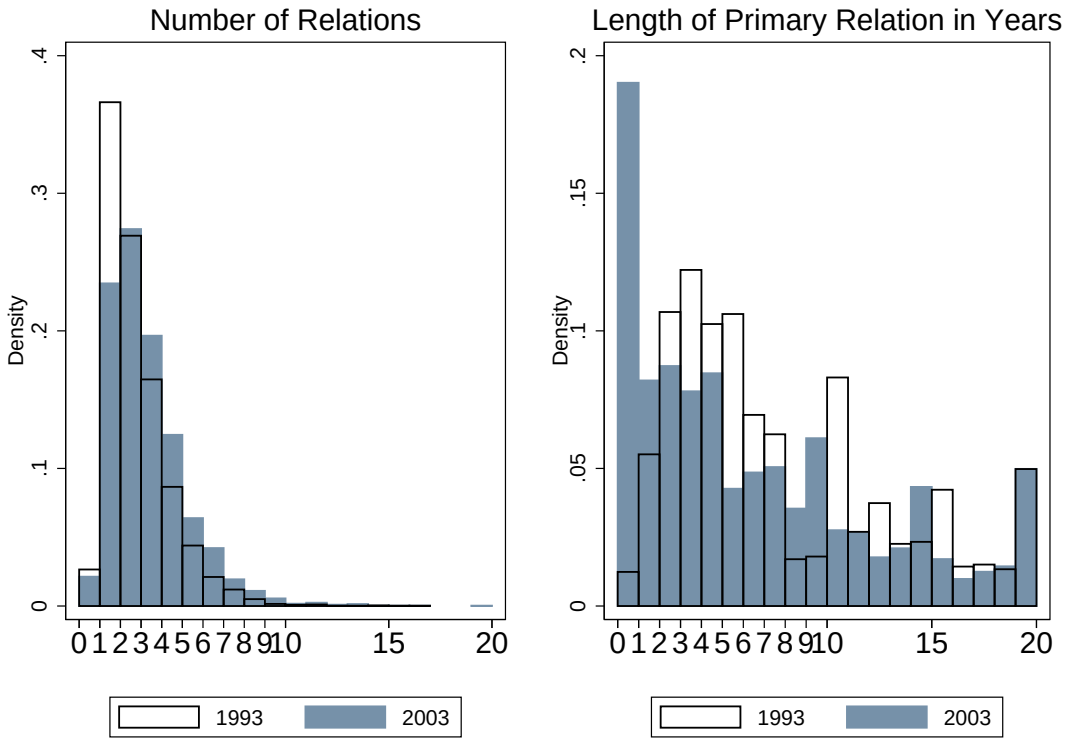


FIGURE 4: LENDING RELATIONSHIP COUNTS AND LENGTHS: FIRMS FORM NEW RELATIONS WITH NATIONAL BANKS

Notes: Figure 4 represents changes in lending relationship: counts of a firm's bank relations and the length of a firms' primary financial institutions from 1993 to 2003. The null hypotheses that there is no change from 1993 to 2003 for either the number of relations or the length of primary relations are both rejected at 1% (see Appendix Table C1).

Table 1: Summary Statistics of US Data

	Year	Obs.	Mean	S.D.	5%	Median	95%
Panel A	Interstate Branching Deregulation (0-4) across States						
Interstate0-4	1994	51	0.039	0.280	0	0	2
Interstate0-4	1995	51	0.686	1.364	0	0	4
Interstate0-4	1996	51	1.039	1.455	0	0	4
Interstate0-4	1997	51	1.588	1.445	0	1	4
Interstate0-4	1998	51	1.588	1.417	0	1	4
Interstate0-4	1999	51	1.647	1.412	0	1	4
Interstate0-4	2000	51	1.784	1.376	0	1	4
Interstate0-4	2001	51	1.941	1.448	0	1	4
Interstate0-4	2002	51	1.961	1.469	0	1	4
Interstate0-4	2003	51	2.000	1.470	0	1	4
Interstate0-4	2004	51	2.059	1.489	0	2	4
Interstate0-4	2005	51	2.098	1.487	0	2	4
Panel B	Wage Inequality across States and Years (CPS)						
w	1994	51	39456	4475	33596	38356	48569
$sd(w)$	1994	51	32643	3656	27982	31900	38993
90/10	1994	51	7.521	0.813	5.994	7.719	8.668
90/50	1994	51	2.362	0.124	2.197	2.357	2.562
50/10	1994	51	3.187	0.339	2.555	3.250	3.649
75/25	1994	51	2.656	0.159	2.378	2.667	2.917
75/50	1994	51	1.599	0.056	1.510	1.599	1.691
50/25	1994	51	1.661	0.070	1.527	1.677	1.773
Gini	1994	51	39.289	1.552	36.142	39.303	41.421
Theil	1994	51	0.311	0.043	0.235	0.307	0.377
w	2005	51	44658	5325	37531	43546	54470
$sd(w)$	2005	51	37217	5080	30440	36637	45797
90/10	2005	51	7.235	0.849	5.957	7.261	8.713
90/50	2005	51	2.401	0.161	2.159	2.393	2.723
50/10	2005	51	3.018	0.340	2.549	2.987	3.605
75/25	2005	51	2.604	0.159	2.326	2.596	2.832
75/50	2005	51	1.592	0.057	1.502	1.587	1.680
50/25	2005	51	1.634	0.063	1.541	1.642	1.729
Gini	2005	51	39.301	1.700	36.880	38.796	42.416
Theil	2005	51	0.309	0.041	0.258	0.304	0.402

Notes: Table 1 presents summary statistics for wage inequality and interstate branching deregulation variables in the US. Panel A presents the summary statistics of interstate branching deregulation from Rice and Strahan (2010). Panel B presents the summary statistics of annual wage (real 2016$), standard deviation of wages, wage ratios between the two percentiles specified in the first column, and inequality indices Gini (%) and Theil (log).

Table 2: Wage Inequality with Financial Deregulation

	(1)	(2)	(3)	(4)	(5)
State-year panel	$log(w^{90}/w^{10})_{i,t}$				
Panel A	Indicator Independent Variable				
Deregulated	0.060***	0.048***	0.040***	0.042***	0.042***
	(0.007)	(0.007)	(0.007)	(0.008)	(0.012)
R^2	0.689	0.718	0.731	0.748	0.748
N	1275	1275	1250	1250	1250
Panel B	Discrete Independent Variable (Scale 0, 1, ..., 4)				
Interstate0-4	0.021***	0.017***	0.015***	0.015***	0.015***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)
R^2	0.690	0.718	0.732	0.748	0.748
N	1275	1275	1250	1250	1250
Year & State FEs	yes	yes	yes	yes	yes
Edu, Exp, Demog	no	yes	yes	yes	yes
Politics & Ideology	no	no	yes	yes	yes
Bank & Macro	no	no	no	yes	yes
Clustered s.e.	no	no	no	no	yes

Notes: Table 2 presents results from the regression $log(w^{90}/w^{10})_{i,t} = \gamma Deregulated_{i,t} + X_{i,t}'\delta + \alpha_i + \alpha_t + const + \epsilon_{i,t}$. The regression is on the state (i) - year (t) panel across all states from 1983 to 2007. The dependent variable is the log ratio between the 90th and the 10th percentiles of wages across all workers in a given state-year.
The independent variable in Panel A is an indicator measure of the interstate branching deregulation, $Deregulated_{i,t}$, which is equal to 1 if a state had deregulated either interstate de novo branching or interstate branch acquisitions by the end of year t. In Panel B, the independent variable is Interstate0-4 on a scale of 0-4 measuring the total number of deregulation dimensions a state deregulates on, where 0 means no interstate branching deregulation and 4 means full interstate branching deregulation.
In both panels, Column (1) controls state and year fixed effects. Column (2) controls education, experience, quadratic experience, and demographic variables including the female ratio, race ratios, and the marital status in addition. Column (3) controls political and ideological variables in addition, including whether a state has split legislatures, whether a state has split government, party of governor, party control of state senate, party control of state house, proportion of democratic/republican population, proportion of liberal/conservative population, and policy mood measures of a state in a year. Column (4) controls small bank group interest variables that affects the deregulation. Columns (1)-(4) present robust standard errors in parentheses and in Column (5), the standard errors double-clustered by state and year are in parentheses. See Appendix Tables B1, B2, and B3 for lagged control variables and pre-deregulation control variables.

Table 3A: Alternative Hypothesis: Reverse Causality

	(1)	(2)	(3)	(4)	(5)
State-year panel	log(Duration Until Deregulation)				
log(Wage90/Wage10)	-0.237	-0.117	-0.140	0.004	0.114
	(0.206)	(0.165)	(0.147)	(0.083)	(0.125)
Relative Assets%		0.008	0.007	0.007**	0.008**
		(0.006)	(0.006)	(0.004)	(0.003)
Relative Cap-ratio%		-0.007	-0.008	-0.000	0.000
		(0.009)	(0.009)	(0.008)	(0.008)
N	605	605	605	605	605
Small Bank Controls	no	yes	yes	yes	yes
Finance Controls	no	no	yes	yes	yes
Politics & Ideology	no	no	no	yes	yes
Wage Levels	no	no	no	no	yes
Clustered s.e.	yes	yes	yes	yes	yes

Notes: Table 3A presents the maximum likelihood estimates of $(\underline{\delta}, \underline{\delta}_X)$ from the hazard model $log(T_{i,t}) = Ineq_{i,t}\ \underline{\delta} + X_{i,t}'\underline{\delta}_X + e_{i,t}$, where e has the type-III extreme value distribution. The dependent variable is the log duration until deregulation in a state-year. The main independent variable is the wage inequality measured by the log ratio between the 90th and the 10th percentiles of wages across all workers in a given state-year. The vector of control variables, $X_{i,t}$, includes variables measuring group interests of small banks, ideological, political, and legal variables, and labor market variables: Column (2) controls variables measuring group interests of small banks. Column (3) controls finance industry variables in addition. Column (4) controls political, ideological, and legal variables in addition. Column (5) controls wage levels including log mean wages and log wages at percentiles 25, 50, 75, and 90 in addition. In all columns, the standard errors double-clustered by state and year are in parentheses. Alternative distribution assumptions are checked in Appendix Table B4.

Table 3B: Alternative Hypothesis: Labor Law Changes and Other Financial Deregulations

	(1)	(2)	(3)	(4)	(5)	(6)
State-year panel			$log(w^{90}/w^{10})_{i,t}$			
Panel A: Effects of Minimum Wage Laws and Right-to-Work Laws						
Deregulated	0.042***	0.041***	0.040***		0.043***	0.064***
	(0.012)	(0.012)	(0.012)		(0.012)	(0.012)
Min Wage Change		-0.006	-0.007			
		(0.012)	(0.013)			
Deregulated*MinWage			0.003			
			(0.012)			
RTW Adopted				-0.010	-0.027**	-0.003
				(0.020)	(0.014)	(0.022)
Deregulated*RTW						-0.061***
						(0.019)
R^2	0.748	0.748	0.748	0.742	0.748	0.752
N	1250	1250	1250	1250	1250	1250
Year & State FEs	yes	yes	yes	yes	yes	yes
All Controls	yes	yes	yes	yes	yes	yes
Clustered s.e.	yes	yes	yes	yes	yes	yes
Panel B: Effects of Other Financial Deregulations						
Deregulated				0.040***	0.040***	0.040***
				(0.012)	(0.012)	(0.012)
Intrastate	-0.034***	-0.006		-0.001		-0.001
	(0.013)	(0.014)		(0.013)		(0.013)
Dodd-Frank			0.010		-0.020	-0.019
			(0.063)		(0.063)	(0.066)
R^2	0.718	0.739	0.738	0.744	0.744	0.744
N	1372	1600	1600	1600	1600	1600
Year & State FEs	yes	yes	yes	yes	yes	yes
All Controls	a few	yes	yes	yes	yes	yes
Clustered s.e.	state	yes	yes	yes	yes	yes

Notes: Table 3B presents tests for two types of alternative hypotheses: labor law changes and other financial deregulations. Panel A presents the effects of minimum wage changes and right-to-work law changes on the effects of the interstate branching deregulation on wage inequality. "Min Wage Change" is an indicator variable equal to one if a state changes its minimum wage in a year, either by the state legislation or as a result of the federal legislation. "RTW Adopted" is an indicator variable equal to one if a state had adopted a right-to-work law by the end of the year. Panel B presents the effects of other financial deregulations on the effects of the interstate branching deregulation on wage inequality. The two deregulations considered are the intrastate branching deregulation (mostly 1970s-1980s) and the Dodd-Frank Act in 2010. The two variables are both indicator variables that are equal to one if a state had deregulated by the end of the year. All columns in both panels have same specifications as the last column of Table 2 except for extra independent variables for other legal events. Column (1) in Panel B replicates Beck et al. (2010) with fewer control variables and standard errors clustered only by state.

Table 4: Heterogeneous Effects across Dimensions of Deregulation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
State-year panel				$log(w^{90}/w^{10})_{i,t}$				
Interstate0-4	0.015***							
	(0.004)							
DeNovo		0.041***						
		(0.012)						
Acquisitions			0.042***		0.041**		0.002	
			(0.012)		(0.019)		(0.015)	
MinAge				0.019	-0.053***			
				(0.015)	(0.020)			
Acquisitions*MinAge					0.050**			
					(0.025)			
DepositCap						0.030**	0.009	
						(0.014)	(0.017)	
Acquisitions*DepositCap							0.047**	
							(0.020)	
Deregulated								0.042***
								(0.012)
R^2	0.748	0.747	0.748	0.743	0.749	0.744	0.750	0.748
N	1250	1250	1250	1250	1250	1250	1250	1250
Year & State FEs	yes	yes	yes	yes	yes	yes	yes	yes
All Controls	yes	yes	yes	yes	yes	yes	yes	yes
Clustered s.e.	yes	yes	yes	yes	yes	yes	yes	yes

Notes: Table 4 presents the effect of interstate branching deregulation decomposed into the 4 dimensions: de novo branching, branch acquisitions, and two acquisition restrictions. Deregulations on acquisition restrictions (the minimum age of the branch to be acquired and the deposit cap after the acquisition) are interacted with the acquisition deregulation.
Independent variables vary across columns: See the next page.

Notes for Table 4, Continued: Column (1) has the discrete independent variable measuring the total number of dimensions a state deregulates on. It is on a scale of 0, 1,..., 4, where 0 means no interstate branching deregulation and 4 means full interstate branching deregulation. Columns (2)-(4) and Column (6) present results of the 4 indicator variables for each of the 4 dimensions of the deregulation, respectively.
Columns (5) adds to Column (3) the minimum age deregulation (an acquisition restriction) to the acquisition deregulation, together with their interaction. And Columns (7) adds to Column (3) similar terms of the deposit cap deregulation (another acquisition restriction). Column (8) presents the result for the main independent variable, the indicator variable for whether a state deregulates either de novo branching or branch acquisitions for a juxtaposed comparison. See Section 2.2 for details on deregulation measures.
All columns control state and year fixed effects and the full set of controls with standard errors clustered by state and year. See notes under Table 2 for more details.

Table 5: Banking Industry: De Novo Banks and Bank M&A

	(1)	(2)	(3)	(4)
Bank-level	(log) Duration Until De Novo Banks		(log) Duration Until Acquisitions	HHI
	Unit Banks	Multi-branch	All Banks	State-year
Allowing DeNovo	0.048**	-0.046**		
	(0.023)	(0.022)		
Allowing Acqst Both			-0.090**	
			(0.036)	
Deregulated				349.047*
				(197.277)
Nobs	10172	928	16358	1250
N Transactions	532	46	1205	-
Time Window	1994-2007	1994-2007	1986-2001	1983-2007
Bank Controls	yes	yes	yes	yes
Ideological Controls	yes	yes	yes	yes
Political Controls	yes	yes	yes	yes
Other Deregulations	no	no	yes	no
Clustered s.e.	yes	yes	yes	yes

Notes: Table 5 presents the effects of the interstate branching deregulation on the banking industry through de novo and acquisition deregulations. The specification of Columns (1)-(3) is similar to Equation (3) and Table 3A. Column (4) has a similar specification to Equation (1). Columns (1) and (2) present the effect of the de novo deregulation. Column (1) presents results using the sample of de novo banks of unit banks (the proxy for local community banks) and Column (2) presents results using the sample of de novo banks of multi-branch banks (the proxy for entering national banks). Column (3) analyzes the effect of the acquisition deregulation. Allowing Acqst Both is an indicator variable equal to 1 if both states of the acquirer and the target allow acquisitions. And Other Deregulations include MinAge, DepositCap and their interactions with Acquisitions for both states of the acquirer and the target. Column (4) has the banking industry (deposits) Herfindahl-Hirschman Index of the state-year as the dependent variable (low concentration if below 1000 and high concentration if above 1800).

Table 6: Bank Loan Market: Positive Credit Supply Shock

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Firm-loan level	Interest Rate (%)		Loan Amount (log$)		Trade Credit		Payables
					If Paid Late	% Paid Late	log($)
Deregulated	-1.223***	-1.311***	0.217**	0.215***	-0.604**	-4.105***	-0.694***
	(0.361)	(0.306)	(0.095)	(0.024)	(0.302)	(0.091)	(0.124)
R^2	0.276	0.354	0.534	0.523			0.450
N	3299	5128	3299	5128	4479	2522	4786
Survey Time	1993+2003	All	1993+2003	All	All	All	All
Loan Controls	yes	yes	yes	yes	yes	yes	yes
Loan Market	yes	yes	yes	yes	yes	yes	yes
Relationship	yes	yes	yes	yes	yes	yes	yes
Borrower Controls	yes	yes	yes	yes	yes	yes	yes
Ind, Region FEs	yes	yes	yes	yes	yes	yes	yes
Clustered s.e.	yes	yes	yes	yes	yes	yes	yes

Notes: Table 6 presents the interstate branching deregulation as a credit supply shock. Tables 6, Table 7, and Panel A of Table 8A use all 4 surveys of the SSBF data and run regressions across all firms with their survey weights. Columns (1)-(4) present the results for the most recent loan across firms: The dependent variable is the interest rate of the loan in percentage points in Columns (1) and (2) and it is the log of the dollar amount of the loan in Columns (3) and (4). Columns (5) and (6) present the results on whether (indicator variable) and how much (in percentage points) a firm pays its trade credit (a much more expensive credit than bank loans) late. Column (7) presents the log dollar amount of a firm's accounts payable. Column (5) applies the Logit model to the indicator variable and Column (6) applies the Tobit model with a lower bound of 0 and an upper bound of 100. Other columns use least squares regressions.

Table 7: Heterogeneity across Firm Ages, Sizes, and Profitability

	(1)	(2)	(3)	(5)	(6)	(7)
Panel A	Firm Ages and Sizes					
Firm-loan level	Interest Rate (%)			Loan Amount (log$)		
Deregulated	-1.300***	-1.283***	-1.980***	0.078	-0.019	-0.418
	(0.359)	(0.387)	(0.512)	(0.066)	(0.038)	(0.304)
Deregulated*Age0-1	-0.612			-0.451***		
	(0.803)			(0.160)		
Deregulated*Age2-10	0.018			0.282**		
	(0.114)			(0.133)		
Deregulated*Small		0.115			0.211**	
		(0.470)			(0.083)	
Deregulated*Emp1-19			0.822*			0.484*
			(0.475)			(0.293)
Deregulated*Emp20-99			0.210			0.580**
			(0.305)			(0.294)
R^2	0.353	0.353	0.354	0.502	0.400	0.403
N	5128	5128	5128	5128	5128	5128
Loan Controls	yes	yes	yes	yes	yes	yes
Loan Market	yes	yes	yes	yes	yes	yes
Relationship	yes	yes	yes	yes	yes	yes
Borrower Controls	yes	yes	yes	yes	yes	yes
Ind, Region FEs	yes	yes	yes	yes	yes	yes
Clustered s.e.	yes	yes	yes	yes	yes	yes

TABLE 7, CONTINUED

	(4)	(8)
Panel B	Firm Profitability	
Firm-loan level	Interest Rate (%)	Loan Amount (log$)
Deregulated	-0.922***	0.051
	(0.285)	(0.083)
Profitability	-0.182	0.041*
	(0.166)	(0.021)
Deregulated*Profitability	0.579***	-0.021
	(0.050)	(0.124)
Profitability^2	0.082	0.031***
	(0.108)	(0.010)
Deregulated*Profitability^2	-0.384***	0.232*
	(0.119)	(0.141)
R^2	0.355	0.531
N	5128	5128
Loan Controls	yes	yes
Loan Market	yes	yes
Relationship	yes	yes
Borrower Controls	yes	yes
Ind, Region FEs	yes	yes
Clustered s.e.	yes	yes

Notes: Table 7 presents the heterogeneous effects of the credit supply shock across firm ages, sizes, and profitability. The dependent variables are the loan interest rate and loan amount of the most recently approved loan of a firm, same as Table 6. The independent variables are Deregulated, firm characteristics, and their interactions. Firm characteristics include firm ages, sizes, and profitability. Age is measured by the age of firms in years and is categorized into new firms (age 0-1) and young but not new firms (age 2-10). (See Appendix Figure C1 for anecdotal evidence on age requirements of loans.) Size is measured either by an indicator variable Small (firm assets below the median firm assets in the survey year) in Columns (2) and (6) or by firm employment in the categories of 1-19, 20-99, and 100-500 employees in Columns (3) and (7). Profitability is calculated by the ratio between profit (net income) and assets, i.e., ROA as defined in Fama and French (2002), standardized to mean 0 with a standard deviation of 1. (Alternatively, Profit/Equity, i.e., ROE as defined by Fama and French (2015) gives similar results.)

Table 8A: Heterogeneous Labor Market Decisions - Small-Medium Businesses

Firm-year panel	(1)	(2)	(3)	(4)	(5)	(6)
Panel A			log(Payroll/Emp)			
Age0-1	1.193***			0.730*		
	(0.234)			(0.383)		
Age2-10	-0.209*			-0.367***		
	(0.123)			(0.079)		
Small		-1.997***			-2.202***	
		(0.415)			(0.279)	
Profitability	0.200***	0.101***	0.220***	0.192***	0.050	0.030
	(0.063)	(0.036)	(0.057)	(0.043)	(0.047)	(0.050)
Deregulated				0.532**	0.047	0.929**
				(0.246)	(0.362)	(0.415)
Deregulated*Age0-1				-2.543*		
				(1.513)		
Deregulated*Age2-10				0.562*		
				(0.298)		
Deregulated*Small					2.378***	
					(0.477)	
Deregulated*Profitability						0.745***
						(0.157)
R^2	0.319	0.299	0.321	0.264	0.265	0.268
N	1626	1626	1626	3124	3124	3124
Panel B			log(Emp)			
Age0-1	0.041			-0.089		
	(0.088)			(0.162)		
Age2-10	-0.151***			-0.186***		
	(0.024)			(0.012)		
Small		-0.964***			-0.955***	
		(0.049)			(0.033)	
Profitability	0.112***	-0.028*	0.114***	0.233***	0.030***	0.128***
	(0.024)	(0.016)	(0.025)	(0.009)	(0.005)	(0.029)
Deregulated				-0.073	-0.170***	0.175**
				(0.072)	(0.049)	(0.070)
Deregulated*Age0-1				-0.139		
				(0.265)		
Deregulated*Age2-10				0.322***		
				(0.078)		
Deregulated*Small					0.295***	
					(0.070)	
Deregulated*Profitability						0.504***
						(0.118)
R^2	0.574	0.389	0.577	0.469	0.348	0.486
N	3081	3081	3081	5488	5488	5488
Test	Without Deregulation			With+Without Deregulation		
Loan Controls	yes	yes	yes	yes	yes	yes
Loan Market	yes	yes	yes	yes	yes	yes
Relationship	yes	yes	yes	yes	yes	yes
Other Borrower Controls	yes	yes	yes	yes	yes	yes
Ind, Region FEs	yes	yes	yes	yes	yes	yes
Clustered s.e.	yes	yes	yes	yes	yes	yes

Notes: See the next page.

Notes for Table 8A: Tables 8A and 8B present heterogeneous labor market decisions across small-medium businesses (8A) and across all firms (8B). Table 8A has similar specifications to Table 7 except for the different dependent variable. In Panel A, the dependent variable is the average wage, measured by the log of the average payroll. In Panel B, the dependent variable is the production scale, measured by the log employment. Columns (1)-(3) exclude all variables related to the interstate branching deregulation and Columns (4)-(6) include them. See Table 7 for detailed variable definitions.

Table 8B: Heterogeneous Labor Market Decisions - All Firms

State-year panel	(1)	(2)	(3)
Panel A	log(Payroll/Emp)		
Panel A.1 Firm Ages	0-1	2-5	6+
Deregulated	0.002	0.035**	-0.005
	(0.017)	(0.014)	(0.010)
R^2	0.942	0.972	0.988
N	542	542	542
Panel A.2 Firm Sizes	0-49	50-499	500+
Deregulated	0.018*	-0.005	-0.011
	(0.009)	(0.009)	(0.014)
R^2	0.985	0.984	0.984
N	542	542	542
Panel B	log(Emp)		
Panel B.1 Firm Ages	0-1	2-5	6+
Deregulated	-0.348**	-0.330**	-0.007
	(0.165)	(0.149)	(0.011)
R^2	0.823	0.816	1.000
N	1246	1246	542
Panel B.2 Firm Sizes	0-49	50-499	500+
Deregulated	-0.018**	0.006	-0.004
	(0.009)	(0.014)	(0.017)
R^2	0.999	0.999	0.999
N	542	542	542
Year & State FEs	yes	yes	yes
All Controls	yes	yes	yes
Clustered s.e.	yes	yes	yes

Notes: See notes under Table 8A. Table 8B uses the LEHD data and its categorization of firm ages (in years) in Panels A.1 and B.1 and sizes (by employment) in Panels A.2 and B.2. In Panel A, the dependent variable is the average wage, measured by the log of the average payroll. In Panel B, the dependent variable is the production scale, measured by the log employment. The regression specification is on a state-year panel and is similar to the last column of Table 2. Firm ages and sizes are grouped into fewer categories to avoid random significant across a large number of regressions. See Appendix Table C5 for results on the large and public firms. See Appendix Table C6 for the original categorization by the LEHD (6 categories for firm ages and another 6 for firm sizes).

Table 9A: Labor Market Dynamics: Skill Composition

State-year panel	(1)	(2)	(3)	(4)
Panel A	Abstract	Manual	Routine	log(EduYears)
Deregulated	0.196***	0.023	-0.302***	0.005*
	(0.062)	(0.074)	(0.080)	(0.002)
N	1250	1250	1250	1250
Panel B	Top 1/3 by Skill	Bottom 1/3 by Skill	Top 1/3 by Wage	Bottom 1/3 by Wage
Deregulated	0.239	-0.446*	0.528**	-0.079
	(0.277)	(0.256)	(0.235)	(0.263)
R^2	0.903	0.867	0.862	0.806
N	1250	1250	1250	1250
Panel C	%Married	%Age16-35	%Age36-55	%Age56-64
Deregulated	0.977***	-0.580*	0.628*	-0.049
	(0.305)	(0.346)	(0.325)	(0.140)
R^2	0.881	0.926	0.917	0.830
N	1250	1250	1250	1250
Year & State FEs	yes	yes	yes	yes
All Controls	yes	yes	yes	yes
Clustered s.e.	yes	yes	yes	yes

Notes: Table 9A presents the change in skill composition after the deregulation. In Panel A, Columns (1)-(3) present results for the three main types of skills, measured by occupation-level measures for routine, manual, and abstract tasks derived from the Dictionary of Occupational Titles (DOT) by Autor and Dorn (2013), aggregated to the state-year level and standardized to mean 0 with a standard deviation of 1. Column (4) presents educational attainment of a state-year measured by the log of average years of education. In Panel B, the dependent variables are the fractions of workers in a state from the top or bottom terciles of occupations. The terciles are calculated across all states in a year. Columns (1) and (2) rank occupations by how abstract an occupation is, measured by the Abstract Task Index = log(abstract) - log(manual) using the occupational task intensities (similar to Panel A). Similarly, Columns (3) and (4) use occupational wages to rank occupations. In Panel C, the dependent variables are the fractions (in percentage points) of married workers and workers in respective age ranges. See notes under Table 2 for more details of the regression specification and controls.

Table 9B: Labor Market Dynamics: Geographic and Social Mobility

State-year panel	(1)	(2)	(3)
Panel A	Stay	Move-In	Move-Out
Deregulated	0.310	-0.001	-0.310
	(0.632)	(0.372)	(0.327)
R^2	0.703	0.657	0.602
N	1150	1150	1150
Panel B	Socially Stay	Socially Up	Socially Down
Deregulated	-0.058	0.139	0.279
	(0.048)	(0.231)	(0.301)
R^2	0.349	0.594	0.568
N	1150	1150	1150
Year & State FEs	yes	yes	yes
All Controls	yes	yes	yes
Clustered s.e.	yes	yes	yes

Notes: Table 9B presents geographic and social mobility after the deregulation. All dependent variables are fractions in percentage points. Panel A presents results for geographical mobility. Move-In (Out) is defined as the fraction of workers moving into (out of) the state, which include any workers that do not reside (reside) in the state in year $t-1$ but reside (do not reside) in the state in the year t. Stay is defined as the fraction of workers who reside in the state in both year $t-1$ and year t. Panel B presents results for social mobility. Socially Up (Down) is defined as the fraction of workers moving up (down) more than 5 percentiles. Socially Stay is defined accordingly as the fraction of workers staying within their own decile in the wage distribution of their own state in a year. See notes under Table 2 for more details of the specification and controls.

Appendix

The empirical appendix is arranged into the following sections:

Appendix A provides more details on data described in Section 3.

Appendix B provides further robustness checks and results for the main result that interstate branching deregulation increases wage inequality in Section 4.

Appendix C provides further robustness checks and results for the transmission mechanism of the "finance facilitator" in Section 5.

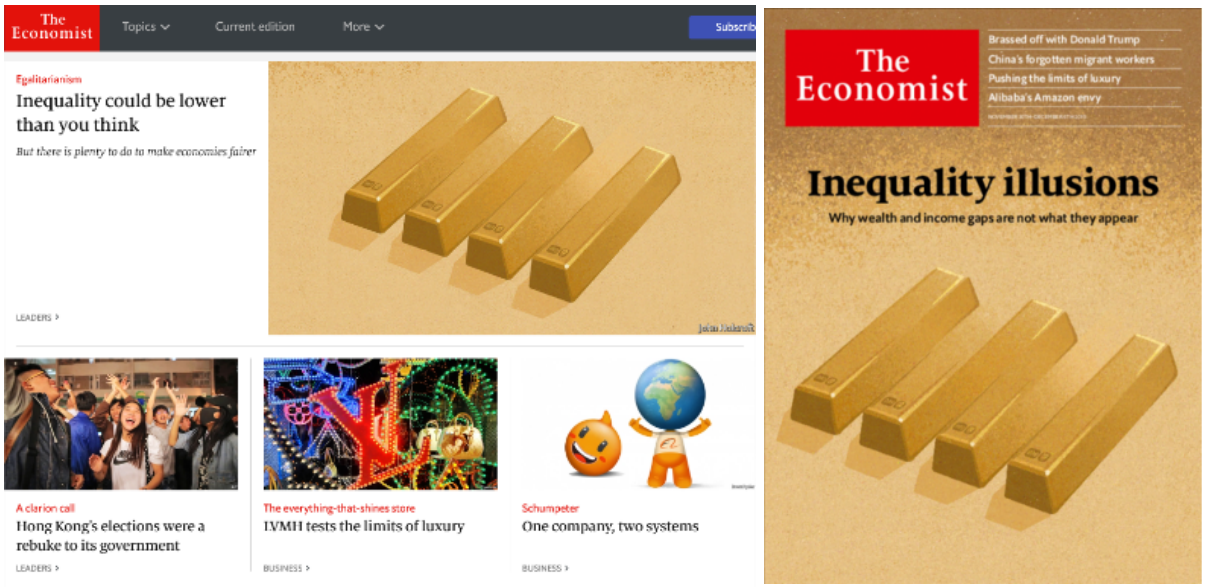
Appendix D presents further results for heterogeneous labor market effects across financial deregulations, emphasizing the intrastate branching deregulation.

Appendix E presents further results for heterogeneous labor market effects across industries and sectors, emphasizing the finance sector and the banking industry.

The mathematical appendix, Appendix F, provides mathematical derivations and proofs for the hazard model in Section 4.3.1 and for the theoretical mechanism in Section 6.

A Appendix for Section 3

A.1 Appendix Figures for Section 3



Appendix Figure A1: Inequality Could Be Lower: Anecdote

Notes: Appendix Figure A1 presents anecdotal evidence against the common belief that inequality increases across different measures and across different economies. The figure on the left is a screen-shot of the front-page of www.economist.com on November 28, 2019 (Titled "Egalitarian - Inequality could be lower than you think: But there is plenty to do to make economies fairer") and the figure on the right is the cover of the November 28, 2019 issue of The Economist (Titled "Inequality illusions - Why wealth and income gaps are not what they appear").

A.2 Appendix Tables for Section 3

Appendix Table A1: Detailed Summary Statistics of Main Panel

	Obs.	Mean	S.D.	5%	Median	95%
Panel A			Deregulation and Legal Changes			
Deregulated	1275	0.221	0.415	0	0	1
Interstate0-4	1275	0.905	1.384	0	0	4
DeNovo	1275	0.176	0.381	0	0	1
Acquisitions	1275	0.221	0.415	0	0	1
MinAge	1275	0.154	0.361	0	0	1
DepositCap	1275	0.355	0.479	0	0	1
Intrastate	1989	0.861	0.346	0	1	1
Dodd-Frank	2040	0.225	0.418	0	0	1
Min Wage Change	1275	0.261	0.439	0	0	1
RTW Adopted	1275	0.416	0.493	0	0	1
Panel B			Full Control Set			
Female	1275	0.462	0.017	0.432	0.464	0.487
Black	1275	0.094	0.106	0.003	0.058	0.286
Hispanic	1275	0.058	0.077	0.003	0.028	0.255
Other race	1275	0.044	0.096	0.005	0.023	0.118
Married	1275	0.609	0.056	0.547	0.610	0.689
Age16-35	1275	0.453	0.056	0.368	0.449	0.545
Age36-55	1275	0.453	0.050	0.366	0.464	0.522
Edu years	1275	13.271	0.356	12.663	13.279	13.844
Experience	1275	2.972	0.061	2.874	2.969	3.069
Experience2	1275	8.836	0.363	8.261	8.816	9.419
Split Legislatures	1250	0.233	0.423	0.000	0.000	1.000
Split Gov	1250	0.557	0.497	0.000	1.000	1.000
Governor Democratic	1250	0.500	0.500	0.000	0.500	1.000
Governor Republican	1250	0.484	0.500	0.000	0.000	1.000
Senate Democratic	1250	0.552	0.497	0.000	1.000	1.000
Senate Republican	1250	0.406	0.491	0.000	0.000	1.000
House Democratic	1250	0.601	0.490	0.000	1.000	1.000
House Republican	1250	0.363	0.481	0.000	0.000	1.000
Policy Mood EK	1275	40.391	6.464	30.453	40.664	48.552
Policy Mood BRFH	1250	49.546	14.971	27.096	48.508	76.993
Liberal%	1275	19.082	5.988	11.079	18.210	28.667
Conservative%	1275	33.925	7.043	23.516	33.306	46.660
Relative Assets%	1275	7.946	4.883	1.238	7.408	16.964
Relative Cap-ratio%	1275	2.306	2.727	-1.118	1.991	6.751
Unit Banking	1275	0.082	0.275	0.000	0.000	1.000
Bank Insuarance Power	1275	0.493	0.500	0.000	0.000	1.000
$\Delta GSP\%$	1275	1.869	3.284	-3.080	1.915	6.725
$\Delta HPI\%$	1275	4.998	4.976	-1.489	4.347	14.480
$\Delta Unemp\%$	1275	-0.194	0.783	-1.350	-0.242	1.150

Notes: See notes under Appendix Tables A2.

Appendix Table A2: Detailed Summary Statistics of Main Panel - More

	Obs.	Mean	S.D.	5%	Median	95%
Skill and Mobility						
Abstract	1275	0.000	1.000	-1.742	0.034	1.646
Routine	1275	0.000	1.000	-1.433	-0.072	1.734
Manual	1275	-0.000	1.000	-1.412	-0.073	1.657
High ATI Occ	1275	41.513	4.454	34.237	41.349	48.899
Low ATI Occ	1275	29.944	3.491	24.565	29.674	36.586
High Wage Occ	1275	34.633	3.633	29.000	34.448	40.790
Low Wage Occ	1275	37.255	2.884	32.534	37.185	42.280
Married	1275	0.609	0.056	0.547	0.610	0.689
Urban	1250	0.699	0.222	0.280	0.731	1.000
Age16-35	1275	0.453	0.056	0.368	0.449	0.545
Age36-55	1275	0.453	0.050	0.366	0.464	0.522
Age56-64	1275	0.095	0.017	0.071	0.092	0.126

Notes: Appendix Tables A1 and A2 present summary statistics for all variables in the main state-year panel, except that inequality variables are in Table 1. The time horizon is 1983-2007 for most variables, except Intrastate and Dodd-Frank Deregulations (1979-2018).

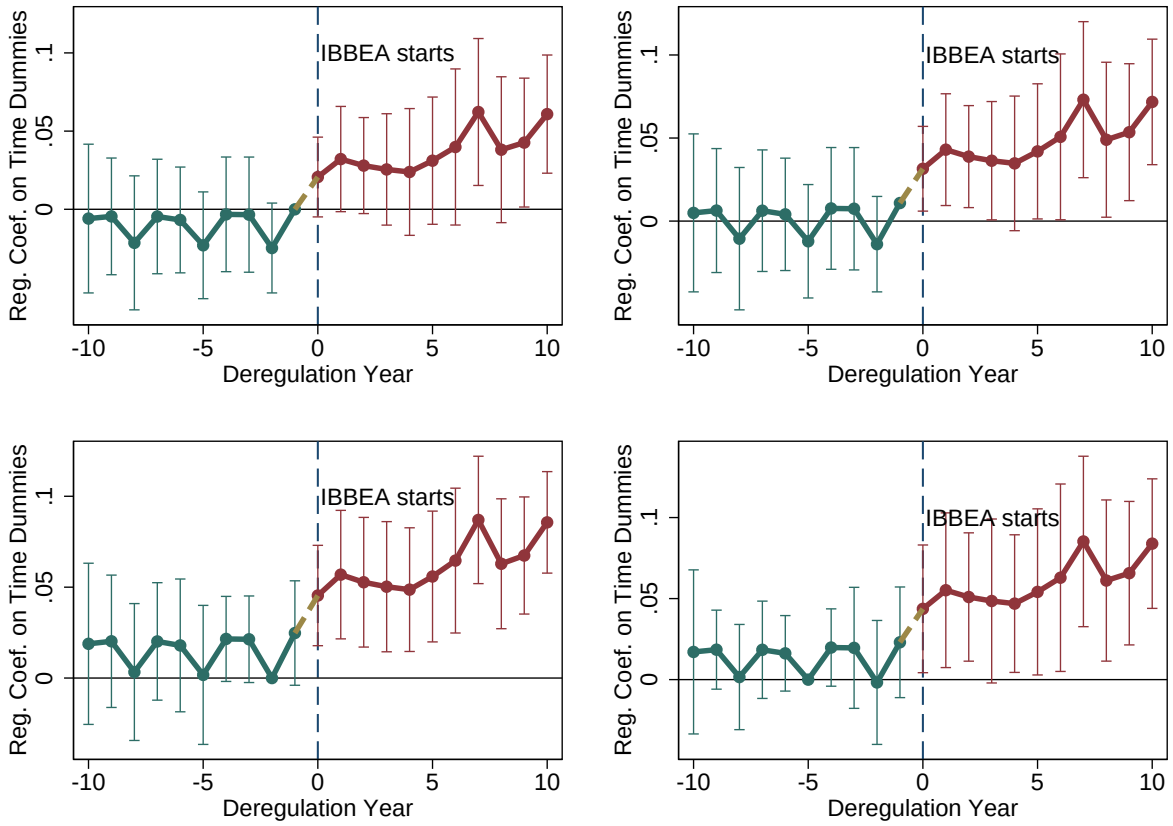
Appendix Table A3: Detailed Summary Statistics of Firm Panel

	Obs.	Mean	S.D.	5%	Median	95%
Panel A			Firm-Level Dependent Variables			
Interest Rate (%)	5274	8.228	3.009	3.800	8.000	13.000
Loan Amount (log)	5274	11.695	2.019	8.759	11.513	15.251
Trade Credit If Paid Late	10463	0.506	0.500	0.000	1.000	1.000
Trade Credit % Paid Late	5260	30.279	27.283	1.000	25.000	100.000
Payables (log)	13878	7.419	5.190	-0.000	9.108	14.106
log(#Relation)	15072	1.115	0.447	0.693	1.099	1.946
log(Relation Yr)	9685	2.004	0.913	0.348	1.946	3.434
Panel B			Firm-Loan Control Set			
Floating	5668	0.507	0.500	0.000	1.000	1.000
Collateral	15072	0.257	0.437	0.000	0.000	1.000
log(Loan Terms (months))	5554	1.244	0.744	0.154	1.099	2.773
Prime Rate	15072	6.556	1.737	4.010	6.000	8.750
Corporate Bond Spread	15072	2.265	0.585	1.550	2.070	3.300
10-Year Treasury Spread	15072	2.338	1.136	0.500	2.880	3.600
log(#Relation)	15072	1.115	0.447	0.693	1.099	1.946
log(Relation Yr)	9685	2.004	0.913	0.348	1.946	3.434
Bank Lender	15072	0.954	0.210	1.000	1.000	1.000
Non-Fin Lender	15072	0.022	0.147	0.000	0.000	0.000
Checking/Saving Acc w Lender	15072	0.850	0.357	0.000	1.000	1.000
Fin Services from Lender	15072	0.431	0.495	0.000	0.000	1.000
High HHI	15068	0.518	0.500	0.000	1.000	1.000
log(Firm Age)	15072	2.571	0.804	1.099	2.639	3.807
log(Firm Assets)	15072	12.023	2.638	8.066	12.044	16.067
Profitability	15072	-0.094	0.926	-0.678	-0.505	2.500
Is C-Corporation	15072	0.291	0.454	0.000	0.000	1.000
Leverage	15072	0.039	0.996	-0.806	-0.498	1.851
Panel C			Firm-Level Heterogeneity			
Age0-1	15072	0.018	0.131	0.000	0.000	0.000
Age2-10	15072	0.402	0.490	0.000	0.000	1.000
Emp1-19	15072	0.712	0.453	0.000	1.000	1.000
Emp20-99	15072	0.203	0.402	0.000	0.000	1.000
Small	15072	0.383	0.486	0.000	0.000	1.000
Profitability	15072	-0.094	0.926	-0.678	-0.505	2.500
Profitability^2	15072	0.866	1.975	0.012	0.325	6.248

Notes: Appendix Table A3 presents summary statistics for all variables in the firm-loan-year panel across all SSBF surveys.

B Appendix for Section 4

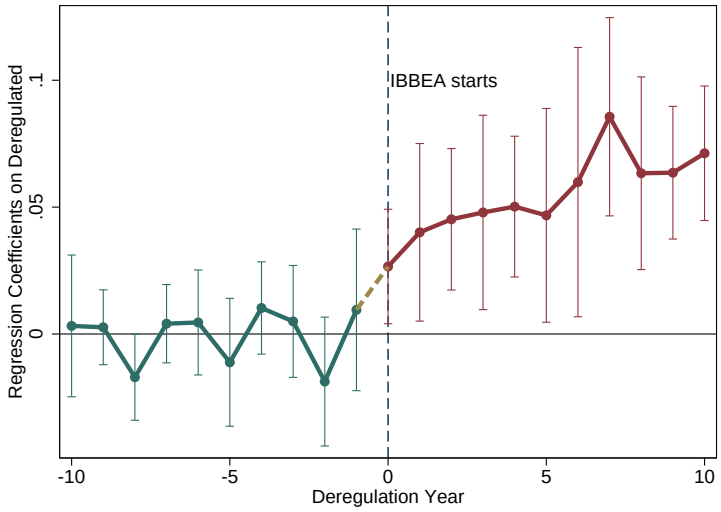
B.1 Appendix Figures for Section 4



Appendix Figure B1: Pre-Trend Test and Persistent Effect - Conventional Method

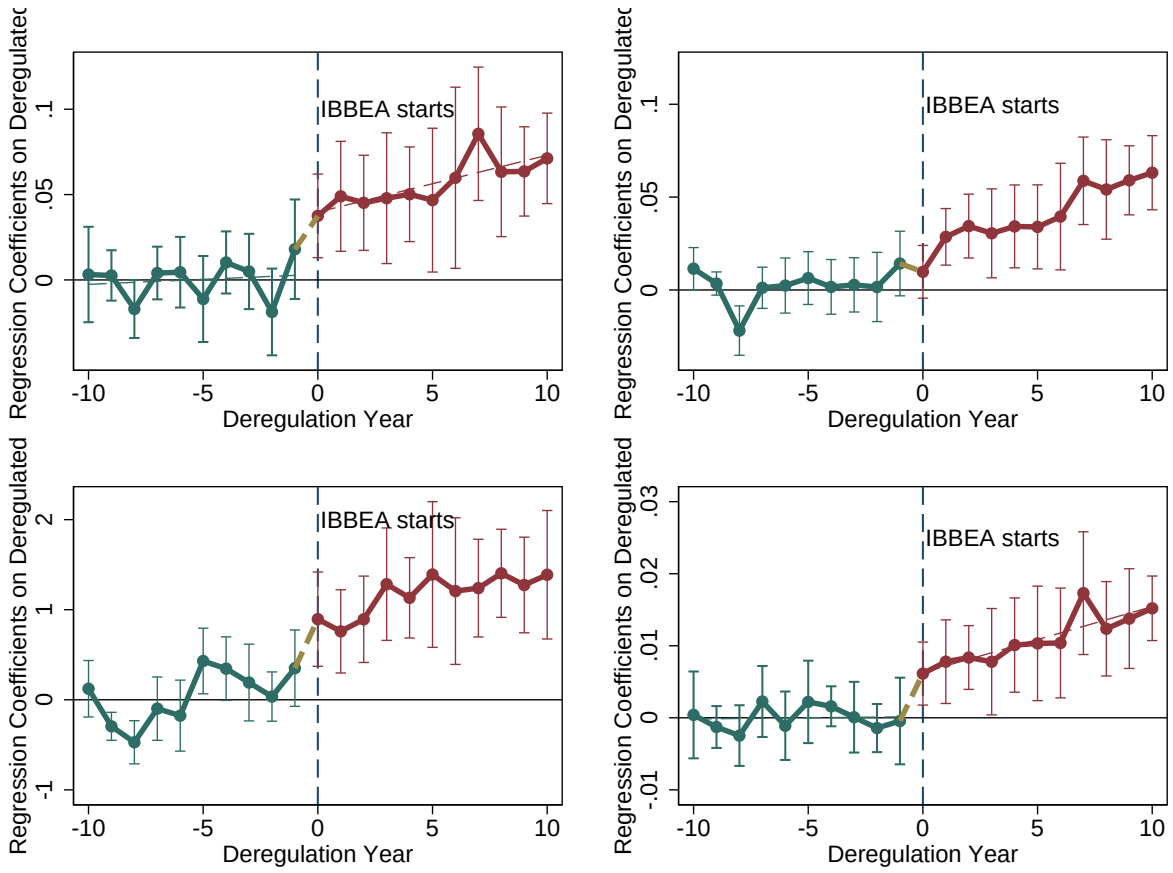
Notes: Appendix Figure B1 represents the single-regression test for the pre-trend and persistence of the interstate branching deregulation, the conventional alternative to Figure 2. This figure reports γ^h with confidence intervals from running a single regression $log(w^{90}/w^{10})_{i,t} = \sum_{h=-10}^{10} \gamma^h 1(t = t_0(i) + h) + X'_{i,t}\delta + const + \alpha_t + \alpha_i + \epsilon_{i,t}$, where $t_0(i)$ is the deregulation year of state i for deregulated states and $t_0(i)$ is infinity for non-deregulated states.

The top two panels represent regression coefficients time indicator variables with a benchmark of 1 year before deregulation. The bottom left (right) panel represents the ones with a benchmark of 2 (5) years before deregulation. The top right panel demeans all coefficients with the mean value of pre-deregulation coefficients while the other three represent the original regression coefficients.



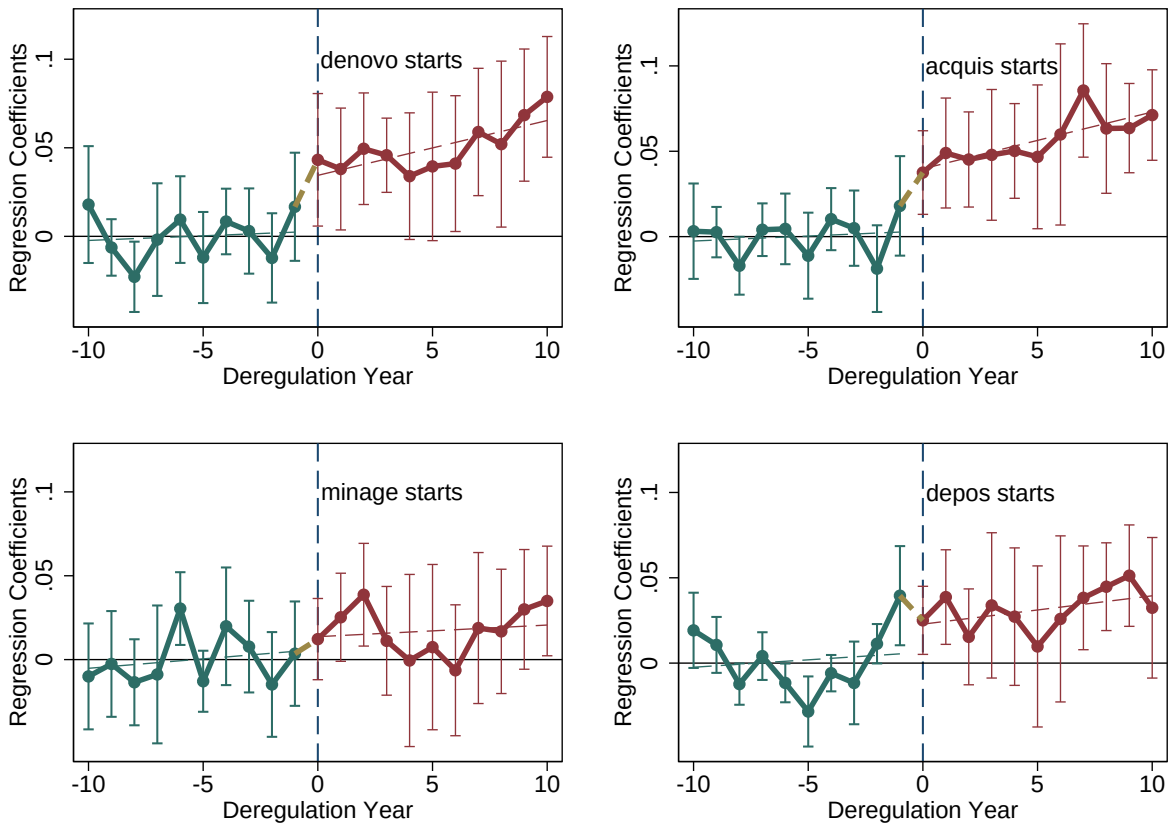
Appendix Figure B2: Pre-Trend Test and Persistent Effect - Dropping States Deregulated in 1997

Notes: Appendix Figure B2 re-runs Figure 2 but drops states that deregulated in 1997 (by themselves or because the IBBEA took effect automatically).



Appendix Figure B3: Pre-Trend Test and Persistent Effect - Alternative Measurements

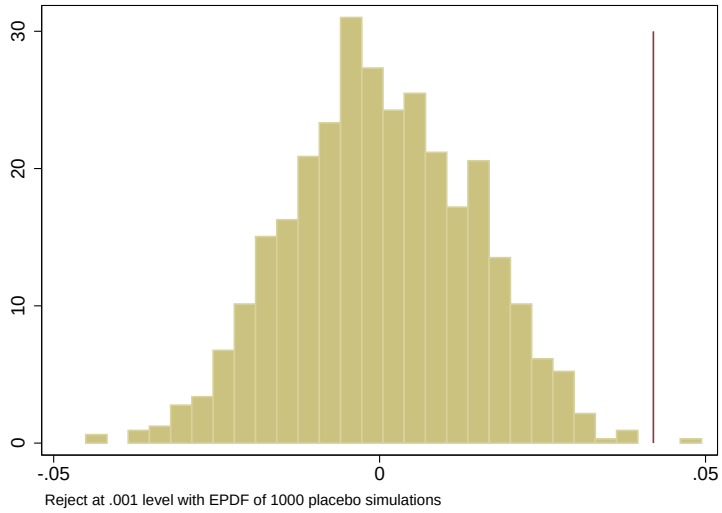
Notes: Appendix Figure B3 re-runs Figure 2 with alternative inequality measures: the benchmark 90-10 log wage ratio (top-left), the 75-25 log wage ratio (top-right), the Gini coefficient (bottom-left), and the log standard deviation of log wages (bottom-right).



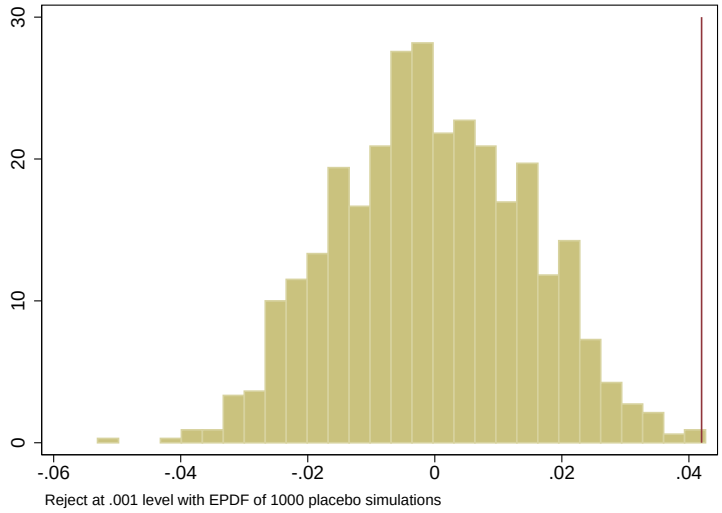
Appendix Figure B4: Pre-Trend Test and Persistent Effect - Deregulation Dimensions

Notes: Appendix Figure B4 re-runs Figure 2 with individual deregulation dimensions measures: allowing de novo branching (top-left), allowing branch acquisitions (top-right), decreasing the minimum age of the target bank (bottom-left), and increasing the maximum percentage of the total deposits of the target and acquirer in the state (bottom-right). Note that the horizontal axis of deregulation years is with respect to individual dimensions of the deregulation as opposed to the timing in Figure 2, as a state may deregulate different dimensions of interstate branching in different years.

Panel A: Randomly assigned deregulation across states and deregulation years



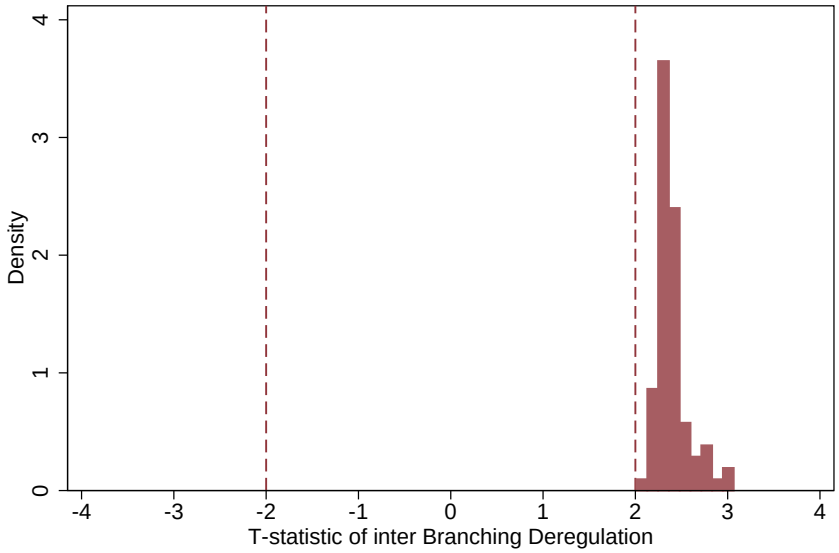
Panel B: Randomly assigned deregulation across states and pre-deregulation years



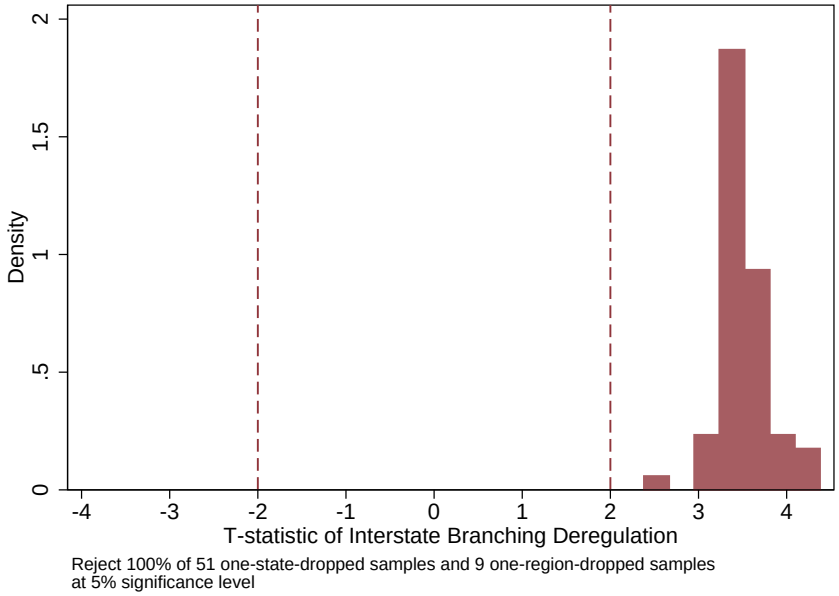
Appendix Figure B5: Placebo Test of the Interstate Branching Deregulation

Notes: Appendix Figure B5 represents the empirical distribution of the Deregulated coefficient in Equation 1 using 1000 placebo experiments randomly assigning deregulation timing across years and locations across states. The red vertical line represents the regression coefficient on Deregulated, 0.042, in the last column in Panel A of Table 2. Panel A randomly assigns the interstate branching deregulation across both states and the deregulation years from 1994 to 2005. Panel B randomly assigns the interstate branching deregulation across both states and the pre-deregulation years from 1983 to 1992. Similar placebo tests within different time windows or on other coefficients in Table 2 or in Table 4 are qualitatively identical.

Panel A: Industry Robustness



Panel B: State Robustness



Appendix Figure B6: Industry and State Robustness

Notes: Panel A of Appendix Figure B6 represents the T-statistics of the interstate branching variable of the last column of Table 2 after dropping one SIC-1 industry or one SIC-2 industry at a time.
Panel B of Appendix Figure B6 represents the T-statistics of the interstate branching variable of the last column of Table 2 after dropping one state at a time.

B.2 Appendix Tables for Section 4

Appendix Table B1: Wage Inequality with Financial Deregulation - Controls Lagged 1 Year

	(1)	(2)	(3)	(4)	(5)
State-year panel	$log(w^{90}/w^{10})_{i,t}$				
Panel A	Indicator Independent Variable				
Deregulated	0.059***	0.042***	0.034***	0.033***	0.033***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.011)
R^2	0.686	0.719	0.732	0.752	0.752
N	1275	1275	1250	1250	1250
Panel B	Discrete Independent Variable (Scale 0, 1, ..., 4)				
Interstate0-4	0.021***	0.015***	0.013***	0.011***	0.011***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
R^2	0.688	0.720	0.733	0.752	0.752
N	1275	1275	1250	1250	1250
Year & State FEs	yes	yes	yes	yes	yes
Edu, Exp, Demog	no	yes	yes	yes	yes
Politics & Ideology	no	no	yes	yes	yes
Bank & Macro	no	no	no	yes	yes
Clustered s.e.	no	no	no	no	yes

Notes: Appendix Table B1 re-runs Table 2 with all control variables lagged for 1 year.

Appendix Table B2: Wage Inequality with Financial Deregulation - Controls Lagged 5 Years

	(1)	(2)	(3)	(4)	(5)
State-year panel	$log(w^{90}/w^{10})_{i,t}$				
Panel A	Indicator Independent Variable				
Deregulated	0.033***	0.032***	0.032***	0.025***	0.025**
	(0.008)	(0.007)	(0.007)	(0.007)	(0.010)
R^2	0.665	0.713	0.725	0.743	0.743
N	1275	1275	1250	1250	1250
Panel B	Discrete Independent Variable (Scale 0, 1, ..., 4)				
Interstate0-4	0.019***	0.017***	0.015***	0.010***	0.010***
	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)
R^2	0.672	0.718	0.728	0.744	0.744
N	1275	1275	1250	1250	1250
Year & State FEs	yes	yes	yes	yes	yes
Edu, Exp, Demog	no	yes	yes	yes	yes
Politics & Ideology	no	no	yes	yes	yes
Bank & Macro	no	no	no	yes	yes
Clustered s.e.	no	no	no	no	yes

Notes: Appendix Table B2 is the same as Appendix Table B1 except that all control variables are lagged for 5 years.

Appendix Table B3: Wage Inequality with Financial Deregulation - Pre-Deregulation Controls

	(1)	(2)	(3)	(4)	(5)
State-year panel	$log(w^{90}/w^{10})_{i,t}$				
Panel A	Indicator Independent Variable				
Deregulated	0.060***	0.057***	0.054***	0.047***	0.047***
	(0.007)	(0.007)	(0.008)	(0.008)	(0.013)
R^2	0.689	0.705	0.718	0.733	0.733
N	1275	1275	1250	1250	1250
Panel B	Discrete Independent Variable (Scale 0, 1, ..., 4)				
Interstate0-4	0.021***	0.020***	0.019***	0.017***	0.017***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)
R^2	0.690	0.706	0.719	0.734	0.734
N	1275	1275	1250	1250	1250
Year & State FEs	yes	yes	yes	yes	yes
Edu, Exp, Demog	no	yes	yes	yes	yes
Politics & Ideology	no	no	yes	yes	yes
Bank & Macro	no	no	no	yes	yes
Clustered s.e.	no	no	no	no	yes

Notes: Appendix Table B3 re-runs Table 2 with all control variables after 1990 taking the values of their corresponding values in 1990, which is before the interstate branching deregulation. Other choices of pre-deregulation years give similar results.

Appendix Table B4: Distribution Robustness for Hazard Model

	(1)	(2)	(3)	(4)	(5)	(6)
State-year panel	log(Duration until deregulation)					
	Cox	Exponential	LogLogistic	LogNormal	Gamma	Gompertz
log(Wage90/Wage10)	-0.100	0.334	-0.128	-0.073	-0.085	-0.138
	(1.048)	(1.124)	(0.105)	(0.067)	(0.080)	(1.454)
Relative Assets%	-0.059	0.071**	0.008*	0.007*	0.007**	-0.128*
	(0.051)	(0.035)	(0.004)	(0.004)	(0.003)	(0.067)
Relative Cap-ratio%	-0.007	-0.016	-0.001	0.001	0.004	0.020
	(0.082)	(0.044)	(0.008)	(0.005)	(0.007)	(0.130)
N	605	605	605	605	605	605
Controls	yes	yes	yes	yes	yes	yes
Clustered s.e.	yes	yes	yes	yes	yes	yes

Notes: Appendix Table B4 presents alternative distribution assumptions for the error term in the hazard model of Equation (3) and Table 3A. See notes under Table 3A for more details.

Appendix Table B5: Timing of Deregulation

	(1)	(2)	(3)
State-year panel		$log(w^{90}/w^{10})_{i,t}$	
Acquisitions*9497	0.057***		
	(0.012)		
Acquisitions*9805	0.007		
	(0.021)		
Acquisitions		0.045***	
		(0.010)	
Acquisitions*Early		0.011***	
		(0.003)	
DeNovo			0.050***
			(0.011)
DeNovo*Early			0.009*
			(0.004)
R^2	0.751	0.754	0.750
N	1250	1250	1250
Year & State FEs	yes	yes	yes
All Controls	yes	yes	yes
Clustered s.e.	yes	yes	yes

Notes: Appendix Table B5 presents the heterogeneous effects of deregulation by different timing of carrying out the legal changes. Column (1) interacts the deregulation indicator variable Acquisitions with two time windows 9497 and 9805, where 9497 equals one if a state deregulates interstate branch acquisitions from 1994 to 1997, which was before the opt-out date of June 1, 1997 set by the federal law (IBBEA), and zero otherwise. And similarly, 9805 equals one if a state deregulates interstate branch acquisitions from 1998 to 2005, which was after the opt-out date of June 1, 1997 set by the federal law (IBBEA), that is, the state first opted out of the section of IBBEA deregulating acquisitions and opted in later. Columns (2) and (3) interact the deregulation with whether it is early relative to the opt-out date of June 1, 1997. Early equals the number of days by which the deregulation precedes June 1, 1997 divided by 365.

Appendix Table B6: Alternative Horizons around the Time of Deregulation

	(1)	(2)	(3)	(4)
	Deregulation Years			
	[-1, +1]	[-4, +4]	[-7, +7]	[-10, +10]
State-year panel	$log(w^{90}/w^{10})_{i,t}$			
Deregulated	0.028***	0.037***	0.037***	0.042***
	(0.010)	(0.010)	(0.012)	(0.012)
R^2	0.825	0.798	0.772	0.763
N	678	831	976	1108
Year & State FEs	yes	yes	yes	yes
All Controls	yes	yes	yes	yes
Clustered s.e.	yes	yes	yes	yes

Notes: Appendix Table B6 presents the robustness check for Table 2 with alternative horizons around the time of deregulation: Column (1) is limited to only the observations of from 1 year before the deregulation to 1 year after the deregulation (3 years in total). Columns (2)-(4) extend the horizon gradually.

Appendix Table B7: Alternative Measures of Wage Inequality and Financial Deregulation

State-year panel	(1)	(2)	(3)	(4)
Panel A	$log(w^{90}/w^{10})_{i,t}$	90/50	50/10	$log(sd(log(w_{i,t})))$
Deregulated	0.042***	0.020***	0.021***	0.008***
	(0.012)	(0.007)	(0.008)	(0.002)
R^2	0.748	0.668	0.810	0.756
N	1250	1250	1250	1250
Panel B	$log(w^{90}/w^{10})_{i,t}$	90/50	50/10	$log(sd(log(w_{i,t})))$
Interstate0-4	0.015***	0.008***	0.006**	0.003***
	(0.004)	(0.002)	(0.003)	(0.001)
R^2	0.748	0.672	0.809	0.756
N	1250	1250	1250	1250
Panel C	75/25	75/50	50/25	Gini
Deregulated	0.026***	0.017***	0.009*	0.889***
	(0.009)	(0.005)	(0.006)	(0.239)
R^2	0.711	0.546	0.683	0.628
N	1250	1250	1250	1250
Year & State FEs	yes	yes	yes	yes
All Controls	yes	yes	yes	yes
Clustered s.e.	yes	yes	yes	yes

Notes: Appendix Table B7 presents robustness checks for alternative measures of both wage inequality and interstate branching deregulation.
Panels A and C present results with the same independent variable as Panel A of Table 2, and Panel B presents the same independent variable as Panel B of Table 2.
In Panels A and B, Column (1) reiterates the last column of Table 2 for a juxtaposed comparison. Column (2) replaces the inequality measure of the log ratio between the 90th and the 10th percentiles of wages with the log ratio between the 90th and the 50th percentiles, and similarly, with that between the 50th and the 10th percentiles in Column (3). Column (4) replaces the log wage ratio with the log of the standard deviation of log real wages in 2016 dollars across all households weighted by the earnings' sampling weights of the CPS.
Columns (1)-(3) in Panel C are similar, presenting results for log wage ratios between the two indicated percentiles, respectively, while Column (4) presents the result for the Gini index (in percentage points).
See Panel B of Table 1 for summary statistics of these alternative measures of inequality.
All columns have clustered s.e. by state and year.

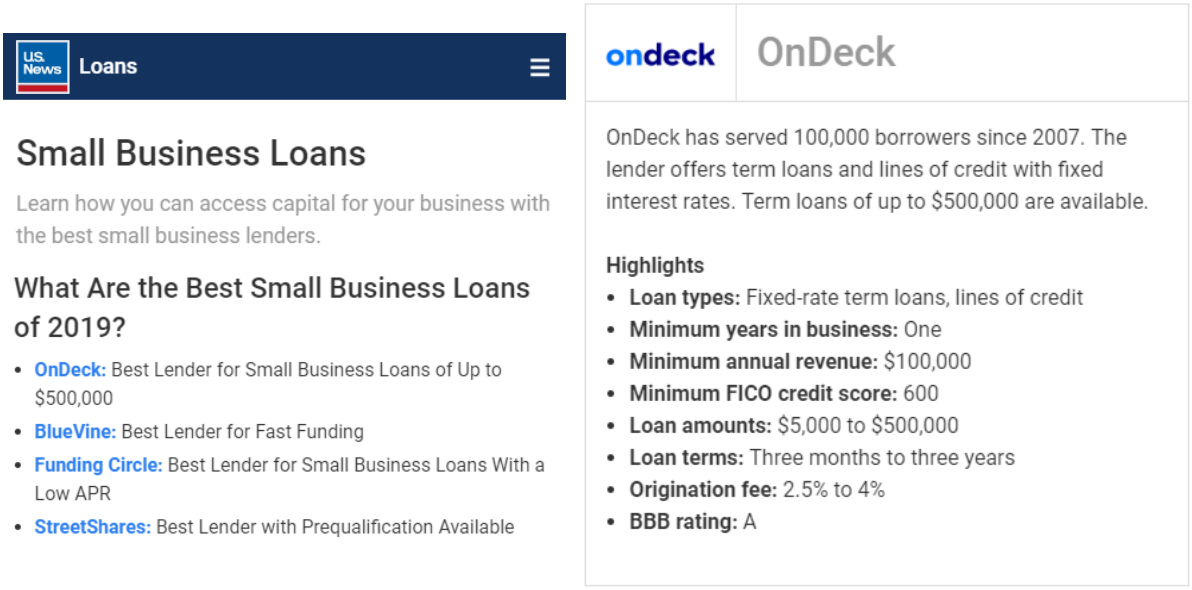
Appendix Table B8: Alternative Datasets to the Main Panel

	Census + ACS			
	Wage 90/10			Income 90/10
Deregulated	0.021*	0.021***	0.021**	0.027*
	(0.012)	(0.006)	(0.011)	(0.014)
R^2	0.903	0.903	0.903	0.851
N	200	200	200	200
Year & State FEs	yes	yes	yes	yes
All Controls	yes	yes	yes	yes
Clustered s.e.	no	year only	yes	yes

Notes: Appendix Table B8 presents robustness checks for alternative datasets of both wage inequality and interstate branching deregulation. The 90/10 log ratios of wages/total income are constructed in the same way as Panel A using the 1980, 1990, and 2000 United States Censuses and the 2006 American Community Surveys (ACS) (4 years in total) across all states from the Integrated Public Use Microdata Series (IPUMS) USA database.
Columns (3) and (4) in Panel D have clustered s.e. by state and year. Column (1) has non-clustered s.e. while Column (2) clusters s.e. by year.

C Appendix for Section 5

C.1 Appendix Figures for Section 5



Appendix Figure C1: Loans across Firm Ages: Anecdote

Notes: Appendix Figure C1 presents examples of small business loans from US News (https://loans.usnews.com/small-business) as anecdotal evidence for Columns (1) and (5) in Table 7. In the right panel, the lender requires the business to have a minimum age of 1 year as an example of firm age requirements by the majority of banks.

C.2 Appendix Tables for Section 5

Appendix Table C1: Relationship Lending: Financing Source Replacement

	(1)	(2)
Firm-year panel	log(#relation)	log(years of relation)
Deregulated	0.186***	-0.540***
	(0.025)	(0.044)
R^2	0.175	0.284
N	5516	5490
Loan Controls	yes	yes
Loan Market	yes	yes
Borrower Controls	yes	yes
Clustered s.e.	yes	yes

Notes: Appendix Table C1 is the regression test for Figure 4. The specification is a firm-year panel regression similar to Table 8A but the main independent variable is Deregulated without interaction terms.

Appendix Table C2: Heterogeneity across Firm Financing Situations

	(1)	(2)	(3)	(4)
Firm-loan level	Interest Rate (%)		Loan Amount (log$)	
Deregulated	-0.791***	-1.298***	0.169***	0.198***
	(0.301)	(0.356)	(0.043)	(0.033)
FinProb	0.542***		-0.033**	
	(0.095)		(0.017)	
Deregulated*FinProb	-0.160		-0.531***	
	(0.769)		(0.187)	
Leverage	-0.053	0.002	0.228***	0.195***
	(0.074)	(0.057)	(0.019)	(0.017)
Deregulated*Leverage		-0.061		0.079*
		(0.153)		(0.043)
R^2	0.285	0.354	0.531	0.523
N	4086	5128	4086	5128
Loan Controls	yes	yes	yes	yes
Loan Market	yes	yes	yes	yes
Relationship	yes	yes	yes	yes
Borrower Controls	yes	yes	yes	yes
Clustered s.e.	yes	yes	yes	yes

Notes: Appendix Table C2 extends firm heterogeneity analysis of Table 7 with a similar specification. FinProb is a self-report indicator variable that equals 1 if a firm has financing problems or has problem accessing the credit market (survey questions varied slightly across years). Leverage is defined as the asset-equity ratio, standardized to mean 0 with a standard deviation 1.

Appendix Table C3: Bank Loan Market - Large Firms

	(1)	(2)	(3)	(4)
Firm-year level	Interest Rate (%)	Short-term Debt (log$)	Long-term Debt (log$)	DealScan Loan (log$)
Deregulated	-0.013	0.026	0.073	0.028
	(0.061)	(0.049)	(0.076)	(0.030)
R^2	0.183	0.565	0.764	0.978
N	123505	149516	149881	149935
Loan Controls	yes	yes	yes	yes
Loan Market	yes	yes	yes	yes
Relationship	yes	yes	yes	yes
Borrower Controls	yes	yes	yes	yes
Year, State, Ind FEs	yes	yes	yes	yes
Clustered s.e.	yes	yes	yes	yes

Notes: Appendix Table C3 is parallel to Table 6 using Compustat and DealScan data (for the large and public firms).

Appendix Table C4: Heterogeneity across Firm Ages, Sizes, and Profitability - Large Firms

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Firm-loan level	Interest Rate (%)				Loan Amount (log$)			
Deregulated	0.132***	0.004	-0.038	0.115***	0.036	0.463***	0.244***	0.028
	(0.043)	(0.072)	(0.060)	(0.038)	(0.036)	(0.094)	(0.048)	(0.029)
Age0-1	0.141**				-0.091***			
	(0.059)				(0.017)			
Deregulated*Age0-1	-0.005				-0.014			
	(0.091)				(0.044)			
Age2-10	0.097***				-0.062***			
	(0.033)				(0.022)			
Deregulated*Age2-10	-0.112**				-0.024			
	(0.045)				(0.033)			
Emp1-499		1.639***				-0.563***		
		(0.078)				(0.086)		
Deregulated*Emp1-499		-0.413***				-0.506***		
		(0.104)				(0.104)		
Emp500-5k		0.753***				-0.454***		
		(0.053)				(0.065)		
Deregulated*Emp500-5k		-0.047				-0.375***		
		(0.084)				(0.084)		
Small			1.520***				-0.309***	
			(0.077)				(0.050)	
Deregulated*Small			-0.364***				-0.329***	
			(0.095)				(0.054)	
Profitability				-0.321***	-0.028***			-0.037***
				(0.020)	(0.006)			(0.006)
Deregulated*Profitability				-0.086***				0.037***
				(0.020)				(0.010)
R^2	0.764	0.664	0.662	0.779	0.978	0.978	0.977	0.978
N	24220	23090	24220	22301	149935	151457	165430	149935
Loan Controls	yes	yes	yes	yes	yes	yes	yes	yes
Loan Market	yes	yes	yes	yes	yes	yes	yes	yes
Relationship	yes	yes	yes	yes	yes	yes	yes	yes
Borrower Controls	yes	yes	yes	yes	yes	yes	yes	yes
Year, State, Ind FEs	yes	yes	yes	yes	yes	yes	yes	yes
Clustered s.e.	yes	yes	yes	yes	yes	yes	yes	yes

Notes: Appendix Table C4 re-runs Table 7 using Compustat and DealScan data (for the large and public firms).

Appendix Table C5: Heterogeneous Labor Market Decisions - Large Firms

Firm-year panel	(1)	(2)	(3)	(4)	(5)	(6)
Panel A			log(Payroll/Emp)			
Age0-1	0.029			0.027		
	(0.057)			(0.068)		
Age2-10	-0.042			-0.066		
	(0.045)			(0.052)		
Profitability	0.045***	0.111***	0.045***	0.045***	0.111***	0.047***
	(0.009)	(0.020)	(0.009)	(0.009)	(0.020)	(0.010)
Small		-1.286***			-1.311***	
		(0.057)			(0.063)	
Deregulated				-0.037	0.058	-0.010
				(0.035)	(0.055)	(0.037)
Deregulated*Age0-1				0.007		
				(0.067)		
Deregulated*Age2-10				0.068		
				(0.064)		
Deregulated*Small					0.156*	
					(0.080)	
Deregulated*Profitability						-0.010
						(0.019)
R^2	0.788	0.459	0.788	0.788	0.462	0.788
N	15696	15696	15696	15696	15696	15696
Panel B			log(Emp)			
Age0-1	-0.127***			-0.133***		
	(0.028)			(0.034)		
Age2-10	-0.121***			-0.121***		
	(0.027)			(0.037)		
Profitability	0.016***	0.095***	0.016***	0.016***	0.094***	0.009*
	(0.005)	(0.009)	(0.005)	(0.005)	(0.009)	(0.005)
Small		-1.163***			-1.144***	
		(0.048)			(0.056)	
Deregulated				-0.002	0.103*	-0.001
				(0.024)	(0.061)	(0.017)
Deregulated*Age0-1				0.014		
				(0.049)		
Deregulated*Age2-10				-0.000		
				(0.037)		
Deregulated*Small					-0.079	
					(0.060)	
Deregulated*Profitability						0.031***
						(0.008)
R^2	0.721	0.378	0.719	0.721	0.379	0.720
N	138003	138003	138003	138003	138003	138003
Test	Without Deregulation			With+Without Deregulation		
Loan Controls	yes	yes	yes	yes	yes	yes
Loan Market	yes	yes	yes	yes	yes	yes
Relationship/Borrower	yes	yes	yes	yes	yes	yes
Year, State, Ind FEs	yes	yes	yes	yes	yes	yes
Clustered s.e.	yes	yes	yes	yes	yes	yes

Notes: Appendix Table C5 re-runs Table 8A using Compustat and DealScan data (for the large and public firms).

Appendix Table C6: Heterogeneous Labor Market Decisions - All Firms (Original Categorization)

State-year panel	(1)	(2)	(3)	(4)	(5)	(6)
Panel A			log(Payroll/Emp)			
Panel A.1 Firm Ages	All	0-1	2-3	4-5	6-10	11+
Deregulated	-0.001	0.002	0.043***	0.029	-0.006	-0.004
	(0.010)	(0.017)	(0.012)	(0.018)	(0.011)	(0.011)
R^2	0.989	0.942	0.956	0.959	0.980	0.987
N	542	542	542	542	542	542
Panel A.2 Firm Sizes	All	0-19	20-49	50-249	250-499	500+
Deregulated	-0.001	0.023**	0.009	0.000	-0.018	-0.011
	(0.010)	(0.009)	(0.011)	(0.008)	(0.013)	(0.014)
R^2	0.989	0.982	0.983	0.983	0.952	0.984
N	542	542	542	542	542	542
Panel B			log(Emp)			
Panel B.1 Firm Ages	All	0-1	2-3	4-5	6-10	11+
Deregulated	-0.005	-0.348**	-0.364**	-0.247**	-0.014	-0.006
	(0.010)	(0.165)	(0.172)	(0.098)	(0.024)	(0.012)
R^2	1.000	0.823	0.800	0.880	0.997	1.000
N	542	1246	1246	1246	542	542
Panel B.2 Firm Sizes	All	0-19	20-49	50-249	250-499	500+
Deregulated	-0.005	-0.024**	-0.006	0.005	0.010	-0.004
	(0.010)	(0.010)	(0.008)	(0.015)	(0.022)	(0.017)
R^2	1.000	0.999	0.999	0.999	0.997	0.999
N	542	542	542	542	542	542
Year & State FEs	yes	yes	yes	yes	yes	yes
All Controls	yes	yes	yes	yes	yes	yes
Clustered s.e.	yes	yes	yes	yes	yes	yes

Notes: See notes under Table 8B. Appendix Table C6 presents the original categorization by the LEHD (6 categories for firm ages and another 6 for firm sizes).

D Extension to Intrastate Branching Deregulation

This section extends the analysis from the interstate branching deregulation (the IBBEA) to the intrastate branching deregulation, summarizing the key results of Wei (2020) for the intrastate branching deregulation: The intrastate branching deregulation is a stronger positive credit supply shock (especially in terms of quantity) but the extra credit brought in by the deregulation does not flow to the financially constrained firms. Rather, the large and public firms absorb the credit without adjusting their labor market decisions. Consequently, no significant impact on inequality.

D.1 Intrastate Branching Deregulation Summary and Heterogeneity across Financial Deregulations

The analysis for the intrastate branching deregulation is in parallel to the main results in the previous sections. The main difference is the main independent variable under consideration, $\text{Intrastate}_{i,t}$, which is an indicator variable that equals 1 if state i had deregulated by the end of year t. The construction of $\text{Intrastate}_{i,t}$ follows Kroszner and Strahan (1999) and Black and Strahan (2001).

Corresponding to Table 2, the table of main results for the interstate deregulation, Appendix Table D1 presents the inequality effect: the intrastate branching deregulation decreases wage inequality, but not robustly significantly, either statistically or economically.

And corresponding to Figure 2, Appendix Figure D1 tests the pre-trend and shows the persistence of the decrease effect. The pre-trend test is passed while the persistence is much weaker than the interstate deregulation.

To investigate the transmission mechanism discovered in Section 5 despite the insignificant inequality effect, the first step is to show the intrastate deregulation did take effect within the banking industry. But this is difficult for the intrastate deregulation. As discussed in Section 5.1, the low-frequency nature of the banking industry results in the difficulty to di-

rectly test the number of newly opened intrastate branches and intrastate bank acquisitions. However, even the hazard model of Table 5 does not suffice for the intrastate deregulation.

The reason that this model does not work for the intrastate deregulation is likely the timing: both the timing of datasets and the timing of the deregulation. The branching dataset of the FDIC is only available for 1994-2018 and the Bank Mergers and Acquisitions Database of the Fed is only available for 1986-2001. While this is not a problem for the interstate deregulation (1994-2005), the banking industry effect of the intrastate is expected to be observed not too long after the deregulation (mostly 1970s and 1980s with a few in the 1990s till 1999). In addition, the timing of the deregulation itself further increases the test difficulty. As discussed in Black and Strahan (2001), the intrastate deregulation has a clustering feature between the de novo deregulation and the acquisition deregulation which makes the definition of $\text{Intrastate}_{i,t}$ difficult to separate the effects of these two deregulation dimensions.[1] However, this difficulty does not reject the hypothesis that the intrastate deregulation did take effect, either. I continue to test the further steps of the main transmission mechanism.

The next step of the mechanism is the positive credit supply shock that transmits from the deregulated banking industry to the real economy. Corresponding to Table 6, Columns (1) and (2) of Appendix Table D2 verify the strong and positive credit supply shock brought by the intrastate deregulation. Comparing to the credit supply shock after the interstate deregulation, the quantity effect (the increase in the credit amount) is smaller but the price effect (the decrease in the interest rate) almost doubles, both significant.

However, Columns (3)-(5) of Appendix Table D2 show that the financial constraints of firms are not loosened. More trade credit, which is more expensive than bank credit, is paid late and firms accumulate larger payables. Built on this, Appendix Table D3 checks the possible heterogeneous effects across firms, corresponding to Table 7. It shows that the

[1] Explaining their construction of the main independent variable, they said "In most cases, branching by M&A occurred first, then unrestricted branching deregulation occurred soon thereafter; this time clustering will make it hard for us to isolate the impact permitting new branches".

younger, smaller, or more profitable firms do not benefit more from the credit supply shock.

Further, corresponding to Figure 4, Appendix Figure D2 presents the relationship lending result. While the interstate deregulation leads to the formation of new lending relationships (new for those that lack it and more for those that would like better loan terms), the intrastate deregulation does not significantly change the lending relationship.

These results are in sharp contrast to the interstate deregulation. After the interstate deregulation, not only the firms are less financially constrained, but also the firms that greatly lacked credit before the deregulation benefit more from the credit supply shock. The intrastate deregulation shocks the real economy with cheaper and more credit, nonetheless, the credit does not flow to the firms in most need.

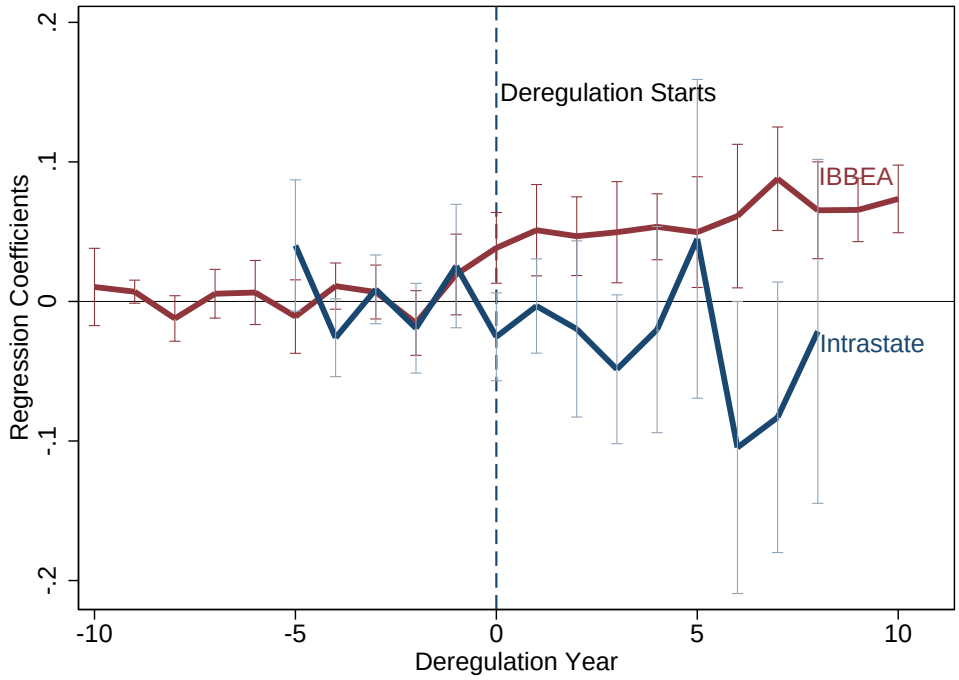
How about the other part of the economy that always enjoys an affluent credit supply? Appendix Table D4 shows that large and public firms receive 60% more credit (also slightly cheaper) after the intrastate deregulation, while they receive insignificantly 3% more credit after the interstate deregulation as shown in Appendix Table C3. Further analysis investigating the heterogeneity across the large firms shows that even among them, the firms with even larger sizes or older ages receive an even larger credit supply shock.

Finally, Appendix Table D5 checks the overall labor market effect for the large firms, corresponding to Tables 8A and 8B. Large firms increase their operation scales (more employment) with the extra credit while remain the same labor structure (average payroll). Further, the corresponding analysis to Panel A of Table 9A for the intrastate deregulation reveals no result (none significant) on skill composition.

To conclude this section, the results on the inequality effect and the transmission mechanism of the intrastate deregulation are consistent with and further corroborate the "heterogeneous financial inclusion" view considering both production-side effects and household-side effects. For the intrastate deregulation, the production-side effect does not reach the labor market because the credit supply shock was channeled to benefit only those less or not financially constrained firms. These firms were not constrained from adjusting their labor market

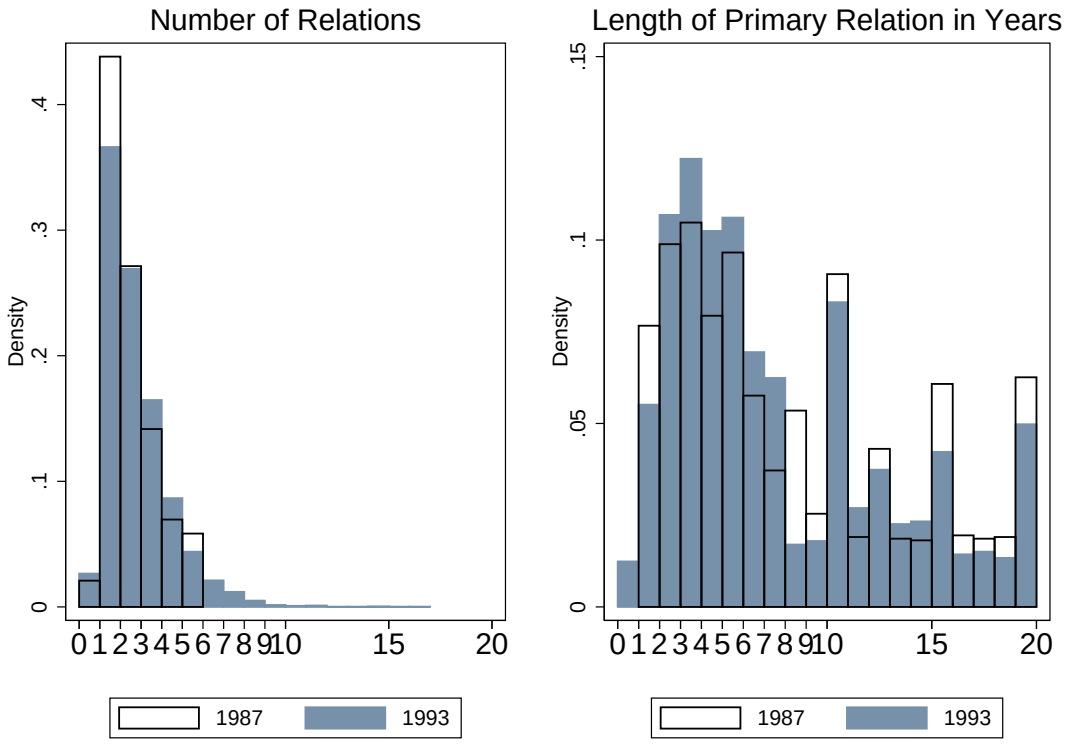
decisions before the deregulation. Consequently, the production-side effect does not show up in inequality, which could have been the same increase effect as the interstate deregulation. On the other hand, the household-side effect may be consistent with the traditional view that financial inclusion increases credit accessibility and subsequently education attainment to decrease inequality. This effect dominates the insignificant production-side effect to give the overall decrease effect shown in Appendix Table D1, but not strong enough to make the decrease effect significant, statistically or economically.

D.2 Appendix Figures for Intrastate Branching Deregulation



Appendix Figure D1: Pre-Trend Test and Persistent Effect of the Interstate Branching Deregulation and the Intrastate Branching Deregulation

Notes: Appendix Figure D1 extends Figure 2 to include the the pre-trend and persistence of the effect of the intrastate branching deregulation. The horizontal axis is the relative time (in years) with respect to the corresponding year of financial deregulation in a given state. The line and bars of the interstate branching deregulation are the same as Figure 2. The panels and regression specifications for the intrastate branching deregulation are the same as Appendix Table D1. See notes under Figure 2 for more details.



Appendix Figure D2: Lending Relationship Counts and Lengths - Intrastate

Notes: Appendix Figure D2 re-runs Figure 4 for the intrastate branching deregulation. It represents changes in the lending relationship: counts of a firm's bank relations and the length of a firms' primary financial institutions from 1987 to 1993, as opposed to the time range from 1993 to 2003 in Figure 4 since the intrastate branching deregulation mostly happened in the late 1970s and 1980s. The null hypotheses that there is no change from 1987 to 1993 for both the number of relations and the length of primary relations are not rejected.

D.3 Appendix Tables for Intrastate Branching Deregulation

Appendix Table D1: Wage Inequality with Financial Deregulation - Intrastate

	(1)	(2)	(3)	(4)	(5)
State-year panel	$log(w^{90}/w^{10})_{i,t}$				
Intrastate	-0.038***	-0.030***	-0.027***	-0.015	-0.015
	(0.007)	(0.007)	(0.007)	(0.009)	(0.012)
R^2	0.698	0.727	0.738	0.752	0.752
N	1421	1421	1392	1392	1392
Year & State FEs	yes	yes	yes	yes	yes
Edu, Exp, Demog	no	yes	yes	yes	yes
Politics & Ideology	no	no	yes	yes	yes
Bank & Macro	no	no	no	yes	yes
Clustered s.e.	no	no	no	no	yes

Notes: Appendix Table D1 re-runs Table 2 replacing the main independent variable Deregulated$_{i,t}$ with Intrastate$_{i,t}$. Intrastate$_{i,t}$ is the indicator measure of the intrastate branching deregulation, which is equal to 1 if state i had deregulated by the end of year t, following Kroszner and Strahan (1999) and Black and Strahan (2001). The panel includes all US states except Delaware and South Dakota from 1979 to 2007. Appendix Table D1 reiterates and extends the main results of Beck et al. (2010), to be parallel to which, Delaware and South Dakota are excluded. Column (1) in Panel B of Table 3B replicates their result by exactly following their specification. In this panel, the intrastate branching deregulation spans 1979-1999 (with most deregulations happened during 1979-1990), which leads to the earlier starting year of the panel than the main panel for interstate branching deregulation (1983-2007). See notes under Table 2 for more details.

Appendix Table D2: Bank Loan Market: Positive Credit Supply Shock - Intrastate

Firm-loan level	(1) Interest Rate (%)	(2) Loan Amount (log$)	(3) Trade Credit If Late	(4) Trade Credit % Late	(5) Payables log($)
Intrastate	-2.424***	0.453**	-0.270	16.249***	2.138***
	(0.450)	(0.177)	(0.296)	(0.047)	(0.242)
R^2	0.352	0.523			0.386
N	5105	5105	4440	2498	5138
Survey Time	All	All	All	All	All
Loan Controls	yes	yes	yes	yes	yes
Loan Market	yes	yes	yes	yes	yes
Relationship	yes	yes	yes	yes	yes
Borrower Controls	yes	yes	yes	yes	yes
Ind, Region FEs	yes	yes	yes	yes	yes
Clustered s.e.	yes	yes	yes	yes	yes

Notes: Appendix Table D2 presents the intrastate branching deregulation as a credit supply shock, corresponding to Table 6. See notes under Table 6 for more details.

Appendix Table D3: Heterogeneity across Firm Ages, Sizes, and Profitability - Intrastate

	(1)	(2)	(3)	(5)	(6)	(7)
Panel A	Firm Ages and Sizes					
Firm-loan level	Interest Rate (%)			Loan Amount (log$)		
Intrastate	-2.517***	-2.094***	-5.111***	0.429	0.181	1.094**
	(0.591)	(0.797)	(1.693)	(0.296)	(0.304)	(0.552)
Intrastate*Age0-1	-4.395**			-0.311		
	(2.043)			(0.190)		
Intrastate*Age2-10	0.514			-0.107		
	(0.488)			(0.110)		
Intrastate*Small		-0.363			-0.458	
		(0.990)			(0.326)	
Intrastate*Emp1-19			2.849*			-0.715
			(1.510)			(0.551)
Intrastate*Emp20-99			2.140			-1.095*
			(1.438)			(0.570)
R^2	0.352	0.350	0.352	0.501	0.400	0.403
N	5105	5105	5105	5105	5105	5105
Loan Controls	yes	yes	yes	yes	yes	yes
Loan Market	yes	yes	yes	yes	yes	yes
Relationship	yes	yes	yes	yes	yes	yes
Borrower Controls	yes	yes	yes	yes	yes	yes
Ind, Region FEs	yes	yes	yes	yes	yes	yes
Clustered s.e.	yes	yes	yes	yes	yes	yes

TABLE D3, CONTINUED

	(4)	(8)
Panel B	Firm Profitability	
Firm-loan level	Interest Rate (%)	Loan Amount (log$)
Intrastate	-2.356***	0.193
	(0.217)	(0.261)
Profitability	0.019	0.094
	(0.607)	(0.395)
Intrastate*Profitability	-0.087	-0.065
	(0.701)	(0.457)
Profitability^2	0.106	-0.210
	(0.252)	(0.190)
Intrastate*Profitability^2	-0.108	0.317
	(0.359)	(0.231)
R^2	0.352	0.526
N	5105	5105
Loan Controls	yes	yes
Loan Market	yes	yes
Relationship	yes	yes
Borrower Controls	yes	yes
Ind, Region FEs	yes	yes
Clustered s.e.	yes	yes

Notes: Appendix Table D3 checks the heterogeneous effects of the credit supply shock across firm ages, sizes, and profitability, corresponding to Table 7. See notes under Table 7 for more details.

Appendix Table D4: Bank Loan Market - Large Firms - Intrastate

	(1)	(2)	(3)	(4)
Firm-year level	Interest Rate (%)	Short-term Debt (log$)	Long-term Debt (log$)	DealScan Loan (log$)
Intrastate	-0.085	0.034	0.092	0.617**
	(0.073)	(0.065)	(0.078)	(0.305)
R^2	0.118	0.232	0.257	0.088
N	149147	181990	182606	210136
Loan Controls	yes	yes	yes	yes
Loan Market	yes	yes	yes	yes
Relationship	yes	yes	yes	yes
Borrower Controls	yes	yes	yes	yes
Year, State, Ind FEs	yes	yes	yes	yes
Clustered s.e.	yes	yes	yes	yes

Notes: Appendix Table D4 is parallel to Table 6 and Appendix Table C3 using Compustat and DealScan data (for the large and public firms) and the intrastate branching deregulation. See notes under Table 6 for more details.

Appendix Table D5: Labor Market Effect - Large Firms - Intrastate

	(1)	(2)
Firm-loan level	log(Payroll/Emp)	log(Emp)
Intrastate	-0.060	0.068***
	(0.040)	(0.021)
R^2	0.788	0.719
N	15696	138003
Year & State FEs	yes	yes
All Controls	yes	yes
Clustered s.e.	yes	yes

Notes: Table D5 presents the labor market effect of the intrastate branching deregulation, using Compustat and DealScan data (for the large and public firms), corresponding to Tables 8A and 8B and Appendix Table C5. See notes under Table 8A for more details.

E Extension to Cross-Industry Heterogeneity

This section extends the analysis of Section 4 across states to the heterogeneous labor market effects across industries, emphasizing the overall finance industry and the banking industry.

In sum, the inequality in services, manufacturing, and finance industries increases significantly and persistently, while in other industries, there is a weaker but still positive inequality effect or a zero inequality effect. The overall finance industry benefits significantly from the interstate branching deregulation (in terms of wage levels) relative to other industries, but the banking industry does not, resulting from the composition of both the harmed local community banks and the benefited national banks and the spillover from banking to the rest of finance.

E.1 Heterogeneous Labor Market Effects across Industries

E.1.1 Industry Analysis Summary

The extension to industry-level analysis mainly involves two adjustments. The first adjustment is the data structure and variable construction. The main CPS state-year panel for the main part of the paper is adjusted to state-industry-year panel to calculate the dependent variables: the within-industry inequality and the cross-industry inequality.

The within-industry inequality extends the main 90-10 wage ratio of workers in a state-year to the ratio of workers in a state i-industry j-year t, denoted as $log(w^{90}/w^{10})_{i,j,t}$. The cross-industry inequality considers the cross-industry ratio of average wages across workers in a state-industry-year. That is, the relative wage of industry j to industry j' in state i and year t, denoted as $log(\overline{w}_{i,j,t}/\overline{w}_{i,j',t})$. Among all industry pairs $j-j'$, three reference points are considered as industry j': all non-farm and non-financial industries as a proxy for the whole economy, the finance industry as it is the financial deregulation, and the banking industry (a subset of the finance industry) that is the most directly affected by the deregulation. After the variable construction, the regressions for individual industries are still on the state-year

panel.

The second adjustment is the control set. Control variables for the within-industry analysis are state i-industry j-year t specific if they vary across industries, including workers' education, experiences, female ratio, racial ratios, etc. Variable definitions are analogous to Section 3. Other control variables that vary only across state i-year t stay the same as the main state-year panel.

Note that the accuracy of the wage percentiles and the average wages in this section is lower than the ones of the main panel, especially for smaller industries (with less employment), such as agriculture and mining industries. The reason is the data size. For example, the wage percentiles of the agriculture industry in state i-year t are calculated using only the workers in this specific state i-industry j-year t combination, while in the main panel, the wage percentiles are calculated using all workers in state i-year t.[2] This decrease in the accuracy of the inequality measures introduces extra randomness to regression coefficients.

The industries are defined in detail as follows. Eight sectors/large industries[3] are defined according to SIC Divisions by the US Department of Labor and the banking industry is defined specifically as a (smaller) industry under the finance sector. The sectors of agriculture, mining, construction, manufacturing, finance, and public administration are defined according to SIC Divisions A, B, C, D, H, and J, respectively. The trade sector is defined as the aggregate of the wholesale trade division (SIC Division F) and retail trade division (SIC Division G). The aggregation is in the sense of considering all workers in these two divisions together in each state-year. The services sector is defined as the aggregate of the services division (SIC Division E) and the transportation, communications, electric, gas, and sanitary services division (SIC Division I). The banking industry is the SIC 2-digit industry of depository institutions under the finance sector (SIC Division H). Non-classifiable establishments (SIC Division K) are omitted in cross-industry analyses.

[2]For instance, the agricultural employment is around 1.4% of the total employment while in some states, this percentage is much lower.

[3]Sectors are referring to SIC Divisions by the US Department of Labor and industries are referring to SIC 2-digit to 4-digit industries under strict definitions but sectors and industries will be used interchangeably.

E.1.2 Industry Heterogeneity Summary

I will briefly discuss the main heterogeneity result across the eight main industries and then discuss specifically the banking industry.

Appendix Table E1 presents the main inequality effects within each sector and especially the banking industry, corresponding to the main results in Table 2. To be consistent with the significant 4.2% increase effect in Table 2, two possibilities of the heterogeneous effects across industries could be: either the inequality decreases in some industries and increases in some other industries while the increase effect dominates, or the inequality increases significantly in some industries but does not significantly change in some other industries. Appendix Table E1 shows the latter. Services and finance industries have the largest inequality increase and construction and trade industries also have significant inequality increase. Only agriculture and mining industries, either of which has less than 5% of the total employment, have slightly negative but insignificant change in inequality. Appendix Figures E1 and E2 present the pre-trend tests and persistent effects across industries, corresponding to Figure 2.

Combining Appendix Table E1 and Appendix Figures E1 and E2, we can see the heterogeneity in inequality effects across industries. The inequality effect of the public industry is the closest to zero and insignificantly different from zero. This zero effect in the public industry is highly persistent over the years, which is consistent with the fact that the public industry almost does not depend on private credit.

Services, manufacturing, and finance industries have the strongest increase effects. On the timing of the effects, the manufacturing industry does not have a significant inequality increase till the sixth year, but the services industry has increased inequality almost before the deregulation, showing the forward-looking behavior discussed in Section 4.2 and checked in Appendix Figure B2. This behavior should be more pronounced in the services industry, where the expansion of operation scales and the change in skill composition can be implemented sooner, while in the manufacturing industry, the production scale-up and the loan process involving capital expenditure may take a longer time.

For other industries, the trade and construction industries have the increase effect but not very persistent, while the agriculture and mining industries may not have enough workers in some state-year combinations, which introduces extra randomness into the regressions.

Appendix Tables E2, E3, and E4 present the relative wages of individual industries with respect to all non-farm and non-financial industries, the finance industry, and the banking industry, respectively.

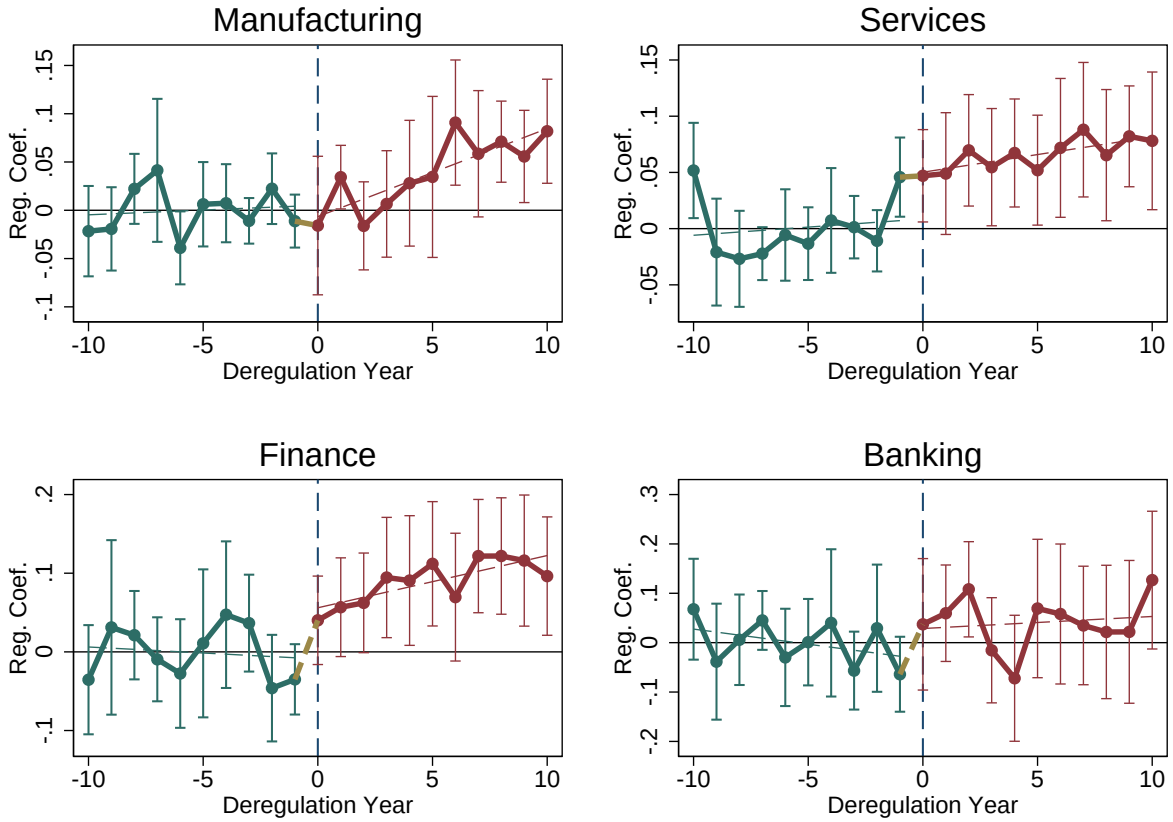
Relative to the whole economy, most industries benefit neither more nor less from the deregulation. The wage level in the finance industry increases significantly, while the wage levels of the trade and construction industries relatively decrease. See Appendix Table E2 for details. This indicates that the finance industry benefits significantly from the financial deregulation. Consequently, the wage levels of all other industries significantly decrease relative to the finance industry, as shown in Appendix Table E3.

Looking closer into the finance industry at the banking industry leads to more insights. It is natural to expect the finance industry to benefit from the financial deregulation as the deregulation removes financial market frictions, specifically for the banks. But does the finance industry and especially the banking industry have to benefit? As shown in Section 5, the deregulation increases both competition and concentration by introducing more competitive new entries into the banking industry in deregulated states. This competition and concentration effect has a negative impact on the incumbent local community banks while positive for entering national banks. Only if the positive impact dominates the negative one on the labor side, would the effect be observed beneficial for the overall industry.

Appendix Table E4 and the parts of the banking industry in previous appendix tables and figures show that the positive impact is larger but not dominant. This leads to an insignificant increase in wage inequality and insignificant benefits in the banking industry, in term of wage levels relative to other individual industries and the whole economy. And there is an insignificant decrease in wage levels of the banking industry relative to the overall finance industry. Comparing these results on the banking industry with the results on the

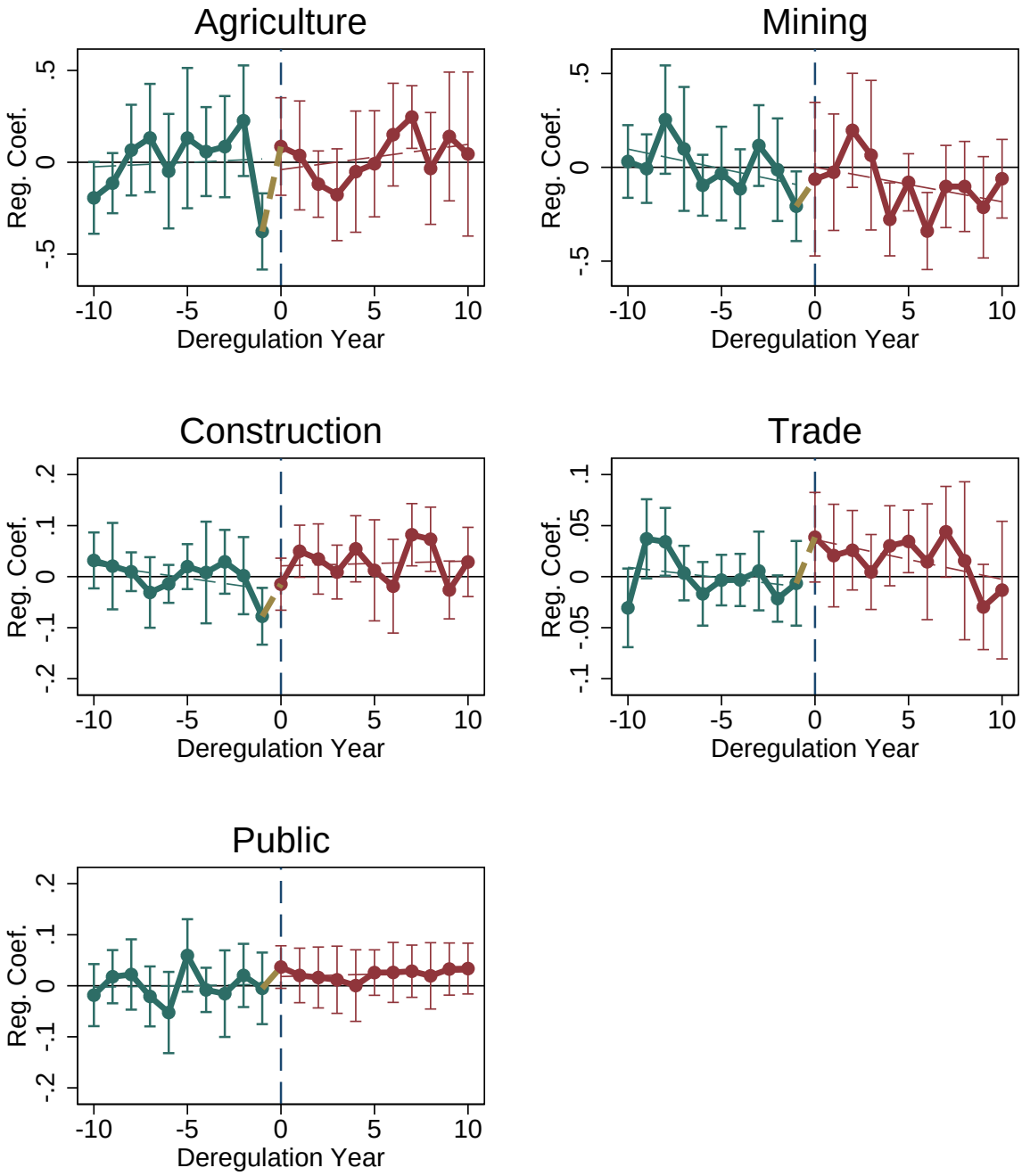
finance industry, it turns out that the positive spillover effect from the banking industry to the overall finance industry dominates. This leads to a significant increase in wage inequality and significant benefits in the finance industry as a whole, relative to other individual industries and the whole economy.

E.2 Appendix Figures for Cross-Industry Heterogeneity



Appendix Figure E1: Pre-Trend Test and Persistent Effect - Across Industries (Main Effects)

Notes: Appendix Figure E1 re-runs Figure 2 across industries. This figure includes industries with main inequality effects. See notes under Appendix Table E1 for industry definitions.



Appendix Figure E2: Pre-Trend Test and Persistent Effect - Across Industries (Small Effects)

Notes: Appendix Figure E2 re-runs Figure 2 across industries. This figure includes industries with small/insignificant inequality effects. See notes under Appendix Table E1 for industry definitions.

E.3 Appendix Tables for Cross-Industry Heterogeneity

Appendix Table E1: Wage Inequality with Financial Deregulation - Across Industries

	(1)	(2)	(3)	(4)	(5)
State-ind-year	$log(w^{90}/w^{10})_{i,j,t}$				
Industry j	Agriculture	Mining	Construction	Trade	Public
Deregulated	-0.035	-0.077	0.028*	0.034*	0.010
	(0.067)	(0.067)	(0.016)	(0.017)	(0.018)
R^2	0.208	0.252	0.342	0.642	0.260
N	1244	1055	1250	1250	1250
Industry j	Manufacturing	Services	Finance	Banking	
Deregulated	0.013	0.054***	0.046*	0.018	
	(0.017)	(0.020)	(0.024)	(0.036)	
R^2	0.647	0.671	0.313	0.314	
N	1250	1250	1250	1250	
Year & State FEs	yes	yes	yes	yes	yes
Edu, Exp, Demog	yes	yes	yes	yes	yes
Politics & Ideology	yes	yes	yes	yes	yes
Bank & Macro	yes	yes	yes	yes	yes
Clustered s.e.	yes	yes	yes	yes	yes

Notes: Appendix Table E1 re-runs Table 2 across sectors and the banking industry. See notes under Table 2 for more details on regression specifications.
Sectors and industries are defined as follows. The sectors of agriculture, mining, construction, manufacturing, finance, and public administration are defined according to SIC Divisions A, B, C, D, H, and J by the US Department of Labor, respectively.
The trade sector is defined as the aggregate of the wholesale trade division (SIC Division F) and retail trade division (SIC Division G).
The services sector is defined as the aggregate of the services division (SIC Division E) and the transportation, communications, electric, gas, and sanitary services division (SIC Division I).
The banking industry is the SIC 2-digit industry of depository institutions under the finance sector (SIC Division H).
Non-classifiable establishments (SIC Division K) are omitted in cross-industry analyses.
The wage percentiles in Appendix Table E1 and average wages in later tables are calculated using all workers in individual combinations of state i-sector/industry j-year t.
Control variables are state i-sector/industry j-year t specific if they are varying across industries (such as workers' education, experiences, female ratio, racial ratios), otherwise, they are state i-year t specific, the same as Table 2.

Appendix Table E2: Average Wages Relative to Whole Economy after Financial Deregulation

	(1)	(2)	(3)	(4)	(5)
State-ind-year	$log(\overline{w}_{i,j,t}/\overline{w}_{i,all,t})$				
Industry j	Agriculture	Mining	Construction	Trade	Public
Deregulated	-0.026	-0.010	-0.013*	-0.012**	-0.005
	(0.040)	(0.027)	(0.007)	(0.006)	(0.009)
R^2	0.438	0.475	0.762	0.691	0.605
N	1249	1166	1250	1250	1250
Industry j	Manufacturing	Services	Finance	Banking	
Deregulated	-0.015	0.004	0.023**	0.021	
	(0.010)	(0.004)	(0.010)	(0.015)	
R^2	0.714	0.719	0.655	0.547	
N	1250	1250	1250	1250	
Year & State FEs	yes	yes	yes	yes	yes
Edu, Exp, Demog	yes	yes	yes	yes	yes
Politics & Ideology	yes	yes	yes	yes	yes
Bank & Macro	yes	yes	yes	yes	yes
Clustered s.e.	yes	yes	yes	yes	yes

Notes: Appendix Table E2 re-runs Table 2 across industries using the log wage ratio between the average wage of an industry and the average wage of all non-farm and non-financial industries. See notes under Table 2 and Appendix Table E1 for more details.

Appendix Table E3: Average Wages Relative to Finance after Financial Deregulation

	(1)	(2)	(3)	(4)	(5)
State-ind-year	$log(\overline{w}_{i,j,t}/\overline{w}_{i,fin,t})$				
Industry j	Agriculture	Mining	Construction	Trade	Public
Deregulated	-0.073*	-0.055*	-0.057***	-0.053***	-0.047***
	(0.043)	(0.028)	(0.014)	(0.012)	(0.016)
R^2	0.462	0.525	0.706	0.450	0.562
N	1249	1166	1250	1250	1250
Industry j	Manufacturing	Services	Banking		
Deregulated	-0.055***	-0.040***	-0.015		
	(0.015)	(0.011)	(0.011)		
R^2	0.644	0.426	0.338		
N	1250	1250	1250		
Year & State FEs	yes	yes	yes	yes	yes
Edu, Exp, Demog	yes	yes	yes	yes	yes
Politics & Ideology	yes	yes	yes	yes	yes
Bank & Macro	yes	yes	yes	yes	yes
Clustered s.e.	yes	yes	yes	yes	yes

Notes: Appendix Table E3 re-runs Table 2 across industries using the log wage ratio between the average wage of an industry and the average wage of the finance industry. See notes under Table 2 and Appendix Table E1 for more details.

Appendix Table E4: Average Wages Relative to Banking after Financial Deregulation

	(1)	(2)	(3)	(4)	(5)
State-ind-year	$log(\overline{w}_{i,j,t}/\overline{w}_{i,bank,t})$				
Industry j	Agriculture	Mining	Construction	Trade	Public
Deregulated	-0.069	-0.058	-0.053***	-0.051***	-0.052***
	(0.047)	(0.038)	(0.019)	(0.017)	(0.019)
R^2	0.426	0.489	0.557	0.302	0.374
N	1249	1166	1250	1250	1250
Industry j	Manufacturing	Services	Finance		
Deregulated	-0.054***	-0.034*	0.002		
	(0.018)	(0.018)	(0.012)		
R^2	0.470	0.282	0.206		
N	1250	1250	1250		
Year & State FEs	yes	yes	yes	yes	yes
Edu, Exp, Demog	yes	yes	yes	yes	yes
Politics & Ideology	yes	yes	yes	yes	yes
Bank & Macro	yes	yes	yes	yes	yes
Clustered s.e.	yes	yes	yes	yes	yes

Notes: Appendix Table E4 re-runs Table 2 across industries using the log wage ratio between the average wage of an industry and the average wage of the banking industry. See notes under Table 2 and Appendix Table E1 for more details.

F Mathematical Appendix

F.1 Simplification of the Hazard Model

This appendix simplifies the full hazard model to the log duration form of Equation (3).

I apply the proportional hazards model to test whether higher inequality can increase the likelihood of the interstate branching deregulation. The hazard function for the Cox proportional hazards model is

$$\lambda(t_i|Ineq_{i,t}, X_{i,t}) = \lambda_0(t_i)exp(Ineq_{i,t}\delta + X_{i,t}{}'\delta_X)$$

where $Ineq_{i,t}$ is the wage inequality in state i and year t measured by the log ratio of the 90th and the 10th percentiles of wages in a given state-year. I assume the duration until deregulation (the survival time T) is Weibull distributed with scale and shape parameters (λ, κ), respectively. Therefore, the model parameters to be estimated are $(\delta, \delta_X, \lambda, \kappa)$.

The distribution assumption follows Kroszner and Strahan (1999). Two advantages of the Weibull distribution assumption are (1) a more intuitive interpretation of the model parameter estimates and (2) the coincidence of a proportional hazards model and an accelerated failure time model. (Weibull distribution is the only distribution with the property to be parameterized as either model at the same time.) For the purpose to interpret the maximum likelihood in the proportional hazards model, this Weibull distribution assumption equivalently turns it into the log of the duration until deregulation of the accelerated failure time model. Conveniently, the log duration is reduced to a linear function of inequality and control variables in Equation (3). And this equivalence only requires a rescale of $e_{i,t}$ by $1/\kappa$ and lets $\underline{\delta}_{\cdot} = -\delta_{\cdot}/\kappa$.

F.2 Proof of Lemma 1

Writing out the Incentive Compatibility Condition of Entrepreneurs gives

$$\bar{K}(k,z) \equiv (1-\phi)(1-\tilde{\theta})f(z,k,h(k,z),l(k,z)) - (R+\phi(1-\delta))k + (1+r)a \geq 0$$

where $\tilde{\theta} = \theta + \alpha\frac{a_l l^\mu}{a_k k^\mu + a_l l^\mu}$ is the labor share.

Properties of $\bar{K}(k,z)$ deriving from properties of $f(.)$ and parameter assumptions yield a concave function with two roots, one positive and the other negative. The positive root, denoted as $\bar{k}(z,\phi)$, is the upper bound that financial intermediaries are willing to lend to entrepreneurs with skill z.

Properties of $\bar{K}(k,z)$ give the monotonicity of $\bar{k}(z,\phi)$ in z and ϕ in Lemma 1.

F.3 Proof of Lemma 2

This proof follows Lucas (1978) closely.

Because firms are financially constrained (by regularity assumptions), firms operate at the optimal scale given capital amount $\bar{k}(z,\phi)$, which gives $c_e^*(z)$ as an increasing function in z. On the other hand, $c_w^*(w_h) = w_h + (1+r)a$ is invariant to z. Comparing $c_e^*(z)$ with $c_w^*(w_h)$ gives the cutoff strategy of H-type households and thus Lemma 2.

The restriction that L-type households can only work as unskilled workers gives the lower cutoff (z_{min}) below which households choose to work as unskilled workers. In addition, this restriction on L-type households can be loosened. The two-cutoff occupational choices remain as long as households with higher skill levels can earn higher wages if choosing to work as workers.

F.4 Proof of Proposition 1

This proof lays out the main logic of Proposition 1 and omits lengthy equations. Inequality is measured by the standard deviation of wages across workers

$$sd(w) = (w_h - w_l)\frac{(HL)^{\frac{1}{2}}}{(H+L)},$$

which increases in the relative wage (or wage difference) $w_h - w_l$ and increases in relative employment H/L (when $H/L < 1$). This measure is equivalent to the standard deviation of total payoffs across workers and can be easily generalized to alternative measures.

By Lemma 1, financial deregulation (a lower ϕ) gives a higher $\bar{k}(z, \phi)$. Then, capital-skill complementarity assumed in Section 6.2 results in higher relative demand for the skilled labor. In consequence, both the relative wage and relative employment increase and thus, inequality increases.

Furthermore, the partial equilibrium (PE) effect of financial deregulation (holding wages fixed) works through the relative employment between the skilled and unskilled workers. Another PE effect is that the higher $\bar{k}(z, \phi)$ attracts the marginal skilled workers with relatively higher skills to change their occupation to entrepreneurs but this PE effect is dominated by the previous one. The general equilibrium (GE) effect increases relative wages and the higher wage of skilled workers attracts the marginal entrepreneurs with relatively lower skills to work as skilled workers, which further increases relative employment. Therefore, the PE and GE effects increase inequality.