Reallocation, industry structure and the effects of banking deregulation

Matthieu Bellon
Columbia University

Jaromir Nosal
Boston College

Jonathan Vogel
Columbia University

May 4, 2016

Abstract

What is the contribution of industry reallocation and productivity changes to the economic gains resulting from banking deregulation? How does local industrial structure determine the outcomes of banking deregulation? This study uses the staggered reforms of the banking sector in the U.S. between 1977 and 1997 to empirically investigate these questions. In the private sector, we show that the deregulation-induced reallocation of workers was directed towards industries with lower GDP per worker. Moreover, employment gains were associated with a reduction in productivity. Nevertheless we find that these effects are offset by across the board within-industry productivity gains. In addition, total output and aggregate productivity increased because of the reallocation of workers out of unemployment, self-employment and non-private industries towards the more productive private sector. Finally we find that initial industry mix can explain up to one third of the variation in state aggregate responses.

1 Introduction

An ever growing literature demonstrates that banking deregulations have real effects on the economy. In particular, a vast body of evidence establishes three facts: first, banking deregulation affects the allocation of resources; second, deregulation contributes to aggregate economic growth; and third, these effects are heterogeneous across firms and industries.

Indeed, some industries are more dependent than others on the performance of the banking sector. Industry also differ in average and marginal returns. Then the deregulation-induced reallocation of workers across industries must affect aggregate average productivity if reallocations are related to productivity differences. However, little is known about the

contribution of deregulation-induced inter-industry reallocation to the overall response of aggregate GDP.

Furthermore, while it is well known that different industries are spatially concentrated in different locations, we don't know how local mix of industries affect local response differentially. Local differentials could arise from the reallocation of workers across locations or from the specific response of local industries.

This study uses a triple difference-in-difference analysis and the staggered deregulation of the banking sector in the U.S. between 1977 and 1997 to investigate the role of industrial structure in determining the aggregate effects of finance on the real economy. We find that inter-industry reallocations are essential for understanding changes in productivity (measured as GDP per worker) and GDP resulting from banking deregulation. Furthermore we show that state heterogeneity in industrial structure affects local outcomes through internal changes rather than through cross-state reallocations.

We start by revisiting the evidence about the effect of the U.S. *interstate* banking and *intrastate* branching deregulation on GDP. States implemented these reforms in different years and many studies have exploited simple difference-in-difference across states and time periods to analyze banking deregulation. We demonstrate that the well-cited results in Jayaratne and Strahan (1996) [8] for *intrastate* deregulation only holds in growth rates and not in levels. We show that these reforms typically occurred after years of relative decline and coincided with the beginning of the recovery. We also find that *interstate* deregulation reforms are associated with a 5% increase in GDP that seems unrelated to any prior trend. Nevertheless, we conclude that one needs to control for state trends and business cycles in order to identify the effect of deregulation.

Our identification strategy is based on a triple difference-in-difference using both the staggered occurrence of reforms and the heterogeneity in industry exposure to finance. It relies on the assumption that banking deregulation have stronger effects on industries that are more exposed to finance. In addition we need to assume that industry-specific business cycles

and expectations about industry-specific growth are orthogonal to the timing of reforms once state-level trends and cycles are controlled for. Specifically we use two prior measures of exposure: the external finance dependence proposed in Rajan and Zingales (1998) [14] and the tangibility of assets developed in Braun (2003). [11] To assess the validity of the identification hypothesis, we look for a relationship between the dates of reform and state initial average exposure to finance. We find no significant relationship once we control for the initial share of employment in private establishments.

Using the different measures of industry exposure to finance, we find that the effects of deregulation are heterogeneous across industries. The results of the triple difference-in-difference analysis suggest that *interstate* banking deregulation has a positive and significant effect on GDP. Furthermore, this effect is robust and persistent enough that we also find a positive effect on GDP growth rates: over our sample, we find a differential growth effect of .5% between two industries that would be one standard deviation apart from each other in terms of exposure. Estimates of the effect of the *intrastate* branching deregulation reforms studied in Jayaratne and Strahan (1996) [8] are substantially less robust and less significant. Therefore we choose to focus on the *interstate* banking deregulation reforms. Overall, if one is willing to assume that deregulation has a linear effect that is only a function of the exposure measures, then the average effects implied by the estimates of the *interstate* deregulation are quantitatively similar to the aggregate effects estimated at the state level.

We find that initial industry mix can explain up to one third of the variation in state GDP responses. The uneven distribution of industries across states translates into differences in state average exposure to finance. We test whether initial local differences in these averages due to a specific industrial structure are associated with differences in state responses: we find that the average tangibility of assets is indeed strongly related to the magnitude of state GDP increase. We find insignificant results for the external finance dependence index.

We use a simple accounting framework to examine the drivers of the aggregate state GDP response. This framework allows us to decompose the GDP increases into three com-

ponents, namely employment changes, average productivity changes from the reallocation of workers across industries, and productivity gains within industries. We show that two thirds of the observed GDP increase is associated with an increase in employment due to unemployment reduction. Within-industry productivity changes and the productivity changes caused by reallocation had conflicting effects. On one hand, productivity increased because of improvements within the industries of the private sector and because of the reallocation of workers from government activities, household production and agriculture to the private sector. On the other hand, the reallocation of workers in the private sectors was directed to industries with lower GDP per worker.

The implementation of our identification strategy on the drivers of growth is consistent with these patterns and confirm that at least two thirds of the effects caused by banking deregulation stem from increases in employment. Industries in the private sector that are more exposed to finance tend to have lower GDP per workers. Banking deregulation allows them to expand employment, thereby decreasing the average productivity. We only find small and insignificant differential increases in productivity within these industries. In addition, we find that the average size of establishments in expanding industries increases in the first years after the reform suggesting that the new workers are hired by existing establishments. However in the long run, the persistent increase in employment is driven by the creation of new establishments as the average establishment size reaches a plateau after three years.

Finally we estimate the direct effect of banking deregulation on the productivity of disaggregate industries that would have prevailed in the absence of changes in industry employment. We hypothesize that net flows of heterogeneous workers can indeed affect the composition of workers within industries and can interact with industry returns to scale. Our objective is then to isolate the direct effect of deregulation on industry productivity when inter-industry worker reallocation does not operate. Specifically we use an instrumental variable approach to control for changes in industry employment share and find a positive and significant direct effect on industry productivity. The estimated direct effect

is larger than the estimated total productivity change. This validates our hypothesis: it implies that employment gains resulting from banking deregulation are associated with a reduction in productivity which mostly offsets the direct increase in productivity enabled by deregulation.

Our work is related to a growing literature seeking to understand the drivers of the growth effects of banking deregulation. One strand of the literature has focused on the differential effects of banking deregulation across establishments. Within this literature, a large number of work use the staggered *interstate* banking deregulation in the U.S. Benmelech et al. (2011) [3] find that changes in firm employment is very sensitive to firms' financial health. They also document the positive association between banking deregulation and reduction in unemployment that we estimate being one of the most important drivers of the total gains from deregulation. Ceterolli and Strahan (2006) [5] use the same triple difference-in-difference analysis as we do. They show that firm entry is hindered when banking is less competitive because of concentration in the financial sector. The scope of their results for industry gains is challenged by Bai et al. (2015). [2] These authors examine the drivers of within-industry changes resulting from banking deregulation. They find that the three quarters of the gains stem from the reallocation of labor towards more productive firms. They estimate that the remaining effects are mostly due productivity increases within firm, leaving little role for changes in firm entry and exit. These findings are consistent with our results that emphasize the prominent role of labor reallocation.

While we found that the share of wages in value added decreases with banking deregulation, suggesting an increasing reliance on capital, we found little improvements in GDP per worker. The small effect of capital reallocation on worker productivity may be puzzling but Bai et al. (2015) [2] come to the same conclusion: what matters most is the reallocation of workers and increased access to finance serves to remove financial constraints on hiring. According to them, hiring is hampered by financial constraints because of upfront hiring and training costs, and because there is a timing delay between payments to workers and

the additional cash flows generated by the use of more labor. Banking deregulation helps to increase employment by providing funds more abundantly and at a cheaper cost.

Closely related to our study because of the focus on industry structure is the work of Bertrand et al. (2007) [4] on the 1985 banking deregulation in France. This study compares the performance of industries that are more exposed to finance relative to other industries before and after the reform. They show an increase in asset and job reallocation, an improvement in allocative efficiency across firms, and a decline in concentration in banking-dependent sectors. However the absence of staggered reforms within France prevents them to estimate the relative contributions of the different drivers of GDP gains. In a more recent study on the industry-level effects of banking, Pagano and Pica (2012) [13] show that industries more exposed to finance in countries with more developed financial sector experience larger employment gains. They also find that financial development is associated with a greater mobility of workers across industries in response to industrial shocks

We are not the first study to question the robustness of the effects of *intrastate* deregulation on GDP. Huang (2008) [7] and the references therein, argue that the results are not robust to additional geographic controls.

Finally, our work relates to the literature on the interaction between worker reallocation and changes in productivity. Milligan (2011) [12] shows that the productivity increase observed in the aftermath of the 2008-9 recession can be attributed to changes in the average quality of the workforce as laid-off workers were less productive than those who remained employed. Young (2014) [15] develops a model to demonstrate that the average productivity of an industry can be negatively correlated with its employment share because of changes in the distribution of worker ability. He then provides evidence for this effect by implementing an instrumental variable approach. He concludes that productivity growth in services is not lower than in the good production sector as was previously thought because the increasing share of services and the associated fall in average worker ability masked productivity gains. His conclusion is very similar in spirits with our findings.

The rest of the chapter is organized as follows. In the next section, we present the data sources and provide an overview of the deregulation reforms. In section 3 we revisit previous evidence about the state-level effects of banking deregulation in the U.S. and discuss the strength of different identification strategies. Then we show in section 4 how industry heterogeneity is related to variation in state responses and use this heterogeneity to identify the effects on state GDP. In section 5, we examine the relative contribution to the response of GDP of employment, worker productivity and establishment entry. We first use a simple accounting framework to illustrate the effects of reallocation and then estimate the effects of banking deregulation on the different drivers of growth. In section 6, we estimate the direct effect of the reforms on GDP per worker within industry. Section 7 concludes.

2 Data and industry characteristics

In this section, we present our sources and their use in the construction of our dataset.

2.1 Data sources

We focus on the years 1977 through 1997. We construct measures of exposure to finance using data from S&P Compustat. We obtain total value added, price indexes,[1] average wages, total employment, and total profit at the industry-state level from the Bureau of Economic Analysis (BEA). We obtain measures of the number of workers, the number of establishments, and total payroll at the industry-state level from the Census Bureau's County Business Patterns (CBP).[2] From the Census Bureau, we also get state population for the month of July in every year[3]. We finally collect data on state total employment and unemployment for the month of July from the Local Area Unemployment Statistics (LAUS) dataset of

[1]Prices indices are such that the industy-state real GDP values are normalized to 100 in 1997.

[2]The data is collected from establishments with paid employment in the week of March 12 for every year. Are excluded from the scope of the CBP the self-employed individuals, employees of private households, railroad employees, agricultural production employees, and most government employees.

[3]In 1980 and 1990, we use the values from the decenial censuses. The Census Bureau provides estimates of the population for the years in between censuses.

the Bureau of Labor Statistics. The measure of employment in the LAUS differs from the sum of employment across industries from the CBP because the latter only includes private industries.[4] Therefore we restrict most of our attention to the analysis of the private sector.

2.2 Indexes of exposure to banking

We are interested in constructing indexes of exposure to finance. The first index we use measures the dependence of firms within an industry on external finance. The second index measures the average tangibility of firm assets. Both measures are related to the potential benefits of banking deregulation. First, industries with greater funding needs benefit relatively more from an increase in the supply of credit and decreases in interest rates. Second, firms in industries with more tangible assets are more likely to obtain credit because their assets can serve as collateral. Therefore industries in which assets are less tangible are likely to benefit relatively more from an increase in the quality of financial intermediation brought by banking deregulation.

We define the dependence on external finance by sectors as the amount of desired investment that cannot be financed through internal cash flows generated by the same business, as in Rajan and Zingales (1998).[14] Because their measure is constructed for a distinct industry concordance[5] which does not directly map into the classification used by the BEA[6] we replicate their method and construct three alternative measures using data from Compustat:

1. EFD1: the share of capital expenditure that is not financed by cash-flows[7]
2. EFD2: the share of capital expenditure that is not financed by cash-flows or the net changes in operation-related assets and liabilities[8]

[4] See footnote 2.

[5] The International Standard Industrial Classification of All Economic Activities (ISIC)

[6] The 1987 Standard Industrial Classification (SIC87)

[7] In practice, we compute this index as one minus the ratio of cash-flows to capital expenditure, where cash-flows are defined as "Funds From Operations" (Compustat #110) and capital expenditure is defined as "Capital Expenditures" (Compustat #128). For some format, item #110 is not available and we re-construct it as the sum of Compustat #123, #125, #126, #106, #213, and #217.

[8] In practice, we compute this index as one minus the ratio of cash-flows plus decreases in inventories ("Decreases in Accounts Receivable", Compustat #302), decreases in receivables ("Decreases in Inventory",

3. EFD3: the share of capital expenditure, net acquisitions of plants and equipments that is not financed by cash-flows or the changes in operation-related assets and liabilities[9]

These different definitions allow us to assess the robustness of our results. For all three measures, we start by computing the average of the numerator and the average of the denominator separately by firms over the period 1977-1997. Then, we take the median ratio across firms as our measure.

We follow Braun (2003) [11] and define asset tangibility as net property, plant and equipment divided by book value of assets[10].

We cannot exactly compare our measures with those constructed by Braun (2003) [11] and Rajan and Zingales (1998) [14] because they use a different industry classification and restrict their focus to manufacturing. However an approximate matching of manufacturing industries based on industry names allows us to compute the correlations in table 11 in appendix. The correlations between different measures of the same index are all above .60, indicating that the methodology is robust. We also find that tangibility and external finance dependence are either not strongly correlated as in Braun (2003) [11] or negatively correlated depending on the measure used. We also check for the stability of the measures other time. The graphs of figure 6 in appendix show that the measures computed on split samples (1977-1986 and 1987-1997) are well correlated.

In Table 12 in the appendix we tabulate our indexes of exposure to finance by industry codes. We exclude from the analysis the industries of the financial and legal sector that are

Compustat #303), and increases in payables ("Increases in Accounts Payable and Accrued Liabilities", Compustat #304) to capital expenditure (Compustat #128).

[9] In practice, we compute this index as one minus the ratio of cashflows plus decreases in inventories, decreases in receivables, and increases in payables (Compustat #110+#302+#303+#304) over total investing activities which correspond to capital expenditure (Compustat #128), plus acquisitions (Acquisitions, Compustat #129), minus the sales of tangible assets ("Sale of Property, Plant, and Equipment", Compustat #107), plus the net increase in investments ("Increase in Investments", Compustat #113, minus "Sale of Investments", Compustat #109)

[10] Technically we first compute the average "net value of property, plant, and equipment" (Compustat #8) and the average value of "assets minus total liabilities and stockholder's equity" (Compustat #6) by firms over the period 1977-1997. We then take the median ratio across firms as our tangibility index. Note that Braun (2003) [11] reports that the correlation between tangibility and external finance dependence to be very weak (0.01).

affected by banking deregulation in a specific way and the industries that are not included in the CBP. We find that "Pipelines" and "Electric, gas and sanitary services" have the highest value for the tangibility index, while "Business services" and "Wholesale trade" have the lowest. "Chemicals and allied products" consistently emerges as the industry that relies the most on external finance for the three alternative measures. "Pipelines", on the other hand, is the industry generating the most excess cash-flows and has negative external funding needs. "Leather" follows close behind.

In addition, table 12 reports the share of each industry in total U.S. GDP, as well as the ratio of total wages to value added, the average wage, worker productivity (defined as nominal value added per worker) and average establishment employment (defined as number of workers per establishment) by industry at the beginning of our sample in 1977. The significance of the relationships are then estimated using weighted bivariate regressions and data from all states.[11] Estimates and significance levels are reported in table 13 in appendix. We find that industries with more tangible assets and more external finance needs have lower wage to nominal value added ratio and better worker productivity. This correlation with productivity is particularly large and significant for tangibility but barely significant for external finance dependence. We also find that industries that are more dependent on external finance also pay higher wages and typically feature smaller establishments.

We follow the literature by excluding Delaware and South Dakota throughout the analysis as these states differ from other states because their banking structure is skewed by the presence of credit card banks.

2.3 The different deregulations and their staggered implementation

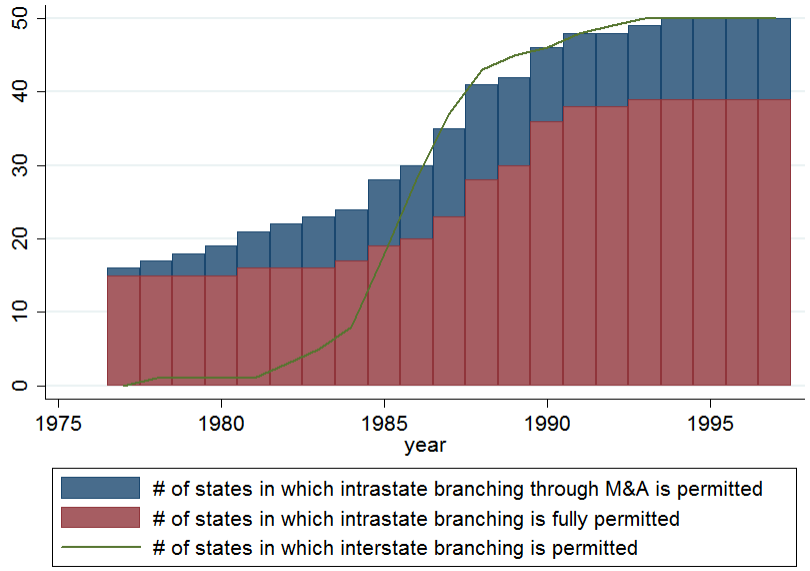
We use the state variation in the dates of banking deregulation reforms in our empirical analysis. Before the deregulations of the 1970's, banks needed a charter from the state legislature to operate on specific locations. For example, states restricted the opening of

[11] At the bottom of the table, we also report the correlations across characteristics using 1977 GDP weights.

new branching within state borders and branching by the merger and acquisition of local banks. They prevented multi-bank holding companies to convert offices of subsidiary banks (existing or acquired) into branches of a single integrated bank. States also restricted out-of-state bank holding companies to acquire in-state banks. Kroszner and Strahan (1999) [10] document how these translated into local banking monopolies and tightened the provision of credit.

This set of restrictive regulation was gradually removed starting from the end of the 1970's. We follow Amel (1993) [1] and Kroszner and Strahan (1999) [10] in the definition of the dates of the different type of reforms.[12] For the sake of conciseness, we follow common practice in the literature by focusing on the *interstate* banking deregulation and the *intrastate* branching deregulation through M&A as in Jayaratne and Strahan (1996), [8] Ceterolli and Strahan (2006) [5] and Bai et al. (2015) [2] to name a few.

Figure 1: Timing of the implementation of deregulation reforms



Sources: Kroszner and Strahan (1999) [10] and Dick and Lehnert (2010). [6]

Table 14 in appendix lists the dates of the reforms by state and figure 1 summarizes the timing of implementations. Most of states conducted some intra- or inter-state deregulation

[12] Kroszner and Strahan (1999) [10] distinguishes four type of reforms: authorization of multi-bank holding companies, *intrastate* branching through M&A, full *intrastate* branching, and *interstate* banking.

reforms in the 80's although 18 of them had conducted some reforms prior 1980. Ten states implemented some deregulation reform as late as in the early 90's, and the deregulation effort culminated in the federal 1994 Riegle-Neal *interstate* Banking and Branching Efficiency Act. Interestingly, there does not seem to be a typical sequence of reform as 32 states implemented a form of *intrastate* deregulation before any *interstate* deregulation while the 19 other states implemented an *interstate* deregulation reform before any *intrastate* reform.

3 Revisiting the evidence

3.1 The limitations of state-level approaches

For the purpose of our empirical analysis, it is important to assess whether there are systematic economic trends and conditions that brought states to reform earlier than other. These conditions must be controled for in order to identify the effect of banking deregulation.

We start by documenting that *intrastate* deregulation reforms were typically implemented when states were performing below national levels. We estimate the state-level effects by year before and after the reforms for a balanced panel of reformers[13] as follows:

$$GDP_{st} = \sum_{\tau=-5}^{\tau=5} \beta_\tau \mathcal{I}_{\{t=t_0(s)+\tau\}} + \delta_t + \gamma_s + \epsilon_{st} \tag{1}$$

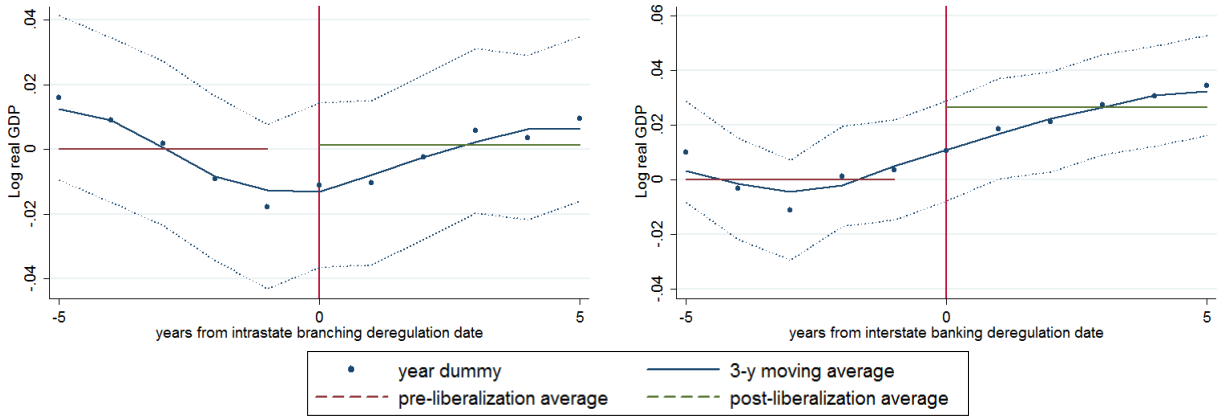
We use the notation $t_0(s)$ to represent the date of reform for state s.

Figure 2 provides a graphic representation of the estimation of equation (1). The results cast some doubts on the interpretation of the results in Jayaratne and Strahan (1996) [8] about *intrastate* deregulation: they argue that their state-level difference-in-difference positive estimates imply a causal effect of *intrastate* deregulation on growth. An alternative interpretation of their estimates is that states deregulated in the midst of local recessions

[13]For the graphical analysis of this section we choose to restrict the sample to states for which we have data five years before and after the reform date. This ensures that the effects we estimate are not driven by the entry or exit of states from the sample.

and that deregulation had no real effects. By contrast, there does not seem to be any pre-reform trend before *interstate* deregulations. These results underscore the necessity to control for state variable characteristic, including state-specific trends and business cycles.

Figure 2: The timing of deregulations and the average evolution of state GDP



Sources: BEA. Year ($\widehat{\beta}_\tau$) and average effects ($\frac{1}{5}\sum_{\tau>0}\widehat{\beta}_\tau, \frac{1}{5}\sum_{\tau\geq 0}\widehat{\beta}_\tau$) before and after the implementation of deregulation reforms for two balanced panels of states. The specification follows equation (1). The left panel focuses on the 27 *intrastate* branching deregulation reforms and the right panel focuses on the 46 *interstate* banking deregulation reforms for which we have 11 years of data. We excluded Delaware and South Dakota.

We nevertheless examine the equation considered in previous studies which relates state variable (y_{st}) to the indicators of having implemented a deregulation reform ($D_{st} = 1$):

$$y_{st} = \beta D_{st} + \delta_t + \gamma_s + \epsilon_{st} \tag{2}$$

In particular, we reproduce the results in Jayaratne and Strahan (1996) [8] in table 1. Their estimates show that *intrastate* deregulation is associated with an increase in GDP growth rates. We run similar regressions using the levels of state value added instead of the growth rates. Strikingly, all the effects vanish. Figure 2 and the previous analysis help to explain the difference between these apparently contradictory results. It suggests that states implement the *intrastate* branching deregulation when their economy has been under-performing for some years compared to the rest of the country. The growth rate estimates then capture the recovery effect in the years that follows. The level estimates additionally show that the buoyant growth that follows the reform does not do more than offset the negative effect of

Table 1: The effect of *intrastate* deregulation on GDP in growth rates and in levels

Reproducing table II in Jayaratne and Strahan (1996)					Specification in levels			
	Baseline		Regional effects		Baseline		Regional effects	
	OLS	WLS	OLS	WLS	OLS	WLS	OLS	WLS
Dintra1	1.271**	1.345***	0.657	1.022**	-2.623	-3.740	-3.235	-2.906
	(0.599)	(0.440)	(0.569)	(0.479)	(2.545)	(2.709)	(2.335)	(2.349)
Observations	668	668	641	641	668	668	641	641
R-squared	0.422	0.612	0.667	0.774	0.769	0.843	0.916	0.929
Dinter	0.608	0.782	1.111**	0.877	7.712**	4.973***	7.344***	5.780***
	(0.735)	(0.614)	(0.518)	(0.652)	(2.915)	(1.635)	(2.194)	(1.237)
Observations	653	653	626	626	653	653	626	626
R-squared	0.422	0.631	0.670	0.779	0.788	0.845	0.920	0.932
Regional-year	no	no	yes	yes	no	no	yes	yes
GDP weights	no	yes	no	yes	no	yes	no	yes

Sources: BEA. The dependent variable is the real GDP growth rate in the left panel and the level of state log real GDP in the right panel. Dintra1 is a state level indicator of *intrastate* branching deregulation and Dinter an indicator of *interstate* banking deregulation. The years of reform are dropped. Delaware is dropped. Alaska and Hawai are dropped in the last 2 columns of each panel. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

the ealier recession: states merely catch-up and do not gain relative to the country. By enlarge, it is not possible to know whether the results in Jayaratne and Strahan (1996) [8] can be attributed to the state cycles or to the effect of deregulation reforms.

3.2 Reform dates and potential endogeneity

More generally, it is important to control for state industrial mix and industry trends in any state-level regression. Indeed, without such controls, the deregulation dummies would wrongly associate nation-wide growth in particular sectors (e.g the financial sectors, or sectors with smaller establishments) as the effect of state-level deregulations.

We investigate whether state initial industrial structure has any relationship with the timing of reforms. To this end, we regress the dates of reform on various state average characteristics at the beginning of the sample in 1977. In particular, we consider the share of the financial sector in state GDP, state average establishment sizes, the employment share of private establishments[14], state average tangibility and state average external finance

[14]This corresponds to the share of employment in CBP to total employment measured by the BLS.

dependence.[15]

Regression results are reported in table 15 and illustrated with figures 7 and 8 in appendix. For both types of deregulation, we find that the states that deregulated earlier had a larger financial sector. relatively more people employed in private establishments and larger establishments on average. This suggests that large private establishments and the financial sector may have lobbied for earlier reform. We also find that when we control for the initial share of employment in private establishments, the state average finance exposure indexes are insignificantly related to the dates of reforms. We interpret these result as suggestive evidence that state specific structure of private industries is independent of the timing of reforms. These findings give support our identification strategy based on the differential responses of non-financial industries within states.

4 Industry heterogeneity

In this section, we implement a triple difference-in-difference strategy to estimate the effects of banking deregulation on GDP. Then we test whether initial industrial structure affects the magnitude of state responses. In what follows, we normalize our measures of exposure to have mean zero and a standard deviation equal to one in order to make the comparisons of effects easier across alternative measures[16]. Therefore one can interpret the interaction coefficients as the magnitude of the differential effect of deregulation on industries that are one standard deviation above the exposure national average.

[15]These last two averages are computed as the GDP-weighted average of industry characteristics using 1977 values.

[16]We used 1977-GDP weights to compute averages and standard deviations.

4.1 Differential effects across sectors with various finance exposure

In order to control for state-level variable effects, we introduce the following equation at the state-industry level:

$$y_{sjt} = \beta_1 D_{st} + \beta_2 E_j * D_{st} + \beta_3 Z_{sjt} + \delta_t + \gamma_s + \phi_j + \epsilon_{sjt} \tag{3}$$

E_j is one of the measure of industry j exposure to finance and we consider different set of time varying variables Z_{sjt} to control for trends and cycles at the state and industry levels. D_{st} are indicators that switch from zero to one when state s implements a deregulation reform, either the deregulation of *intrastate* banking (Dintra1) or the deregulation of *interstate* banking (Dinter). We start by including both the inter- and intra-state banking reforms.

Results in tables 2 and 3 demonstrate that *interstate* banking deregulation is associated with positive effects, but that results for *intrastate* deregulation are ambiguous. In particular in the first column, we estimate the specification of Jayaratne and Strahan (1996) [8] in levels on our sample that includes a few more years (1977-1997). Once again we found no relation between *intrastate* branching deregulation and changes in state GDP. By contrast, we do find that *interstate* deregulation reforms are associated with a 5% increase in GDP.[17] This dichotomy is true throughout our analysis and therefore we choose to focus on the *interstate* banking reform from now on.

Starting from the second columns (B), we exploit industry variation in exposure to finance using interaction terms as in equation (3). We find that the coefficient estimates are qualitatively consistent across specifications. Banking deregulation has a significant differential effect on the GDP of the industries that are more exposed to finance. All coefficient estimates have the expected sign: industries with greater external funding needs benefit relatively more and so do industries with less tangible assets. Coefficient estimates in table 22 in appendix show that the results are robust to alternative measures of external finance

[17] We also tried to include the indicator for *interstate* banking deregulation alone. Estimates reported in table 16 in appendix show that the results are almost unchanged.

Table 2: The differential effect of banking deregulation on GDP across industries

	2.A State aggregate	2.B State-industry	2.C +Weights	2.D +Controls	2.E Industry-year effects	2.F All effects
Dinter	0.054**	0.067***	0.057***	0.013***	0.018***	
	(0.022)	(0.009)	(0.009)	(0.004)	(0.004)	
EFD3*Dinter		0.047***	0.074***	0.012***	0.017***	0.016**
		(0.007)	(0.012)	(0.002)	(0.006)	(0.007)
Dintra1	-0.035	-0.013	-0.013	0.014***	0.025**	
	(0.027)	(0.012)	(0.019)	(0.004)	(0.011)	
EFD3*Dintra1		0.016*	0.010	0.003	-0.008	-0.012
		(0.008)	(0.015)	(0.004)	(0.009)	(0.009)
Observations	1,029	41,133	41,043	34,743	41,043	41,043
R-squared	0.849	0.380	0.484	0.890	0.914	0.919
Number of id	49	2,211	2,191	2,133		
DUMMIES						
State	yes	no	no	no	no	no
Year	yes	yes	yes	yes	no	no
State*Industry	no	yes	yes	yes	yes	yes
State*Year	no	no	no	no	no	yes
Industry*Year	no	no	no	no	yes	yes
CONTROLS						
lag variables	no	no	no	yes	no	no
state-level GDP	no	no	no	yes	yes	no
1977 GDP weights	no	no	yes	yes	yes	yes

Sources: Compustat and BEA. The dependent variable is the level of state log real GDP. Dinter and Dintra1 are respectively state level indicators of deregulations in *interstate* and *intrastate* banking. EFD3*Dinter and EFD3*Dintra1 are the interaction variables between deregulation indicators and the external finance dependence index. Delaware and South Dakota are dropped. The financial and legal services are dropped. Clustered standard errors at the state level in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 3: The differential effect of banking deregulation on GDP across industries

	3.A State aggregate	3.B State-industry	3.C +Weights	3.D +Controls	3.E Industry-year effects	3.F All effects
Dinter	0.054**	0.052***	0.058***	0.014***	0.017***	
	(0.022)	(0.009)	(0.009)	(0.004)	(0.004)	
Tang*Dinter		-0.006	-0.047***	-0.005*	-0.027***	-0.026***
		(0.009)	(0.012)	(0.002)	(0.006)	(0.006)
Dintra1	-0.035	-0.015	-0.011	0.015***	0.025**	
	(0.027)	(0.012)	(0.019)	(0.004)	(0.011)	
Tang*Dintra1		-0.018*	-0.019	-0.005**	0.006	0.007
		(0.010)	(0.014)	(0.003)	(0.010)	(0.010)
Observations	1,029	41,133	41,043	34,743	41,043	41,043
R-squared	0.849	0.371	0.474	0.890	0.914	0.919
Number of id	49	2,211	2,191	2,133		
DUMMIES						
State	yes	no	no	no	no	no
Year	yes	yes	yes	yes	no	no
State*Industry	no	yes	yes	yes	yes	yes
State*Year	no	no	no	no	no	yes
Industry*Year	no	no	no	no	yes	yes
CONTROLS						
lag variables	no	no	no	yes	no	no
state-level GDP	no	no	no	yes	yes	no
1977 GDP weights	no	no	yes	yes	yes	yes

Sources: Compustat and BEA. The dependent variable is the level of state log real GDP. Dinter and Dintra1 are respectively state level indicators of deregulations in *interstate* and *intrastate* banking. Tang*Dinter and Tang*Dintra1 are the interaction variables between deregulation indicators and the external finance dependence index. Delaware and South Dakota are dropped. The financial and legal services are dropped. Clustered standard errors at the state level in parentheses; *** p<0.01, ** p<0.05, * p<0.1

dependence. Additionally, the results in the appendix show that the external finance dependence and tangibility indexes are redundant as only one the two coefficients is significant most of the times. We choose to keep considering both to assess the robustness of our results and to focus on our third definition of external finance dependence for the sake of clarity.

The estimated magnitude of effects differ across specifications. Thanks to our normalization the results in the columns (B)-(C) of tables tables 2 and 3 are easy to interpret. The average effects of deregulations are captured by the coefficients on the deregulation indicators because the exposure indexes have mean zero. The estimates are similar to the the ones in the columns (A) because the set of state level controls is so far the same.[18] Furthermore results mean that industries that are one standard deviation away from the average exposure gain about twice more from the *interstate* deregulation reforms. In the weighted regressions, estimates suggest that there is no significant differential effects across industries of the *interstate* branching deregulation.

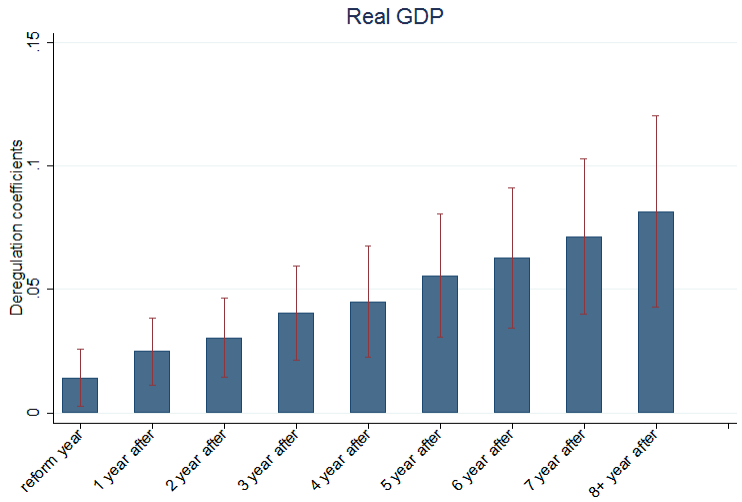
The analysis of the previous subsection underscored the necessity to control for state and industry characteristics and cycles. We examine the effect of introducing different controls in the remaining columns of tables 2 and 3. We include first and second order lag real GDP and the state aggregate GDP in column (D) to control for state cycles. We keep the state aggregate GDP levels and add industry-year effects to control for nation wide industry trends in column (E). In the last column we include both industry-year and state-year fixed effects. The estimates are quantitatively robust to the use of these alternative sets of controls, especially the last two. The results show that the effect of deregulations is three to six time smaller once nation wide industry variations and state cycles are controlled for.

4.2 Deregulation and growth differentials

Having established that *interstate* deregulation reforms were associated with increases in the level of GDP, we turn our attention to the effect on growth rates.

[18] The small differences in magnitude come from the use of weights and the presence of missing values for some industries at some dates.

Figure 3: Effects of deregulation over time after *interstate* deregulation reforms.



Sources: Compustat and BEA. Histogram of the coefficient estimates of the interaction variable between the deregulation indicators and the external finance dependence index (3). The specification follows equation 4. 95% confidence interval are based on clustered standard errors at the state level.

We illustrate the dynamics of the GDP effects by looking at the evolution of real GDP over time. We estimate the same equation as in specification (F) of table 2 except that we substitute the single *interstate* deregulation indicator with nine indicators that are respectively non zero in each of the first eight years from the date of the reform. The ninth indicator is non-zero for year eight and above:[19]

$$\log GDP_{sjt} = \sum_{\tau=0}^{\tau=7} \beta_\tau \mathcal{I}_\tau * E_j * Dinter + \beta_8 \mathcal{I}_{8+} * E_j * Dinter + \delta_{sj} + \gamma_{jt} + \gamma_{st} + \epsilon_{sjt} \qquad (4)$$

Figure 3 features the coefficient estimates by year and their 95% confidence interval. The results seem to support the view that the effect of *interstate* regulation on industry growth rates is steady at least over the first seven years: the magnitude of the estimates keeps increasing in a linear fashion over that period.

We examine whether deregulation is associated with faster growth using the same specifications as in columns (C), (E) and (F) of the previous analysis. The results confirm the conclusions drawn from figure 3. We find that the effect of *interstate* banking deregulation

[19]Given the period covered by our data, we observe 46 states in their eighth year after reform and 18 after 12 years and only five after 14 years.

Table 4: The differential effect of deregulation on GDP growth across industries

	Separate regressions by reform type			All reform types in the same regression		
	4.C Fixed effects	4.E Industry-year effects	4.F All effects	4.C Fixed effects	4.E Industry-year effects	4.F All effects
Dinter	1.190**	1.042**		1.382***	1.069**	
	(0.536)	(0.432)		(0.423)	(0.428)	
EFD3*Dinter	0.296*	0.555***	0.516**	0.265	0.427**	0.391*
	(0.163)	(0.199)	(0.214)	(0.241)	(0.196)	(0.218)
R-squared	0.088	0.521	0.535			
Observations	37,198	37,198	37,198			
Dintra1	1.739***	0.267		1.423***	0.226	
	(0.314)	(0.203)		(0.304)	(0.174)	
EFD3*Dintra1	0.263	0.123	0.095	0.051	0.198	0.196
	(0.201)	(0.211)	(0.214)	(0.288)	(0.217)	(0.220)
R-squared	0.083	0.524	0.539			
Observations	37,721	37,721	37,721			
R-squared				0.083	0.529	0.544
Observations				39,116	35,880	35,880
DUMMIES						
State*Industry	yes	yes	yes	yes	yes	yes
State*Year	no	no	yes	no	no	yes
Industry*Year	no	yes	yes	no	yes	yes
GDP growth control	no	yes	no	no	yes	no

Sources: Compustat and BEA. The dependent variable is the growth of log real GDP. The estimates are multiplied by 100. Dinter and Dintra1 are respectively state level indicators of deregulations in *interstate* and *intrastate* banking. EFD3*Dinter and EFD3*Dintra1 are the interaction variables between deregulation indicators and the external finance dependence index. Delaware and South Dakota are dropped. The financial and legal services are dropped. All regressions are weighted using 1977 GDP weights. Clustered standard errors at the state level in parentheses; *** p<0.01, ** p<0.05, * p<0.1

are so persistent throughout our sample that they are captured on GDP growth rates.[20] Coefficient estimates suggest that industries that are one standard deviation away from the exposure national average grow .4% or .5% faster. The results are robust to using the tangibility index instead as shown by the similar estimates reported in table 17 in appendix.

4.3 Initial difference in industry mix and variations in responses

It is well-established that industries are unevenly distributed across states. We found in the previous subsection that the effects of deregulation are heterogeneous across industries. Therefore it is natural to investigate whether state initial industry structure in 1977 can explain variation in the state responses to deregulation. In this subsection, we do exactly so.

We estimate the state-specific effects of deregulation $\widehat{GDP}_s$ using the following equation on the balanced panel of 43 states for which we have data five years before and after the reform date:

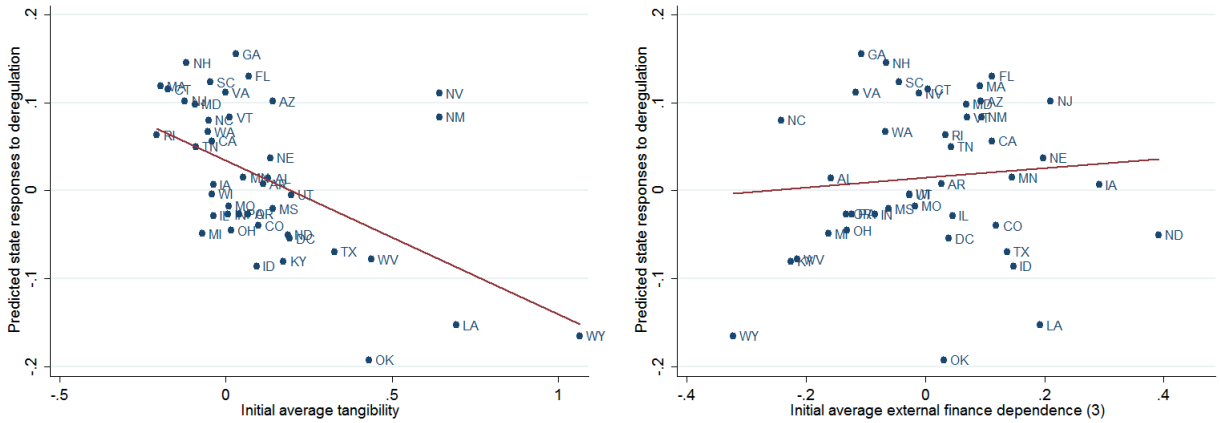
$$\log GDP_{sjt} = \sum_s \beta_s \mathcal{I}_s * Dinter_{st} + \delta_{sj} + \gamma_{jt} + \epsilon_{sjt} \tag{5}$$

$\mathcal{I}_s$ is a dummy variable for state s. We define the estimated state effects by $\widehat{GDP}_s = \widehat{\beta}_s$. We use a balanced sample with the same number of years for every states to make sure that results are not biased by the sluggish response of GDP. In other words we want to avoid that states deregulating earlier get assigned larger effects because we have more years of data for them.

We assess whether the industry mix of states in 1977 is a good predictor of state responses to deregulation by regressing $\widehat{GDP}_s$ on the state exposure average. We define the latter as follows: $\overline{E}_s = \sum_j \frac{GDP_{s,j,1977}}{\sum_{j'} GDP_{s,j',1977}} E_j$. E_j can be any of our exposure indexes. Results are illustrated in figure 4. Differences in average tangibility index of initial industry structure

[20] The results in table 4 show that the results on *intrastate* deregulation with the EFD index are not robust to the inclusion of controls for state cycles. This would suggest that the correct interpretation of the results in Jayaratne and Strahan (1996) [8] is that state recessions caused state legislator to deregulate *intrastate* banking and that the following recovery was a simple coincidence. However, estimates in table 17 in appendix nuances this view: for the first and only time we do find some positive and significant effect on growth using the tangibility index.

Figure 4: Initial industry mix and the variation in state responses to deregulation



Sources: Compustat and BEA. The red line correspond to the bivariate regression of the estimated deregulation effect from equation (5) on initial average exposure to finance.

are tightly related to differences in state responses to deregulation: the coefficient estimate of initial average tangibility is $-.24$ with a p-value of -5.38 and the R-squared of the WLS[21] bivariate regression is 34%. By contrast differences in the initial average external dependence index is unrelated to differences in state outcomes: the coefficient estimate of the regression is 0.08 and largely non-significant. Results in table 5 confirm that these findings are robust to the inclusion of a large set of controls.

We conclude that the initial industry mix in the private sector can explain one third of the variation in state responses to deregulation reforms.

5 The drivers of the increases in GDP

In this section, we examine different possible drivers of the GDP response. In particular, we consider changes in employment, changes in within-industry productivity and the average change in productivity resulting from the reallocation of workers across industries.

[21] We use state 1977 GDP weights. Results are similar for a simple OLS regression without weights.

Table 5: The effect of initial industrial structure on state estimated outcomes

The dependent variable is the state estimated response $\widehat{GDP_s}$			
	(5.1)	(5.2)	(5.3)
Initial tangibility average	-0.238***		-0.233***
	(0.044)		(0.066)
Initial EFD3 average		0.079	0.003
		(0.106)	(0.069)
GDP share of finance			0.005
			(0.004)
GDP share of the non-private sector			0.000
			(0.000)
Average establishment size			-0.018***
			(0.005)
Reform date			-0.018***
			(0.006)
Observations	43	43	43
R-squared	0.340	0.018	0.624
1977 GDP weights	yes	yes	yes

Sources: BEA and CBP. Weighted least square regression of the state predicted effect. Only the 1977 values of independent variables are used. Alaska, Delaware, Hawai, Kansas, Maine, Montana, New York and South Dakota are dropped. Robust standard errors are reported in parentheses; *** p<0.01, ** p<0.05, * p<0.1

5.1 A simple accounting decomposition

We start with a standard accounting decomposition of changes in GDP between two dates in two components: productivity changes and changes in employment. In a second we do the same by industry and sum across all industries j to get another expression for total changes:

$$\Delta GDP_{tot} = \overline{N}_{tot}\Delta PR_{tot} + \Delta N_{tot}\overline{PR}_{tot} \quad (6)$$

$$\Delta GDP_{tot} = \sum_j \left(\overline{N}_j \Delta PR_j + \Delta N_j \overline{PR}_j\right) \quad (7)$$

N represents the number of workers and $PR = \frac{GDP}{Nworkers}$ is a measure of productivity. The first term in each equation captures the change in productivity weighted by the average employment while the second term captures the contribution of the change in employment. Finally, we add and subtract to equation (7) the last term of equation (6) to obtain a decomposition of GDP and compute the relative contribution of the three components of

interest:

$$\Delta GDP_{tot} = \underbrace{\sum_j \overline{N}_j \Delta PR_j}_{\text{direct productivity}} + \underbrace{\left(\sum_j \Delta N_j \overline{PR}_j - \Delta N_{tot} \overline{PR}_{tot} \right)}_{\text{productivity gains from reallocation}} + \underbrace{\Delta N_{tot} \overline{PR}_{tot}}_{\text{employment}} \quad (8)$$

The contribution of the direct productivity changes is the weighted sum of disaggregated industry productivity changes. The contribution of reallocation is captured by the second term: when employment increases relatively more in sectors with above average productivity, then the contribution of reallocation is above. The last term is simply the total increase in employment.

To implement this decomposition in our context we first need to make state experiments comparable despite the fact that they occur at different point in time and for states of different sizes. To do so we first de-trend GDP, employment and productivity separately for each industry using the following equation:

$$\log y_{jt} = \delta_{js} + \gamma_{jt} + \epsilon_{sjt} \quad (9)$$

I use the residual in equation (9) as the de-trended variables $(\widetilde{GDP}, \widetilde{N}, \widetilde{PR})$.[22] A nice property of the weighted least square is that the accounting identity is preserved: $\widetilde{GDP} = \widetilde{N} * \widetilde{PR}$. Therefore we can implement the above decomposition in two steps. First we implement it on broad sectors where we divide the economy into the private and non-private sectors.[23] Then we implement the decomposition on the disaggregated industries of the private sectors. We choose to look at the difference between three years before and three years after reform dates. We aggregate results across states by computing the weighted

[22] I use 1977 GDP weights in the regression.

[23] See section 2 for a precise definition of this distinction.

Table 6: Accounting for the effects of *interstate* deregulation in a seven-year window

	Initial GDP share	GDP % change	Contribution of: productivity direct % change	Contribution of: productivity % change from reallocation	Contribution of: employment % change
Non-corporate sector	18,5	1,84	——— 1,73 ———		0,11
Corporate sector	81,5	4,36	11,22	-10,29	3,40
Total	100,0	3,97	1,09	0,28	2,60

Sources: BEA and CBP. Initial GDP correspond to the values three year before the reform. The percentage changes refer to the increases three years after the reform relative to three year before. Definitions of the contributions of GDP per worker (productivity) and employment are in the main text. Reallocation pertains to flows of workers across more disaggregated industries. DC, Delaware, Hawai, Maine and South Dakota are dropped.

average of relative effects:

$$\sum_s \left(\omega_s \frac{\Delta GDP_{tot,s}}{GDP_{tot,s,t_0(s)}} \right) = \sum_s \left(\omega_s \frac{\sum_j \overline{N}_{j,s} \Delta PR_{j,s}}{GDP_{tot,s,t_0(s)}} \right) + \sum_s \left(\omega_s \frac{\Delta N_{tot,s} \overline{PR}_{tot,s}}{GDP_{tot,s,t_0(s)}} \right) + \sum_s \left(\omega_s \frac{\left(\sum_j \Delta N_{j,s} \overline{PR}_{j,s} - \Delta N_{tot,s} \overline{PR}_{tot,s} \right)}{GDP_{tot,s,t_0(s)}} \right) \quad (10)$$

where we actually use de-trended variables, ω_s are the 1977 GDP weights and $t_0(s)$ are the dates of state reform.

The results of the decomposition are reported in table 6. First we find that the average increase in GDP three years after the reforms is a little under 4%. Two thirds of this increase can be attributed to an increase in employment and 7% to average productivity gains resulting from the reallocation of workers from the non-private to the private sector. The rest stems from changes in the average productivity of the each of the two broad sectors.

Average GDP gains in the private sectors are 4.36%. Of this, 78% can be attributed to an increase in employment. There large productivity gains within disaggregated industries. The contribution of reallocation is highly negative, suggestive large flows of workers towards private industries with low GDP per workers. This could be explained by the employment gains from the disaggregated industries that are more exposed to finance because they tend

to have lower GDP per worker. We test for this hypothesis in the next subsection.

5.2 Identification of the drivers of the increase

In this subsection, we formally identify the effects of banking deregulation on the determinants of GDP using the triple difference-in-difference comparison. We now decompose the real GDP into four components according to equations (11) and (12).

$$\log RGDP_{sjt} = \log \left({}^{RGDP}/_{Nworkers} \right)_{sjt} + \log Nworkers_{sjt} \quad (11)$$

$$\log Nworkers_{sjt} = \log \left({}^{Nworkers}/_{Estb} \right)_{sjt} + \log Estb_{sjt} \quad (12)$$

The above equations simply mean that log real value added ($RGDP$) is the sum of log worker productivity (${}^{RGDP}/_{Nworkers}$) and the log number of workers in private establishments ($Nworkers$) and that the latter is the sum of the log average establishment size (${}^{Nworkers}/_{Estb}$) and the log number of establishments ($Estb$).

Specification (F) results are reported in the second panel of table 7. The coefficient estimates for the external finance dependence index show that two thirds of the increase in real GDP are estimated to come from an increase in employment while the rest comes from a rise in worker productivity. With the tangibility index, all of the GDP increase is estimated to come from employment. The increase in workers for all industries in the states seems to be essentially related to an increase in establishment average size.

We also consider the effect on wages by looking at the wage rate and the ratio of total wages to value added. Industries that are more exposed to finance experience a decline in the share of labor compensation. This is consistent with substitution effects from labor to capital input in these industries.

The average effect implied by the coefficient estimates is obtained by multiplying the estimates with the national average of the exposure index.[24] It would correspond to the av-

[24]Formally, we account for the fact that indexes are normalized by dividing the coefficients by the standard deviation of the original index. Then we multiply them by the weighted average of the index using 1977

Table 7: The decomposition of the effect of deregulation on private sector GDP levels

	7.1 Real GDP	7.2 RGDP per worker	7.3 Number of workers	7.4 Workers per estab.	7.5 Number of estab.	7.6 Wage per worker (CBP)	7.7 Wage to VA ratio (BEA)
Panel I. Specification (A) with weights							
Dinter	0.042***	0.001	0.041**	0.026***	0.015	-0.023*	-0.005
	(0.014)	(0.008)	(0.017)	(0.009)	(0.012)	(0.012)	(0.005)
Observations	1,029	1,029	1,029	1,029	1,029	1,029	1,029
R-squared	0.895	0.675	0.805	0.706	0.906	0.982	0.303
Panel II. Specification (F), interaction with the external finance dependence index							
EFD3*Dinter	0.015**	0.005	0.009***	0.012***	-0.003	0.002	-0.007*
	(0.007)	(0.005)	(0.003)	(0.003)	(0.003)	(0.001)	(0.004)
implied avg. effect	0.031	0.010	0.018	0.024	-0.006	0.004	-0.014
Observations	41,043	41,043	41,043	41,043	41,043	41,043	41,043
R-squared	0.919	0.995	0.995	0.991	0.999	0.993	0.958
Panel III. Specification (F), interaction with the tangibility index							
Tang*Dinter	-0.025***	-0.002	-0.023***	-0.018***	-0.005	-0.000	0.007**
	(0.007)	(0.003)	(0.007)	(0.005)	(0.004)	(0.001)	(0.003)
implied avg. effect	0.052	0.004	0.048	0.038	0.010	0.000	-0.015
Observations	41,043	41,043	41,043	41,043	41,043	41,043	41,043
R-squared	0.919	0.995	0.995	0.991	0.999	0.993	0.958

Sources: Compustat, BEA and CBP. Specification (A) includes weights, year and state dummies while specification (F) has weights, state-year, industry-year and industry-state dummies as detailed in table 2. Dinter is a state level indicator of *interstate* banking deregulation. EFD3*Dinter and Tang*Dinter are the interaction variables with the indicator. The implied average effects are coefficient estimates multiplied by the exposure index national average. Delaware and South Dakota are dropped. The financial and legal services are dropped. Clustered standard errors at the state level in parentheses; *** p<0.01, ** p<0.05, * p<0.1

erage effect of deregulation if the reform effects were linear and operating only as a function of the degree of exposure to finance. We find that the implied average effects are quantitatively close to the estimates of the state aggregate effects. This means that the triple difference-in-difference can be useful to predict the magnitude of local aggregate effects.

Additional tables in the appendix report the effect of *interstate* banking deregulation on the variables of interest for specification (E). Other tables report the estimates obtained using alternative measures for the external finance dependence and using the different index together. The estimates are similar to those presented for specification (F), thereby

GDP values as weights: $\frac{avgEFD}{sdEFD} * \beta_{EFD3*Dinter}$.

demonstrating that the results are robust.

5.3 Where do workers come from?

We demonstrated that most of the state level differential effects are driven by an increase in the number of workers in private establishments as accounted in the CBP ($E_{priv.}$). We now examine the underlying factors driving this result with the following decomposition:

$$\log E_{priv.,st} = \log\left(\frac{E_{priv.}}{E}\right)_{st} + \log \underbrace{\left(E/LF\right)_{st}}_{\text{employment rate}} + \log \underbrace{\left(LF/POP\right)_{st}}_{\text{participation rate}} + \log POP_{st} \quad (13)$$

E is total employment[25] meaning that $(E_{priv.}/E)$ is the employment share of private establishments. LF_s is the labor force and POP_s is the population of state s.

We run the state level regression of specification (A) with weights for each of the above elements of the decomposition. The results in table 8 demonstrate that increases in private establishment workers come from worker reallocation within states. There are two main drivers. First the estimates shows that two third of the increase comes from the reallocation of workers from self-employment, government jobs or agricultural production to jobs in private establishments. Second, the remaining one third of the increase comes from the increase in the participation rates, or equivalently, from a decrease in unemployment.

5.4 The determinants of growth

We examine the evolution of the responses of productivity and production factors over time. We implement our baseline specification (F) using a sequence of deregulation indicators as described in equation (4) with the determinants of GDP instead of the latter. The results are featured in figure 5. They suggest that the estimated increase in GDP is driven by an increase in establishment size in the first three years following the reform. But the employment growth of existing establishments is limited in time. Thereafter, the response

[25] It includes workers that are not in private establishments as described in footnote 2.

Table 8: Decomposition of the effect of banking deregulation on employment

	8.1 Number of workers	8.2 Share of private empl.	8.3 Employment rate	8.4 Participa--tion rate	8.5 Pop.	8.6 Total RGDP	8.7 Private RGDP
Dinter	0.041**	0.019*	0.014***	-0.002	0.010	0.039***	0.042***
	(0.017)	(0.011)	(0.004)	(0.003)	(0.008)	(0.012)	(0.014)
Observations	1,029	1,029	1,029	1,029	1,029	1,029	1,029
R-squared	0.805	0.571	0.596	0.824	0.518	0.887	0.895
Number of id	49	49	49	49	49	49	49

Sources: BEA and CBP. All regressions include 1977 GDP weights, year effects and state fixed effects. Dinter is a state level indicator of *interstate* banking deregulation. Total RGDP is the real GDP of the entire economy including output from government activities, household production and agriculture while private RGDP (the measure of GDP used up to now) excludes them. Delaware and South Dakota are dropped. Clustered standard errors at the state level in parentheses; *** p<0.01, ** p<0.05, * p<0.1

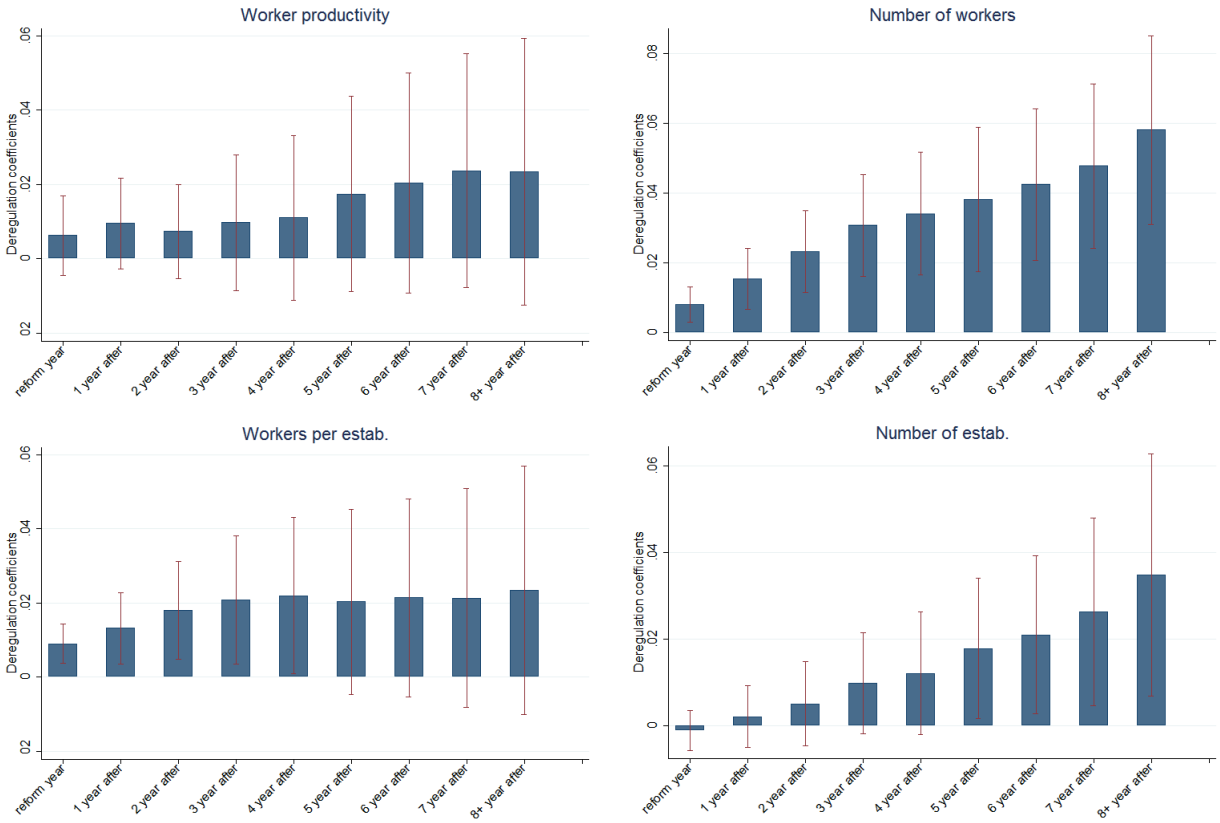
is achieved through establishment entry. Hence, the persistent growth differential effects of banking deregulation is driven by a differential increase in establishment entry rate rather than by a differential increase in establishment growth rates.

We formally estimate the relative contribution of the different drivers of industry GDP growth using the same analysis as in the previous section. Our findings are summarized in table 9 and nuances the accuracy of the graphical illustration in figure 5. While most of the GDP growth effects are estimated to come from employment gains for both exposure indexes, we find that establishment entry is estimated to be more relevant for industries with greater external funding needs than for industries with less tangible assets.

6 The direct effect of banking deregulation on productivity

So far we have estimated that the within-industry productivity changes resulting from banking deregulation are at best small and often insignificant. This is surprising for two reasons. First the results from the accounting decomposition suggested significant improvements in productivity on average. Second one would have expected banking deregulation to

Figure 5: The effects of banking deregulation on GDP determinants over time



Source: Compustat, BEA and CBP. Histogram of the coefficient estimates of the interaction variable between the deregulation indicator and the external finance dependence index (3). The specification follows equation (4). 95% confidence interval are based on clustered standard errors at the state level.

Table 9: The decomposition of the effect of banking deregulation on GDP growth

	9.1 Real GDP	9.2 RGDP per worker	9.3 Number of workers	9.4 Workers per estab.	9.5 Number of estab.	9.6 Wage per worker (CBP)	9.7 Wage to VA ratio (BEA)
Panel I. Specification (F), interaction with the external finance dependence index							
EFD3*Dinter	0.517**	0.060	0.457*	0.112	0.345***	-0.351***	-0.102
	(0.205)	(0.363)	(0.247)	(0.307)	(0.117)	(0.070)	(0.187)
implied avg. effect	1.053	0.122	0.931	0.228	0.703	-0.715	-0.208
Observations	35,848	35,848	35,848	35,848	35,848	35,848	35,848
R-squared	0.585	0.384	0.362	0.370	0.723	0.479	0.466
Panel II. Specification (F), interaction with the tangibility index							
Tang*Dinter	-0.482*	-0.033	-0.448	-0.343	-0.106	0.170	0.121
	(0.254)	(0.381)	(0.323)	(0.416)	(0.173)	(0.105)	(0.140)
implied avg. effect	1.008	0.069	0.937	0.718	0.222	-0.356	-0.253
Observations	35,848	35,848	35,848	35,848	35,848	35,848	35,848
R-squared	0.585	0.384	0.362	0.370	0.723	0.479	0.466

Sources: Compustat, BEA and CBP. All coefficient estimates are multiplied by 100. Panel I and II correspond to separate regressions. Specification (F) has weights, state-year, industry-year and industry-state dummies as detailed in table 2. Dinter is a state level indicator of *interstate* banking deregulation. EFD3*Dinter and Tang*Dinter are the interaction variables with the indicator. The implied average effects are coefficient estimates multiplied by the exposure index national average. Delaware and South Dakota are dropped. The financial and legal services are dropped. Clustered standard errors at the state level in parentheses; *** p<0.01, ** p<0.05, * p<0.1

result in a differential increase in capital investments at industries that are more exposed to finance. In turn, this differential investment rate would be expected to translate into improvements in worker productivity.

We conjecture that relative employment gains in the industries that are more exposed to finance caused a reduction in the average productivity of their workforce. This could be the results of diminishing returns to scale as establishments expand. This could also come from a decrease in the ability of the marginal worker of these industries as their employment share expands.

We test this hypothesis by introducing employment controls in our baseline specifications. This is an issue because measurement errors are likely to generate a spurious negative correlation between employment and our measure of productivity (GDP per worker). Therefore we instrument employment using lag values.

We report the 2SLS estimates in table 10. The results provide support to our conjecture. Once we control for industry employment share, we obtain larger coefficient estimates of the differential effect of banking deregulation. This implies that increases in employment shares do reduce industry-productivity and mask the direct gains resulting from banking deregulation. note that the first stage is very robust as demonstrated by the statistical tests reported in table 10. Instrumenting corrects for the expected downward bias of the estimates of employment shares on productivity.

7 Conclusion

This chapter uses the staggered deregulation of the banking sector in the U.S. between 1977 and 1997 to empirically investigate the role of industrial structure in determining the effects of banking deregulation. We contribute to the vast literature on the effects of banking deregulation by investigating the determinants of the well-know positive effects of banking. Specifically, we examine the relative contribution of changes in employment, within-industry

Table 10: The direct effect of *interstate* banking deregulation on GPD per worker

	Specification (E)			Specification (F)		
	10.1 OLS	10.2 OLS	10.3 2SLS	10.4 OLS	10.5 OLS	10.6 2SLS
Panel I.						
Dinter	0.010**	0.029***	0.020***			
	(0.004)	(0.007)	(0.005)			
EFD3*Dinter	0.007	0.011*	0.009	0.005	0.010	0.008
	(0.005)	(0.006)	(0.005)	(0.006)	(0.006)	(0.006)
implied average effects			0.018			0.016
Log number of workers		-0.375***	-0.203***		-0.489***	-0.294***
		(0.044)	(0.038)		(0.045)	(0.047)
Underidentification p-value			.000			.000
Maximum remaining bias			<10%			<10%
Observations	38,371	38,371	38,371	38,371	38,371	38,371
R-squared	0.995	0.995	0.995	0.995	0.996	0.996
Panel II.						
Dinter	0.010**	0.029***	0.020***			
	(0.004)	(0.007)	(0.005)			
Tang*Dinter	-0.001	-0.011***	-0.007**	-0.002	-0.013***	-0.009**
	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)
implied average effects			0.015			0.019
Log number of workers		-0.376***	-0.203***		-0.489***	-0.295***
		(0.044)	(0.038)		(0.045)	(0.047)
Underidentification p-value			.000			.000
Maximum remaining bias			<10%			<10%
Observations	38,371	38,371	38,371	38,371	38,371	38,371
R-squared	0.995	0.995	0.995	0.995	0.996	0.996

Sources: Compustat, BEA and CBP. The dependent variable is the real GDP per worker. Details about specifications (E) and (F) can be found in table 2. Panel I and II correspond to separate regressions. Dinter is a state level indicator of *interstate* banking deregulation. EFD3*Dinter and Tang*Dinter are the interaction variables between the deregulation indicator and the external finance dependence index and the tangibility index respectively. The implied average effects are coefficient estimates multiplied by the national exposure index average. Delaware and South Dakota are dropped. The financial and legal services are dropped. Clustered standard errors at the state level in parentheses; *** p<0.01, ** p<0.05, * p<0.1

productivity improvements and average productivity changes from the reallocation of workers across industries with different levels of productivity. We find that inter-industry reallocations are essential to understand the responses of GDP and productivity at the aggregate and the disaggregate industry levels.

Our identification strategy is a triple difference-in-difference making use of heterogeneity in industry exposure to finance and the variation in the timing of state banking deregulation reforms. The main findings can be summarized as follows. In the private sector, we show that the deregulation-induced reallocation of workers was directed towards industries with lower GDP per worker. Moreover, employment gains were associated with a reduction in productivity. Nevertheless we find that these effects are offset by across the board within-industry productivity gains. In addition, output and aggregate productivity increased because of the reallocation of workers out of unemployment, self-employment and non-private industries towards the more productive private sector. Finally we find that initial industry mix can explain up to one third of the variation in state aggregate responses.

References

[1] Dean Amel. State laws affecting the geographic expansion of commercial banks. manuscript, Board of Governors of the Federal Reserve System, 1993.

[2] John Jianqiu Bai, Daniel Carvalho, and Gordon Phillips. The impact of bank credit on labor reallocation and aggregate industry productivity. 2015.

[3] Efraim Benmelech, Nittai K Bergman, and Amit Seru. Financing labor. Technical report, National Bureau of Economic Research, 2011.

[4] Marianne Bertrand, Antoinette Schoar, and David Thesmar. Banking deregulation and industry structure: Evidence from the french banking reforms of 1985. The Journal of Finance, 62(2):597–628, 2007.

[5] Nicola Cetorelli and Philip E Strahan. Finance as a barrier to entry: Bank competition and industry structure in local us markets. The Journal of Finance, 61(1):437–461, 2006.

[6] Astrid A Dick and Andreas Lehnert. Personal bankruptcy and credit market competition. The Journal of Finance, 65(2):655–686, 2010.

[7] Rocco R. Huang. Evaluating the real effect of bank branching deregulation: Comparing contiguous counties across {US} state borders. Journal of Financial Economics, 87(3):678 – 705, 2008.

[8] Jith Jayaratne and Philip E. Strahan. The finance-growth nexus: Evidence from bank branch deregulation. The Quarterly Journal of Economics, pages 639–670, 1996.

[9] Christian A Johnson and Tara Rice. Assessing a decade of interstate bank branching. Wash. & Lee L. Rev., 65:73, 2008.

[10] Randall S. Kroszner and Philip E. Strahan. What drives deregulation? economics and politics of the relaxation of bank branching restrictions. The Quarterly Journal of Economics, 114(4):1437–1467, 1999.

[11] Braun Matias. Financial contractibility and assets' hardness: Industrial composition and growth. Technical report, mimeo, University of California Los Angeles, 2003.

[12] Casey B. Mulligan. Rising Labor Productivity during the 2008-9 Recession. NBER Working Papers 17584, National Bureau of Economic Research, Inc, November 2011.

[13] Marco Pagano and Giovanni Pica. Finance and employment. Economic Policy, 27(69):5–55, 2012.

[14] Raghuram G Rajan and Luigi Zingales. Financial Dependence and Growth. American Economic Review, 88(3):559–86, June 1998.

[15] Alwyn Young. Structural transformation, the mismeasurement of productivity growth, and the cost disease of services. The American Economic Review, 104(11):3635–3667, 2014.

Appendix

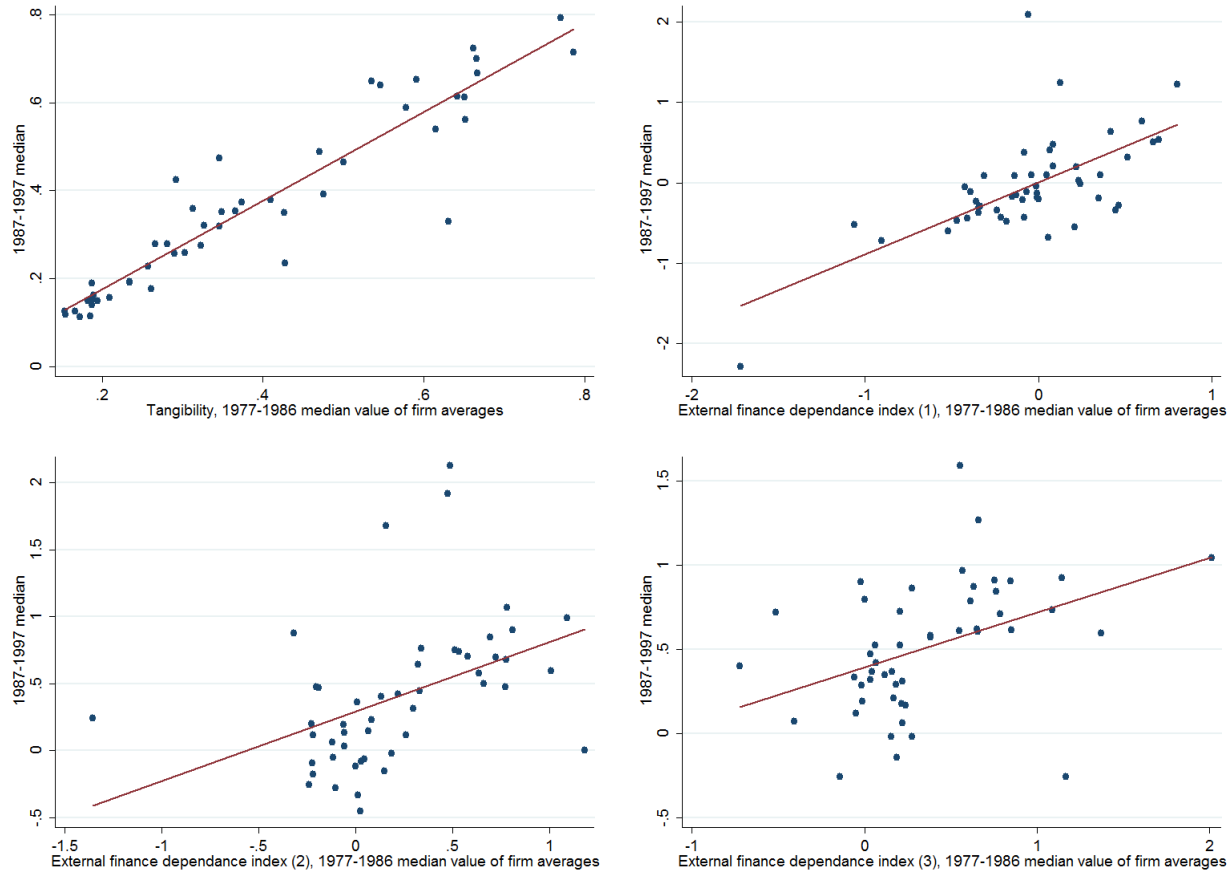
8 Data appendix: complementary data characteristics

Table 11: Indexes of exposure to finance: correlations across alternative measures.

	Our indexes			
	Tangibility	External finance dependence		
		alternative 1	alternative 2	alternative 3
Panel A. Braun (2003) indexes:				
Tangibility	0.85			
External finance dependence		0.62	0.79	0.65
Panel B. Our indexes:				
Tangibility	1			
External finance dependence 1	0.06	1		
External finance dependence 2	-0.29	0.79	1	
External finance dependence 3	-0.41	0.75	0.89	1

Source: Compustat. Panel A: Correlation of industry characteristics across 23 manufacturing industries with similar designations. Panel B: Correlations across all the 58 industries of the SIC87 classification excluding financial and legal services (8 industries).

Figure 6: Stability of exposure indexes over time.



Source: Compustat. Includes all private industries except pipelines, financial and legal services.

Table 12: Industry characteristics at the U.S. level in 1977.

SIC 87		Share of GDP	Tangibility	External finance need (1)	External finance need (2)	External finance need (3)	Wages /GDP ratio	Wage rate (BEA)	Nominal GDP per worker	Workers per estab.
2	Private industries	100.0	21.2	6.6	44.6	60.6	54.1	1.5	2.8	14.6
4	Farms	2.5	37.5	46.2	86.8	118.5	17.9			
5	Agr. Services, forestry, and fishing	0.4	34.6	24.1	12.4	26.1	47.4	1.5	3.2	5.1
7	Metal mining	0.1	61.6	86.4	89.8	81.9	79.0	2.2	2.8	95.2
8	Coal mining	0.6	61.5	-4.6	9.9	9.7	53.1	2.5	4.6	50.2
9	Oil and gas extraction	2.3	68.7	66.2	64.5	65.0	19.4	2.3	12.1	20.7
10	Nonmetallic minerals, except fuels	0.2	59.5	4.6	-0.2	-14.1	53.9	2.0	3.6	18.1
11	Construction	5.5	15.4	-11.2	71.4	76.9	68.8	1.9	2.8	7.8
14	Lumber and wood products	0.9	34.2	-20.9	4.6	24.1	60.3	1.4	2.4	20.9
15	Furniture and fixtures	0.4	27.9	-41.1	8.5	24.3	83.4	1.2	1.5	48.7
16	Stone, clay, and glass products	0.9	42.6	-15.1	0.9	14.6	73.4	1.8	2.5	36.2
17	Primary metal industries	1.9	38.4	-9.7	14.5	34.7	78.0	2.3	2.9	159.3
18	Fabricated metal products	2.0	28.1	-41.7	-5.7	20.9	75.7	1.7	2.3	48.6
19	Industrial machinery and equip^t	3.2	17.4	-4.0	62.1	68.8	71.7	1.9	2.6	46.8
20	Electronic and other electric equip^t	2.3	20.4	1.0	62.8	67.8	77.4	1.8	2.3	126.0
21	Motor vehicles and equipment	2.1	27.4	-27.2	14.8	34.7	64.9	1.4	2.1	191.2
22	Other transportation equipment	1.1	23.6	-35.8	6.8	21.1	102.6	1.1	1.1	191.2
23	Instruments and related products	0.8	15.5	27.0	108.3	104.8	75.1	1.8	2.4	81.0
24	Miscellaneous manufacturing	0.5	17.1	-15.8	68.1	69.9	69.1	1.2	1.8	28.3
26	Food and kindred products	2.4	36.0	-19.0	1.7	23.2	61.0	1.7	2.8	61.7
27	Tobacco products	0.3	18.8	-166.6	-127.7	13.1	21.4	2.1	9.6	249.4
28	Textile mill products	0.8	33.7	-17.9	13.5	19.0	77.0	1.1	1.5	130.4
29	Apparel and other textile products	0.9	13.9	-63.6	16.6	28.1	78.9	0.9	1.1	55.4
30	Paper and allied products	1.0	46.7	-11.3	1.8	16.8	68.1	1.9	2.8	101.1
31	Printing and publishing	1.4	26.8	-50.0	-10.5	22.8	68.9	1.5	2.2	25.3
32	Chemicals and allied products	2.3	19.8	123.0	167.1	135.7	55.6	2.4	4.4	77.1
33	Petroleum and coal products	0.5	58.2	-1.3	-10.7	3.9	61.7	4.1	6.7	66.0
34	Rubber and misc. plastics products	0.8	35.9	-11.2	12.2	20.8	72.3	1.5	2.1	66.0
35	Leather and leather products	0.2	13.6	-90.4	-27.8	-32.2	82.2	1.1	1.3	78.7
38	Railroad transportation	0.9	78.4	-3.8	-4.6	-9.6	78.5			
39	Local passenger transit	0.2	32.2	-39.4	46.6	52.2	72.7	1.5	2.1	14.1
40	Trucking and warehousing	1.8	57.6	12.1	23.9	24.7	68.8	1.8	2.7	14.1
41	Water transportation	0.3	66.7	31.7	38.8	34.4	73.7	2.0	2.7	28.8
42	Transportation by air	0.8	60.8	64.8	65.3	62.5	67.0	2.6	3.9	63.0
43	Pipelines, except natural gas	0.2	79.1	-330.6	-156.7	-137.5	14.4	6.9	47.6	11.9
44	Transportation services	0.3	17.7	-0.9	35.9	23.4	51.2	1.6	3.1	7.6
45	Communications	3.0	37.7	26.1	32.8	69.1	46.6	2.1	4.5	48.1
46	Electric, gas, and sanitary services	3.0	72.2	-2.7	1.1	10.1	30.2	2.4	8.0	42.9
47	Wholesale trade	8.3	13.2	-21.1	74.3	80.8	53.0	1.8	3.4	11.3
48	Retail trade	11.1	32.1	18.5	41.6	49.3	60.3	0.9	1.5	10.2

SIC 87		Share of GDP	Tangibility	External finance need (1)	External finance need (2)	External finance need (3)	Wages /GDP ratio	Wage rate (BEA)	GDP per worker	Workers per estab.
2	Private industries	100.0	21.2	6.6	44.6	60.6	54.1	1.5	2.8	14.6
58	Hotels and other lodging places	0.8	67.0	19.0	18.0	50.6	55.3	0.8	1.5	20.2
59	Personal services	0.8	29.6	-13.7	18.6	33.8	53.1	0.8	1.5	5.6
60	Business services	2.5	12.8	17.1	88.3	92.0	60.8	1.1	1.9	15.9
61	Automotive repair, services	0.8	63.2	50.4	54.0	37.5	41.9	1.2	2.8	4.9
62	Miscellaneous repair services	0.3	16.7	1.1	171.5	104.2	54.1	1.2	2.3	5.1
63	Motion pictures	0.3	38.4	40.3	74.2	74.7	55.6	1.4	2.5	11.8
64	Amusement and recreation services	0.6	64.4	34.9	31.6	46.0	53.8	1.0	1.8	12.5
65	Health services	4.4	28.3	1.5	67.4	79.6	71.7	1.2	1.7	15.3
67	Educational services	0.7	21.5	-8.2	40.0	67.5	91.8	1.1	1.2	38.2
68	Social services	0.4	51.4	73.5	89.4	91.2	96.3	0.8	0.8	14.6
69	Membership organizations	0.7					96.7	1.1	1.2	8.0
70	Other services	1.3	15.7	1.8	70.0	81.8	61.8	2.1	3.3	9.1
71	Private households	0.3					100.0			
	Employment weighted average		29.51	.24	44.46	54.45	66.35	1.42	2.29	41.60
	Employment weighted sd		14.06	30.90	34.15	27.09	13.48	0.50	1.39	51.91
	Employment weighted correlation									
	– with tangibility		1.00	0.34	-0.40	-0.45	-0.24	0.01	0.23	-0.03
	– with external finance need (3)		-0.45	0.51	0.94	1.00	-0.13	0.13	0.07	-0.32
	Excluded financial and legal services:									
50	Depository institutions	2.5	1.5	-67.7	-46.6	-3.1	41.8	1.4	3.3	30.4
51	Nondepository institutions	0.4	1.7	-284.6	113.3	95.2	87.5	1.3	1.4	8.6
52	Security and commodity brokers	0.4	3.3	-138.7	103.2	97.6	68.2	2.5	3.6	19.9
53	Insurance carriers	1.7	1.6	-571.2	-120.3	59.6	60.9	1.6	2.6	36.0
54	Insurance agents, broke	0.6	9.4	-89.4	-62.5	40.9	52.8	1.5	2.8	5.1
55	Real estate	11.2	34.9	31.6	33.9	62.4	5.1	1.1	22.3	4.9
56	Holding and other investment offices	0.1	0.2	41.6	66.3	80.9	132.5	1.4	1.0	10.0
66	Legal services	1.0	11.7	596.5	453.2	204.3	38.4	1.7	4.3	4.3

Source: Compustat, BEA and CBP.

Table 13: Correlations between exposure indexes and industry characteristics in 1977

	Wage to GDP ratio	Wage rate BEA	GDP per worker	Workers per establishment
Tangibility	-3.490***	-0.034	0.400***	0.749
	(0.307)	(0.036)	(0.090)	(2.062)
R-squared	0.126	0.176	0.121	0.111
External finance dependence (1)	-4.268***	-0.061**	0.115	-20.813***
	(0.496)	(0.026)	(0.070)	(4.562)
R-squared	0.143	0.179	0.096	0.153
External finance dependence (2)	-1.742***	0.078***	0.106**	-23.943***
	(0.405)	(0.019)	(0.046)	(4.032)
R-squared	0.102	0.182	0.096	0.169
External finance dependence (3)	-1.598***	0.078***	0.081*	-24.017***
	(0.397)	(0.021)	(0.044)	(3.910)
R-squared	0.100	0.182	0.095	0.168
Observations	2,066	2,068	2,111	2,126

Source: Compustat, BEA and CBP. Each cell corresponds to one single regression with state fixed effects and with 1977 state-industry GDP weights. The exposure indexes were normalized to have mean zero and a standard deviation of one to facilitate comparisons. Delaware and South Dakota as well as the financial and legal sectors were excluded. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

.

Table 14: Deregulation of restrictions on geographical expansion by state.

State	Intrastate branching through M&A	Full intrastate branching permitted	Interstate banking permitted	Multibank holding companies permitted
AL	1981	1990	1987	<1970
AK	<1970	<1970	1982	<1970
AZ	<1970	<1970	1986	<1970
AR	1994	**	1989	1985
CA	<1970	<1970	1987	<1970
CO	1991	**	1988	<1970
CT	1980	1988	1983	<1970
DE	<1970	<1970	1988	<1970
DC	<1970	<1970	1985	<1970
FL	1988	1988	1985	<1970
GA	1983	**	1985	1976
HI	1986	1986	>1997	<1970
ID	<1970	<1970	1985	<1970
IL	1988	1993	1986	1982
IN	1989	1991	1986	1985
IA	1997	**	1991	1984
KS	1987	1990	1992	1985
KY	1990	**	1984	1984
LA	1988	1988	1987	1985
ME	1975	1975	1978	<1970
MD	<1970	<1970	1985	<1970
MA	1984	1984	1983	<1970
MI	1987	1988	1986	1971
MN	1993	**	1986	<1970
MS	1986	1989	1988	1990
MO	1990	1990	1986	<1970
MT	1990	**	1993	<1970
NE	1985	**	1990	1983
NV	<1970	<1970	1985	<1970
NH	1987	1987	1987	<1970
NJ	1977	**	1986	<1970
NM	1991	1991	1989	<1970
NY	1976	1976	1982	1976
NC	<1970	<1970	1985	<1970

State	Intrastate branching through M&A	Full intrastate branching permitted	Interstate banking permitted	Multibank holding companies permitted
ND	1987	**	1991	<1970
OH	1979	1989	1985	<1970
OK	1988	**	1987	1983
OR	1985	1985	1986	<1970
PA	1982	1990	1986	1982
RI	<1970	<1970	1984	<1970
SC	<1970	<1970	1986	<1970
SD	<1970	<1970	1988	<1970
TN	1985	1990	1985	<1970
TX	1988	1988	1987	1970
UT	1981	1981	1984	<1970
VT	1970	1970	1988	<1970
VA	1978	1987	1985	<1970
WA	1985	1985	1987	1981
WV	1987	1987	1988	1982
WI	1990	1990	1987	<1970
WY	1988	**	1987	<1970

Sources: Amel (1993),[1] updates by Koshner and Strahan (1999)[10] and Johnston and Rice (2007).[9]** States not yet deregulated in 1997 at the time of Koshner and Strahan (1999). The first and the third columns correspond respectively to Dick and and Lehnert (2010)'s intrastate branching and interstate banking deregulation dates whenever available.

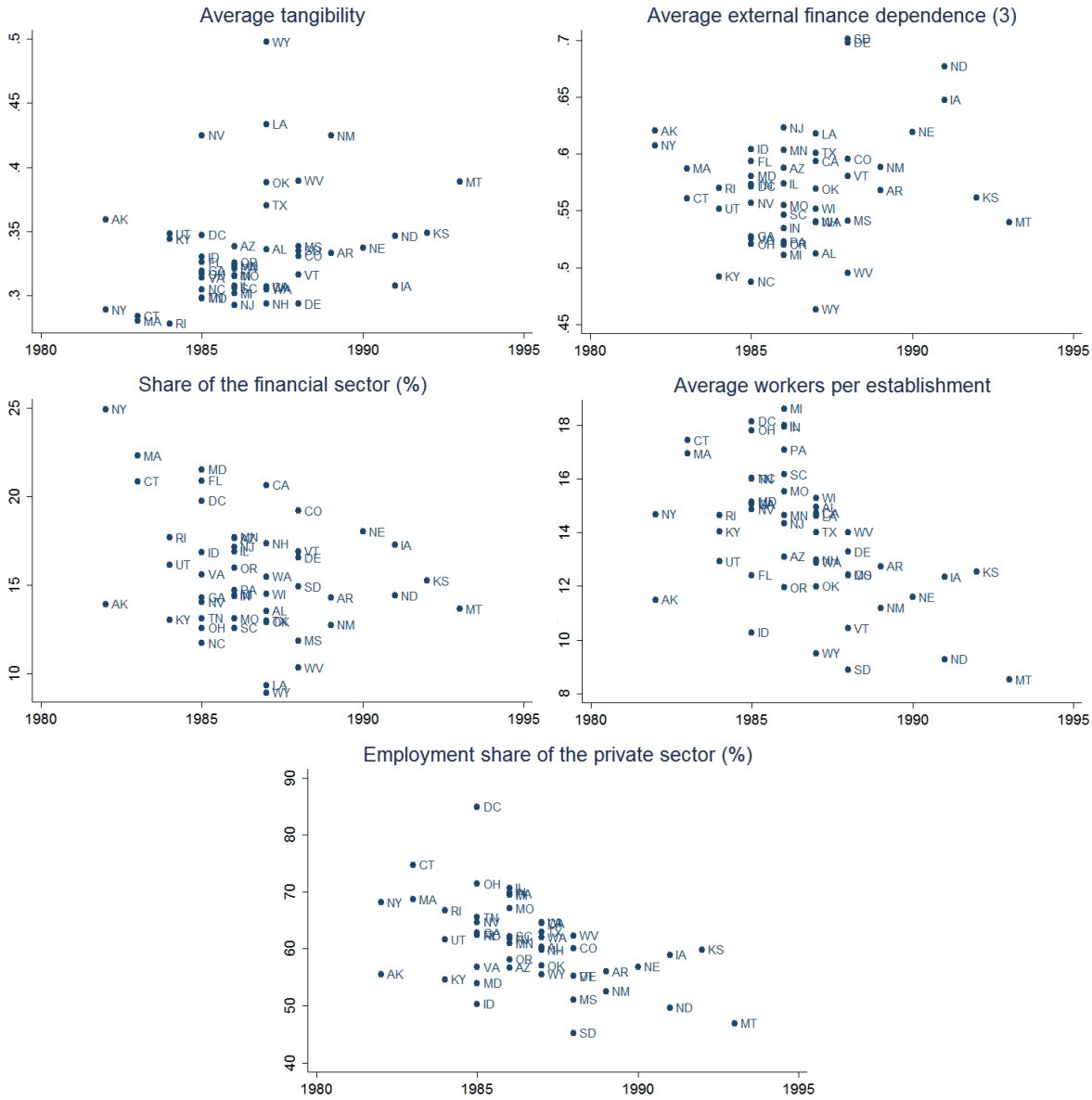
.

Table 15: Begining of period characteristics of the states that deregulated earlier

	Interstate deregulation date		Intrastate deregulation date	
	(15.1)	(15.2)	(15.3)	(15.4)
Average tangibility	15.698**	-5.066	21.630	16.519
	(7.467)	(10.033)	(13.498)	(20.859)
R-squared	0.086		0.083	
Average external	9.187**		14.452	
finance dependence (1)	(4.267)		(8.617)	
R-squared	0.090		0.076	
Average external	6.915		14.397	
finance dependence (2)	(5.230)		(13.139)	
R-squared	0.036		0.037	
Average external	9.231	7.350	18.052	20.124
finance dependence (3)	(6.591)	(6.830)	(14.495)	(15.589)
R-squared	0.040		0.048	
GDP share of	-0.205**	-0.244*	-0.146	-0.015
the financial sector	(0.098)	(0.126)	(0.188)	(0.254)
R-squared	0.086		0.019	
Average workers	-0.484***	-0.477*	-0.458*	-0.679
per establishment	(0.114)	(0.269)	(0.234)	(0.646)
R-squared	0.278		0.110	
Employment share	-0.151***	-0.021	-0.458*	-0.391
of the private sector	(0.040)	(0.084)	(0.089)	(0.232)
R-squared	0.230		0.172	
Observations	49	49	33	33
R-squared		0.349		0.248

Sources: Compustat, BEA and CBP. We use 1977 values for independent variables. The state average exposure indexes are computed using industry GDP weights. Columns 1 and 3 feature bivariate regressions where dates of the reform are regressed on one independent variable at a time. Only the states that deregulate between 1979 and 1994 are included. All regressions include a constant. Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Figure 7: 1977 state characteristics and the timing of interstate banking reforms.

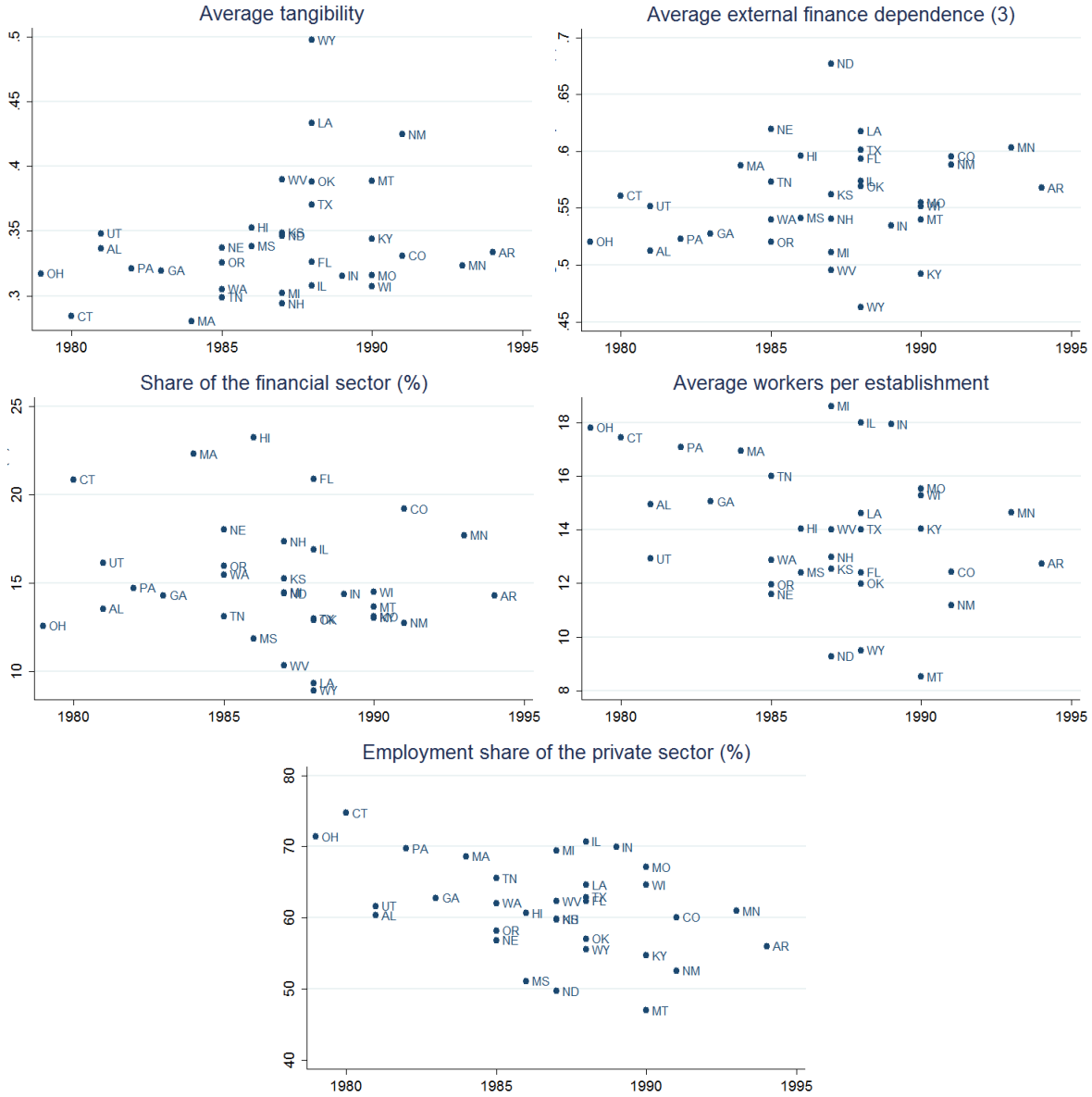


Sources: Compustat, BEA and CBP. The state average exposure indexes are computed using 1977 industry GDP weights. The horizontal axis shows the year of reform.

9 Robustness tables

.

Figure 8: 1977 state characteristics and the timing of intrastate branching reforms.



Sources: Compustat, BEA and CBP. The state average exposure indexes are computed using 1977 industry GDP weights. The horizontal axis shows the year of reform.

Table 16: The differential effects of interstate banking deregulation across industries.

	16.A State aggregate	16B State-industry	16.C +Weights	16.D +Controls	16.E Industry-year effects	16.F All effects
Panel A: External finance dependence (3)						
Dinter	0.051**	0.068***	0.055***	0.016***	0.022***	
	(0.021)	(0.009)	(0.009)	(0.004)	(0.005)	
EFD3*Dinter		0.056***	0.079***	0.014***	0.016**	0.015**
		(0.006)	(0.011)	(0.002)	(0.007)	(0.007)
Observations	1,029	41,133	41,043	34,743	41,043	41,043
R-squared	0.847	0.380	0.484	0.890	0.913	0.919
Number of id	49	2,211	2,191	2,133		
Panel B: Tangibility						
Dinter	0.051**	0.053***	0.056***	0.016***	0.021***	
	(0.021)	(0.009)	(0.009)	(0.004)	(0.005)	
Tang*Dinter		-0.016*	-0.057***	-0.007***	-0.026***	-0.025***
		(0.008)	(0.011)	(0.002)	(0.006)	(0.007)
Observations	1,029	41,133	41,043	34,743	41,043	41,043
R-squared	0.847	0.370	0.473	0.889	0.914	0.919
Number of id	49	2,211	2,191	2,133		
DUMMIES						
State	yes	no	no	no	no	no
Year	yes	yes	yes	yes	no	no
State*Industry	no	yes	yes	yes	yes	yes
State*Year	no	no	no	no	no	yes
Industry*Year	no	no	no	no	yes	yes
CONTROLS						
lag variables	no	no	no	yes	no	no
state-level GDP	no	no	no	yes	yes	no
1977 GDP weights	no	no	yes	yes	yes	yes

Sources: Compustat and BEA. The dependent variable is the level of state log real GDP. Panel A and B correspond to separate regressions. Dinter is a state level indicator of interstate banking deregulation. EFD3*Dinter and Tang*Dinter are the interaction variables between the deregulation indicator and the finance exposure indexes. Delaware and South Dakota are dropped. The financial and legal services are dropped. Clustered standard errors at the state level in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 17: The differential effect of banking deregulation on growth across industries

	Separate regressions by reform type			All reform types in the same regression		
	17.C Fixed effects	17.E Industry-year effects	17.F All effects	17.C Fixed effects	17.E Industry-year effects	??.F All effects
Dinter	1.192**	1.046**		1.395***	1.065**	
	(0.536)	(0.429)		(0.420)	(0.425)	
Tang*Dinter	0.098	-0.394	-0.362	0.286	-0.367	-0.330
	(0.163)	(0.247)	(0.257)	(0.209)	(0.229)	(0.241)
R-squared	0.087	0.521	0.535			
Observations	37,198	37,198	37,198			
Dintra1	1.745***	0.245		1.410***	0.205	
	(0.315)	(0.199)		(0.304)	(0.172)	
Tang*Dintra1	-0.243	-0.556**	-0.566**	-0.385	-0.559**	-0.568**
	(0.187)	(0.221)	(0.221)	(0.240)	(0.226)	(0.231)
R-squared	0.083	0.524	0.539			
Observations	37,721	37,721	37,721			
R-squared				0.083	0.529	0.544
Observations				39,116	35,880	35,880
DUMMIES						
State*Industry	yes	yes	yes	yes	yes	yes
State*Year	no	no	yes	no	no	yes
Industry*Year	no	yes	yes	no	yes	yes
GDP growth	no	yes	no	no	yes	no

Sources: Compustat and BEA. The dependent variable is the growth of log real GDP. The estimates are multiplied by 100. Dinter and Dintra1 are respectively state level indicators of deregulations in interstate and intrastate banking. Tang*Dinter and Tang*Dintra1 are the interaction variables between deregulation indicators and the asset tangibility index. Delaware and South Dakota are dropped. The financial and legal services are dropped. All regressions are weighted using 1977 GDP weights. Clustered standard errors at the state level in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 18: Growth effects of inter- and intra-state deregulation using both indexes

	All reform types in the same regression		
	18.C Fixed effects	18.E Industry-year effects	18.F All effects
Dinter	1.400***	1.062**	
	(0.423)	(0.426)	
EFD3*Dinter	0.648**	0.340	0.318
	(0.275)	(0.304)	(0.336)
Tang*Dinter	0.668***	-0.166	-0.141
	(0.246)	(0.338)	(0.358)
Dintra1	1.400***	0.201	
	(0.304)	(0.170)	
EFD3*Dintra1	-0.280	-0.200	-0.219
	(0.325)	(0.222)	(0.225)
Tang*Dintra1	-0.570**	-0.682***	-0.704***
	(0.267)	(0.230)	(0.236)
R-squared	0.083	0.529	0.544
Observations	39,116	35,880	35,880
Number of id	2,189		
DUMMIES			
State*Industry	yes	yes	yes
State*Year	no	no	yes
Industry*Year	no	yes	yes
GDP growth control	no	yes	no

Sources: Compustat and BEA. The dependent variable is the the growth of log real GDP. The estimates are multiplied by 100. Dinter and Dintra1 are respectively state level indicators of deregulations in interstate and intrastate banking. EFD3*Dinter, EFD3*Dintra1, Tang*Dinter and Tang*Dintra1 are the interaction variables between deregulation indicators and the finance exposure indexes. Delaware and South Dakota are dropped. The financial and legal services are dropped. All regressions are weighted using 1977 GDP weights. Clustered standard errors at the state level in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 19: Decomposition of the deregulation effect on GDP using specification (E)

	19.1 Real GDP	19.2 RGDP per ctivity	19.3 Number of workers	19.4 Workers per estab.	19.5 Number of estab.	19.6 Wage per worker (CBP)	19.7 Wage to VA ratio (BEA)
Panel I. Specification (A)							with weights
Dinter	0.042***	0.001	0.041**	0.026***	0.015	-0.023*	-0.005
	(0.014)	(0.008)	(0.017)	(0.009)	(0.012)	(0.012)	(0.005)
Observations	1,029	1,029	1,029	1,029	1,029	1,029	1,029
R-squared	0.895	0.675	0.805	0.706	0.906	0.982	0.303
Panel II. Specification (E), interaction with the external finance dependence index							
Dinter	0.022***	0.010**	0.011***	0.002	0.012**	0.001	-0.007
	(0.005)	(0.004)	(0.003)	(0.005)	(0.005)	(0.002)	(0.005)
EFD3*Dinter	0.016**	0.006	0.010***	0.012***	-0.002	0.002	-0.008**
	(0.007)	(0.005)	(0.003)	(0.003)	(0.003)	(0.001)	(0.004)
implied avg. effect	0.033	0.012	0.020	0.024	-0.004	0.004	-0.016
Observations	41,043	41,043	41,043	41,043	41,043	41,043	41,043
R-squared	0.913	0.994	0.994	0.990	0.999	0.993	0.956
Panel III. Specification (E), interaction with the tangibility index							
Dinter	0.021***	0.010**	0.010***	0.001	0.012**	0.001	-0.006
	(0.005)	(0.004)	(0.003)	(0.005)	(0.005)	(0.002)	(0.005)
Tang*Dinter	-0.026***	-0.001	-0.024***	-0.018***	-0.006	-0.000	0.007**
	(0.006)	(0.003)	(0.007)	(0.006)	(0.004)	(0.001)	(0.004)
implied avg. effect	0.054	0.002	0.050	0.038	0.013	0.000	-0.015
Observations	41,043	41,043	41,043	41,043	41,043	41,043	41,043
R-squared	0.914	0.994	0.994	0.990	0.999	0.993	0.956

Sources: Compustat, BEA and CBP. Specification (A) includes weights, year and state dummies while specification (E) has weights, state-wide control, industry-year and industry-state dummies as detailed in table 2. Dinter is a state level indicator of interstate banking deregulation. EFD3*Dinter and Tang*Dinter are the interaction variables with the indicator. The implied average effects are coefficient estimates multiplied by the exposure index national average. Delaware and South Dakota are dropped. The financial and legal services are dropped. Clustered standard errors at the state level in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 20: Decomposition of the differential effects of inter- and intra-state deregulation

	20.1 Real GDP	20.2 RGDP per worker	20.3 Number of workers	20.4 Workers per estab.	20.5 Number of estab.	20.6 Wage per worker (CBP)	20.7 Wage to VA ratio (BEA)
Panel I. Specification (E): weights, state-wide control, industry-year and industry-state dummies							
Dinter	0.018***	0.009**	0.008**	0.002	0.010**	-0.000	-0.006
	(0.004)	(0.004)	(0.003)	(0.005)	(0.004)	(0.002)	(0.004)
EFD3*Dinter	0.017***	0.007	0.010***	0.012***	-0.002	0.002	-0.008**
	(0.006)	(0.005)	(0.003)	(0.003)	(0.003)	(0.001)	(0.004)
Dintra1	0.025**	0.003	0.017*	0.002	0.015**	0.008*	-0.004
	(0.011)	(0.007)	(0.009)	(0.007)	(0.007)	(0.004)	(0.005)
EFD3*Dintra1	-0.008	-0.005	-0.002	-0.000	-0.002	-0.000	0.002
	(0.009)	(0.008)	(0.005)	(0.005)	(0.004)	(0.003)	(0.005)
Observations	41,043	41,043	41,043	41,043	41,043	41,043	41,043
R-squared	0.914	0.994	0.994	0.990	0.999	0.968	0.956
Panel II. Specification (F): weights, state-year, industry-year and industry-state dummies							
EFD3*Dinter	0.016**	0.006	0.010***	0.012***	-0.002	0.002*	-0.008**
	(0.007)	(0.006)	(0.004)	(0.004)	(0.003)	(0.001)	(0.004)
EFD3*Dintra1	-0.012	-0.007	-0.005	-0.001	-0.004	-0.001	0.003
	(0.009)	(0.008)	(0.005)	(0.005)	(0.005)	(0.003)	(0.005)
Observations	41,043	41,043	41,043	41,043	41,043	41,043	41,043
R-squared	0.919	0.995	0.995	0.991	0.999	0.993	0.958

Sources: Compustat, BEA and CBP. Details about specifications (E) and (F) can be found in table 2. Dinter and Dintra1 are respectively state level indicators of deregulations in interstate and intrastate banking. EFD3*Dinter and EFD3*Dintra1 are the interaction variables between deregulation indicators and the external finance dependence index. Delaware and South Dakota are dropped. The financial and legal services are dropped. Clustered standard errors at the state level in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 21: Decomposition of the deregulation effect on growth using specification (E)

	21.1 Real GDP	21.2 RGDP per worker	21.3 Number of workers	21.4 Workers per estab.	21.5 Number of estab.	21.6 Wage per worker (CBP)	21.7 Wage to VA ratio (BEA)
Panel I. Specification (E), interaction with the external finance dependence index							
Dinter	1.108**	0.757***	0.328	0.018	0.202	0.090	0.202
	(0.417)	(0.267)	(0.260)	(0.193)	(0.147)	(0.087)	(0.156)
EFD3*Dinter	0.568***	0.101	0.460*	0.095	0.359***	-0.343***	-0.064
	(0.189)	(0.347)	(0.250)	(0.309)	(0.112)	(0.068)	(0.182)
implied avg. effect	1.157	0.206	0.937	0.193	0.731	-0.699	-0.130
Observations	35,848	35,848	35,848	35,848	35,848	35,848	35,848
R-squared	0.567	0.369	0.344	0.354	0.713	0.459	0.443
Panel II. Specification (E), interaction with the tangibility index							
Dinter	1.109***	0.759***	0.329	0.004	0.215	0.080	0.204
	(0.411)	(0.263)	(0.258)	(0.191)	(0.154)	(0.085)	(0.157)
Tang*Dinter	-0.535**	-0.065	-0.433	-0.325	-0.108	0.159	0.094
	(0.238)	(0.348)	(0.320)	(0.404)	(0.161)	(0.102)	(0.153)
implied avg. effect	1.119	0.136	0.906	0.680	0.226	-0.333	-0.197
Observations	35,848	35,848	35,848	35,848	35,848	35,848	35,848
R-squared	0.567	0.369	0.344	0.354	0.712	0.459	0.443

Sources: Compustat, BEA and CBP. All coefficient estimates are multiplied by 100. Panel I and II correspond to separate regressions. Specification (E) has weights, state-wide control, industry-year and industry-state dummies as detailed in table 2. Dinter is a state level indicator of interstate banking deregulation. EFD3*Dinter and Tang*Dinter are the interaction variables with the indicator. The implied average effects are coefficient estimates multiplied by the exposure index national average. Delaware and South Dakota are dropped. The financial and legal services are dropped. Clustered standard errors at the state level in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 22: Robustness of the deregulation differential effects across indexes of exposure

	Specification E: state-wide control				Specification F: State-year, ind.-year effects			
VARIABLES	EFD (1)	EFD (2)	Tangibility	with EFD (3)	EFD (1)	EFD (2)	Tangibility	with EFD (3)
Dinter	0.018***	0.018***	0.017***	0.017***				
	(0.004)	(0.004)	(0.004)	(0.004)				
EFD*Dinter	-0.000	0.018**		0.002	0.000	0.018**		0.002
	(0.005)	(0.007)		(0.007)	(0.006)	(0.007)		(0.008)
Tang*Dinter			-0.027***	-0.026***			-0.026***	-0.025***
			(0.006)	(0.006)			(0.006)	(0.007)
Dintra1	0.025**	0.025**	0.025**	0.025**				
	(0.011)	(0.011)	(0.011)	(0.011)				
EFD*Dintra1	-0.000	-0.005		-0.006	-0.004	-0.009		-0.012
	(0.007)	(0.010)		(0.010)	(0.008)	(0.010)		(0.011)
Tang*Dintra1			0.006	0.002			0.007	-0.000
			(0.010)	(0.011)			(0.010)	(0.012)
Observations	41,043	41,043	41,043	41,043	41,043	41,043	41,043	41,043
R-squared	0.914	0.914	0.914	0.914	0.919	0.919	0.919	0.919
DUMMIES								
State*Industry	yes	yes	yes	yes	yes	yes	yes	yes
State*Year	no	no	no	no	yes	yes	yes	yes
Industry*Year	yes	yes	yes	yes	yes	yes	yes	yes
CONTROLS								
state-level GDP	yes	yes	yes	yes	no	no	no	no

Sources: Compustat, BEA and CBP. The dependent variable is the level of state log real GDP. All specifications include 1977 GDP weights. Dinter and Dintra1 are respectively state level indicators of deregulations in interstate and intrastate banking. EFD*Dinter and EFD*Dintra1 are the interaction variables between deregulation indicators and the external finance dependence indexes (with alternative measures 1,2 and 3 respectively in columns 1,2 and 4 of each panel). Tang*Dinter and Tang*Dintra1 are the interaction variables between deregulation indicators and the tangibility index. The signs are as predicted by theory: industries with more tangible assets benefit less from banking deregulation. Delaware and South Dakota are dropped. The financial and legal services are dropped. Clustered standard errors at the state level in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 23: Robustness of the differential effects of deregulation on GDP per worker

VARIABLES	Specification E: state-wide control				Specification F: State-year, ind.-year effects			
	EFD (1)	EFD (2)	Tangibility	with EFD (3)	EFD (1)	EFD (2)	Tangibility	with EFD (3)
Dinter	0.010***	0.009**	0.009**	0.009**				
	(0.004)	(0.004)	(0.004)	(0.003)				
EFD*Dinter	0.009**	0.008		0.008	0.009*	0.007		0.007
	(0.004)	(0.007)		(0.007)	(0.004)	(0.007)		(0.007)
Tang*Dinter			-0.003	0.002			-0.003	0.001
			(0.003)	(0.004)			(0.003)	(0.005)
Dintra1	0.003	0.003	0.004	0.004				
	(0.007)	(0.007)	(0.007)	(0.007)				
EFD*Dintra1	-0.007	-0.006		0.001	-0.009	-0.008		-0.002
	(0.010)	(0.009)		(0.011)	(0.010)	(0.010)		(0.011)
Tang*Dintra1			0.010**	0.010			0.010**	0.008
			(0.004)	(0.008)			(0.004)	(0.008)
Observations	41,043	41,043	41,043	41,043	41,043	41,043	41,043	41,043
R-squared	0.994	0.994	0.994	0.994	0.995	0.995	0.995	0.995
DUMMIES								
State*Industry	yes	yes	yes	yes	yes	yes	yes	yes
State*Year	no	no	no	no	yes	yes	yes	yes
Industry*Year	yes	yes	yes	yes	yes	yes	yes	yes
CONTROLS								
state-level GDP	yes	yes	yes	yes	no	no	no	no

Sources: Compustat, BEA and CBP. The dependent variable is the level of state log real GDP per workers. See table 22 for details about specifications

Table 24: Robustness of the differential effects of deregulation on employment

VARIABLES	Specification E: state-wide control EFD (1)	EFD (2)	Tangibility	with EFD (3)	Specification F: State-year, ind.-year effects EFD (1)	EFD (2)	Tangibility	with EFD (3)
Dinter	0.008**	0.008**	0.007**	0.007**				
	(0.003)	(0.003)	(0.003)	(0.003)				
EFD*Dinter	-0.009*	0.011***		-0.006	-0.008*	0.011***		-0.005
	(0.005)	(0.003)		(0.005)	(0.005)	(0.003)		(0.005)
Tang*Dinter			-0.023***	-0.026***			-0.023***	-0.026***
			(0.006)	(0.008)			(0.006)	(0.008)
Dintra1	0.017*	0.016*	0.016*	0.016*				
	(0.009)	(0.009)	(0.009)	(0.009)				
EFD*Dintra1	0.007	0.001		-0.007	0.006	-0.001		-0.010
	(0.009)	(0.006)		(0.008)	(0.009)	(0.006)		(0.008)
Tang*Dintra1			-0.003	-0.007			-0.003	-0.009
			(0.009)	(0.012)			(0.008)	(0.012)
Observations	41,043	41,043	41,043	41,043	41,043	41,043	41,043	41,043
R-squared	0.994	0.994	0.994	0.994	0.995	0.995	0.995	0.995
DUMMIES								
State*Industry	yes	yes	yes	yes	yes	yes	yes	yes
State*Year	no	no	no	no	yes	yes	yes	yes
Industry*Year	yes	yes	yes	yes	yes	yes	yes	yes
CONTROLS								
state-level GDP	yes	yes	yes	yes	no	no	no	no

Sources: Compustat, BEA and CBP. The dependent variable is the log number workers. See table 22 for details about specifications

Table 25: Robustness of the deregulation differential effects on establishment size

VARIABLES	Specification E: state-wide control				Specification F: State-year, ind.-year effects			
	EFD (1)	EFD (2)	Tangibility	with EFD (3)	EFD (1)	EFD (2)	Tangibility	with EFD (3)
Dinter	0.011***	0.010**	0.009**	0.009**				
	(0.004)	(0.004)	(0.004)	(0.004)				
EFD3*Dinter	0.010**	0.018***		0.010*	0.010**	0.019**		0.010
	(0.004)	(0.007)		(0.005)	(0.004)	(0.007)		(0.006)
Tang*Dinter			-0.020***	-0.014***			-0.020***	-0.014**
			(0.005)	(0.005)			(0.005)	(0.005)
Dintra1	0.008	0.009	0.009	0.008				
	(0.007)	(0.007)	(0.007)	(0.007)				
EFD3*Dintra1	-0.010	-0.008		-0.007	-0.011	-0.010		-0.010
	(0.009)	(0.008)		(0.011)	(0.009)	(0.008)		(0.011)
Tang*Dintra1			0.001	-0.003			0.002	-0.004
			(0.007)	(0.011)			(0.007)	(0.011)
Observations	41,043	41,043	41,043	41,043	41,043	41,043	41,043	41,043
R-squared	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997
DUMMIES								
State*Industry	yes	yes	yes	yes	yes	yes	yes	yes
State*Year	no	no	no	no	yes	yes	yes	yes
Industry*Year	yes	yes	yes	yes	yes	yes	yes	yes
CONTROLS								
state-level GDP	yes	yes	yes	yes	no	no	no	no

Sources: Compustat, BEA and CBP. The dependent variable is the log of the number of workers per establishment. See table 22 for details about specifications

Table 26: Robustness of the differential effects of deregulation on establishments

VARIABLES	Specification E: state-wide control EFD (1)	EFD (2)	Tangibility	with EFD (3)	Specification F: State-year, ind.-year effects EFD (1)	EFD (2)	Tangibility	with EFD (3)
Dinter	0.010**	0.010**	0.010**	0.010**				
	(0.004)	(0.004)	(0.004)	(0.004)				
EFD3*Dinter	-0.010***	-0.000		-0.008***	-0.010***	-0.000		-0.008***
	(0.003)	(0.003)		(0.003)	(0.003)	(0.003)		(0.003)
Tang*Dinter			-0.006*	-0.011***			-0.006	-0.011***
			(0.003)	(0.004)			(0.004)	(0.004)
Dintra1	0.016**	0.015**	0.016**	0.016**				
	(0.007)	(0.007)	(0.007)	(0.007)				
EFD3*Dintra1	0.009	0.003		0.001	0.008	0.002		-0.002
	(0.008)	(0.004)		(0.006)	(0.008)	(0.004)		(0.007)
Tang*Dintra1			0.005	0.006			0.005	0.004
			(0.010)	(0.013)			(0.010)	(0.013)
Observations	41,043	41,043	41,043	41,043	41,043	41,043	41,043	41,043
R-squared	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
DUMMIES								
State*Industry	yes	yes	yes	yes	yes	yes	yes	yes
State*Year	no	no	no	no	yes	yes	yes	yes
Industry*Year	yes	yes	yes	yes	yes	yes	yes	yes
CONTROLS								
state-level GDP	yes	yes	yes	yes	no	no	no	no

Sources: Compustat, BEA and CBP. The dependent variable is the log of the number of establishments. See table 22 for details about specifications

Table 27: Robustness of the differential effects of deregulation on wages

VARIABLES	Specification E: state-wide control				Specification F: State-year, ind.-year effects			
	EFD (1)	EFD (2)	Tangibility	with EFD (3)	EFD (1)	EFD (2)	Tangibility	with EFD (3)
Dinter	0.009**	0.009**	0.009**	0.009**				
	(0.004)	(0.004)	(0.004)	(0.004)				
EFD3*Dinter	0.005	-0.002		0.004	0.004	-0.003		0.002
	(0.004)	(0.004)		(0.004)	(0.004)	(0.004)		(0.004)
Tang*Dinter			0.005	0.008			0.005	0.006
			(0.004)	(0.005)			(0.004)	(0.005)
Dintra1	0.014**	0.014**	0.014**	0.014**				
	(0.006)	(0.006)	(0.006)	(0.006)				
EFD3*Dintra1	-0.004	-0.001		0.001	-0.006	-0.003		-0.002
	(0.008)	(0.006)		(0.008)	(0.008)	(0.005)		(0.008)
Tang*Dintra1			0.005	0.006			0.005	0.004
			(0.006)	(0.008)			(0.006)	(0.009)
Observations	41,043	41,043	41,043	41,043	41,043	41,043	41,043	41,043
R-squared	0.968	0.968	0.968	0.968	0.969	0.969	0.969	0.969
DUMMIES								
State*Industry	yes	yes	yes	yes	yes	yes	yes	yes
State*Year	no	no	no	no	yes	yes	yes	yes
Industry*Year	yes	yes	yes	yes	yes	yes	yes	yes
CONTROLS								
state-level GDP	yes	yes	yes	yes	no	no	no	no

Sources: Compustat, BEA and CBP. The dependent variable is the log wage rate (wages per workers). See table 22 for details about specifications.

Table 28: Robustness of the differential effects of deregulation on wage ratios

VARIABLES	Specification E: state-wide control				Specification F: State-year, ind.-year effects			
	EFD (1)	EFD (2)	Tangibility	with EFD (3)	EFD (1)	EFD (2)	Tangibility	with EFD (3)
Dinter	-0.006	-0.006	-0.006	-0.006				
	(0.004)	(0.004)	(0.004)	(0.004)				
EFD3*Dinter	-0.005	-0.010**		-0.005	-0.005	-0.010**		-0.004
	(0.004)	(0.005)		(0.005)	(0.004)	(0.004)		(0.005)
Tang*Dinter			0.008**	0.005			0.008**	0.005
			(0.003)	(0.005)			(0.003)	(0.004)
Dintra1	-0.004	-0.004	-0.004	-0.004				
	(0.005)	(0.005)	(0.005)	(0.005)				
EFD3*Dintra1	0.001	0.003		-0.002	0.003	0.005		0.000
	(0.007)	(0.006)		(0.007)	(0.007)	(0.006)		(0.007)
Tang*Dintra1			-0.005	-0.007			-0.005	-0.004
			(0.006)	(0.008)			(0.005)	(0.008)
Observations	41,043	41,043	41,043	41,043	41,043	41,043	41,043	41,043
R-squared	0.956	0.956	0.956	0.956	0.958	0.958	0.958	0.958
DUMMIES								
State*Industry	yes	yes	yes	yes	yes	yes	yes	yes
State*Year	no	no	no	no	yes	yes	yes	yes
Industry*Year	yes	yes	yes	yes	yes	yes	yes	yes
CONTROLS								
state-level GDP	yes	yes	yes	yes	no	no	no	no

Sources: Compustat, BEA and CBP. The dependent variable is the log of the share of wages in GDP. See table 22 for details about specifications.

Table 29: The direct effect of inter- and intra-state deregulation on GPD per worker

	Specification (E)			Specification (F)		
	29.1 OLS	29.2 OLS	29.3 2SLS	29.4 OLS	29.5 OLS	29.6 2SLS
Panel I.						
Dinter	0.009**	0.029***	0.020***			
	(0.004)	(0.006)	(0.004)			
EFD3*Dinter	0.008	0.012**	0.010*	0.007	0.011*	0.009
	(0.006)	(0.006)	(0.005)	(0.006)	(0.006)	(0.006)
Dintra1	0.003	0.006	0.004			
	(0.007)	(0.011)	(0.009)			
EFD3*Dintra1	-0.006	-0.007	-0.007	-0.007	-0.010	-0.009
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Log number of workers		-0.376***	-0.203***		-0.489***	-0.295***
		(0.044)	(0.038)		(0.045)	(0.047)
Underidentification p-value			.000			.000
Maximum remaining bias			%			%
Observations	38,371	38,371	38,371	38,371	38,371	38,371
R-squared	0.995	0.995	0.995	0.995	0.996	0.996
Panel II.						
Dinter	0.010**	0.028***	0.020***			
	(0.004)	(0.006)	(0.005)			
Tang*Dinter	-0.003	-0.012***	-0.008**	-0.003	-0.014***	-0.010***
	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)
Dintra1	0.003	0.006	0.005			
	(0.007)	(0.011)	(0.008)			
Tang*Dintra1	0.010**	0.007	0.009*	0.010**	0.008	0.009*
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)
Log number of workers		-0.376***	-0.202***		-0.489***	-0.295***
		(0.044)	(0.038)		(0.045)	(0.047)
Underidentification p-value			.000			.000
Maximum remaining bias			%			%
Observations	38,371	38,371	38,371	38,371	38,371	38,371
R-squared	0.995	0.995	0.995	0.995	0.996	0.996

Sources: Compustat, BEA and CBP. Details about specifications (E) and (F) can be found in table 2. Panel I and II corresond to separate regressions. Dinter and Dintra1 are state level indicators of inter- and intra-state banking deregulation. EFD3*Dinter, EFD3*Dintra1, Tang*Dintra1 and Tang*Dinter are the interaction variables between the deregulation indicators and the external finance dependence index and the tangibility index respectively. Delaware and South Dakota are dropped. The financial and legal services are dropped. Clustered standard errors at the state level in parentheses; *** p<0.01, ** p<0.05, * p<0.1