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

Aslı Leblebicioğlu* Ariel Weinberger†
Baruch College, CUNY University of Oklahoma

March 2019

A Extra Results

In this section we report the robustness checks and the additional results mentioned but not tabulated in the main text.

*Address: Baruch College, CUNY, One Bernard Baruch Way, New York, NY, 10010. E-mail: Asli.Leblebicioglu@baruch.cuny.edu

†Address: Department of Economics, University of Oklahoma. 338 Cate Center Drive, Norman, OK 73019. E-mail: Ariel.Weinberger@ou.edu

Table A1: Banking Deregulation Dates

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

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

Table A2: Does Lagged Labor Share Predict Policy Adoption at the State Level?

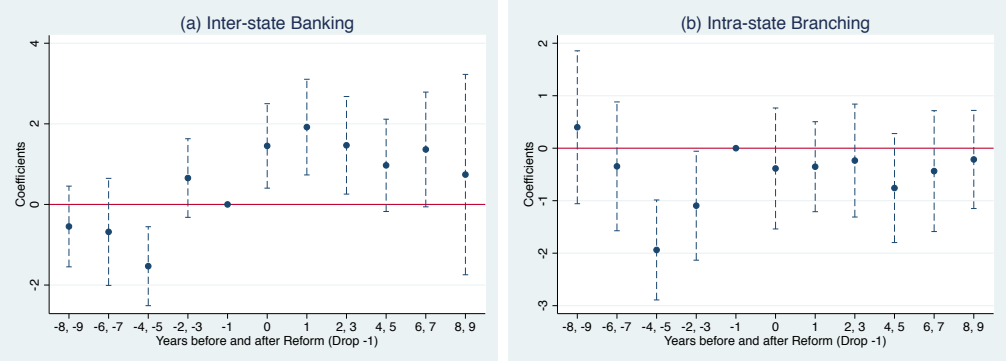
	Inter-state Banking Dereg		Intrastate Branching Dereg	
	(1)	(2)	(3)	(4)
L.Labor Share	-0.006	-0.014*	0.016	0.005
	(0.010)	(0.008)	(0.014)	(0.014)
L2.Labor Share	0.000	-0.005	0.024**	0.017
	(0.009)	(0.009)	(0.011)	(0.010)
L.Unemployment		-0.206**		-0.112
		(0.099)		(0.112)
L2.Unemployment		-0.135		0.103
		(0.108)		(0.141)
L.House Price Index		-0.095		0.268
		(0.264)		(0.373)
L2.House Price Index		-0.320		-0.809**
		(0.213)		(0.319)
Fixed Effects	State,Year	State,Year	State,Year	State,Year
N	828	828	828	828

Notes: This table presents a lagged fixed effects specification. All regressors include one and two year lags. Columns (1) and (3) include only lagged labor share, while (2) and (4) add lagged controls (only unemployment and house price index, which we find to be the most important). Banking deregulation is the dependent variable in the first two columns, and Branching deregulation is dependent variable in last two columns. We only use 1977-1996 data, when unemployment and HPI are both available. All specifications include state and year fixed effects. Standard errors – clustered by state – are in parentheses. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

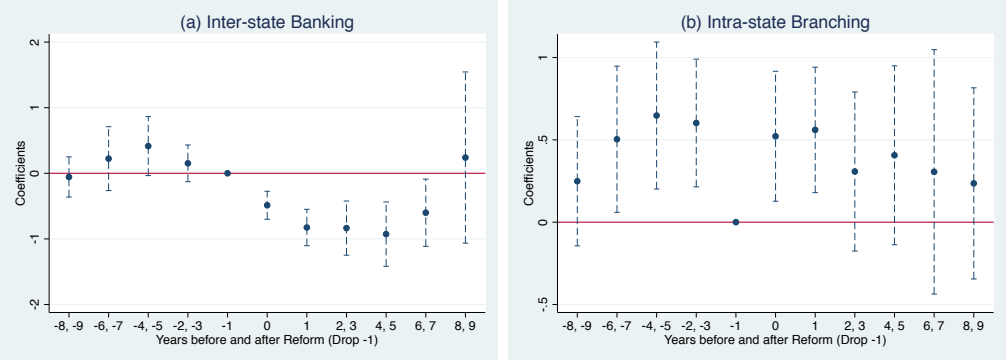
A.1 Dynamic Effects of Bank Deregulation on Various Outcomes

Figure A1: Dynamic Effects

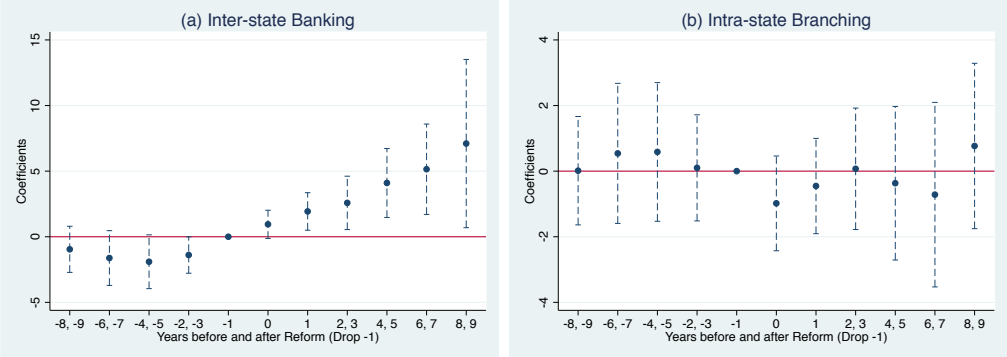
Panel A: GSP Growth



Panel B: Unemployment Ratio



Panel C: Log Capital Intensity



Notes: The figures plot the coefficients we obtain from a specification that regresses GSP growth, log unemployment, and log capital intensity on the following dummies for interstate banking and intrastate branching deregulations: (9, 8), (7, 6), (5,4), (3,2) years before the policy, and (0), (1), (2,3), (4,5), (6,7), (8,9) years after the policy implementation. Year 0 is the year of implementation and all coefficients are evaluated relative to one year prior to the policy adoption. Parentheses refer to the years we group into one dummy variable. Dashed vertical bars represent 95% confidence intervals. In Panels A and B, the coefficients are multiplied by 100, so that coefficients can be interpreted as percentage point deviations of the outcome measure in deregulated states relative to non-deregulated states. In Panel C, the coefficients are interpreted as percentages because the outcome is log of capital intensity. Controls include corporate tax rates, union membership, population growth, the house price index, plus state and year fixed effects. Standard errors are clustered by state.

A.2 Banking Market Structure Outcomes

Panel A of Table A3 presents the effects of deregulation on the three banking measures, and Panel B reports the individual coefficients on the contemporaneous and lagged effects of the adoption of the policies. The most striking finding in these tables is that lower loan yields, which proxy for cost of credit, decline following interstate banking deregulation. Yields are reduced immediately and continue to be statistically lower for four years afterwards. Banking concentration (proxied with HHI of deposits) is also reduced. Credit growth, unlike banking concentration, takes effect over time, as there is only a big and positive effect on credit after 2-3 years. The results for the intrastate branching deregulation are mostly muted, which is consistent with the zero effect on the labor share. The evidence of the structural changes in the banking sector are consistent with a growing sophistication of financial markets in deregulated states.

Table A3: Deregulation and Banking Market Structure Outcomes

Panel A: Growing Treatment Effects

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

Panel B: Lags

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

Notes: This table presents evidence for the first stage of the IV regressions (whose results are in Table 3 of the main text). Panel A regresses each banking outcome measure on the deregulation dummies, and finds that states that deregulate experience lower loan yields, larger credit to GSP ratios, and lower Herfindahl indices of bank deposits. In Panel B we add several lags of the deregulation treatment to test whether deregulation has effects on the banking sector up to 4 years after policy adoption. Average loan yield is in percentage points, so the coefficient reflects a one percentage point increase in yields. Credit to GSP ratio is similarly multiplied by 100. "HHI Deposits" is defined as one plus the usual index construction of the sum of squared market shares. All regressions include state and year fixed effects. Standard errors – clustered by state – are in parentheses. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.
Source: The source for the banking outcomes is FDIC data, as described in section 3.

A.3 Robustness Results

Table A4 reports various robustness checks. To summarize, we test whether our results might be explained by: GSP high-frequency imputations, firm creation, self employment, anti-takeover laws, or macro shocks in the 1980's that affected certain states disproportionately. The results are discussed below.

One possible problem in using the BEA regional accounts is the imputation of state GSP in non-benchmark years. The Economic Census is conducted every five years, with data in between being mainly imputed based on various methodologies. The methods vary by industry as documented in the BEA report, with most of the imputations needed for corporate capital charges. These are imputed using a combination of wages/salaries and Census receipts.[1] Although we point out that many previous papers (cited earlier) have employed this data to study state business cycles, it is useful to check whether the results hold with non-imputed, lower-frequency data. To do so, the most direct test we can do is to re-run the baseline specification using *only* benchmark years of the Economic Census (every five years). The policy dummies remain the same, but for example, all states that deregulate between 1982 and 1987 switch from 0 to 1 together. The first column of Table A4 reports these results. As expected, the results are much noisier, but the coefficient is of a similar size and significant at the 5% level. This is important as even in this case where we lose some of our variation, we can confirm that the results are not driven by the imputation of capital charges in the non-benchmark years.

Second, we have checked the robustness of our results to controlling for some additional variables. An omitted variable one might worry about is a change in the level of markups, which emerges as a determinant of the labor share in standard models (Barkai, 2016; Autor et al., 2017). As a way of controlling for competition at the state level, we have used the Business Dynamics Statistics (BDS) provided at the state level by the Census Bureau. We obtain information on variables such as establishment entry and exit rate, as well as job creation/destruction rates, and include them in our baseline specification described in equation (1). We find that the coefficients on banking deregulation indicators remain almost identical to the results presented in Table 2. The results are reported in the second column of the robustness table (A4).[2] In column (3), we check that the main specification is robust to controlling for the number of self-employed workers in the state.

There is also a related literature on anti-takeover laws. The changes in these laws affected

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

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

cross-state acquisitions, and therefore they may be correlated with states adopting banking deregulation policies. Karpoff and Wittry (2017) and Bertrand and Mullainathan (2003) describe the different types of laws that states passed in order to restrict takeover of their companies by out of state companies. The first generation laws passed mostly in the late 1970's were deemed unconstitutional by the Supreme Court in 1982 (*Edgar vs. Mite Corp.*). We use the data provided in Table 1 of Karpoff and Wittry (2017) to create the "first generation" dummy variable equal to one for the years when the law applied at the state level, and include them in our benchmark specification. We also include the three types of second generation laws described in Bertrand and Mullainathan (2003).[3] Inclusion of these additional policy variables do not alter our results. The effect of banking deregulation on the labor share, presented in column (4) of Table A4, remains similar to the benchmark results.

Finally, we also experiment with excluding some states from the analysis. Specifically, we drop the five states that have the largest share of their value added come from energy industries in 1982. States like Texas suffered greatly from the decline in energy prices in the mid 1980s, which might have coincided with the choice of deregulating the banking system, and therefore might be driving our results. Column (5) of Table A4 estimates our specification omitting the five most energy-intensive states from the sample, with no change in the results. In the penultimate column we drop five"rust belt" states that experienced the most competition from trade in the 1980s, and the results are robust to excluding these states. A final check is whether late-adopting states are driving the results in some way. Given that interstate deregulation eventually became federal law in 1994 with IBBEA, it is possible that at some point firms in non-deregulated states anticipated the change in the state legislature and delayed investment for when lending rates would decline. To some degree, this would be picked up in the pre-trends in Figure 2, and there is no evidence this is the case. Still, we checked robustness by excluding all states that had not deregulated in 1988 from the analysis. While this leads us to lose many "control" states from the analysis, the results in Table A4 confirm our previous finding on the impact of banking deregulation.

[3]These are: Business Combination laws (BC), Fair Price laws (FP), and Control Share Acquisition laws (CS). We include all (first and second generation) laws as recommended by Karpoff and Wittry (2017). The results are robust to just using the BC law dummy, as done by Bertrand and Mullainathan (2003).

Table A4: Robustness Checks for the Response of the State Labor Share to Deregulation

	Labor Share						
	(Benchmark Years)	(2)	(3)	(4)	(No Energy)	(No Rustbelt)	(No Late Adopters)
Interstate Banking	-0.014**	-0.009***	-0.008***	-0.009***	-0.008***	-0.009***	-0.008***
	(0.007)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Intrastate Branching	0.002	0.005	0.003	0.004	0.006	0.003	0.005
	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)
Corp. tax rate	-0.001	0.001	-0.000	0.000	0.000	0.000	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)
Union Membership	-0.000	0.000	0.000	0.000	0.000	0.000	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Popl. growth	-0.225	0.207	0.059	0.167	0.097	0.179	0.042
	(0.270)	(0.156)	(0.146)	(0.149)	(0.178)	(0.157)	(0.124)
Unemployment	-0.020	-0.014**	-0.010	-0.008	-0.013*	-0.011	-0.012*
	(0.012)	(0.007)	(0.007)	(0.006)	(0.006)	(0.007)	(0.006)
House Price Index	-0.043**	-0.036***	-0.034***	-0.036***	-0.038***	-0.047***	-0.032**
	(0.017)	(0.012)	(0.012)	(0.010)	(0.013)	(0.012)	(0.012)
Entry rate		-0.002*					
		(0.001)					
Exit rate		-0.002***					
		(0.000)					
Job creation		-0.001*					
		(0.000)					
Number Self Employed			-0.036*				
			(0.019)				
BC				-0.007*			
				(0.004)			
FP				-0.005			
				(0.005)			
CS				0.005			
				(0.004)			
first generation				-0.001			
				(0.004)			
Fixed Effects	State,Year	State,Year	State,Year	State,Year	State,Year	State,Year	State,Year
R^2	0.939	0.928	0.928	0.928	0.891	0.921	0.931
N	180	908	954	954	850	849	811

Note: This table presents all the robustness checks discussed in section 4.1. The first column drops *all* non-benchmark years – when there was no Economic Census – and otherwise follows the baseline specification in Table 2. Column (2) brings back the full dataset and adds BDS data on firm exit, entry and job creation to the benchmark specifications. Column (3) controls for the number of self employed. The next column controls for "anti-takeover" laws passed in the 1970's (first generation) and in the 1980's (second generation). The laws are as follows: Business Combination laws (BC), Fair Price laws (FP), and Control Share Acquisition laws (CS), and all first generation laws (first generation). The last three columns restrict the benchmark results to states *not* intensive in energy (drop the 5 most energy intensive states), *not* in "rust belt", and to states that have adopted by 1988 respectively. Energy states are: Texas, Oklahoma, Wyoming, North Dakota, and Louisiana. Rust belt states include: Indiana, Michigan, Wisconsin, Ohio and North Carolina. Late adopting states include: Arkansas, Iowa, Kansas, Montana, North Dakota, Nebraska, and New Mexico. Labor shares, policy implementation dates, corporate tax rates, union membership, and GDP/population growth rates are available starting in 1970. House price indices start in 1975, while unemployment data starts in 1976. BDS data start in 1977. All specifications include state and year fixed effects. Standard errors – clustered by state – are in parentheses. $***p < 0.01$, $**p < 0.05$, $*p < 0.1$.
Source: Most controls are as in the main text. As described in the text, BDS data is gathered from the Census website, and the adoption of "anti-takeover" laws is from Karpoff and Wittry (2017) and Bertrand and Mullainathan (2003). The number of self employed is part of the BEA regional accounts data.

A.4 Extended sample with the IBBEA provisions

The results we have presented thus far cover the 1970-1996 period, and utilize the staggered adoption of banking deregulation by the states to identify a credit supply shock that lowered the labor share. We end our sample in 1996 due to the passage of IBBEA, as described in section 1. However, Elsby et al. (2013), among others, show that the majority of the decline in the U.S. labor share occurred after this period. In order to analyze the role of credit markets in the states' labor share decline in the later period, we consider the restrictions states imposed on interstate branching after 1997. As described in Rice and Strahan (2010), despite deregulating banking nationwide, IBBEA allowed the states to have influence over the manner in which it was implemented, and let them erect barriers to interstate branching. From the time of enactment in 1994 until the branching trigger date in 1997, IBBEA allowed states to employ various regulations on interstate branching with regard to provisions on de novo interstate branching, acquisition of individual branches, and a statewide deposit cap. The first two provisions allow the states to opt-out from permitting out-of-state banks from opening new branches and acquiring a branch (or number of branches) of a bank without acquiring the entire bank. The third one is related to a statewide deposit concentration limit. While IBBEA specifies the limit of deposits in insured depository institutions in the state as 30% for interstate mergers, it also gives the right to impose a deposit cap on an interstate bank merger below 30%. A lower deposit cap *limits* the power of a single bank operating in the state.

We use the adoption and the removal dates of these restrictions across the states between 1997-2005, documented by Rice and Strahan (2010), to identify the effect of credit supply shocks on the labor share during this period.[4] We define a "Allow acquisitions" indicator that takes on a value zero if the state imposes restrictions on both de novo branching and out of state mergers, a value of one if the state removes one of these restrictions, and a value of two if the state removes both restrictions. Hence, an increase in this indicator mirrors the banking deregulation dummies we have used in our previous specifications, and implies an improvement in the credit conditions. We also include a continuous value of the states' deposit concentration limit imposed. This is 30% for states that do not opt-out of IBBEA and generally below 30% for states that opt out.[5] Notice that an increase in the limit can imply a deterioration in the credit conditions in the form of higher interest rates, since it

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

[5]There is also one state that imposes a limit above 30%.

would allow banks to have more power in the state. We indeed find that an increase in the deposit cap raises the loan yields.

Table A5: The Change in State-Year Labor Share in Response to IBBEA Provisions, 1997-2005 Sample

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

Notes: This table presents results for a specification similar to (1), but for the years 1997-2005 and for restrictions imposed by states post-IBBEA. The "Allow acquisitions" indicator that takes on a value zero if the state imposes restrictions on both de novo branching and out of state mergers, a value of one if the state removes one of these restrictions, and a value of two if the state removes both restrictions. "Deposit cap" is a (continuous) value of the maximum share of deposits at the state level that can come from one back. The default under IBBEA is 0.30. For states that opt out, the value is generally below 0.3, although it is also allowed to be above. The first two columns present the results from an OLS specification comparable to columns (2) and (3) in Table 2, where the second column drops the GSP control. The estimates in the last column are obtained from an IV specification, where the average loan yields is instrumented with acquisition restriction indicator and deposit cap measure. All specifications include state and year fixed effects, and the same controls as the previous tables except for the corporate tax which has reduced availability during this period. Standard errors – clustered by state – are in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. *Sources:* State treatment measures are constructed using adoption and removal dates of the various restrictions as reported in Rice and Strahan (2010).

In columns (1) and (2) of Table A5, we present the results from OLS specifications with the acquisition restrictions and deposit cap variables. While the coefficient on the former is negative and the latter is positive in both columns, they are statistically significant only when the GSP growth variable is included the specification. Similar to the results from our baseline specification using the banking deregulation indicators, the negative coefficient implies that the removal of the acquisition restrictions (an increase in the indicator) led to a decline in the labor share. On the other hand, the positive coefficient on the deposit cap suggests that relaxing the restriction on deposit concentration limit, and therefore allowing

for higher concentration, led to an increase in the labor share.[6] In order to analyze the mechanism behind these effects, in column (3) we estimate an IV specification, where we instrument average loan yields with the two provision variables. In the first stage (available upon request), the coefficient on deposit cap is positive and the one on acquisition restrictions is negative, suggesting that average loan yields increase with higher concentration limits, and decrease with looser entry restrictions. In turn, the statistically significant coefficient on average loan yields in column (3) implies that a one percentage point decline in average loan yields leads to a 0.5 percentage point decline in the labor share. This impact is smaller than the one we obtained for the 1970-1996 sample; however, it is still both economically and statistically significant. Moreover, it shows that cheaper credit played a role also for a more recent period, where the labor share was declining more considerably and some nationwide factors, such as offshoring, were gaining steam. The results are consistent with both the change in the labor share and the mechanisms found in our main results.

A.5 Results by Industry

There are a total of 56 2-digit SIC levels available for disaggregation, which we also construct eight 1-digit groups to analyze the changes in the labor share in the aggregate industries.The aggregate industry groups are: Agriculture (A), Mining (I), Construction (C), Manufacturing (M), Transportation and Electricity and other Utilities (U), Wholesale and Retail Trade (T), Finance (F), and Services (S). We eliminate the finance sector from the aggregate industry results. Table A6 repeats the state and industry-year fixed effects analysis for each of the individual 1-digit SIC sectors. Notice that for each aggregate industry, the number of observations depends on the number of 2-digit SIC industries. We only show the growing treatment effects to condense the results, but show more detailed results for manufacturing and services in the main text.[7] The coefficients are of similar magnitude in Manufacturing, Construction and Transportation/Utilities — and bigger in the small Mining industry — which is consistent with a theory that predicts the effects are strongest in industries that are dependent on financing.

[6]The magnitude of this coefficient looks large because it is not a categorical variable (as was used for the other deregulation measures). In this case, we use the continuous measure of the deposit cap. The cap generally varies from 0.3, down to 0 (though most states keep it above 0.2). The second row of column (1) in Table A5 should be interpreted as: "a 10 percentage point reduction in the deposit cap (i.e. from 0.3 to 0.2) *reduces the labor share by 2 percentage points* (multiply the coefficient by 0.1).

[7]We also investigated whether the banking deregulation policy might have had an effect of moving labor across industries with heterogeneous labor share levels. Table A7 below reports the deregulation effects on the employment share of an industry within a state.

Table A6: The Change in Industry-State-Year Labor Share in Response to State Deregulation: Aggregate Industries

	Labor Share						
	(A)	(I)	(C)	(M)	(U)	(T)	(S)
Banking (growing treatment)	-0.000	0.013*	-0.004	-0.003	-0.005	-0.001	-0.001**
	(0.004)	(0.007)	(0.004)	(0.002)	(0.003)	(0.001)	(0.001)
Branching (growing treatment)	-0.001	-0.010	0.004	-0.004**	0.004	-0.000	0.001
	(0.002)	(0.009)	(0.003)	(0.002)	(0.005)	(0.001)	(0.001)
Corp. tax rate	-0.004	-0.020	-0.000	-0.003	0.005	-0.000	0.001
	(0.003)	(0.016)	(0.006)	(0.002)	(0.005)	(0.001)	(0.001)
Union Membership	-0.002**	0.007**	-0.000	-0.001	0.001	-0.000	0.000
	(0.001)	(0.003)	(0.002)	(0.001)	(0.001)	(0.000)	(0.000)
Popl. growth	0.710**	0.631	-0.572	-0.680**	0.666	-0.033	-0.059
	(0.314)	(0.843)	(0.416)	(0.306)	(0.580)	(0.138)	(0.126)
Unemployment	0.052***	-0.021	-0.001	-0.003	-0.013	-0.002	-0.015***
	(0.018)	(0.051)	(0.018)	(0.012)	(0.016)	(0.004)	(0.004)
House Price Index	0.052**	-0.173**	-0.002	0.023	-0.102	0.036***	-0.003
	(0.020)	(0.074)	(0.024)	(0.016)	(0.075)	(0.007)	(0.007)
Avg Labor Share	0.246	0.293	0.676	0.685	0.470	0.584	0.690
Fixed Effects	State, Industry-Year	State, Industry-Year	State, Industry-Year	State, Industry-Year	State, Industry-Year	State, Industry-Year	State, Industry-Year
R^2	0.870	0.444	0.655	0.423	0.418	0.777	0.937
N	954	2050	954	15586	7551	1908	12300

Notes: This table presents results for the specification given in (3), for each aggregate industry. We present results only for the growing treatment effects. For each aggregate industry, we report the average labor share, weighting each 2-digit industry by its GDP share in the aggregate industry. The sample covers 1976-1996 due to the availability of the control variables. Definition of the control variables are in the Data Section and all included controls presented. All regressions include separate state and industry-year interacted fixed effects. The aggregate industry groups are: Agriculture (A), Mining (I), Construction (C), Manufacturing (M), Transportation and Electricity and other Utilities (U), Wholesale and Retail Trade (T), and Services (S). Standard errors – clustered by state – are in parentheses. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

B Factor Reallocation

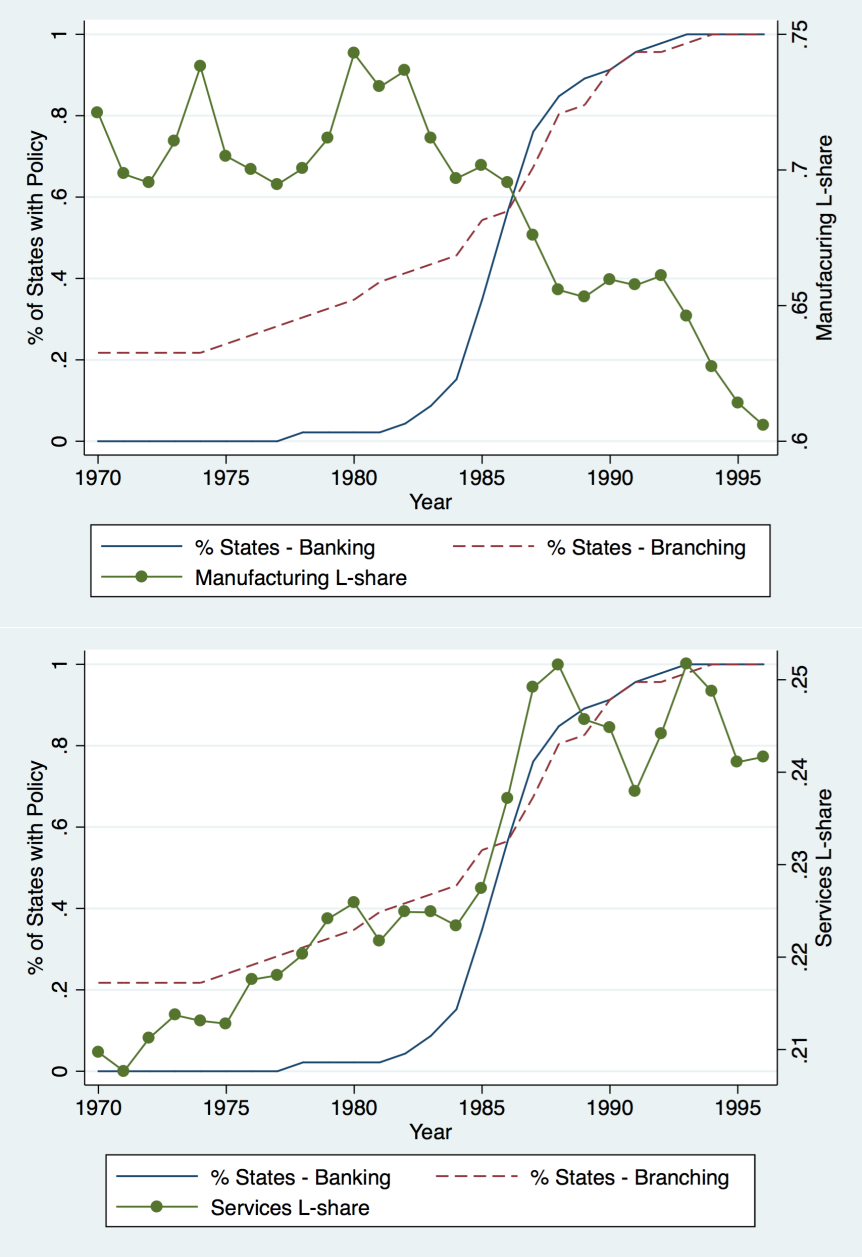
Factor Reallocation Figure 1 in the main text is consistent with the findings in Elsby et al. (2013), where the labor share is mostly constant until the mid-1990s, with a minor downturn during the 1980s. However, our results show that the deregulation policies did reduce the labor share in the manufacturing and service industries, at least in the states that adopted the policy relative to those that did not. In Figure A2 we separately plot the U.S. labor share in manufacturing and services, respectively (right axis). We also plot the cumulative fraction of states that have adopted the banking and branching deregulation on the same graphs (left axis). These figures show that the labor share declined throughout the period in manufacturing, but it actually increased within the services industry (despite the fact that banking deregulation lowered the labor share in states that adopted the policy).

Finally, we examine whether there were any reallocation of factors contributing to the time series in the above figures for manufacturing and services. As the labor share was being reduced in manufacturing, the banking deregulation policy might have had an effect of moving labor across industries with heterogeneous labor share levels. Table A7 reports the deregulation effects on the employment share of an industry within a state. There is not much evidence for labor reallocating across industries in response to the deregulation policies. In particular, there is no evidence of labor moving in or out of manufacturing. The employment share does seem to increase modestly in services, though it is in response to the intrastate branching deregulation as opposed to the interstate banking deregulation, which we found to lower the labor share in the previous results. Banking deregulation has a significant (negative) effect only in mining, which makes up around 1.6% of the states' labor force on average, making it unlikely that this had an important impact on the aggregate labor share. it might have had an effect on the overall state labor share.

Overall, we do not find much evidence that deregulation affected state labor shares through its impact on the expansion or contraction of certain industries, which suggests that our results are driven by within-industry changes in the labor share. Our set-up cannot address or identify what is likely an even more interesting type of reallocation, which is at the firm level. If deregulation and the changing banking structure fueled the rise of relatively capital-intensive firms, and the exit of labor-intensive firms within manufacturing and service industries, this would show up as a lower labor share at the state-industry-year level.[8]

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

Figure A2: US Labor Share in Manufacturing and Services Only, with Banking Deregulation Dates



Notes: The figures plot the aggregate labor share for manufacturing (top) and services (top) at the national level, and the cumulative number of states that adopted the interstate banking and intrastate branching deregulations. Aggregate labor share for each industry is constructed by summing up labor compensation and gross output in manufacturing/services across all states for each year, and taking the ratio between the two.

Table A7: The Change in Employment Share for each Industry Group Within States in Response to Deregulation

	EMPshare						
	(A)	(I)	(C)	(M)	(U)	(T)	(S)
intbanking	0.000	-0.002**	0.001	0.000	-0.000	0.002	0.001
	(0.000)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)
intbranching	0.000	-0.004***	-0.002	0.003	0.000	0.001	0.003
	(0.000)	(0.002)	(0.001)	(0.004)	(0.001)	(0.002)	(0.003)
corptax	0.000	-0.002	-0.000	0.001	0.000	0.001	-0.001
	(0.000)	(0.001)	(0.001)	(0.002)	(0.000)	(0.002)	(0.001)
unionmem	-0.000	0.000	-0.000	0.001	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
popgrowth	-0.014	0.243**	0.383***	-0.073	-0.053*	-0.063	-0.291***
	(0.011)	(0.099)	(0.045)	(0.119)	(0.029)	(0.063)	(0.094)
lnunemp	0.000	0.000	-0.008***	-0.014***	0.001	0.000	0.014***
	(0.000)	(0.003)	(0.002)	(0.004)	(0.001)	(0.003)	(0.004)
lnhpi	-0.004***	0.018***	0.025***	-0.063***	0.001	-0.003	0.005
	(0.001)	(0.005)	(0.003)	(0.009)	(0.002)	(0.005)	(0.007)
Avg Empshare	0.012	0.017	0.069	0.169	0.061	0.269	0.313
Fixed Effects	State,Year, Industry	State,Year, Industry	State,Year, Industry	State,Year, Industry	State,Year, Industry	State,Year, Industry	State,Year, Industry
R^2	0.962	0.938	0.918	0.970	0.941	0.884	0.971
N	954	3816	954	18126	8584	1908	12402

Notes: This table presents results for possible reallocation of employment across industries in response to deregulation. The dependent variable is the employment share of an industry in its respective state. All regressions include year, state and industry (2-digit) fixed effects. The data range covers 1976 to 1996. The aggregate industry groups are: Agriculture (A), Mining (I), Construction (C), Manufacturing (M), Transportation and Electricity and other Utilities (U), Wholesale and Retail Trade (T), and Services (S). Standard errors – clustered by state – are in parentheses. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

C Model and Calibration Details

C.1 First order conditions–Optimal Contract

Let λ_t denote the Lagrange multiplier on (12). The first order conditions with respect to k_t^i, n_t^i, and $\bar{\omega}_{t+1}^i$ are:

$$\beta_f F(\bar{\omega}_{t+1}^i) R_{t+1}^k + \lambda_t \left[R_{t+1}^k G(\bar{\omega}_{t+1}^i) - R_t q_t \right] = 0 \tag{A1}$$

$$-1 + \lambda_t R_t = 0 \tag{A2}$$

$$\beta_f F'(\bar{\omega}_{t+1}^i) R_{t+1}^k k_t^i + \lambda_t \left[R_{t+1}^k G'(\bar{\omega}_{t+1}^i) k_t^i \right] = 0. \tag{A3}$$

Combining these first order conditions we get

$$\beta_f R_t F'(\bar{\omega}_{t+1}^i) + G'(\bar{\omega}_{t+1}^i) = 0 \tag{A4}$$

where the derivatives are given by

$$F'(\bar{\omega}_{t+1}^i) = \Phi(\bar{\omega}_{t+1}^i) - 1 \tag{A5}$$

$$G'(\bar{\omega}_{t+1}^i) = 1 - \Phi(\bar{\omega}_{t+1}^i) - \mu \bar{\omega}_{t+1}^i \Phi'(\bar{\omega}_{t+1}^i). \tag{A6}$$

Combining the last three equations, we obtain

$$\beta_f R_t \left[\Phi(\bar{\omega}_{t+1}^i) - 1 \right] + \left[1 - \Phi(\bar{\omega}_{t+1}^i) - \mu \bar{\omega}_{t+1}^i \Phi'(\bar{\omega}_{t+1}^i) \right] = 0. \tag{A7}$$

C.2 Aggregation, Spread and the Labor Share

Resource constraint Substituting in the expressions for aggregate variables in equation (22), and using the zero-profit and solvency conditions in (10) and (12), we obtain the following resource constraint:

$$C_t + K_t - (1-\delta) K_{t-1} + \frac{\varphi_1}{\varphi_2} I_t^{\varphi_2} = Y_t - R_t^k K_{t-1} \left[\bar{\omega}_t - G(\bar{\omega}_t) \right]. \tag{A8}$$

Spread As mentioned in the text, combining equations (10) and (12), we can obtain the expression for spread in equation (19). The derivative of S with respect to $\bar{\omega}$ is

$$\frac{\partial S}{\partial \bar{\omega}} = \frac{G(\bar{\omega}) - \bar{\omega} G'(\bar{\omega})}{\left[G(\bar{\omega}) \right]^2}. \tag{A9}$$

To show that this derivative is positive, we need to evaluate the expression in the numerator. When we substitute equations (13) and (A6) into the expression numerator, it simplifies to

$$G(\bar{\omega}) - \bar{\omega}G'(\bar{\omega}) = (1-\mu)\int_0^{\bar{\omega}} \omega d\Phi(\omega) + \mu\bar{\omega}^2\Phi'(\bar{\omega}), \tag{A10}$$

which is positive since $\Phi'(\bar{\omega})$ denotes the probability density function, and all the other terms are positive.

Labor share To obtain the labor share expression, we combine the definitions of aggregate labor and aggregate output with optimal labor and output expressions in equations (5) and (7), which gives us

$$s_L = \frac{WL}{Y} = (1-\gamma)^{\sigma} W^{1-\sigma}. \tag{A11}$$

Instead of expressing the labor share as a function of the wage rate, we can write it as a function of the return to capital, R^k

$$R^k = \gamma^{\frac{\sigma}{\sigma-1}} \left[1 - (1-\gamma)\left(\frac{W_t}{1-\gamma}\right)^{1-\sigma}\right]^{\frac{1}{1-\sigma}} \tag{A12}$$

defined in (9) and the fact that $E(\omega) = 1$. Combining the definition of labor share in (A11) and the above expression for the return to capital gives us equation (20) in the text.

C.3 Parametrization for Calibration

The full list of parameters can be found in Table A8.

Table A8: Parameters for Calibration

Parameter	Description	Value
β	Household discount factor	0.99
β_f	Firm discount factor	0.9
σ	Elasticity of substitution between capital and labor	0.7
γ	Weight on capital in the CES basket	0.7
υ	Standard deviation of the productivity distribution	0.5
θ	Risk-aversion coefficient	1
ν	Frisch elasticity parameter	2
φ_2	Investment adjustment cost parameter	1
φ_1	Investment adjustment cost parameter	Chosen to match loan rate and the leverage ratio
μ	Monitoring cost parameter	Chosen to match loan rate and the leverage ratio

Notes: This table lists the parameter values we use to calibrate the model presented in section 4. The explanation of the calibration strategy is explained in subsection 4.3. The last parameters μ and φ_1 are chosen to match the loan rate (ranging between 4% and 10%) and the leverage ratio (ranging between 13.8% and 18%). The formula for the leverage ratio can also be found in subsection 4.3.

C.4 Robustness for Calibration

As discussed in the main text, most of the parameters used in the calibration are common in the literature, and we use the generally accepted values. In this section, we check the robustness of our results to using alternative values for the parameters that could be essential to identifying the mechanism through which lower borrowing costs affect the labor share. In particular, we consider different values for the elasticity of substitution between capital and labor (σ), the variance of the log normal distribution of productivity shocks (v), and the investment adjustment cost parameter (φ_2). [9] Our baseline parametrization matches a value of 0.58 for the labor share 8% for the lending rate.

In the robustness checks, we first change the parameter we are interested in, and then adjust weight on capital in the CES basket (γ) to match the level of the labor share.[10] To check the sensitivity of the results, we conduct the following exercises:

1. Set $\sigma = 0.5$ (lower bound in Raval (2014)). Then, γ is adjusted to 0.95. We replicate the labor share response below in Panel (A) (analogous to Figure 6 – note that in this case the leverage ratio does not change). Given about the same level of the labor share as the benchmark specification, the labor share *is more responsive to changes in interest rates*. This is not surprising given equation (20) in the text.

2. Set $\sigma = 0.9$ (upper bound in Raval (2014)).[11] Then, γ is adjusted to 0.485. We replicate the labor share response below (Panel (B)). Now, the labor share response is much smaller, as there is a very small drop in the labor share as interest rates decrease; nonetheless, the labor share still decreases. Again, this is due to equation (20) in the text. We know that as $\sigma \to 1$ (a Cobb-Douglas production function) the labor share will be constant.

3. Set $v = 0.3$. Then, γ is adjusted to 0.725. We replicate the labor share response below in Panel (C). The results are very similar to the main text, although the response of the labor share to interest rates is slightly smaller in magnitude with this smaller variance.[12]

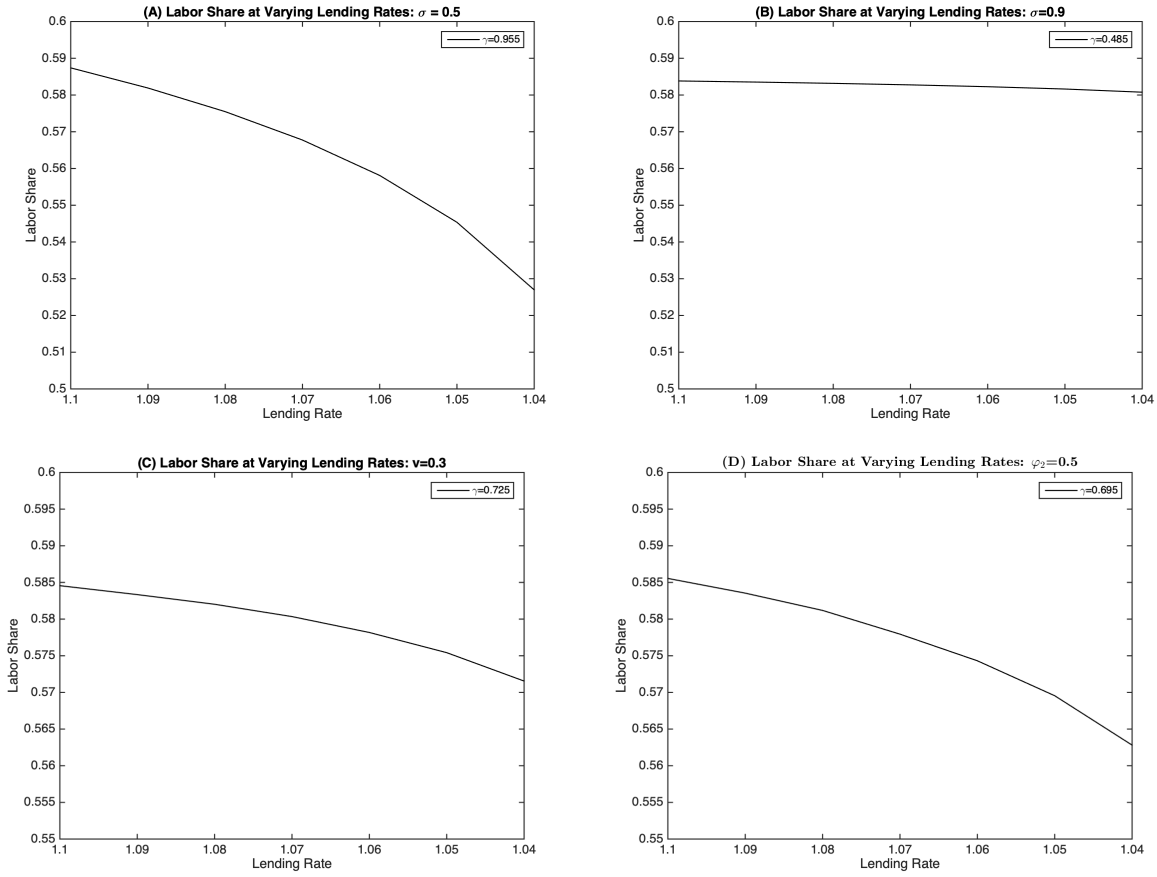
[9] The other important parameter for the mechanism is μ (the monitoring costs parameter), and it is pinned down endogenously to match the lending rate.

[10] For example, if we keep γ fixed and lower σ to 0.6, the labor share varies between 0.68 and 0.666. To make results comparable, we always adjust γ.

[11] Of course, we could also report results for $\sigma > 1$, but it is clear that in the case the rise in rental income will lead the labor share to *increase*, and given the micro estimates for the US, $\sigma > 1$ is not empirically relevant.

[12] With a larger variance, the response is magnified instead.

Figure A3: Labor Share, Capital Costs, and Firm Survival at Varying Lending Rates



Notes: Panels (A) through (D) represent the labor share as in Figure 6 in the main text, adjusting one parameter (plus γ) at a time. The caption states which parameter is changed (and its new value). The new γ is reported to keep the level of the labor share at 10% interest rates about the same as the benchmark analysis. Lending rates vary between 10% and 4%. We take the lending rate and leverage ratio as given by the data. Lending rates are about 8 percentage points at the start of the sample, and the leverage ratio is 13.9%. For these figures we keep the leverage ratio constant, assuming a lower bound credit ratio of 0.25 and investment rate of 0.18. We solve the model to match the finance premium and the leverage ratio, plus other model constraints.

4. Set $\varphi_2 = 0.5$ (this is the second adjustment cost parameter that we fix to 1 in the main text). γ is adjusted to 0.695. We replicate the labor share response below in Panel (D). This parameter barely affects the labor share. At a lower φ_2, the labor share to interest rates is magnified slightly.[13]

[13]As $\varphi_2 \to 1$, the effect decreases. Above 1 there is basically no effect on the labor share.

References

Autor, David, David Dorn, Lawrence F. Katz, Christina Patterson, and John Van Reenen, "Concentrating on the Fall of the Labor Share," Working Paper 23108, National Bureau of Economic Research 2017.

Barkai, Simcha, "Declining labor and capital shares," *University of Chicago, November*, 2016.

Bertrand, Marianne and Sendhil Mullainathan, "Enjoying the Quiet Life? Corporate Governance and Managerial Preferences," *Journal of Political Economy*, 2003, *111* (5), 1043–1075.

Demyanyk, Y., C. Ostergaard, and B.E. Sørensen, "U.S. Banking Deregulation, Small Businesses, and Interstate Insurance of Personal Income," *The Journal of Finance*, 2007, *62*, 2763–2801.

Elsby, Michael, Bart Hobijn, and Aysegul Sahin, "The Decline of the U.S. Labor Share," *Brookings Papers on Economic Activity*, 2013, *Fall*, 1–63.

Gopinath, Gita, Sebnem Kalemli-Ozcan, Loukas Karabarbounis, and Carolina Villegas-Sanchez, "Capital Allocation and Productivity in Southern Europe," *Quarterly Journal of Economics*, 2017, *132* (4), 1915–1967.

Karpoff, Jonathan and Michael Wittry, "Institutional and Legal Context in Natural Experiments: The Case of State Antitakeover Laws," *Journal of Finance*, 2017, *73* (2), 657–714.

Kroszner, R.S. and P.E. Strahan, "What drives deregulation? Economics and politics of the relaxation of bank branching restrictions," *Quarterly Journal of Economics*, 1999, *114*, 1437–1467.

Raval, Devesh, "The micro elasticity of substitution and non-neutral technology," Technical Report, working paper, Federal Trade Commission 2014.

Rice, Tara and Philip E Strahan, "Does Credit Competition Affect Small-Firm Finance?," *The Journal of Finance*, 2010, *65* (3), 861–889.