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Credit and the Labor Share: Evidence from U.S. States*

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Abstract

We analyze the role of credit markets in explaining the changes in the U.S. labor share by evaluating the effects of state-level banking deregulation, which resulted in improved access to cheaper credit. Utilizing a difference-in-differences strategy, we provide causal evidence showing labor share declined following the interstate banking deregulation. We show that the lower cost of credit, increase in the availability of credit, and greater bank competition in each state are mechanisms that led to the decline in the labor share. We use this evidence to obtain the elasticity of labor share with respect to borrowing costs, which itself is informative about the aggregate elasticity of substitution between capital and labor. Finally, we focus on manufacturing and services to show that the impact of banking deregulation is particularly important in capital intensive and external finance dependent industries.

JEL codes: E21, E22, E25, G21, G28

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1 Introduction

Research into the determinants of the share of value added paid to labor has had a resurgence recently due to the observation that it is no longer holding steady as it did during most of the post-war era. Although labor share data over the last 35 years provide clear evidence that this statistic has significantly and persistently decreased from its long-run trend, the evidence on the reasons behind this decline is more scant. The seminal papers on this topic concentrate on structural changes in the economy during the years contemporaneous with the sharpest aggregate decline in the U.S. labor share. Elsby et al. (2013) conclude that globalization – more specifically offshoring – deserves most of the blame, while Karabarbounis and Neiman (2014) concentrate on the growing role of capital in production, initiated by the lower price of investment goods.[1] In this study we focus on the role of credit in explaining the changes in the labor share. We explore how deregulation in the U.S. banking industry, which was conducted state by state in separate years, impacted the labor share of value added in that state. We provide rigorous evidence showing that states experienced a reduction in the labor share of income as a result of banking deregulation, which was characterized by a lower cost and increased availability of credit.

The deregulation of the banking sector was a process through which individual states opted to allow out of state banks to operate in their state and also expanded the ability of in-state banks to open new branches within the state. Until the 1970s banks were strictly constrained by state statutes in their ability to expand, but this changed starting in the late 1970s, when states began removing the restrictions on intrastate bank branching and interstate bank expansions. The deregulation led to tougher competition, greater efficiency, and a reduction in monopoly power in the banking sector, which increased the availability of credit and lowered its cost in the states that adopted the deregulations (Jayaratne and Strahan (1996); Jayaratne and Strahan (1998); Cetorelli and Strahan (2006)). We utilize the time series variation in the adoption of interstate banking and intrastate branching deregulations and conduct a difference-in-differences estimation, which compares the labor share in states that implement the policy to those that do not. We carry out our benchmark analysis for the period of 1976-1996, but also show that our results hold for 1997-2005.[2]

[1] Piketty and Zucman (2014) similarly find evidence for the growing role of capital. On the other hand, using microeconometric estimates of the elasticity of substitution between capital and labor, Oberfield and Raval (2014) find that the decline in the labor share originates from factors that affect technology, including automation and offshoring, rather than mechanisms that work mainly through factor prices.

[2] While data availability determine the beginning of our sample, the end is determined by the fact that we have no more "treated" states after 1994, the year in which the Riegle-Neal Interstate Banking and Branching Efficiency Act (IBBEA) deregulating interstate banking nationwide was passed. We run separate specifications for 1997-2005 using the dates when banks adopted and later removed the provisions to IBBEA.

The examination of this policy implementation is interesting for at least three reasons. First, we show in a simple model that the lending rate of private banks, which declines following banking deregulation, is a determinant of the change in the labor share. The model allows us to link the credit supply shock in the banking sector to the interest payments paid by firms and households that accumulate capital. Second, our use of state-level data offers an important advantage over a cross-country analysis, as it implicitly accounts for many characteristics common to all states, such as macroeconomic, trade and federal policies that can affect the labor share. Third, the state-by-state implementation of the deregulation, along with the panel feature of the data, provides a clean difference-in-differences strategy to argue for a causal impact of the policy on the labor share. Banking deregulation acts as an exogenous shock to the supply of credit at the state level, which affects the labor share negatively. The magnitudes are economically significant and suggest that a large part of the reduction in the labor share seen in the 1980s can be directly attributed to states implementing this policy.

The model we consider provides a clear mechanism through which competition in the banking sector can be linked to the labor share of income in the aggregate value added. We assume that the intermediate input producing firms and capital-owners face liquidity constraints, which require them to borrow the necessary funds from a financial intermediary, which charges a mark-up premium over the safe interest rate when lending. This is where competition in the banking sector plays a role, as more competition reduces the markup on the lending rate. The credit supply shock is then channeled to intermediate input producers and capital-owners through a lower interest rate. We show that changes in the labor share can then be decomposed into shocks to the usual determinants – markups, capital augmenting technology and the rental rate of capital – as well as the interest rate on the loans. The linearized equation for the equilibrium labor share also identifies the substitutability between capital and labor as a necessary but not a sufficient condition to generate a reduction in the labor share given a decrease in the cost of borrowing.

We start our empirical analysis by estimating the impact of the interstate banking and intrastate branching deregulations on labor's share of value added in the state. Hence, in the first set of specifications, we focus on within state variation in the credit conditions, following the adoption of these policies. We provide robust evidence showing the states that adopted the interstate banking deregulation experienced a labor share reduction relative to the states that did not implement the policy. Our most conservative specification indicates that on average a state that adopted the policy experienced a decline in the labor share of 0.8 percentage points. We find that the impact of the interstate banking deregulation was not only felt right after the adoption of the policy, but that it grew over time. We conduct

an event study that traces the impact of the banking deregulation over a range of 10 years prior to 10 years after the policy implementation. We find no evidence of a pre-trend in the labor shares. Moreover, we find that the labor share drops in the year the policy is enacted and continues to decline further up to 6-7 years after the policy is adopted.

To further examine the mechanisms behind this decline, we consider some of the structural changes in the banking industry that were caused by the deregulation. These include changes in the average loan yield, loan volume, and the concentration in the banking sector as measured by a Herfindahl Index of deposits. Using an instrumental variables technique, where we use the policy experiment and exploit the exogenous variation in the interstate banking and intrastate branching deregulations as instruments for the changes in the banking structure, we show that in more competition in the banking sector and lower loan yields contributed to the decline in the labor share. Most importantly, we find that cheaper credit available in states that deregulated their banking system (a decline in the average loan yield of 1.4 percentage points) led to a reduction in the labor share by about 1.25 percentage points. Economically, this change constitutes a significant determinant of the decline in the labor share, which averaged about 2 percentage points during our sample period (depending on the starting year).

The IV estimate for the elasticity of the labor share with respect to the lending rate also provides a useful estimate with which to we can check the plausibility of the model's mechanism. We use the structure of the model and available data to back out the implied capital-labor substitution parameter that can reconcile the estimated elasticity. We infer a substitution parameter in the range of 1.1 to 1.35, well within the range of the literature that has found capital and labor to be substitutes in the aggregate data. Although we stress that our empirical contribution is a clean identification of how a credit supply shock contributed to the decline in the labor share, the elasticity estimate supports our argument that the lending rate is a mechanism in the growing role of capital in production.

We conduct various robustness tests to our main results, and confirm they are not driven by data frequency, missing controls, other state policies, or the timing of state deregulation policies. However, the reliability of these estimates from the state-level specifications depend on our ability to control for other important determinants of the labor share, such as firm markups and the rental rate of capital, which are measures that are not available at the state level. In order to better account for the industry-level determinants of labor share, we move onto a more disaggregated analysis, where we analyze the changes in the labor share within an industry and state over time. This allows us to additionally control for industry specific time effects, which would for example capture the impact of changes in industry mark-ups over time. With these more disaggregated specifications, we show that

the impact of banking deregulation on labor share remains robust. We then turn our focus to the services and manufacturing sectors given the attention these two sectors have received in the literature on structural change. The decline in the labor share operated within both of these sectors, although we also point out that we find no evidence for the policy causing any reallocation of labor into any particular industry. In order to further explain our findings, we dig deeper into the analysis on the manufacturing and services sectors and differentiate among the 2-digit SIC industries. For both sectors we identify "capital intensive" industries and find that the decline in the labor share is larger for these industries, which conforms to the predictions of our model with working capital constraints. Furthermore, we also find a larger labor share decline in the "external finance dependent" (Rajan and Zingales (1998)) manufacturing industries. This result provides further evidence on the importance of access to cheaper credit as a mechanism that leads labor's share of income to decline.

We conclude the paper by conducting a counterfactual experiment in order to quantify the overall effect of banking deregulation on the aggregate U.S. labor share. To that end, we compute the predicted labor shares with and without the deregulation policy changes for each state, aggregate them using state GDP weights, and compare the two nation-level series. We find the labor share in the counterfactual case to be 1 percentage point higher than the labor share with the actual policies implemented in 1994 (when all states were required to deregulate their banking sector). Comparing the average observed labor share in 1970-1982 with that in 1983-1996, we see that in the latter years the average labor share is in the range of one percentage point lower than in the former years. This suggests that banking deregulation was a large determinant of the path of the average U.S. labor share during this period.

Our paper fits in most closely with the recent literature focusing on the deviation from Kaldor's stylized fact stating that the share of GDP paid to labor is stable over time (Kaldor (1961)). In an attempt to track the movements in the labor share over a 25 year period in an empirically consistent way, Elsby et al. (2013) conclude that the average U.S. labor share dropped 6 percentage points between 1987 and 2012, and that the stability in the prior period masked offsetting movements within industries. Their study is less conclusive in finding a clear determinant of the recent decline, though they argue that offshoring of the labor-intensive component of the supply chain is the most plausible explanation. Our paper examines a period before the sharp drop in the average labor share, and before the integration of most modern supply chains, but it is able identify movements in state labor shares nonetheless.

Karabarbounis and Neiman (2014) and Chen et al. (2017) identify a determinant for the fall in the labor share which is similar to the topic of our paper. In these studies, a

decline in the price of investment relative to consumption induces producers to change their capital to labor ratios. In the case where capital and labor are substitutes in production, as they find in their estimation, a reduction in the cost of capital has negative effects on the labor share. In our model, the reduction in the labor share is also attributed to the increase in the availability of capital, which is identified through an increase in credit supply in our difference-in-differences estimation strategy, as changes in the price of investment are common to all states. Our explanation is also consistent with Caballero et al. (forthcoming), which provides an accounting framework that integrates the labor share decline with the fall in the risk-free interest rate (which is proportional to the loan rates in our model), the real return to productive capital, markups, and the earnings yield. They argue for the importance of the decline in the risk-free rate, which points to the role of finance as in our findings, and show that this decline continues through the 1990's and 2000's. Finally, our focus on the changes in the banking industry complements the results in Gonzalez and Trivin (2016), who attribute the decline in the labor share to a steady increase in Tobin's Q, which raises equity returns and lowers the capital-labor ratio.

Other mechanisms that are complementary to the results in our paper also merit discussion. The labor share can be affected by institutional changes in the labor market or imperfect competition in the product markets (see e.g. Blanchard and Giavazzi (2003)). We control for state unionization rates and corporate tax rates to account for the labor market factors and business conditions. Although we do not have information on market power, we include industry-year fixed effects, which likely absorb most of the variation in market concentration and industry markups. Autor et al. (2017) attribute the decline in the labor share to a rise in firm concentration within industries that has reallocated production to the largest firms, which also have relatively low labor shares. Relatedly, Kehrig and Vincent (2017) find that the majority of the labor share is due to shifts in firm market shares. We examine aggregate (state-level) labor shares and therefore cannot speak to the micro (firm-level) reallocation that very well could be a factor. Rognlie (2015) points out that the treatment of housing might affect the measured labor share, which we control for using a state-year housing price index.[3] Finally, interesting new work by Eden and Gaggl (2017) finds that the decline in the labor share is driven by *routine* labor, which is substitutable with information and communications technology (ICT).

The impact of banking deregulation across the U.S. states on real economic activity has been explored at length both in the domestic and international contexts.[4] In particular

[3]Controlling for this index has no effect on our results.

[4]Some examples on the international side are Cacciatore et al. (2015), who study the effects of banking deregulation on domestic business entry, exchange rate appreciation, and international borrowing, and

relevance to our study, Demyanyk et al. (2007) provide evidence showing that personal income insurance improved after banking deregulation, with a larger effect on proprietors' income than on other components of personal income. Concentrating on income inequality, Beck et al. (2010) find that banking deregulation increased the relative wage rates and working hours of unskilled workers, and thereby tightened the distribution of income. We add onto the previous findings in the literature by focusing on not just labor income, but its share in the value added and show that banking deregulation contributed to the decline in the labor share, potentially by allowing firms to finance more capital.

The remainder of the paper is organized as follows. In the next section, we present the stylized model that illustrates how financing needs can affect the labor share, and provides us with an equation, which forms the basis for our estimation. Section 3 describes the staggered adoption of the interstate banking and intrastate branching deregulations. Section 4 discusses the data that we use in our estimations, and reports the summary statistics. In section 5, we present our empirical methodology and discuss our findings. Section 6 concludes.

2 A Model of Borrowing Costs and Labor Share

In order to motivate the relationship between cheaper credit, brought about by banking deregulation, borrowing needs, and the changes in the labor share, we consider a model similar to the one developed in Karabarbounis and Neiman (2014). We augment their model with working capital constraints for the firms, and differentiate the households as capital owners and workers. The model contains a final consumption good and an investment good, produced with a continuum of intermediate inputs. We assume that the production of intermediate inputs are subject to working capital constraints, where the firms need to finance a fraction of their capital and labor costs before production takes place. In order to finance their liquidity needs, the intermediate input firms borrow from the financial intermediary, which charges a premium over the safe interest rate. Additionally, we assume that to finance investment expenditures, capital owners also borrow from the financial intermediary and pay the higher interest rate. In what follows, we describe the problem of the intermediate input producers, consumption and investment good producers, as well as the households. Then, we illustrate how the equilibrium labor share depends on the borrowing costs.

Kandilov et al. (2016), who focus on the foreign investment in the U.S. On the domestic side, examples include Cetorelli and Strahan (2006) and Kerr and Nanda (2009), who have found that firm entry and entrepreneurship among domestic firms respond positively following banking deregulation.

2.1 Final Consumption and Final Investment Good Producers

As in Karabarbounis and Neiman (2014), we assume that there are perfectly competitive firms that purchase intermediate inputs from a continuum of monopolistically competitive producers and combine the varieties $z \in [0,1]$ with the following CES technology to produce the final consumption good:

$$C_t = \left(\int_0^1 c_t(z)^{\frac{\epsilon_t - 1}{\epsilon_t}} dz \right)^{\frac{\epsilon_t}{\epsilon_t - 1}}, \tag{1}$$

where $c_t(z)$ is the quantity of input z used in the production of the final consumption good, and $\epsilon_t > 1$ denotes the elasticity of substitution between the inputs. Normalizing the price of the final consumption good to 1, the demand for input variety z can be written as $c_t(z) = p_t(z)^{-\epsilon_t} C_t$, where $p_t(z)$ is the price of input variety z, and the price index for the final consumption good can be obtained as

$$P_t^C = \left(\int_0^1 p_t(z)^{1-\epsilon_t} dz \right)^{\frac{1}{1-\epsilon_t}} = 1. \tag{2}$$

Producers of the final investment good, X_t, purchase the same continuum of inputs and assemble them using a similar CES technology:

$$X_t = \frac{1}{\xi_t} \left(\int_0^1 x_t(z)^{\frac{\epsilon_t - 1}{\epsilon_t}} dz \right)^{\frac{\epsilon_t}{\epsilon_t - 1}}. \tag{3}$$

The variable ξ_t denotes the productivity of the consumption good relative to the investment good. Hence, a reduction in ξ_t implies an improvement in the relative productivity of the investment good. Moreover, ξ_t determines the relative price of investment, since cost minimization yields the following price index for the final investment good

$$P_t^X = \xi_t \left(\int_0^1 p_t(z)^{1-\epsilon_t} dz \right)^{\frac{1}{1-\epsilon_t}} = \xi_t. \tag{4}$$

Given the price index above, investment good producers' demand for input z can be obtained as $x_t(z) = \xi_t p_t(z)^{-\epsilon_t} X_t$.

2.2 Intermediate Input Producers

The producer of the intermediate input variety z rents capital, $k_t(z)$, from the capital owners, who determine the utilization rate of capital (u_t), and combines them with labor $n_t(z)$ with

a constant returns to scale technology to produce output, $y_t(z) = F(u_t k_t(z), n_t(z))$. On top of the usual costs of hiring labor and capital, intermediate input producer z incurs an additional operating cost due to working capital constraints. We assume that the firm needs liquidity at the beginning of the period to cover a fraction θ^k of the rental cost of capital, and a fraction θ^n to pay a part of the wage bill before the production is realized.[5] We further assume that the firm obtains the necessary liquidity from a financial intermediary through an intra-period loan. The firm repays the loan, along with the interest on the loan, at the end of the same period, once the product is sold to consumption and investment goods producers. We assume that the profit the financial intermediary makes from these interest payments are then distributed back to the households in a lump-sum fashion.

Producer of input z chooses labor, capital, and the price of its product in order to maximize profits given by

$$\prod_t(z) = p_t(z)y_t(z) - (1+\theta^k\tilde{r}_t)R_t u_t k_t(z) - (1+\theta^n\tilde{r}_t)W_t n_t(z) \tag{5}$$

subject to

$$y_t(z) = c_t(z) + x_t(z) = p_t(z)^{-\epsilon}\left(C_t + \xi_t X_t\right), \tag{6}$$

where $\tilde{r}_t$ is the interest rate on the loan, R_t is the rental rate of capital, and W_t is the wage rate. The first order conditions yield the following demand equations for capital and labor:

$$(1+\theta^k\tilde{r}_t)u_t R_t = \frac{1}{\mu_t}F_{k,t}(z)p_t(z) \tag{7}$$

$$(1+\theta^n\tilde{r}_t)W_t = \frac{1}{\mu_t}F_{n,t}(z)p_t(z), \tag{8}$$

where F_k and F_n denote the marginal product of capital and labor, and $\mu_t = \frac{\epsilon_t}{\epsilon_t - 1}$ is the time-varying mark-up that the firm charges over the factor prices.

2.3 Households

In order to allow the borrowing and investment decisions of the households to be affected by the banking deregulation in a stylized way, we make the simplifying assumption that only part

[5] Previous literature has adopted alternative set-ups for the financing requirement. For example, Neumeyer and Perri (2005) and Uribe and Yue (2006) assume that the firms need to cover a fraction of the wage-bill only; where as, Perri and Quadrini (2016) assume that the liquidity needed at the beginning of the period is equal to a fraction of the total revenue. We choose a general formulation and assume that the liquidity needs can be different for capital and labor, and later show that these parameters are crucial in determining the impact of financing on the labor share.

of the population borrows and accumulates capital, while the rest of the households provide funds to the financial intermediary with their savings.[6] We provide a more parsimonious model with homogeneous households and no household borrowing in Appendix A, and obtain the same determinants of the equilibrium labor share we show below, albeit with more unrealistic parameter implications.

We assume that the economy is populated with a continuum of households on the interval [0,1]. A fraction θ^b of the households borrow funds from the financial intermediary in order to undertake investment and rent out their capital to the intermediate good producers. The rest of the households provide labor to the firms, consume the final consumption good, and have access to a savings account that pays the safe interest rate r_t. Each worker household chooses $\{C_t^L, D_{t+1}^L, N_t^L\}$ to maximize

$$U^L = \sum_{t=0}^{\infty} \beta^t U(C_t^L, N_t^L), \tag{9}$$

subject to their budget constraint

$$C_t^L + D_{t+1}^L = W_t N_t^L + \Lambda_t + \Pi_t^L, \tag{10}$$

where β denotes their discount factor; Λ_t is the profit the financial sector transfers; and Π_t^L captures the dividend payments from the intermediate good firms. Labor market clearing condition is given by $(1-\theta^b)N_t^L = N_t = \int_0^1 n_t(z)dz$.

The rest of the households (fraction θ^b) are the capital owners. In addition to the final consumption goods, they purchase the final investment good, which augments the capital stock that they rent to the intermediate good producers. They also determine the capital stock's utilization rate, which increases the depreciation costs.[7] In order to undertake investment, capital owners get loans from the financial intermediary each period. As in the case for intermediate goods firms, the financial intermediary charges the higher rate $\tilde{r}_t$ on

[6] An explicit way households would be affected by banking deregulation is through cheaper mortgages (see for example (Mian et al. (2017) and Justiniano et al. (2017)) for the literature on deregulation and the increase in housing investment). It is beyond the scope of our paper to model the housing sector. Therefore, we opt this simple modeling trick to separate the households as borrowers who invest from the worker households who save.

[7] In Appendix A, we eliminate the assumption that depreciation costs depend on utilization and show that the equilibrium labor share equation looks similar. However, the utilization rate allows for a progressing effect of lower borrowing costs on the labor share, which is validated by our empirical results discussed below.

the loans. These households choose $\{C_t, X_t, K_{t+1}, u_t, D^B_{t+1}\}$ to maximize

$$U^B = \sum_{t=0}^{\infty} \nu^t U(C^B_t), \tag{11}$$

subject to the capital accumulation equation $K^B_{t+1} = (1 - \delta(u_t))K^B_t + X_t$, and the budget constraint

$$C^B_t + \xi_t X_t + (1 + \tilde{r}_t)D^B_t = R_t u_t K^B_t + D^B_{t+1}. \tag{12}$$

We assume that the discount factor of the capital owners ν is smaller than the discount factor of the worker households β, which ensures that these households will be borrowers in the steady state. Moreover, we assume that the depreciation costs increase with capital utilization and is given by $\delta(u_t) = \frac{u_t^{1+\phi}}{1+\phi}$, with $\phi > 0$. Aggregate capital stock in the economy is equal to $\theta^b K^B_t = K_t = \int_0^1 k_t(z)dz$. Finally, equilibrium in the loan market requires $\theta^b D^B_t = (1 - \theta^b)D^L_t$.

2.4 Interest rates

In order to incorporate the impact of banking deregulation into the model in a stylized way, we assume that the financial intermediary charges a premium, η_t, over the safe interest rate when lending to the firms and the borrower households

$$\tilde{r}_t = r_t + \eta_t, \tag{13}$$

where the safe real interest rate is pinned down by the Euler equation of the worker households:

$$1 + r_{t+1} = \frac{U_C(C^L_t, N^L_t)}{\beta U_C(C^L_{t+1}, N^L_{t+1})}. \tag{14}$$

This formulation of the loan rate is consistent with Jayaratne and Strahan (1998) and Cetorelli and Strahan (2006), who find that banking deregulation led to higher competition, greater efficiency, and thereby improved the access to cheaper credit. Hence, we consider the effect of banking deregulation as reducing the premium η_t, and thereby lowering $\tilde{r}_t$.

2.5 Labor Share in Equilibrium

As in Karabarbounis and Neiman (2014), the equilibrium of the model is symmetric with $p_t(z) = P^C_t = 1$, $k_t(z) = K_t$, $n_t(z) = N_t$, $c_t(z) = C_t$, $x_t(z) = \xi_t X_t$, and $y_t(z) = Y_t = F(u_t K_t, N_t)$. To simplify the exposition, we assume that the price of investment is constant

and equalized to the price of the consumption good.[8] Combining the equilibrium conditions with the intermediate good producers' optimality conditions in (7) and (8), we can write the labor share as

$$s_{L,t} = \frac{W_t N_t}{Y_t} = \frac{1}{\mu_t} \frac{W_t N_t}{(1+\theta^n \tilde{r}_t) W_t N_t + (1+\theta^k \tilde{r}_t) R_t u_t K_t}. \tag{15}$$

Adopting the following CES production function for intermediate inputs,

$$Y_t = F(u_t K_t, N_t) = \left[\alpha_k \left(A_{K,t} u_t K_t \right)^{\frac{\sigma-1}{\sigma}} + (1-\alpha_k) \left(A_{N,t} N_t \right)^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}}, \tag{16}$$

where σ denotes the elasticity of substitution between capital and labor, α_k is the distribution parameter determining the capital intensity in production, and $A_{K,t}$ is the capital augmenting technology, we can express the equilibrium labor share as

$$1 - (1+\theta^n \tilde{r}_t) \mu_t s_{L,t} = \alpha_K^{\sigma} \left[\frac{A_{k,t}}{(1+\theta^k \tilde{r}_t) \mu_t R_t} \right]^{\sigma-1}. \tag{17}$$

In order to facilitate the interpretation of the coefficients and to obtain an equation that can be used as the basis for our empirical specification, we first substitute in the relationship between the rental rate of capital and the interest rates derived from the capital owners' optimization:

$$R_{t+1} = \left(\frac{\phi+1}{\phi} \right)^{\frac{\phi}{\phi+1}} \left[\tilde{r}_{t+1} \right]^{\frac{\phi}{\phi+1}}, \tag{18}$$

and take a first order Taylor approximation of the expression for the labor share, which yields the following linear equation for labor share

$$s_{L,t} = \gamma_1 \tilde{r}_t + \gamma_2 \mu_t - \gamma_3 A_{K,t}. \tag{19}$$

The coefficients are given by

$$\gamma_1 = \frac{(\sigma-1)\left[1-(1+\theta^n \tilde{r})\mu s_L\right]}{(1+\theta^n \tilde{r})\mu} \left(\frac{\theta^k}{1+\theta^k \tilde{r}} + \frac{\phi}{\phi+1} \frac{1}{\tilde{r}} \right) - \frac{\theta^n s_L}{1+\theta^n \tilde{r}} \tag{20}$$

$$\gamma_2 = \frac{(\sigma-1)\left[1-(1+\theta^n \tilde{r})\mu s_L\right]}{(1+\theta^n \tilde{r})\mu^2} - \frac{s_L}{\mu} \tag{21}$$

$$\gamma_3 = \frac{(\sigma-1)\left[1-(1+\theta^n \tilde{r})\mu s_L\right]}{(1+\theta^n \tilde{r})\mu A_K}, \tag{22}$$

[8] This assumption does not affect our empirical specification or the results, since the price of investment goods are the same across the states, and therefore are absorbed by the year effects that capture the shocks common to all the states.

where the variables expressed without the time subscripts denote the values around which the approximation is taken (e.g., the steady-state values).

Equation (19) shows that changes in the labor-share can be attributed to changes in the cost of borrowing, mark-ups, and capital-augmenting technology. The last two factors, in addition to the price of investment, have been considered in Karabarbounis and Neiman (2014), who use aggregate data for the U.S., as well as a number of other countries. The novel factor we emphasize in this paper is the variation in the cost of borrowing, which we identify with the changes in credit conditions brought about by the banking deregulation across the U.S. states over time. Specifically, we are interested in analyzing whether following banking deregulation, a reduction in $\tilde{r}$ has led to a reduction in the labor share in that particular state; that is, whether γ_1 is positive. The sign of γ_1 depends on the substitutability between capital and labor (σ) in addition to the other structural parameters in the model. In the empirical results section, we use the estimate of γ_1 along with other parameter values obtained from the data to infer the implied value of σ.

3 Banking Deregulation across U.S. States

The model we described above aims to highlight how cheaper credit is a potential mechanism for changes in the labor share. As shown in Equation (13), we model the interest rate on the loans as a markup the financial intermediary charges over the safe rate. Our contribution is to uncover an exogenous shock to this markup and therefore to isolate the movement in the labor share that is driven solely by a shock to the interest rate. We do so by taking advantage of the deregulation in the banking sector, which we summarize in this section. In the empirical results section, we provide evidence that this policy has the effect of raising competition in the banking industry and reducing lending rates, as would be necessary to identify the variation in the interest rate defined in Equation (13).

The advantage of using this policy to capture the impact of credit market conditions is that states were "treated" in different years, which allows for a difference-in-difference identification strategy. Until the 1970s, banks in the U.S. were severely constrained by state statutes in their ability to expand across state borders and to branch within a state. Beginning in the late 1970s, states began allowing bank holding companies headquartered in other states, with which they had entered into reciprocal agreements, to acquire local banks. In 1978 Maine was the first state to pass a law allowing entry by bank holding companies from any state that allowed reciprocal entry of Maine banks. It was followed by more states passing similar laws, mostly in the 1980s, with the specific dates of implementation shown in Table 13 in the Appendix. Most states adopted the deregulation policy before

the 1990s, but in 1994 the Riegle-Neal Interstate Banking and Branching Efficiency Act (IBBEA) deregulated interstate banking nationwide.[9] We count a state as being treated when it implements the interstate banking deregulation, and end our sample in 1996 after all states were required to allow interstate banking.[10]

Similarly, only a few states allowed unrestricted within state branching until the 1970s. State branching deregulation allowed banks to establish multiple branches within a state through mergers and acquisitions (M&As) and de novo branching throughout the 1970s and 1980s. Since branching through M&As dominates the state branching deregulation reform (Cetorelli and Strahan (2006); Demyanyk et al. (2007)), we use those dates to mark a states adoption of intrastate branching deregulation. In the robustness analysis, we consider the states' incorporation of IBBEA provisions in the 1997-2005 period, which allowed the states to influence the manner in which out-of-state branching was implemented, as a separate policy variation.

We point out that, as in Black and Strahan (2002), Demyanyk et al. (2007), and Kerr and Nanda (2009), we allow for both interstate banking and intrastate branching deregulation to affect the labor share, which is not the case for all studies. We believe that either policy could plausibly affect the labor share through the mechanism provided in our model, since deregulation of both within and across state bank restrictions has been shown to improve bank efficiency and to limit market power, leading to lower lending rates (Black and Strahan (2002)). We exploit the staggered adoption of the interstate banking and intrastate branching deregulation laws in the 46 contiguous states. We exclude Delaware and South Dakota because of the preponderance of credit card banks in these states (Black and Strahan (2002); Berger et al. (2012)).

A potential concern is that the timing of banking deregulation may be driven by the changes in the labor share of income in the deregulating state, rather than the other way around. Kroszner and Strahan (1999) argue that the timing of banking deregulation is related to the relative strength of private interest groups, such as firms that are dependent on bank finance, standing to gain from deregulation. Additionally, Freeman (2002) and Berger et al. (2012) point out that the timing of banking deregulation is correlated with a state's past economic performance, while Huang (2008) suggests that the timing of deregulation could also be correlated with anticipated changes in future economic activity. To alleviate such

[9]Texas and Montana opted out of the interstate banking provisions of Riegle-Neal Act until 1997 (Kroszner and Strahan (1999)).

[10]This state-by-state policy change has been used in a number of economic studies; hence, there is a lot of information in the literature on the details of the deregulation. See, for example, Jayaratne and Strahan (1996), Kroszner and Strahan (1999), Cetorelli and Strahan (2006), Demyanyk et al. (2007), Kerr and Nanda (2009), and Kandilov et al. (2016) among others.

concerns, in our empirical specifications we report results that control for state's real GDP growth, as well as its unemployment rate and population growth rate. Further, we check the pre- and post-trends of these economic variables in response to the policy adoption. These statistics account for the state's economic performance, which might be correlated with labor share, as well as the timing of the banking deregulation. In regards to the lobbying efforts, it is unlikely that these were related to wage-capital income distributions. However, if firm dynamics (entry/exit) are correlated with both the labor share and the policy adoption, not accounting for such dynamics could result in an omitted variable bias. In robustness checks, we do control for firm entry and exit using the Business Dynamics Statistics (BDS) provided by the Census and do not find any change in the results. Also in the robustness checks, we control for the anti-takeover laws adopted by the states, as these might be correlated with whether states adopt banking deregulation or not.[11] Finally, in Section 5.1 we show that there are no pre-deregulation trends in the labor share, which points to the absence of a link between the timing of banking deregulation and the changes in the labor share. Relatedly, our final robustness check is to include the lagged labor share as a predictor for the policy in a logit model, and find a zero effect.

4 Data

The information to construct the labor share comes exclusively from the Bureau of Economic Analysis (BEA) Regional Accounts, which decomposes the gross domestic product of each state (GSP) into compensation to employees,[12] taxes on production and imports, (less) subsidies, and gross operating surplus. All measures are for private industries only.[13] The BEA splits its data by when SIC classification was used (up to 1997) and the NAICS era (1997-). This works out nicely for us, as we end the main specification in 1996, and use 1997-2005 data separately as a further check on our mechanism. Labor share is defined as the ratio of labor compensation to state GDP. We do point out that for years with no Economic Census, state gross product uses imputed capital charges with a methodology that differs slightly by industry. In the robustness analysis we describe this further and perform a

[11] These are laws that constrained hostile takeovers and placed restrictions on mergers among other transactions (Bertrand and Mullainathan (2003); Atanassov (2013)).

[12] Labor compensation includes wages and salaries plus supplements to wages and salaries (employer contributions). GSP numbers are based on income generated in establishments, with the sources mainly industrial censuses. Additional information is available from the BEA using the link: https://www.bea.gov/regional/methods.cfm.

[13] BEA regional data have been used extensively in previous studies that examine state business cycles. See for example Donald P. Morgan and Strahan (2004), Kalemli-Ozcan et al. (2010), Jayaratne and Strahan (1996) among others.

sensitivity test by dropping all non-census years (therefore use much lower frequency data). The results are not sensitive to eliminating the non-census years.

In addition to calculating the labor share at the state-year level, we are also able to disaggregate the labor share within states across the 2-digit SIC industries. The BEA decomposes the data into 64 separate industries, though we combine some industries to get a total of 56 industries within each state.[14] We then compute the labor share at the state-industry-year level.

Figure 1 plots our labor share data aggregated to the U.S. level (right axis) by summing up labor compensation and GDP across all states in each year. This way of calculating labor share differs slightly from that used in Karabarbounis and Neiman (2014), who for the most part only use information on the corporate sector to compute the share of value added going to labor compensation. Since we require data at the state level, we stick to the methods of the BEA regional accounts, which generate aggregate U.S. labor share numbers that are slightly below the level presented in their paper. Another reason the labor share looks lower than in other studies is that we use the *private* industries only (the labor share is about 7% higher with government). Also, Elsby et al. (2013) point out that there are minor deviations in the labor share calculations when the way sole proprietors report their wages is not accounted for. However, this should not affect our study as our variation is across states over time, and there is no reason to believe that the error from not restricting the data to the corporate sector is correlated with when states implemented the deregulation policy. In the same figure we also add the fraction of states that have implemented the branching and banking deregulation policies (left axis). In 1970, no state had implemented the interstate banking deregulation, while 20% of states had already deregulated intrastate branching. The labor share declined slightly in this time period, although not in the significant way it did in the 25 years after the period we study (as documented by the papers cited above). The difference between the labor share in 1970 and in 1996 is around 3 percentage points, but if we use an average of the 1970's, then the difference with the end of the sample is closer to 2 percentage points. This comparison of ad hoc starting and end dates might confound business cycle effects in those years, so another comparison would be to compare the averages in the periods 1970-1982 and 1983-1996.[15] The aggregate labor share drops about 1.2 percentage points between the two periods.

We point out that although the magnitude of the labor share decline (approximately 2

[14]We drop the industries that are double-counted in the 64 original industries. Also, we also combine some of the industries to be able to match one to one the employment data from the Bureau of Labor Statistics.

[15]Most states start to implement the policy around 1982. As described above, Maine is the first state to do so in 1978, but it is not followed by other states until later.

percentage points) sounds small, it is not necessarily an insignificant number. In the data examined by Elsby et al. (2013) and other papers about the more recent decline in the labor share, usually the reported magnitude is around 6 percentage points, and in the context of the stability of the labor share since the post-war era, this is regarded as an important decline. Our data span a period with a more stable labor share on average, but we find that the effect of banking deregulation on the supply of credit can explain a large part of the decline. Given that credit continued to grow after the period that we study, it is possible that the mechanism we identify in this paper continued to be a factor in the following years and might have contributed to the larger decline in the quarter century thereafter. In fact, as a robustness check, we extend our analysis to 1997-2005 by using state policies enacted after IBBEA was passed federally. The interstate branching provisions contained in IBBEA granted states the right to set up obstacles to branch expansion, such as forbidding out-of-state banks from opening new branches or acquiring existing ones, or by limiting the amount of total deposits any one bank could hold (Rice and Strahan (2010)). We show these provisions had the predicted effects on loan yields and their removal lowered the labor share in the same manner as our main policy treatments.

In order to capture the structural changes in the state's banking sector brought about by banking deregulation (see, for example, Jayaratne and Strahan (1998)), we use data from the Federal Deposit Insurance Corporation (FDIC) and Federal Financial Institutions Examinations Councils Consolidated Reports of Condition and Income (Call Reports) to construct state-level banking variables. First, we consider the direct mechanism illustrated in our theoretical section, and ask whether banking deregulation lowered the labor share by reducing the cost of financing capital. We construct the average loan yield in state s during year t as a measure of the cost of credit, by dividing all banks' total interest income on loans and leases by their total loans and leases given out in that state and year. Second, we check if banking deregulation did in fact lead firms to take out more credit by looking at the total commercial and industrial loans as a fraction of the state's GSP. Lastly, we also analyze if enhanced bank competition as a result of banking deregulation affected labor's share of income. To measure competition, we calculate the Herfindahl-Hirschmann index (HHI) of bank deposit concentration using bank-level data from the Call Reports.

Additionally, we control for some time-varying state factors in our empirical specification to account for the state economic conditions, labor market conditions, and the local cost of doing business. These include state corporate tax rate (source: World Tax Database, Office of Tax Policy Research, University of Michigan), state unemployment rate (source: U.S. Bureau of Labor Statistics), union membership (source: Current Population Survey, Hirsch et al. (2001)), population growth rate (source: U.S. Census), growth rate of GSP (source: BEA),

and the "all-transactions" house price index (source: Federal Housing Finance Agency).[16] Table 1 reports summary statistics for the variables used in the analysis by subperiod: 1970-1982 and 1983-1996. As our baseline specification focuses on the state-year panel, we report the summary statistics using information at the state-year level.

[Figure 1 about here.]

[Table 1 about here.]

5 Empirical Results

The model in Section 2 is informative for framing our research question. Incorporating firms' and capital owners' financing needs to the model of Karabarbounis and Neiman (2014) provides us with a framework to examine how the structural changes in the banking sector, in addition to markups, capital costs, and capital-augmenting technology growth, impact the labor share. A difference-in-differences strategy that leverages the implementation of banking deregulation in different years across the states allows us to plausibly control for the industry-specific or nation-wide factors using various fixed effects. Our contribution is therefore to isolate the impact of improved credit conditions on state labor shares through the staggered banking deregulation.

The first set of results we present focus on labor share data at the state level from 1970-1996, though our main specification starts in 1976 due to data availability of controls. We provide a series of robustness results, including extending the sample to 1997-2005 to study a separate (albeit smaller) credit expansion. Using the results from the state level panel, we provide a quantitative analysis that allows us to infer the aggregate capital-labor substitution parameter implied by our model and the estimate of γ_1. Since some factors affecting the labor share might vary at the industry level and industries are not equally represented across states, we then disaggregate the data further and present results using industry-state-year labor shares. We also examine whether the results are especially strong within specific industries and find this to be the case for manufacturing and services. Using more disaggregate data allows us to also look at specific industry characteristics as mechanisms for the impact of banking deregulation on the labor share. Finally, we examine some implications of banking deregulation at the state level for the aggregate U.S. labor share.

[16] The price of land is considered in Rognlie (2015) as a factor affecting the capital's share of income, who argues that it can be part of what is picked up by the gross operating surplus measure in value added. The house price index data is from the following source: https://www.fhfa.gov/DataTools/Downloads/Pages/House-Price-Index-Datasets.aspx.

5.1 State-level specifications

We begin with a state-year panel estimation that can control for factors that are time and/or state specific. The dummy policy variables "Bank" and "Branch" are equal to one when a state adopts the interstate banking and intrastate branching deregulations, and remain equal to one afterwards. The following summarizes our identifying equation:

$$labor sh_{st} = \beta_{Bank} Bank_{st} + \beta_{Branch} Branch_{st} + \eta X_{st} + \alpha_s + \alpha_t + \epsilon_{st}. \tag{23}$$

X_{st} includes time-varying state covariates such as union membership rates, one year growth-rate in state GDP and population, a house price index, and the unemployment rate. We include state and year fixed effects, where the latter capture the aggregate productivity shocks, and the macroeconomic shocks common to all states, such as monetary policy changes. Standard errors are always clustered at the state level.[17]

It is important that we link this specification to equation (19). Our parameter of interest in that equation is γ_1, which governs the change in the labor share in response to a shock to interest rates. We argue that β_{Bank} and β_{Branch} correspond to γ_1, since one of the credit market consequences of banking deregulation policies is lower cost of borrowing.[18] Year fixed effects should guarantee that we control for the changes in the capital-augmenting technology, $A_{K,t}$, since they would be common to all states. However, it is less obvious if the year fixed effects account for the changes in the mark-up, μ_t, or the rental rate of capital, R_t.[19] It is possible that markups and rental rates move differently across states depending on the industry composition of each state. For that reason, we control for industry specific year effects later in this section, which capture all time-varying industry-specific factors, and show that the results are consistent with the state-year panel results.

Baseline Results Table 2 presents the results from our baseline specification for the effects of banking deregulation on the labor share at the state level. In the first column, we present results with corporate tax rates and union membership rates, plus statistics capturing states' economic conditions: statewide average salaries, GSP growth rate, and population growth. In the second column we also control for the state unemployment rate

[17] We cluster by state to allow for an arbitrary serial correlation within state over time following Bertrand et al. (2004), since the main policy variables (interstate banking and intrastate branching) vary at the state level.

[18] To get an estimate of γ_1 that can be taken to the model we later use the deregulation as an instrumental variable for lending rates, which provides the elasticity of the labor share with respect to lending rates.

[19] Mark-ups and the rental rate of capital constitute important economic factors in most accounting frameworks that concentrate on the labor share, notably Karabarbounis and Neiman (2014) and Caballero et al. (forthcoming).

and a state house price index, for which the data start in 1976. The third column presents results where the labor share is calculated by eliminating the finance industry. We aggregate the state-industry-year compensation and GSP data up to the state level sans the finance industry to check whether the results are driven especially by an industry that could be directly impacted by the deregulation. It is reassuring that the results are almost identical, even with the slight increase in the standard error, the main policy variable is significant at the 5% level. Finally, note that in unreported results we also confirm that in a specification with no "branching" dummy, our main policy variable, "intbanking," has an identical effect on labor share as the reported results.

Across all three specifications the results are consistent with the interstate banking, but not intrastate branching deregulation, as a factor leading to the decline in the labor share. The coefficient on the interstate banking dummy is significant at the 1% level in the first two columns.[20,21] The size of the coefficient in column (2) implies that a state adopting the interstate banking deregulation experienced a labor share reduction of 0.8 percentage points relative to states that did not implement the policy. The results are extremely robust in favor of the conclusion that the deregulation in the banking industry, at least the interstate deregulation, had a negative impact on the labor share. Union membership and corporate tax rates are mildly positively associated with the labor share, but the coefficients are very small and insignificant. As for the state's economic conditions, GSP growth, higher house prices, and unemployment are associated with a lower labor share, while population growth within a state is positively correlated with the labor share.[22]

[Table 2 about here.]

The negative impact of the interstate banking indicator suggests that by lowering the cost of borrowing and increasing the availability of credit (mechanisms we discuss below), deregulation led to a substitution away from labor to capital. It is highly plausible that firms reorganized their capital and labor over time as the local banks adjusted to the deregulation. In order to examine how the policy's impact might have changed over time after its adoption,

[20]We have investigated specifications with no controls, which results in a larger coefficient (and about the same standard error).

[21]It is not obvious that all controls in column (2) should be included. If they only *respond* to the policy – as opposed to being a reason why the policy is implemented – then controlling for them actually introduces a different type of selection bias (Angrist and Pischke (2009)). Below we investigate the pre- and post-trends of GSP growth and unemployment.

[22]In an alternative specification, we also controlled for the labor force participation rate as a control for states' economic conditions instead of the unemployment rate. Additionally, used average salaries but excluded them due to the possible relationship with the outcome variable. We obtained very similar results, which are available upon request.

we modify our difference-in-differences specification to include not just interstate banking and intrastate branching dummies for the year of policy implementation, but add dummies for different number of years before and after the policy adoptions:

$$labor sh_{st} = \sum_{q=-10}^{10} \beta_{Bank,t+q} \Delta Bank_{s,t+q} + \sum_{q=-10}^{10} \beta_{Branch,t+q} \Delta Branch_{s,t+q} + \eta X_{st} + \alpha_s + \alpha_t + \epsilon_{st}. \tag{24}$$

Considering ten years before and after the policy implementation, there can be up to 20 separate indicator variables for each deregulation. Given the sample size, estimating 20 indicator variables for each policy would lower the precision of the estimates. In order to alleviate this issue, we group some years to reduce the number of coefficients to be estimated.[23] Figure 2 presents these coefficients and the 5% confidence intervals, with year 0 as the year of deregulation and all coefficients evaluated relative to one year prior to the policy adoption. The graphs clearly illustrate that there are no significant effects from the deregulations prior to their adoption- the estimated coefficients corresponding to the years prior to the reforms are not statistically significant–, and there doesn't seem to be pre-reform trends in the labor share. Moreover, we also find that the negative impact of interstate banking deregulation on the labor share grew over time in the years following the policy change, which is expected if firms do not immediately take advantage of the new opportunities in the credit markets. Adding to the immediate negative effects of the interstate banking deregulation on the labor share right after the policy (year 1), the magnitude grows larger over time, and levels off after 6-7 years. There are no significant trends before or after the intrastate branching deregulation.

[Figure 2 about here.]

It is also useful to conduct a similar analysis for some of the control variables in case they represent a type of "bad control." For example, if GSP growth is an *outcome* of deregulation, then controlling for it introduces a form of selection bias (see page 64 in Angrist and Pischke (2009)). We present the dynamic effect figures for unemployment and GSP growth in Figure 8 of the Appendix. The plot in the upper panel suggests that GSP growth responds to the banking policy, but does not necessarily predict the policy. Therefore, there is an argument to not control for GSP growth. As seen in column (4) of Table 2, the results from our baseline

[23] We run regressions with the following dummies: (10, 9, 8), (7, 6), (5,4), (3,2) years before the policy, and (0), (1), (2,3), (4,5), (6,7), (8,9,10) years after the policy implementation. Parentheses denote that we group these years together into one dummy variable. Results that allowed for separate dummies for each year (no grouping) did not affect our interpretation of the dynamic effects of banking deregulation.

specification omitting GSP growth remain similar to the findings in the previous columns. By contrast, there are significant pre-trends for unemployment, as well as a decline after the policy, as displayed in the lower panel of Figure 8. This suggests that we should control for unemployment since it might be a factor in the timing of the policy adoption. We have also carried similar analyses for the other controls, but none of those respond significantly to the policy implementation, nor display pre-trends. Hence, in all subsequent specifications, we keep all the state-specific controls, except for the GSP growth.[24]

In order to incorporate the fact that the deregulation's effect seems to get larger a few years after the policy change, we incorporate a treatment effect that grows over time (similar to the growing treatment effect in Kerr and Nanda (2009)). Specifically, we create a treatment effect that is equal to the number of years since the policy change (only letting it get up to 4). Hence, the treatment takes a value of 1 during the year of the policy adoption, 2 the year after, 3 the year after that, and then continues to take the value of 4 thereafter.[25] The last column of Table 2 allows for the fact that banking deregulation has long-lasting effects using this "growing treatment" variable. The results confirm the previous findings. Compared to column (4), the interstate deregulation's effect on the labor share is of lower magnitude but more tightly estimated. In order to account for effects that accumulate over time, in the rest of the analysis, we will consider columns (4) and (5) as our benchmark results, and focus on both specifications for treatment effects.

Mechanisms Another interesting avenue is to investigate more directly the mechanisms through which the banking deregulation policy impacts the labor share. We consider three banking measures that are directly affected by the deregulation (see e.g., Jayaratne and Strahan (1998)), which then lead to changes in the labor share: average loan yields, value of total credit relative to state GDP, and a Herfindahl Index (HHI) of concentration in bank deposits. Panel A of Table 10 in Appendix B presents the effects of deregulation on these banking measures, and Panel B reports the individual coefficients on the contemporaneous and lagged effects of the adoption of the policies. The most striking finding in these tables is that interstate banking deregulation results in lower loan yields, consistent with a lower markup on the loans that we consider in Section 2.4, and the decline continues to hold for several years after the policy's adoption. Yields are reduced immediately and continue to be statistically lower for four years afterwards. Banking concentration (proxied with HHI of deposits) is also reduced. Credit growth, unlike banking concentration, takes effect over time, as there is only a big and positive effect on credit after 2-3 years. The results for

[24]Notice that the results in column (3) are also presented without GSP growth since this will be our benchmark specification. Omitting GSP growth is innocuous in that regression as well though.

[25]We have allowed this to go up to 6 years or down to 3 years, and the results are robust.

the intrastate branching deregulation are mostly muted, which is consistent with the zero effect on the labor share. There is some evidence of a negative effect on credit and banking concentration, but these are mostly negated by opposite coefficients at different lags.

Given the evidence on the structural changes deregulation leads to in the banking sector, we now show the effects of these banking outcomes on the labor share by running instrumental variable (IV) regressions. Since the labor share and banking indicators, such as loan yields and total credit given, can be endogenously determined, we utilize the policy experiment and use the exogenous variation in the interstate banking deregulation as an instrument for the changes in the banking industry. We do point out that our identifying assumption for the IV regression is that deregulation, through its impact on the banking market structure, affects the labor share *only* through the mechanisms listed above. For example, when interstate banking is an instrument for the average loan yield, the reduction in the loan yield is the only channel through which the change in the banking system reduces the labor share. While it is plausible to assume that banking deregulation affects labor share mainly through the changes in the banking industry, it is too restrictive to think the policy change operates only through one of the three banking indicators that we consider. Given the lack of extra (over-identifying) instruments, we cannot test the exclusion restriction. For this reason, we consider the results from the IV specifications as further evidence for the mechanism in our model, but for the rest of the paper we keep it general and focus on the reduced form specification following equation (23).

In Table 3, each column uses the regular pre-post interstate banking treatment variable as an instrument for the three banking outcomes.[26] These include the average loan yield (%), a Herfindahl index of bank deposits, and the total credit to GSP ratio.[27] The results show that a lower average loan yield (column (1)) and more intensified competition in the banking industry (a reduction in HHI in column (3)) reduce the labor share. The estimate in column (1) shows that a one percentage point reduction in the average loan yield brought about by banking deregulation, leads to a 0.9 percentage point decrease in the labor share. Given the estimate of interstate banking deregulation in Panel A of Table 10 (-1.39), our results suggest that cheaper credit available in states that deregulated their banking system led to a reduction in the labor share by about 1.25 percentage points (= (-1.39)*(0.9 percentage points)). We obtain a slightly larger impact arising from increases in the total loans but do not rely on these results because as the IV estimate is not significant. The sign on the banking concentration variable suggests that lower concentration in bank deposits also works

[26]We also ran the same IV regressions using the growing treatment policy dummy as the instrument instead of the pre-post dummy. The results are consistent with the baseline table.

[27]Panel A of Table 10 provides the first stage results for each of the banking measures.

to lower the labor share, and this is significant at the 1% level (column (3)). Although the magnitude might seem small, we emphasize that a 1.25 percentage point decline is *more than half of the overall reduction* in the U.S. labor share after states started adopting the banking deregulation policies.[28] In the context of the constant labor share prediction of the neoclassical theory, these declines are economically significant. Overall, these results are supportive of the claim that deregulation lowers the labor share through the financial markets, especially through a reduction in the cost of borrowing.

[Table 3 about here.]

Robustness Tables 11 and 12 report various robustness checks. To summarize, we test whether our results might be explained by: GSP high-frequency imputations, firm creation, anti-takeover laws, certain state groups, or the endogenous timing of deregulation policies. The results are discussed below, with the tables reported in the appendix.

One possible problem in using the BEA regional accounts is the imputation of state GSP in non-benchmark years. The Economic Census is conducted every five years, with data in between being mainly imputed based on various methodologies. The methods vary by industry as documented in the BEA report, with most of the imputations needed for corporate capital charges. These are imputed using a combination of wages/salaries and Census receipts.[29] Although we point out that many previous papers (cited above) have used this data to study state business cycles, it is useful to use check whether the results hold with lower-frequency, non-imputed data. To do so, the most direct test we can do is to re-run the baseline specification using *only* benchmark years of the Economic Census (every five years). The policy dummies remain the same, but for example, all states that deregulate between 1982 and 1987 switch from 0 to 1 together. The first column of Table 11 in the appendix reports the results. As expected, the results are much noisier, but the coefficient is of a similar size and significant at the 5% level. This is important as even in this case where we lose some of our variation we can confirm that the results are not driven by the imputation of capital charges in the non-benchmark years.

We have checked the robustness of our results to controlling for some additional variables. The main omitted variable one can worry about is the markups, which emerges as a determinant of the labor share in equation (19). As a way of controlling for competition at the state level, we have used the Business Dynamics Statistics (BDS) provided at the state level by the Census Bureau. We obtain information on variables such as establishment entry

[28] In Section 4 we argue the average labor share declines by 1-2 percentage points depending on the data range we use to measure the decline.

[29] https://www.bea.gov/regional/pdf/gsp/GDPState.pdf

and exit rate, as well as job creation/destruction rates, and include them in our baseline specification described in equation (23). We find that the coefficients on banking deregulation indicators remain almost identical to the results presented in Table 2, and only the exit rate has a (negative) significant effect on the labor share. The results are reported in second column of Table 11 in the appendix, since there is no change in the treatment results.[30]

There is also a related literature on anti-takeover laws. The changes in these laws affected cross-state acquisitions, and therefore they may be correlated with states adopting banking deregulation policies. Karpoff and Wittry (forthcoming) and Bertrand and Mullainathan (2003) describe the different types of laws that states passed in order to restrict takeover of their companies by out of state companies. The first generation laws passed mostly in the late 1970's were deemed unconstitutional by the Supreme Court in 1982 (*Edgar vs. Mite Corp.*). We use the data provided in Table 1 of Karpoff and Wittry (forthcoming) to create the "first generation" dummy variable equal to one for the years when the law applied at the state level, and include them in our benchmark specification. We also include the three types of second generation laws described in Bertrand and Mullainathan (2003).[31] Inclusion of these additional policy variables do not alter our results. The effect of banking deregulation on the labor share, presented in columns (3) and (4) of Table 11, remains similar to the benchmark results.

We have also experimented with excluding some states from the analysis. Specifically, we drop the five states that have the largest share of their value added come from energy industries in 1982.[32] States like Texas suffered greatly from the decline in energy prices in the mid 1980s, which might have coincided with the choice of deregulating the banking system, and therefore might be driving our results. The penultimate column of Table 11 estimates our specification omitting the five most energy-intensive states from the sample, with no change in the results. Finally, we also drop five"rust belt" states that experienced shrinking of their once-powerful industrial sector in the 1980s: Indiana, Michigan, Wisconsin, Ohio and North Carolina. The last column shows that the results are robust to excluding these states.

Finally, we do one last check to test the important assumption that the timing of the deregulation can be treated as random with respect to the labor share. Table 12, also in the

[30]We also included the Business Dynamics Statistics (BDS) in the industry-state- year specifications that we discuss in a later subsection. Once again the BDS variables had no meaningful impact on the results, and therefore are omitted.

[31]These are: Business Combination laws (BC), Fair Price laws (FP), and Control Share Acquisition laws (CS). We include all (first and second generation) laws as recommended by Karpoff and Wittry (forthcoming). The results are robust to just using the BC law dummy, as done by Bertrand and Mullainathan (2003).

[32]The five states are: Texas, Oklahoma, Wyoming, North Dakota, and Louisiana.

appendix, reports a fixed effects logit model with the deregulation dummies as the dependent variable and the lagged labor share (and controls) as regressors. The first two columns relate to the banking deregulation, while the latter two to the branching deregulation. The lagged labor share is *not* shown to predict either of the two policies.

Extended sample with the IBBEA provisions The results we have presented so far covers the 1970-1996 period, and utilizes the staggered adoption of banking deregulation by the states to identify a credit supply shock that lowered the labor share. We end our sample in 1996 due to the passage of IBBEA, as described in section 3. However, Elsby et al. (2013), among others, show that the majority of the decline in the U.S. labor share occurred after this period. In order to analyze the role of credit markets in the states' labor share decline in the later period, we consider the restrictions states imposed on interstate branching after 1997. As described in Rice and Strahan (2010), despite deregulating banking nationwide, IBBEA allowed the states to have influence over the manner in which it was implemented, and let them erect barriers to interstate branching. From the time of enactment in 1994 until the branching trigger date in 1997, IBBEA allowed states to employ various regulations on interstate branching with regard to provisions on de novo interstate branching, acquisition of individual branches, and a statewide deposit cap. The first two provisions allow the states to opt-out from permitting out-of-state banks from opening new branches and acquiring a branch (or number of branches) of a bank without acquiring the entire bank. The third one is related to a statewide deposit concentration limit. While IBBEA specifies the limit of deposits in insured depository institutions in the state as 30% for interstate mergers, it also gives the right to impose a deposit cap on an interstate bank merger below 30%. A lower deposit cap *limits* the power of a single bank operating in the state.

We use the adoption and the removal dates of these restrictions across the states between 1997-2005, documented by Rice and Strahan (2010), to identify the effects credit supply shocks on the labor share during this period.[33] We define a "Branching restriction" indicator that takes on a value zero if the state imposes restrictions on both de novo branching and out of state mergers, a value of one if the state removes one of these restrictions, and a value of two if the state removes both restrictions. Hence, an increase in this indicator mirrors the banking deregulation dummies we have used in our previous specifications, and implies an improvement in the credit conditions. We also include the deposit concentration limit in our specifications for this period. Notice that while an increase in the limit is considered as

[33]Rice and Strahan (2010) form an index based on these three restrictions and an additional restriction on the age of the bank to be acquired. Instead of using their index, we opted to look at the restrictions separately as they have different effects on average loan yields. In alternative specifications, we also included the age restriction. It does not have any significant impact on the labor share or the average loan yields.

the removal of restriction, it can imply a deterioration in the credit conditions in the form of higher interest rates, since it would allow banks to have more power in the state. We indeed find that an increase in the deposit cap raises the loan yields.

[Table 4 about here.]

In columns (1) and (2) of Table 4, we present the results from OLS specifications with the banking restriction and deposit cap variables. While the coefficient on the former is negative and the latter is positive in both columns, they are statistically significant only when the GSP growth variable is included the specification. Similar to the results from our baseline specification using the banking deregulation indicators, the negative coefficient implies that the removal of the branching restrictions (an increase in the indicator) led to a decline in the labor share. On the other hand, the positive coefficient on the deposit cap suggest that relaxing the restriction on deposit concentration limit, and therefore allowing for large banks, led to an increase in the labor share. In order to analyze the mechanism behind these effects, in column (3) we estimate an IV specification, where we instrument average loan yields with the two provision variables. In the first stage (available upon request), the coefficient on deposit cap is positive and the one on branching restrictions is negative, suggesting that average loan yields increase with higher concentration limits, and decrease with looser entry restrictions. In turn, the statistically significant coefficient on average loan yields in column (3) implies that a one percentage point decline in average loan yields leads to a 0.5 percentage point decline in the labor share. This impact is smaller than the one we obtained for the 1970-1996 sample; however, it is still both economically and statistically significant. Moreover, it shows that cheaper credit played a role also for a more recent period, where the labor share was declining more considerably and some nationwide factors, such as offshoring, were gaining steam. The results are consistent with both the change in the labor share and the mechanisms found in our main results.

5.2 Inference for σ

In presenting the empirical results, we have not taken a stand on the structural parameters of the model, but instead focused on the reduced form estimation of the impact of banking deregulation on labor shares. This is the estimate that we can cleanly identify given the novel policy variation we employ. Although the focus of this study is not the capital-labor substitution elasticity, we can use our estimate of γ_1 — combined with steady-state and parameter values obtained from the data — to infer the aggregate capital-labor substitution parameter implied by our model. We do this as a plausibility check for the mechanism we provide in the model to explain a drop in the labor share.

To make the aggregate capital-labor substitution parameter clear we rewrite the expression for γ_1 in (20) as

$$(\sigma - 1) = \frac{(1 + \theta^n \tilde{r})\mu}{[1 - (1 + \theta^n \tilde{r})\mu s_L]} \left(\gamma_1 + \frac{\theta^n s_L}{1 + \theta^n \tilde{r}} \right) \left(\frac{\theta^k}{1 + \theta^k \tilde{r}} + \frac{\phi}{\phi + 1} \frac{1}{\tilde{r}} \right)^{-1} \tag{25}$$

Notice that since the right hand side is positive for a positive γ_1, the above equation implies that the aggregate substitution between capital and labor is above one. Using the IV specification with average loan yields as a proxy for the borrowing costs (see Table 3), we find γ_1 to be 0.9 in our benchmark results and 0.5 for the post-IBBEA period. Hence, our results predict capital and labor to be substitutes in the aggregate data.

To calculate the predicted value of σ, we use the steady state values of the markup, labor share and the average loan yield from data or the previous literature. For the steady-state value of the markup, we assume a value of 1.10. The steady state labor share is set to 0.55, which is the aggregate labor share (private industries only) in 1976. For the real loan yield, we use our data on nominal loan yields from the FDIC and subtract the expected inflation using the Michigan Consumer Survey data. For the nominal yields we take the state-level data and take the average by year. Expected inflation is at the U.S. level, so we use our average nominal yields to construct a real yield by year. Over our sample period we find that the average real loan yield is about 8%, so we plug in 0.08 for $\tilde{r}$. We use data on capacity utilization in order to back out a value for ϕ. Equation (18) and the specification for depreciation costs as a function of utilization allows us set ϕ to match the observed capacity utilization in the data (setting $\tilde{r} = 0.08$). We use the Board of Governors total industry capacity utilization, which averages 80% over our sample. The parameters with no obvious moments in the data are (θ^k, θ^n), so we show results for the range of possible values of these parameters.

[Figure 3 about here.]

Figure 3 displays the possible values of σ for $\theta^k \in (0, 1)$ and various values of θ^n. We present results for $\gamma_1 = 0.9$ in the top panel and $\gamma_1 = 0.5$ in the lower panel. In the main specification (pre-IBBEA) we find a σ in the range of 1.2 to 1.35, with small variations for different values of the capital and labor borrowing requirements.[34] These values are consistent with the estimate obtained by Karabarbounis and Neiman (2014), who use aggregate

[34] A less important implication of a positive γ_1 is also that $\theta^k > \theta^n$. This should be taken into account when studying the figures of the implied σ. For example, in the case where $\theta^n = 0.75$, only the $\theta^k > 0.75$ part of the figure is applicable.

data and cross-country variation in investment prices, to find an elasticity of 1.25. However, they are higher than the value of 0.71 estimated by Oberfield and Raval (2014) using plant-level data.[35] The post-IBBEA period results in values of σ in the range of 1.11 to 1.25. Therefore, although the model requires capital and labor to be substitutes at the state level, it yields an elasticity estimate close to 1 consistent with much of the previous literature.

5.3 Industry-State Labor Share

We now disaggregate the data to the industry-state level in order to investigate whether the results can be attributed to certain industries of the economy. At the industry-state level, we can control for factors such as automation and markup shocks at the 2-digit industry level, which might not be accounted for using only state and year fixed effects. Automation has long been a rationale for wage inequality, but we are not aware of a reasonable control at the state-year level. Recent work by Autor et al. (2017) finds that the reduction in the labor share can be partly attributed to more market concentration at the industry level, and Elsby et al. (2013) cite offshoring in certain industries as being correlated with reductions in the labor share. Although both of these latter mechanisms seem to gather steam after the period we investigate, it is useful to control for these factors using industry and industry-year fixed effects.[36] The policy changes continue to be at the state-year level, but the labor share is computed for each state-industry-year. The empirical specification is given by:

$$labors h_{jst} = \beta_{Bank} Bank_{st} + \beta_{Branch} Branch_{st} + \eta X_{st} + \alpha_s + \alpha_{jt} + \epsilon_{jst}. \tag{26}$$

This is similar to the baseline specification in equation (23), but the labor share is now an industry (2 digit)-state-year observation. The penultimate term captures the industry-year fixed effects, although we also show results for a specification with separate state, industry, and year fixed effects. There are a total of 64 2-digit SIC levels available for disaggregation, but we also construct eight 1-digit groups to analyze the changes in the labor share in the aggregate industries.[37]

Baseline State-Industry-Year Results We begin by estimating equation (26), which

[35] One possible explanation for the difference in the estimates is the well-known "aggregation bias," although Oberfield and Raval (2014) do account for that, at least at the U.S. level.

[36] State-year export/import data would be a useful control as well, but we do not have access to that data for a reasonable period that goes back until at least the late 1970s.

[37] The aggregate industry groups are: Agriculture (A), Mining (I), Construction (C), Manufacturing (M), Transportation and Electricity and other Utilities (U), Wholesale and Retail Trade (T), Finance (F), and Services (S). We eliminate the finance sector from the aggregate industry results.

includes industry-year fixed effects that capture the variation across states within a 2-digit industry-year, in addition to the state, industry and year effects. If the changes in the labor share are driven by changes in industry-specific factors, such as the markups or differences in the way factors like automation have affected specific industries, then the changes would be soaked up by the industry-year fixed effects.[38] Table 5 measures the effect of banking and branching deregulation policies on the labor share computed at the state-industry-year level. The effect of banking deregulation on the labor share has similar patterns to what we found using the aggregate state-year data. In columns (1) and (3) we include separate state, industry and year fixed effects and find that the labor share results are less noisy using the growing treatment effects (column (3)) than the simple pre-post regression (column (1)). In columns (2) and (4), we run the more restrictive model with industry-year interacted fixed effects to control for shocks that might occur at the industry level. The coefficient is negative and significant when using the growing treatment indicators, identical to the results column (3). Again, the results are noisier in the simple pre-post analysis and are not statistically significant. The coefficient implies that on average, the labor share in individual industries drop by 0.4% when a state allows interstate banking. Reassuringly, the growing treatment effect of interstate banking deregulation continues to be significant, which is consistent with the dynamic effects in Figure 2. We therefore find these results to be supportive of the claim that banking deregulation lowered industry labor shares in states that implement the deregulation.[39]

[Table 5 about here.]

Table 6 repeats the state and industry-year fixed effects analysis for each of the individual 1-digit SIC sectors (the aggregate sectors are listed in footnote 37). We only show the growing treatment effects to condense the results but show more detailed results for manufacturing and services in the next table. We focus our attention on the manufacturing and services industries, which have been highlighted as part of U.S.'s structural change as labor has reallocated from manufacturing to services (e.g. Herrendorf et al. (2014)).[40] These are also the only industries where we get statistical significance other than a marginally *positive* coefficient in Mining. The coefficients are of similar magnitude in Construction and Transportation/Utilities, which is consistent with the model if these are dependent on financing.

[38]This would be true as long as 2-digit industry disaggregation is enough to capture the industry-level changes affecting labor shares.

[39]In omitted results, we confirm that the IV results also look similar to the ones found in Table 3.

[40]We come back to explore reallocation across industries in the next subsection.

The strongest effects for manufacturing are seen in response to intrastate branching deregulation. While the coefficient on interstate banking is negative and similar in magnitude to the overall effect obtained in Table 5, it is not significant at the conventional levels (although we find it is significant for the short-run specification). In the services sector, there is a strongly significant negative effect from interstate banking deregulation, which might be due to the fact that adjustment costs are larger in this sector.[41]

[Table 6 about here.]

Manufacturing and Services Table 7 displays the results from the specification with industry-year fixed effects for the manufacturing and services industries separately. Column (2) is a repeat from the previous table and column (1) presents the results with the regular pre-post treatment, which also shows a negative and significant effect of interstate branching deregulation on the labor share in manufacturing. To further investigate the mechanisms behind the decline in the labor share, we consider two industry characteristics– "capital intensity" and "financial dependence" of the 2-digit industries. Capital intensity is available for both manufacturing and services, so we investigate it first in Table 7. Financial dependence is available only for manufacturing industries, so we report those results independently in the next table.

There is an extensive literature on investment in machinery and equipment, its role in economic growth (Delong and Summers (1991), Greenwood et al. (1997), Krusell et al. (2000)), and how the adoption of capital might be influenced by the expansion in the supply of credit (King and Levine (1993)). For capital intensity, we calculate the stock of net fixed assets per worker and define a capital intense industry as one with a ratio above the median.[42] We then interact this indicator with the interstate banking and intrastate branching deregulation dummies, and include the interaction terms in the preferred specification with industry-year effects (26), along with the capital intensity indicator. We expect the labor share in capital intensive industries to decline by more following banking deregulation, as cheaper credit would make it easier for firms to finance the adoption of new capital. As expected, column (3) of Table 7 shows that the effect of deregulation on the labor share is stronger in capital intensive manufacturing industries. The interaction of capital intensity in equipment with the treatments is negative but not statistically significant (though it is in the sub-samples below). Table 7 also presents results for the services sector in the last three

[41] We have also checked the event study figures for each industry individually but do not include the results as they don't add any information relative to what is presented in the regression results.

[42] The stock of net fixed assets are taken from BEA's national accounts. The BEA disaggregates total fixed assets by equipment and structures. We only present the results using assets of *equipment* per worker. The signs are the same if we use total stock of fixed assets to define capital intensity.

columns. The second service column is repeated from Table 5, while the first column presents the results from the pre-post deregulation analysis. The last column investigates whether capital intensity is a significant factor across the service industries in determining the role of banking deregulation on the labor share. This is indeed the case as capital intensity is an even more important determinant in the labor share reduction, with strongly significant negative interactions of capital intensity with both interstate banking and intrastate branching deregulations.

[Table 7 about here.]

Next, we analyze the importance of cheaper and more available credit as a channel through which banking deregulation can affect labor share by showing that manufacturing industries which are more reliant on external finance (Rajan and Zingales (1998)) experienced a larger reduction in their labor shares following the intrastate branching deregulation. To that end, we categorize industries as: *more* external finance dependent and *less* external finance dependent industries- based on a measure of external finance dependence defined in Cetorelli and Strahan (2006). The external finance dependence variable takes on a negative value when the median firm in a 2-digit SIC industry has free cash flow, and therefore is *less* external finance dependent, and a positive value when the median firm in an industry must issue debt or equity to finance investment. As with the capital intensity case, we expect industries more dependent on external finance to experience larger declines in the labor share in response to deregulation.

To provide evidence on the roles of capital intensity and external financial dependence in explaining the reduction in the labor share in manufacturing following banking deregulation, we carry out a sub-sample analysis.[43] In the first two columns of Table 8 we estimate the state-industry-year specification, for more external finance dependent industries (FD=1), and then for less external finance dependent industries (FD=0). The results are much stronger in the more external finance dependent industries. There are no significant effects of banking deregulation in the rest of the manufacturing industries and the coefficients are of much smaller magnitude. These results suggest that by reducing borrowing costs and making credit more available, banking deregulation allowed firms that rely on external finance to increase their use of capital, and lowered the share of labor in value added. The last two columns estimate the same specification for the capital intensive (KI=1), and

[43]We also tested whether the impact of banking deregulation on the labor share varies with the external finance dependence by including interaction terms between the external finance dependence dummy (equal to 1 for *more* external finance dependent industries) and the interstate banking and intrastate branching indicators in (26). The interpretation of those results are the same as the sub-sample.

non-capital intensive industry (KI=0) sub-samples. The results are still consistent with the evidence presented in the previous table. There is a statistically significant effect of branching deregulation on the labor share only in capital intensive industries, which is not present in the non-capital intensive industries.

[Table 8 about here.]

These results are important because they provide evidence supporting the mechanism that emerges from our model in Section 2. The equilibrium labor share in equation (19) is derived by incorporating working capital constraints for producers of intermediate inputs. These constraints necessitate the provision of loans by financial intermediaries, such as banks. One link to the working capital constraints in our data is the financial dependence of industries. We provide strong evidence that firms in industries that are more dependent on external finance are driving the reduction in the labor share. Moreover, our results using the capital intensity dummy, which can be defined for service industries in addition to manufacturing, is consistent with a mechanism that operates through liquidity constraints on capital.[44]

5.4 Average U.S. Labor Share and Factor Reallocation

Average U.S. Labor Share Our analysis utilizes the staggered adoption of banking deregulation, and provides significant evidence that labor's share of income declined in states following the implementation of these policies. A natural question that ensues our analysis is how much banking deregulation contributed to the changes in the aggregate U.S. labor share over our sample period (1976-1996 in most specifications). One interesting exercise to quantify this overall effect is to compare the predicted values of the average U.S. labor share given our estimated coefficients to the counterfactually predicted values imposing no banking or branching deregulation and setting all other covariates to their estimated values. To that end, we first compute the predicted labor share, $\widehat{labor sh}_{st}$, from equation (23) using data on all the covariates, and also calculate the same predicted variable imposing $Bank_{st}$ and $Branch_{st}$ equal to zero for all years. This gives us state-year labor shares, which we then aggregate to an overall U.S. labor share using state GSP weights. We implement this in two ways: first with a constant weight for each state computed in 1976, and second with time varying weights, which we calculate as the average of states' weights over year t and $t-1$.

[44]Notice that another implication of $\gamma_1 > 0$ in equation (20) is that the liquidity requirements need to be higher for capital than they are for labor. Hence, it is reassuring that our results are stronger for capital intensive industries that presumably have larger financing needs for capital.

The predicted aggregate U.S. labor share series are displayed in Figures 4 and 5. In 1994 (when all states were required to deregulate their banking sector), the labor share in the counterfactual case is calculated to be right around 1 percentage point higher than the labor share with the actual policies implemented.[45] Using the time varying weights, the difference between the two series is again 1 percentage point. The magnitude of an overall 1 percentage point reduction in the labor share is consistent with the interpretation once again that banking deregulation can explain about *half* of the overall change in the labor share in the 20 year period of the mid 1970s to the mid 1990s. If the actual change in the US labor share is calculated using the average of the pre-1982 period and average of the post-1982 then the 1 percentage point reduction explains almost all of the labor share decline, which suggests the labor share might have been constant during the period if no banking deregulation had occurred. Of course, the usual disclaimer about this type of counterfactual should be taken into account, which is that all the parameters are held constant over time.

[Figure 4 about here.]

[Figure 5 about here.]

Factor Reallocation Figure 1 above is consistent with the findings in Elsby et al. (2013), where the labor share is mostly constant until the mid-1990s, with a minor downturn during the 1980s. However, our results show that the deregulation policies did reduce the labor share in the manufacturing and service industries, at least in the states that adopted the policy relative to those that did not. Figures 6 and 7 separately plot the U.S. labor share in manufacturing and services, respectively (right axis). We also plot the cumulative fraction of states that have adopted the banking and branching deregulation on the same graphs (left axis). These figures show that the labor share declined throughout the period in manufacturing, but it actually increased within the services industry (despite the fact that banking deregulation lowered the labor share in states that adopted the policy).

[Figure 6 about here.]

[Figure 7 about here.]

Finally, we examine whether there were any reallocation of factors contributing to the time series in the above figures for manufacturing and services. As the labor share was being reduced in manufacturing, the banking deregulation policy might have had an effect

[45]The predicted values are created using the "growing treatment" regressions (see Table 2, column 6). If we were to use the pre-post results, the difference drops to about 0.5 percentage points.

of moving labor across industries with heterogeneous labor share levels. Table 9 reports the deregulation effects on the employment share of an industry within a state. There is not much evidence for labor reallocating across industries in response to the deregulation policies. In particular, there is no evidence of labor moving in or out of manufacturing. The employment share does seem to increase modestly in services, though it is in response to the intrastate branching deregulation as opposed to the interstate banking deregulation, which we found to lower the labor share in the previous results. Banking deregulation has a significant (negative) effect only in mining, which makes up around 1.6% of the states' labor force on average, making it unlikely that this had an important impact on the aggregate labor share. it might have had an effect on the overall state labor share.

Overall, we do not find much evidence that deregulation affected state labor shares through its impact on the expansion or contraction of certain industries, which suggests that our results are driven by within-industry changes in the labor share. Our set-up cannot address or identify what is likely an even more interesting type of reallocation, which is at the firm level. If deregulation and the changing banking structure fueled the rise of relatively capital-intensive firms, and the exit of labor-intensive firms within manufacturing and service industries, this would show up as a lower labor share at the state-industry-year level.[46]

[Table 9 about here.]

6 Conclusion

Understanding the changes in labor's share of income is important not only for macroeconomic modeling, but also for formulating policy, since a decline in the labor share has implications for socioeconomic outcomes, such as income inequality. We contribute to the literature by analyzing the role of access to credit in explaining the decline in the labor share. In a highly stylized model, where intermediate input producing firms and capital-owners borrow from a financial intermediary to finance their liquidity needs, we show that a decline in the cost of borrowing – due to for example an increase in the competition in the banking industry– would lead to a decline in the labor share if capital and labor are substitutable. We evaluate the importance of the credit channel by exploiting the cross-state variation in the timing of intrastate branching and interstate banking deregulations over the 1976-1996

[46]This type of reallocation would be a mechanism consistent with Autor et al. (2017), where industries are made up of fewer – and relatively less labor-intensive – firms. In Southern Europe, Gopinath et al. (2015) find that a reduction in the real interest rate resulted in a capital flow to larger (less capital constrained) firms.

period, which intensified the local bank competition, increased the availability of credit, and lowered its cost. We estimate a difference-in-differences model with multiple time periods and control for a number of state-specific, time-varying characteristics that can affect the labor share and be correlated with the timing of the banking deregulations. In extended specifications, we consider the over time variation in the labor share at the industry-state level, which allows us to also control for industry specific time effects that capture factors such as time-varying mark-ups and industry-specific productivity shocks. An important advantage of our empirical setup, compared with a cross-country analysis, is that it implicitly accounts for many characteristics common to all states, such as macroeconomic and federal policies, as well as trade policy, which can affect labor share.

We provide robust evidence showing states that adopted the interstate banking deregulation experienced a decline in their labor share. Specifically, we find that on average a state that adopted the policy experienced a decline in the labor share of 0.8 percentage points. Moreover, we find that the labor share continued to decline further up to 6-7 years after the policy was enacted. We also show that lower cost of credit, increase in the availability of credit, and greater bank competition in each state are potential mechanisms that led to the decline in the labor share. The estimate on the labor share elasticity with respect to changes in borrowing costs allows us to calibrate the implied capital-labor substitution parameter as a check that confirms the mechanism we propose in the theory. Finally, we run a state-industry-year panel specification to allow for more stringent controls and investigate in detail the manufacturing and services sectors. Our results show that capital intensity (in the case of manufacturing and services) and external finance dependence (in the case of manufacturing) intensified the decline in the labor share in response to banking deregulation.

Our baseline analysis covers a time period (1976-1996) when the aggregate U.S. labor share did not decline by much, as the U.S. labor share started to decline mainly in the 1990s (Elsby et al. (2013)). Nonetheless, we find robust evidence for the impact of banking deregulation, and the accompanying changes in the banking industry, on the labor share across the states. When we conduct a counterfactual experiment to quantify the overall effect of banking deregulation on the aggregate U.S. labor share, we find that the labor share in 1996 would have been 1 percentage point higher without the banking deregulation. The implication is that the U.S. labor share might have stayed constant over this time period had it not been for these policy adoptions. Our extended sample analysis for 1997-2005 confirming the baseline results also suggests that the credit mechanism is a likely culprit in the declining labor share experienced more recently, as credit further grew in the years following the data coverage of our main policy variation.

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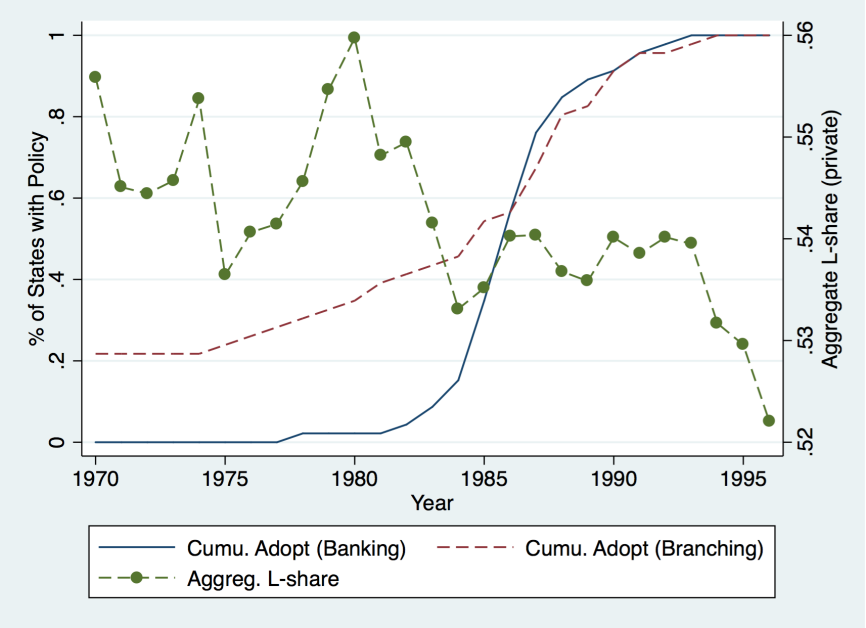
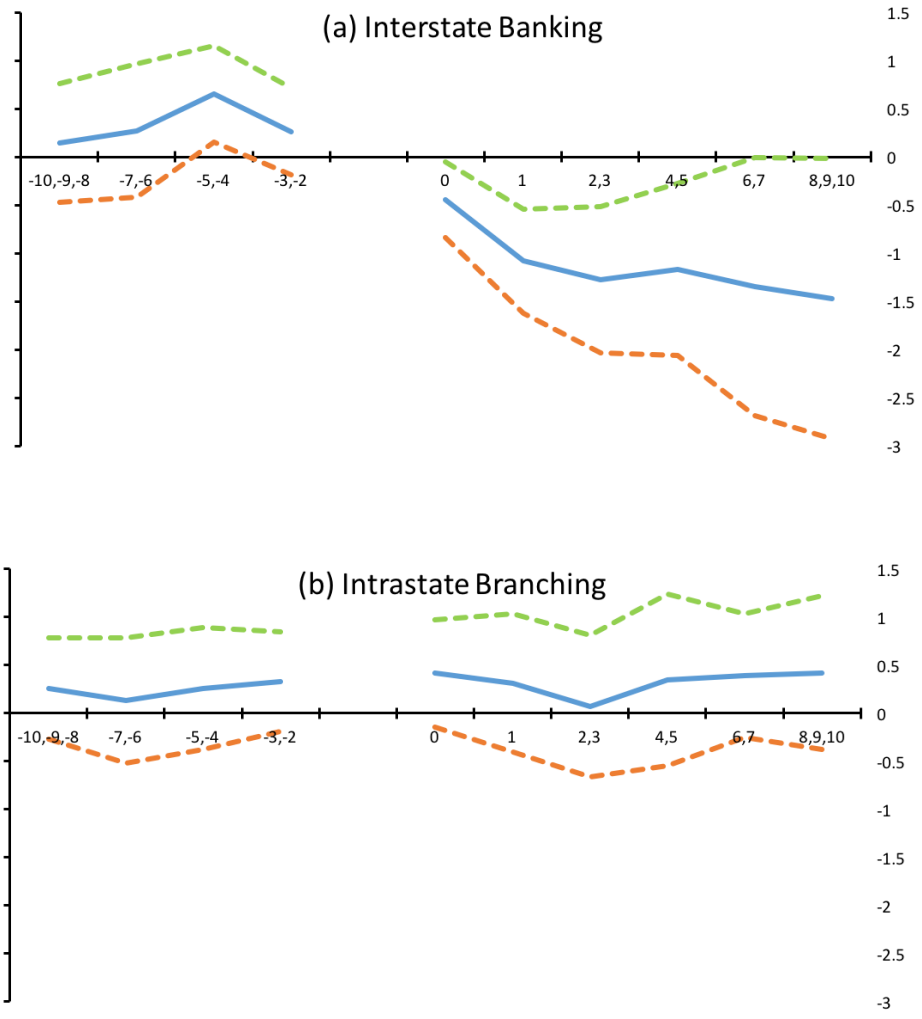
Figure 1: U.S. Aggregate Labor Share and Banking Deregulation



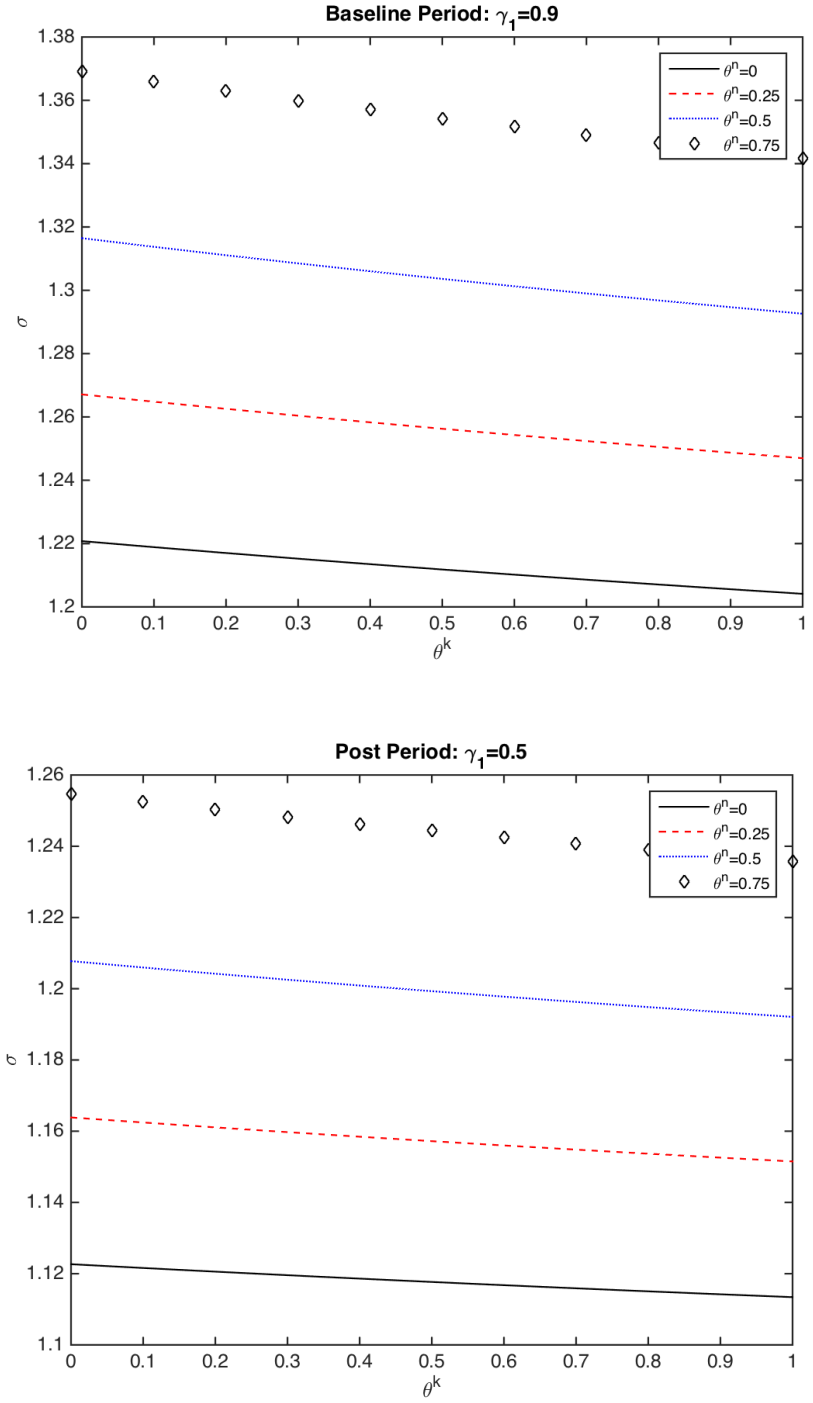
We sum compensation and gross output across all states for each year to compute the labor share (no weights required). The left axis is the fraction of states that have adopted the branching/banking deregulation as defined in section 3.

Figure 2: Dynamic Effects: Coefficients in Years Before and After Deregulation



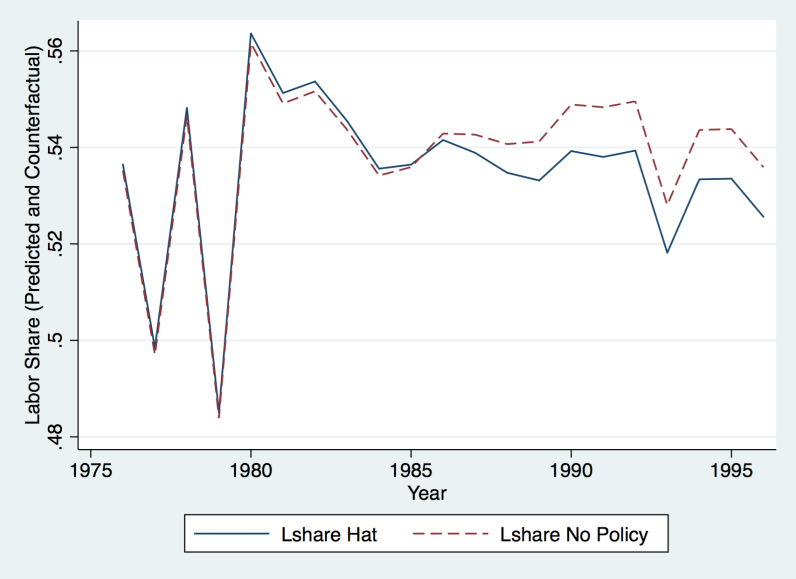
The figures plot the coefficients we obtain from a specification that regresses the labor share on the following dummies for interstate banking and intrastate branching deregulations: (10, 9, 8), (7, 6), (5,4), (3,2) years before the policy, and (0), (1), (2,3), (4,5), (6,7), (8,9,10) years after the policy implementation. Year 0 is the year of implementation and all coefficients are evaluated relative to one year prior to the policy adoption. Parentheses refer to the years we group into one dummy variable. Solid line represents the coefficients for dummies from 10 years before to 10 years after the policy implementation. The dashed lines represent the 95% confidence intervals. The coefficients are multiplied by 100.

Figure 3: Implied Aggregate Substitution Parameter



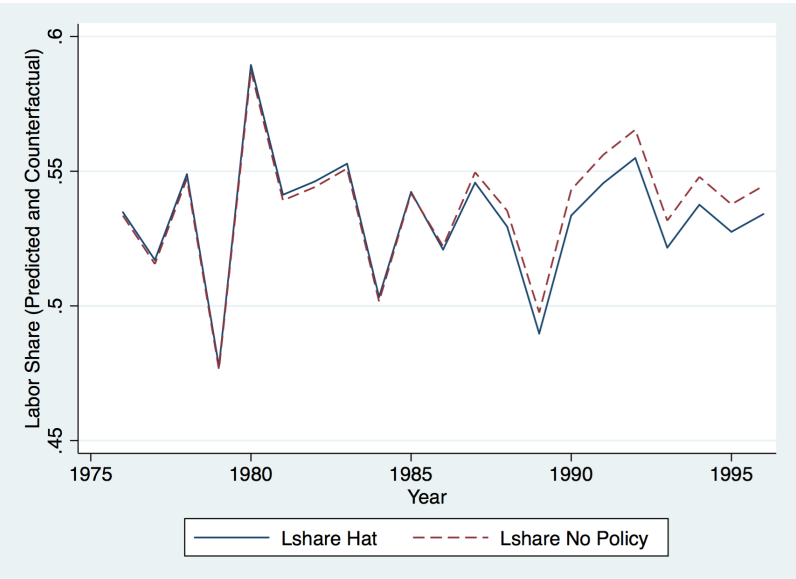
σ is calculated from Equation 25 and steady-state values from data. Both figures use the same parameter values, but for a different γ_1. Parameter values: $u = 0.8$, $\tilde{r} = 0.08$, $\mu = 1.1$, $s_L = 0.55$. We use u and $\tilde{r}$ to get $\phi = 9.89$. (θ^k, θ^n) vary as shown in the figures. Notice that positive γ_1 implies $\theta^k > \theta^n$. For example in the case where $\theta^n = 0.75$, only the $\theta^k > 0.75$ part of the figure is applicable.

Figure 4: US Labor Share aggregated with base weights



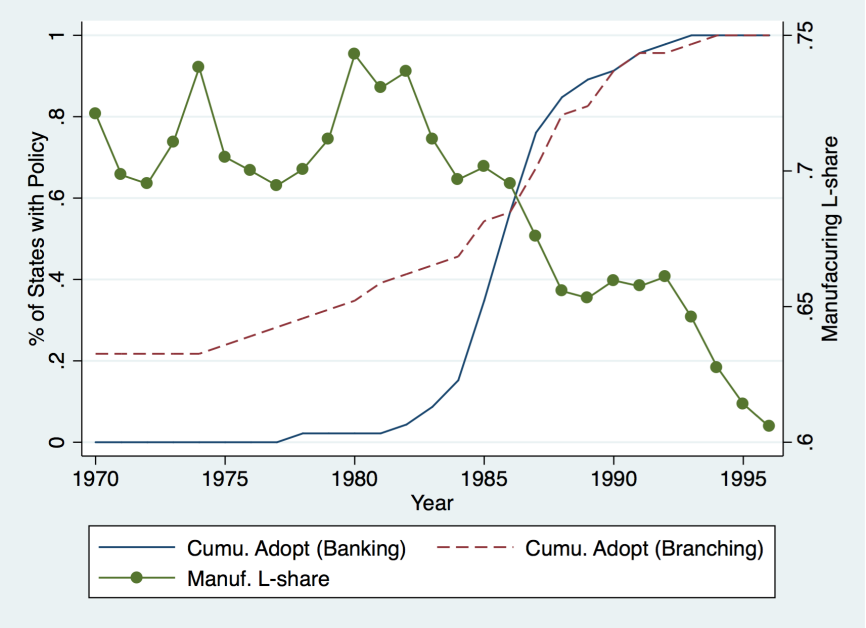
We first compute the predicted labor share, $\widehat{laborsh}_{st}$, from equation (23) using data on all the covariates, and also calculate the same predicted variable imposing $Bank_{st}$ and $Branch_{st}$ equal to zero for all years ("No Policy"). This gives us state-year labor shares, which we then aggregate to an overall U.S. labor share using state GSP weights. This Figure uses weights fixed to the state share of value added in 1976.

Figure 5: US Labor Share aggregated with time varying weights



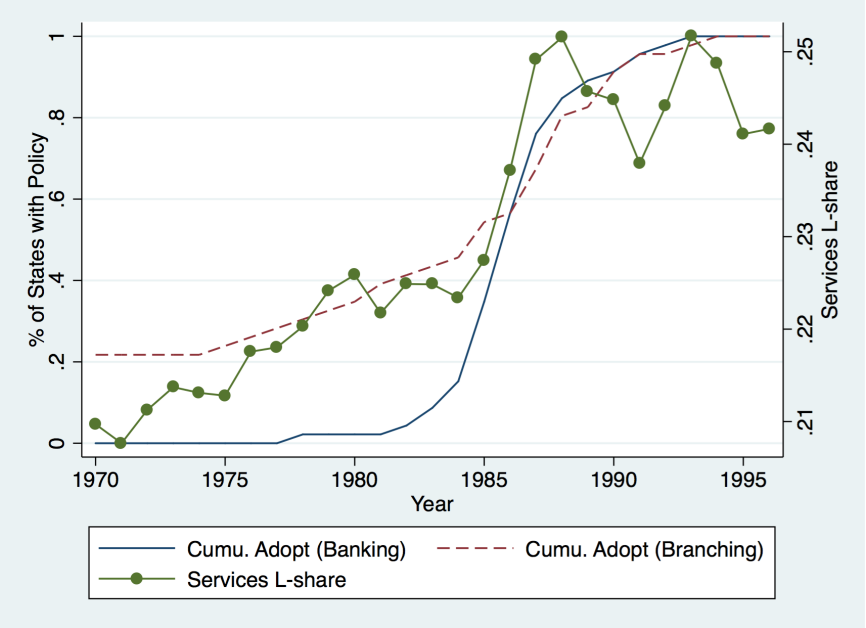
We first compute the predicted labor share, $\widehat{laborsh}_{st}$, from equation (23) using data on all the covariates, and also calculate the same predicted variable imposing $Bank_{st}$ and $Branch_{st}$ equal to zero for all years ("No Policy"). This gives us state-year labor shares, which we then aggregate to an overall U.S. labor share using state GSP weights. This Figure uses time varying weights, which we calculate as the average of states' weights over year t and $t-1$.

Figure 6: US Labor Share in Manufacturing Only and Banking Deregulation



The figure plots the aggregate labor share for manufacturing at the national level, and the cumulative number of states that adopted the interstate banking and intrastate branching deregulations. Aggregate labor share is constructed by summing up labor compensation and gross output in manufacturing across all states for each year, and taking the ratio between the two.

Figure 7: US Labor Share in Services Only and Banking Deregulation



The figure plots the aggregate labor share for services at the national level, and the cumulative number of states that adopted the interstate banking and intrastate branching deregulations. Aggregate labor share is constructed by summing up labor compensation and gross output in services across all states for each year, and taking the ratio between the two.

Table 1: Summary Statistics

	mean	sd	p50
1970-1982			
(mean) laborsh	0.579	0.0544	0.594
(mean) gsp	41239.5	50642.8	24578
(mean) comp	24511.4	30309.3	14293
Avg. loan yield rate	0.135	0.0370	0.122
Credit/GDP	0.286	0.101	0.271
HHI of deposits	0.0659	0.0761	0.0328
GDP growth rate	0.0329	0.0447	0.0339
Pop'l growth rate	0.0139	0.0131	0.0119
Avg salary (Dollars)	11158.7	2766.3	10756.5
Corporate tax rate	5.836	2.742	6
Union memb. (% of workers)	22.00	8.105	21.35
Unempl. (%)	6.835	2.051	6.600
House Price Index	87.90	18.12	90.81
1983-1996			
(mean) laborsh	0.572	0.0403	0.581
(mean) gsp	116777.2	136820.4	74354.5
(mean) comp	67749.0	78861.8	41675
Avg. loan yield rate	0.141	0.0278	0.139
Credit/GDP	0.312	0.110	0.300
HHI of deposits	0.0392	0.0619	0
GDP growth rate	0.0342	0.0333	0.0343
Pop'l growth rate	0.00921	0.0111	0.00724
Avg salary (Dollars)	20875.6	4021.7	20383.5
Corporate tax rate	6.575	2.833	7
Union memb. (% of workers)	15.07	6.173	14
Unempl. (%)	6.341	1.994	6.100
House Price Index	154.1	45.76	139.9
Total			
(mean) laborsh	0.575	0.0478	0.585
(mean) gsp	80407.2	111170.0	42312.5
(mean) comp	46930.9	64275.9	24326.5
Avg. loan yield rate	0.138	0.0327	0.129
Credit/GDP	0.299	0.107	0.287
HHI of deposits	0.0476	0.0678	0.0199
GDP growth rate	0.0336	0.0389	0.0341
Pop'l growth rate	0.0114	0.0123	0.00877
Avg salary (Dollars)	16650.9	5973.5	16655.5
Corporate tax rate	6.224	2.814	6
Union memb. (% of workers)	18.40	7.959	17.80
Unempl. (%)	6.506	2.026	6.231
House Price Index	130.0	49.66	117.8

Observations are state-year cells. The first panel describes the data in the first half of the period (1970-1982) when very few states had deregulated. The second panel describes the data in the second half of our data span. Mean/SD/Median are across the 50 states with no weights. Sources are described in Section 4 of the text.

Table 2: State-year variation: OLS results

	Lshare				
	(1)	(2)	(3)	(4)	(5)
Banking	-0.009***	-0.008***	-0.008**	-0.009***	
	(0.003)	(0.002)	(0.004)	(0.003)	
Branching	0.007	0.005	0.002	0.004	
	(0.005)	(0.004)	(0.004)	(0.004)	
Corp. tax rate	0.001	0.000	0.001	0.000	0.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Union Mem	0.000	0.000	0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
GSP growth	-0.164***	-0.181***			
	(0.027)	(0.023)			
Popl. growth	0.137	0.296*	-0.092	0.133	0.116
	(0.146)	(0.162)	(0.182)	(0.150)	(0.149)
Unempl		-0.022***	-0.013	-0.010	-0.009
		(0.006)	(0.008)	(0.006)	(0.006)
House Price Index		-0.052***	-0.024**	-0.042***	-0.039***
		(0.012)	(0.012)	(0.012)	(0.011)
Banking (growing tr)					-0.003***
					(0.001)
Branching (growing tr)					0.001
					(0.001)
Fixed Effects	State,Year	State,Year	State,Year	State,Year	State,Year
R^2	0.913	0.933	0.941	0.926	0.926
N	1174	954	954	954	954

Labor share is calculated using total compensation and state GSP in *private* industries. The first four columns use a regular pre/post treatment: the "Banking" and "Branching" dummy turn to one when a state deregulates. Column (3) calculates the labor share by eliminating all finance related compensation and omits GSP. The last column presents the growing treatment, so that "Banking (growing tr)" and "Branching (growing tr)" equal to the number of years since the policy change (only letting this get up to 4). Hence, the treatment takes a value of 1 during the year of the policy adoption, 2 the year after, 3 the year after that, and then continues to take the value of 4 thereafter. Definition of the control variables are in the Data Section. All included controls are presented in the table. Labor shares, policy implementation dates, corporate tax rates, and union membership rates are available starting in 1970. House price indices start in 1975, while unemployment data starts in 1976. All specifications include state and year fixed effects. Standard errors clustered by state.

Table 3: State-year: IV Results using a Growing Treatment Instrument

	Lshare		
	(1)	(2)	(3)
Avg. Yield	0.009**		
	(0.004)		
Corp. tax rate	0.001	0.007	0.001
	(0.002)	(0.006)	(0.003)
Union Mem	0.000	-0.001	-0.000
	(0.001)	(0.002)	(0.001)
Unempl	-0.029**	-0.048	-0.038***
	(0.011)	(0.040)	(0.012)
Popl. growth	0.262	0.594	-0.211
	(0.228)	(0.541)	(0.221)
House Price Index	-0.032***	-0.012	-0.053***
	(0.012)	(0.056)	(0.014)
Credit/GDP		-0.008	
		(0.009)	
HHI Deposits			0.442***
			(0.156)
Fixed Effects	State,Year	State,Year	State,Year
R^2	0.890	0.439	0.864
N	954	954	862

The sample covers 1976-1996 due to the availability of the control variables. Definition of the control variables are in the Data Section. Average loan yield is in percentage points, so the coefficient reflects a one percentage point increase in the yields. Credit to GSP ratio is included as percentages. "HHI Deposits" is defined as one plus the usual index construction of the sum of squared market shares. All specifications include state and year fixed effects. Standard errors clustered by state.

Table 4: State-year variation, 1997-2005

	Lshare		
	(1)	(2)	(3)
Branching restrictions	-0.004**	-0.003	
	(0.002)	(0.002)	
Deposit cap	0.209***	0.156	
	(0.072)	(0.094)	
Union Mem	-0.000	0.000	0.001
	(0.001)	(0.001)	(0.001)
Unempl	-0.026***	-0.012	-0.016
	(0.009)	(0.010)	(0.010)
Popl. growth	0.158	0.065	0.008
	(0.115)	(0.131)	(0.154)
House Price Index	-0.006	0.008	-0.003
	(0.012)	(0.015)	(0.015)
GSP growth	-0.219***		
	(0.041)		
Avg. Yield			0.005**
			(0.002)
Fixed Effects	State,Year	State,Year	State,Year
R^2	0.943	0.926	0.909
N	414	414	414

The sample covers 1997-2005. The first two columns present the results from an OLS specification. The estimates in the last column are obtained from an IV specification, where the average loan yields is instrumented with branching restriction and deposit cap indicators. All specifications include state and year fixed effects. Standard errors clustered by state.

Table 5: State-Year-Industry

	Lshare			
	(1)	(2)	(3)	(4)
Banking	-0.003	-0.004		
	(0.004)	(0.004)		
Branching	0.001	0.001		
	(0.006)	(0.006)		
Banking (growing tr)			-0.003**	-0.003*
			(0.002)	(0.002)
Branching (growing tr)			-0.000	0.000
			(0.002)	(0.002)
Corp. tax rate	0.001	0.000	0.001	0.000
	(0.002)	(0.002)	(0.002)	(0.002)
Union Mem	0.000	0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Popl. growth	-0.073	-0.102	-0.090	-0.118
	(0.238)	(0.251)	(0.234)	(0.246)
Unempl	-0.010	-0.009	-0.012	-0.011
	(0.009)	(0.009)	(0.010)	(0.009)
House Price Index	-0.001	0.002	0.002	0.005
	(0.018)	(0.018)	(0.017)	(0.018)
Fixed Effects	State, Industry, Year	State, Industry-Year	State, Industry, Year	State, Industry-Year
R^2	0.418	0.488	0.418	0.488
N	46963	46963	46963	46963

The sample covers 1976-1996 due to the availability of the control variables. The first two columns use pre-post treatment effects, while the latter two columns use the growing treatment. Columns (1) and (3) include separate state, industry, and year fixed effects. Columns (2) and (4) include state and industry-year interacted fixed effects. Definition of the control variables are in the Data Section and all included controls presented. Standard errors clustered by state. Fixed effects differ by column as represented in the "Fixed Effects" row.

Table 6: Aggregate Industry Results

	Lshare						
	(A)	(I)	(C)	(M)	(U)	(T)	(S)
Banking (growing tr)	-0.000	0.013*	-0.004	-0.003	-0.006	-0.001	-0.001**
	(0.004)	(0.007)	(0.004)	(0.002)	(0.004)	(0.001)	(0.001)
Branching (growing tr)	-0.001	-0.010	0.004	-0.004**	0.007	-0.000	0.001
	(0.002)	(0.009)	(0.003)	(0.002)	(0.006)	(0.001)	(0.001)
Corp. tax rate	-0.004	-0.020	-0.000	-0.003	0.003	-0.000	0.001
	(0.003)	(0.016)	(0.006)	(0.002)	(0.005)	(0.001)	(0.001)
Union Mem	-0.002**	0.007**	-0.000	-0.001	0.002	-0.000	0.000
	(0.001)	(0.003)	(0.002)	(0.001)	(0.002)	(0.000)	(0.000)
Popl. growth	0.710**	0.631	-0.572	-0.680**	0.255	-0.033	-0.059
	(0.314)	(0.843)	(0.416)	(0.306)	(0.658)	(0.138)	(0.126)
Unempl	0.052***	-0.021	-0.001	-0.003	-0.040	-0.002	-0.015***
	(0.018)	(0.051)	(0.018)	(0.012)	(0.034)	(0.004)	(0.004)
House Price Index	0.052**	-0.173**	-0.002	0.023	-0.065	0.036***	-0.003
	(0.020)	(0.074)	(0.024)	(0.016)	(0.075)	(0.007)	(0.007)
Avg Lshare	0.261	0.549	0.676	0.707	0.571	0.579	0.681
Fixed Effects	State, Industry-Year	State, Industry-Year	State, Industry-Year	State, Industry-Year	State, Industry-Year	State, Industry-Year	State, Industry-Year
R^2	0.870	0.444	0.655	0.423	0.351	0.777	0.937
N	954	2050	954	15586	7553	1908	12300

The sample covers 1976-1996 due to the availability of the control variables. Definition of the control variables are in the Data Section and all included controls presented. Standard errors clustered by state. All regressions include separate state and industry-year interacted fixed effects. The aggregate industry groups are: Agriculture (A), Mining (I), Construction (C), Manufacturing (M), Transportation and Electricity and other Utilities (U), Wholesale and Retail Trade (T), and Services (S).

Table 7: State-Year-Industry: Manufacturing and Services

	Lshare					
	(M)	(M)	(M)	(S)	(S)	(S)
Banking	-0.012**		-0.002	-0.001		0.004
	(0.006)		(0.012)	(0.002)		(0.004)
Branching	-0.014**		-0.001	0.005		0.010**
	(0.007)		(0.010)	(0.004)		(0.005)
Banking (growing tr)		-0.003			-0.001**	
		(0.002)			(0.001)	
Branching (growing tr)		-0.004**			0.001	
		(0.002)			(0.001)	
Kint*Banking			-0.017			-0.018**
			(0.018)			(0.007)
Kint*Branching			-0.022			-0.017**
			(0.016)			(0.007)
Corp. tax rate	-0.004	-0.003	-0.004	0.002	0.001	0.002
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Union Mem	-0.001	-0.001	-0.001	0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
Popl. growth	-0.665**	-0.680**	-0.664**	-0.049	-0.059	-0.049
	(0.310)	(0.306)	(0.310)	(0.128)	(0.126)	(0.128)
Unempl	-0.002	-0.003	-0.002	-0.015***	-0.015***	-0.015***
	(0.012)	(0.012)	(0.012)	(0.004)	(0.004)	(0.004)
House Price Index	0.015	0.023	0.015	-0.004	-0.003	-0.004
	(0.017)	(0.016)	(0.017)	(0.007)	(0.007)	(0.007)
Fixed Effects	State,Industry-Year	State,Industry-Year	State,Industry-Year	State,Industry-Year	State,Industry-Year	State,Industry-Year
R^2	0.423	0.423	0.423	0.937	0.937	0.937
N	15586	15586	15586	12300	12300	12300

The first 3 columns restrict the data to only include manufacturing industries, while the last 3 columns are based on service industries only. "KI" equals 1 for industries with above median capital intensities. Capital intensity is calculated as the stock of net fixed assets (only equipment) per worker (averaged across all years). The data range covers 1976 to 1996. Definition of the controls are in the main text. All specifications include state and industry-year interacted fixed effects. Standard errors clustered by state.

Table 8: State-Year-Industry: Manufacturing by Type

	Lshare			
	(FD=1)	(FD=0)	(KI=1)	(KI=0)
Banking	-0.013	-0.010	-0.017**	-0.004
	(0.009)	(0.009)	(0.007)	(0.009)
Branching	-0.024**	-0.005	-0.022**	-0.002
	(0.009)	(0.008)	(0.010)	(0.008)
Corp. tax rate	-0.005	-0.002	-0.005	-0.001
	(0.004)	(0.003)	(0.004)	(0.003)
Union Mem	-0.001	-0.001	-0.001	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Popl. growth	-0.471	-0.876**	-0.374	-1.023**
	(0.465)	(0.373)	(0.431)	(0.427)
Unempl	0.010	-0.016	0.009	-0.016
	(0.018)	(0.017)	(0.017)	(0.014)
House Price Index	0.033	-0.003	0.009	0.022
	(0.026)	(0.023)	(0.025)	(0.018)
Fixed Effects	State,Industry-Year	State,Industry-Year	State,Industry-Year	State,Industry-Year
R^2	0.480	0.353	0.363	0.487
N	8315	7271	9100	6486

Each column represents a regression on a select subsample of the Manufacturing sector. "FD" denotes external financial dependence and it takes on a value 1 for *more* external finance dependent industries. An industry is classified as more finance dependent when the median firm in the 2-digit SIC industry must issue debt or equity to finance investment. The first two columns differentiate between *more* (FD=1) and *less* (FD=0) external finance dependent industries within manufacturing. The latter two columns differentiate based on *more* (KI=1) and *less* (KI=0) capital intensive industries within manufacturing. The data range covers 1976 to 1996. Definition of the controls are in the main text. All regressions include state and industry-year fixed effects. Standard errors clustered by state.

Table 9: Employment share for each industry group within state

	EMPshare						
	(A)	(I)	(C)	(M)	(U)	(T)	(S)
Banking	0.000	-0.002**	0.001	-0.000	0.000	0.002	0.001
	(0.000)	(0.001)	(0.001)	(0.002)	(0.000)	(0.002)	(0.002)
Branching	0.000	-0.004***	-0.002	0.003	-0.000	0.001	0.003
	(0.000)	(0.002)	(0.001)	(0.004)	(0.001)	(0.002)	(0.003)
Corp. tax rate	0.000	-0.002	-0.000	0.001	0.000	0.001	-0.001
	(0.000)	(0.001)	(0.001)	(0.002)	(0.000)	(0.002)	(0.001)
Union Mem	-0.000	0.000	-0.000	0.001	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
Popl. growth	-0.014	0.243**	0.381***	-0.078	-0.050*	-0.061	-0.291***
	(0.011)	(0.099)	(0.043)	(0.134)	(0.029)	(0.061)	(0.091)
Unempl	0.000	0.000	-0.007***	-0.019***	0.002	0.002	0.016***
	(0.000)	(0.003)	(0.002)	(0.005)	(0.001)	(0.003)	(0.004)
House Price Index	-0.004***	0.018***	0.025***	-0.071***	0.001	0.001	0.008
	(0.001)	(0.005)	(0.003)	(0.010)	(0.002)	(0.005)	(0.007)
Avg Empshare	0.012	0.016	0.067	0.188	0.060	0.263	0.306
Fixed Effects	State,Year, Industry	State,Year, Industry	State,Year, Industry	State,Year, Industry	State,Year, Industry	State,Year, Industry	State,Year, Industry
R^2	0.963	0.938	0.919	0.969	0.942	0.899	0.971
N	954	3816	954	20034	8586	1908	12402

The dependent variable is the employment share of an industry in its respective state. All regressions include year, state and industry (2-digit) fixed effects. The data range covers 1976 to 1996. Standard errors clustered by state. The aggregate industry groups are: Agriculture (A), Mining (I), Construction (C), Manufacturing (M), Transportation and Electricity and other Utilities (U), Wholesale and Retail Trade (T), and Services (S).

Appendices

A Alternative Model

In this section we show that our identification equation for the labor share is not driven by our structural assumptions in section 2.

There are two alternative structures that we investigate: i) full capacity utilization with fixed depreciation rate and ii) a more parsimonious model of homogeneous households that provide labor and invest without borrowing. Since for the most part the model looks similar to the main text, we only highlight here the main differences that arise and what the labor share equation looks like.

Final Consumption and Final Investment Good Producers These producers are modeled exactly as in Karabarbounis and Neiman (2014) and would not be affected by the alternative structural assumptions.

Intermediate Input Producers The only difference here with the main text is whether we choose to incorporate the capacity utilization. A more parsimonious model would set $u_t = 1$ so that the first order conditions for capital and labor become:

$$(1 + \theta^k \tilde{r}_t) R_t = \frac{1}{\mu_t} F_{k,t}(z) p_t(z) \tag{27}$$

$$(1 + \theta^n \tilde{r}_t) W_t = \frac{1}{\mu_t} F_{n,t}(z) p_t(z), \tag{28}$$

Households In the main text we make the assumption that only some households provide labor (lenders) and other households only accumulate capital (borrowers). Although this may seem ad hoc, it allows us to incorporate $\tilde{r}$ into the household decision. An alternative formulation follows.

The representative household consumes the final consumption good, provides labor to the intermediate good producers, and purchases the final investment good, which augments the capital stock that is rented to the intermediate good producers. The household owns all the firms in the economy, and receives dividends at the end of each period. Additionally, the household holds a bond B_t that pays interest r_t, and is in zero net supply. The household

chooses $\{C_t, X_t, K_{t+1}, B_{t+1}, \{n_t(z)\}\}$ to maximize

$$\mathbf{U} = \sum_{t=0}^{\infty} \beta^t U(C_t, N_t), \tag{29}$$

subject to the capital accumulation equation $K_{t+1} = (1-\delta)K_t + X_t$, and the budget constraint

$$C_t + \xi_t X_t + B_{t+1} - (1+r_t)B_t = \int_0^1 \left(W_t n_t(z) + R_t k_t(z) + \prod_t(z) \right) dz + \Lambda_t, \tag{30}$$

where β denotes the discount factor; Λ_t is the interest payments the financial sector transfers from the intermediate good producers to the household; and aggregate labor supply and capital stock are given by $N_t = \int_0^1 n_t(z)dz$ and $K_t = \int_0^1 k_t(z)dz$.

Interest Rates The household's optimization yields the following expression for the relationship between the rental rate of capital and the interest rate on the one-period bonds:

$$R_{t+1} = \xi_t(1 + r_{t+1}) - \xi_{t+1}(1-\delta), \tag{31}$$

where the real interest rate is pinned down by the usual Euler equation:

$$1 + r_{t+1} = \frac{U_C(C_t, N_t)}{\beta U_C(C_{t+1}, N_{t+1})}. \tag{32}$$

As in the main text, we can assume $\xi = 1$ in the identification equa.tion. In this case we continue to assume $\tilde{r}_t = r_t + \eta_t$, but notice that that R_{t+1} is independent of the markup charged by the intermediaries.

Labor Share in Equilibrium Using the same symmetric equilibrium, equations 15 and 19 are identical, with $u_t \leq 1$. We first present the results for the case where all households work and buy bonds. Lastly, we also show the implications of taking model in the main text without utilization costs.

If we let (31) be the rental rate of capital instead of (18) in the main text, then the linear equation for the labor share becomes:

$$s_{L,t} = \gamma_1 \tilde{r}_t + \gamma_2 \mu_t + \frac{\gamma_3}{R} R_t - \frac{\gamma_3}{A_K} A_{K,t}. \tag{33}$$

The coefficients are given by

$$\gamma_1^{alternative} = \frac{(\sigma - 1)\left[1 - (1 + \theta^n \tilde{r})\mu s_L\right]}{(1 + \theta^n \tilde{r})\mu} \frac{\theta^k}{1 + \theta^k \tilde{r}} - \frac{\theta^n s_L}{1 + \theta^n \tilde{r}} \tag{34}$$

$$\gamma_2^{alternative} = \frac{(\sigma-1)\left[1-(1+\theta^n\tilde{r})\mu s_L\right]}{(1+\theta^n\tilde{r})\mu^2} - \frac{s_L}{\mu} \tag{35}$$

$$\gamma_3^{alternative} = \frac{(\sigma-1)\left[1-(1+\theta^n\tilde{r})\mu s_L\right]}{(1+\theta^n\tilde{r})\mu}. \tag{36}$$

Notice that the identification of γ_1 is still the same as in the main text, but that the "micro-foundations" are different. The term in (20), $\frac{\phi}{\phi+1}\frac{1}{\tilde{r}}$, drops out if the households bond holdings are in zero net supply. These micro-foundations have implications in terms of what an estimated γ_1 implies about the capital-labor substitution for given parameter values.

In the case where the rental rate is given by (31), γ_1 is independent of the utilization rate. If instead we take the case in the main text, where the rental rate is given by (18), we can also assume that the depreciation costs are independent of the utilization rate so that equation 19 is unchanged but the coefficient of interest is given by:

$$\gamma_1^{alternative\#2} = \frac{(\sigma-1)\left[1-(1+\theta^n\tilde{r})\mu s_L\right]}{(1+\theta^n\tilde{r})\mu}\left(\frac{\theta^k}{1+\theta^k\tilde{r}} + \frac{1}{\delta+\tilde{r}}\right) - \frac{\theta^n s_L}{1+\theta^n\tilde{r}} \tag{37}$$

The inference for σ will look very similar to the main text.

B Extra Results

[Figure 8 about here.]

[Figure 9 about here.]

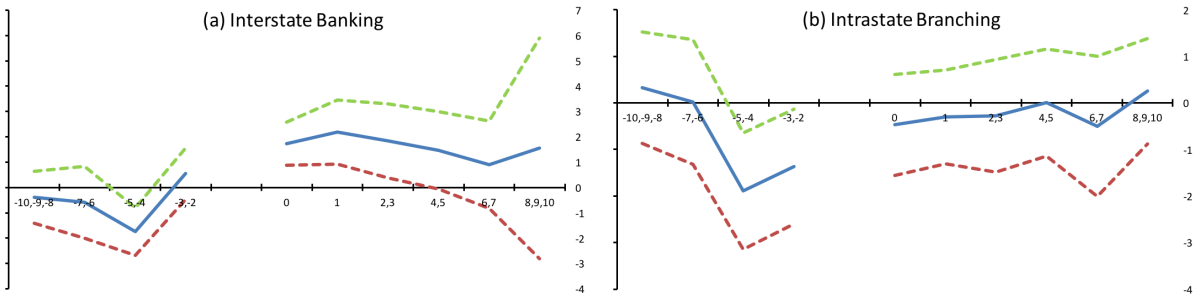
[Table 10 about here.]

[Table 11 about here.]

[Table 12 about here.]

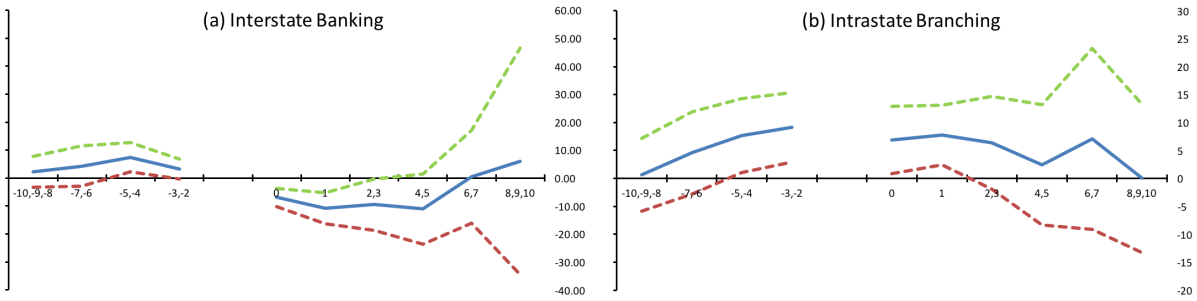
[Table 13 about here.]

Figure 8: Dynamic Effects: GSP Growth Pre-Post Trends



Solid line represents the coefficients for dummies from 10 years before to 10 years after the policy implementation. The dashed lines represent the 95% confidence intervals. The coefficients are multiplied by 100. See notes to Figure 2 for the year groupings.

Figure 8: Dynamic Effects: Unemployment Pre-Post Trends



Solid line represents the coefficients for dummies from 10 years before to 10 years after the policy implementation. The dashed lines represent the 95% confidence intervals. The coefficients are multiplied by 100. See notes to Figure 2 for the year groupings.

Table 10: Banking De-regulation and Banking Outcomes

Panel A: Growing Treatment Effects

	Loan Yld	Credit	HHI Deposits
	(1)	(2)	(3)
Banking	-1.388***	3.153*	-0.027***
	(0.336)	(1.716)	(0.008)
Branching	0.024	-1.007	-0.008
	(0.231)	(1.653)	(0.006)
Fixed Effects	State,Year	State,Year	State,Year
R^2	0.897	0.781	0.731
N	1242	1242	874

Panel B: Lags

	Loan Yld	Credit	HHI Deposits
	(1)	(2)	(3)
Banking	-0.986***	1.348	-0.021***
	(0.279)	(1.168)	(0.006)
L.Banking	-0.297**	0.789*	-0.006***
	(0.125)	(0.459)	(0.002)
L2.Banking	-0.292*	1.109***	-0.006*
	(0.147)	(0.411)	(0.003)
L3.Banking	-0.264**	1.260**	-0.006
	(0.111)	(0.520)	(0.003)
L4.Banking	-0.206	1.706**	0.012**
	(0.150)	(0.827)	(0.005)
Branching	0.275	-2.148**	-0.002
	(0.261)	(0.964)	(0.006)
L.Branching	-0.062	-0.318	-0.003
	(0.131)	(0.320)	(0.003)
L2.Branching	-0.347	1.461	-0.007
	(0.251)	(1.446)	(0.005)
L3.Branching	0.031	-0.031	-0.004
	(0.151)	(0.323)	(0.004)
L4.Branching	-0.304	1.113	0.009*
	(0.208)	(0.899)	(0.005)
Fixed Effects	State,Year	State,Year	State,Year
R^2	0.886	0.810	0.734
N	1058	1058	874

Average loan yield is in percentage points, so the coefficient reflects a one percentage point increase in yields. Credit to GSP ratio is similarly multiplied by 100. "HHI Deposits" is defined as one plus the usual index construction of the sum of squared market shares. Definition of the controls are in the main text. All regressions include state and year fixed effects. standard errors clustered by state.

Table 11: State-year variation: OLS Robustness Checks

	Lshare			Lshare (No Energy)	Lshare (No Rustbelt)
	(1)	(2)	(3)	(4)	(5)
Banking	-0.014**	-0.009***	-0.009***	-0.008***	-0.009***
	(0.007)	(0.003)	(0.003)	(0.003)	(0.003)
Branching	0.002	0.005	0.004	0.006	0.003
	(0.005)	(0.004)	(0.004)	(0.004)	(0.005)
Corp. tax rate	-0.001	0.001	0.000	0.000	0.000
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)
Union Mem	-0.000	0.000	0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Popl. growth	-0.225	0.207	0.167	0.097	0.179
	(0.270)	(0.156)	(0.149)	(0.178)	(0.157)
Unempl	-0.020	-0.014**	-0.008	-0.013*	-0.011
	(0.012)	(0.007)	(0.006)	(0.006)	(0.007)
House Price Index	-0.043**	-0.036***	-0.036***	-0.038***	-0.047***
	(0.017)	(0.012)	(0.010)	(0.013)	(0.012)
Entry rate		-0.002*			
		(0.001)			
Exit rate		-0.002***			
		(0.000)			
Job creation		-0.001*			
		(0.000)			
BC			-0.007*		
			(0.004)		
FP			-0.005		
			(0.005)		
CS			0.005		
			(0.004)		
firstgen			-0.001		
			(0.004)		
Fixed Effects	State,Year	State,Year	State,Year	State,Year	State,Year
R^2	0.939	0.928	0.928	0.891	0.921
N	180	908	954	850	849

The first column drops *all* non-benchmark years, where there was no Economic Census. The specification is then the same as column (4) in Table 2. Column (2) brings back the full dataset and adds BDS data on firm exit, entry and job creation to the benchmark specifications. The next column controls for "anti-takeover" laws passed in the 1970's (first generation) and in the 1980's (second generation). The last two columns restrict the benchmark results to states *not* intensive in energy (drop the 5 most energy intensive states) and *not* intensive in manufacturing respectively. Labor shares, policy implementation dates, corporate tax rates, union membership, and GDP/population growth rates are available starting in 1970. House price indices start in 1975, while unemployment data starts in 1976. BDS data start in 1977. All specifications include state and year fixed effects. Standard errors clustered by state.

Table 12: State-year variation: Does Labor Share Predict Policy?

	Banking Dereg		Branching Dereg	
	(1)	(2)	(3)	(4)
L.Labor Share	0.404	1.122	-0.422	0.248
	(2.102)	(0.989)	(0.831)	(5.599)
L.Corp. tax rate		-0.260		0.214
		(.)		(66.460)
L.Union Mem		-0.428		0.385
		(.)		(8.512)
L.Popl. growth		227.425		-81.720
		(1687.683)		(2908.186)
L.Unempl		-8.488		-17.436
		(58.227)		(210.313)
L.House Price Index		-7.592		-2.899
		(95.550)		(469.041)
Fixed Effects	State,Year	State,Year	State,Year	State,Year
N	1196	908	936	650

This table presents a fixed effects logit specification. All regressors are lagged. Columns (1) and (3) include only lagged labor share, while (2) and (4) add lagged controls. Banking deregulation is the dependent variable in the first two columns, and Branching deregulation is dependent variable in last two columns. Note that there are fewer observations in the last two columns because some states have branching deregulation before 1970 and the fixed effects logit model drops these states. Labor shares are multiplied by 100. Labor shares, policy implementation dates, corporate tax rates, union membership, and GDP/population growth rates are available starting in 1970. House price indices start in 1975, while unemployment data starts in 1976. BDS data start in 1977. All specifications include state and year fixed effects.

Table 13: Banking Deregulation Dates

State	Statewide Branching through M&A	Interstate Banking	State	Statewide Branching through M&A	Interstate Banking
Alabama	1981	1987	Nebraska	1985	1990
Arizona	Before 1970	1986	Nevada	Before 1970	1985
Arkansas	1994	1989	New Hampshire	1987	1987
California	Before 1970	1987	New Jersey	1977	1986
Colorado	1991	1988	New Mexico	1991	1989
Connecticut	1980	1983	New York	1976	1982
Delaware	Before 1970	1988	North Carolina	Before 1970	1985
Florida	1988	1985	North Dakota	1987	1991
Georgia	1983	1985	Ohio	1979	1985
Idaho	Before 1970	1985	Oklahoma	1988	1987
Illinois	1988	1986	Oregon	1985	1986
Indiana	1989	1986	Pennsylvania	1982	1986
Iowa	1997	1991	Rhode Island	Before 1970	1984
Kansas	1987	1992	South Carolina	Before 1970	1986
Kentucky	1990	1984	South Dakota	Before 1970	1988
Louisiana	1988	1987	Tennessee	1985	1985
Maine	1975	1978	Texas	1988	1987
Maryland	Before 1970	1985	Utah	1981	1984
Massachusetts	1984	1983	Vermont	1970	1988
Michigan	1987	1986	Virginia	1978	1985
Minnesota	1993	1986	Washington	1985	1987
Mississippi	1986	1988	West Virginia	1987	1988
Missouri	1990	1986	Wisconsin	1990	1987
Montana	1990	1993	Wyoming	1988	1987

Source: Kroszner and Strahan (1999), and Demyanyk et al. (2007)