Consumption Slowdown After the Great Recession

Dora Zsuzsanna Simon and Vladimir Sulaja

1 Online Appendix

1.1 Descriptives

Table 1 shows the summary statistics for the bank-level regressions. There are around 5800 banks and 3000 counties in our sample.

Table 1: Summary Statistics

(1)

Banks Data	Mean	Standard Deviation	Max	Min
Loan amount	219.7159	1217.21	951495	1
Assets	1.18e+08	3.56e+08	2.14e+09	4514
Deposits	8.29e+07	2.52e+08	1.53e+09	0
Non-interest income	2189772	6723177	4.19e+07	-1815900
Interest Expense	1036557	3856667	3.89e+07	-23
Return on Assets	.7466346	1.554866	207.0973	-26.09702
Efficiency ratio	94.97682	1279.735	72439.26	-2459.509
Tier 1 Capital	13.89387	17.35169	3873.022	-58.48638
N	5283753			

(2)

| County Data	Mean	Standard Deviation	Max	Min
Exposure	.2039885	.0849828	.5911837	.042017
Debt-to-income	1.887505	.7989944	3.46	.78
Population	121970.5	305615.5	5205723	1057
Labor Force	61512.39	179634.8	5096516	38
Unemployment rate	6.534535	2.747033	28.9	1.1
N	1066482			

Notes: This table shows the summary statistics for the bank level and county level data. Bank-level data comes from the FDIC database. County-level data comes from various sources such as HMDA, FHFA, BLS, BEA.

Table 2: Summary Statistics

(Summary statistics for Affected Institutions before 2012)

	Mean	Standard Deciation	Max	Min
Amount of Loans	25659132.33	51835461.05	2.44e+08	2101.00
Assets	3.09e+08	5.01e+08	1.81e+09	1616614.00
Deposits	2.05e+08	3.32e+08	1.19e+09	39487.00
Non-interest income	5579853.29	9732814.42	37099000.00	-578632.00
Total Interest Expense	3831294.52	7719609.80	38916000.00	0.00
Return on Assets	0.38	2.16	8.30	-14.15
Efficiency ratio	764.44	7167.40	72439.26	-478.09
Tier 1 capital ratio	12.73	6.18	42.12	5.64
Observations	112			

(Summary statistics for Affected Institutions after 2012)

	Mean	Standard Deviation	Max	Min
Amount of Loans	27440771.75	41620606.60	1.98e+08	96.00
Assets	5.93e+08	7.19e+08	2.14e+09	3615086.00
Deposits	4.40e+08	5.33e+08	1.53e+09	2911187.00
Non-interest income	9886794.88	12803720.55	41943000.00	-22363.00
Total Interest Expense	1771140.81	2299072.32	9660000.00	12212.00
Return on Assets	0.84	0.45	1.63	-0.37
Efficiency ratio	63.89	10.11	84.39	49.03
Tier 1 capital ratio	13.86	3.91	30.19	9.70
Observations	68			

(Summary statistics for Non-affected Institutions before 2012)

	Mean	Standard Deviation	Max	Min
Amount of Loans	150368.31	1306834.91	1.04e+08	6.00
Assets	1145821.58	7119655.53	3.26e+08	4514.00
Deposits	845935.11	5030831.89	2.14e+08	0.00
Non-interest income	14279.57	144244.68	7278327.00	-1815900.00
Total Interest Expense	18793.33	133805.63	10844151.00	0.00
Return on Assets	0.21	2.12	207.10	-26.10
Efficiency ratio	77.91	66.01	5812.00	-2459.51
Tier 1 capital ratio	14.64	9.29	757.55	-58.49
Observations	40032			

(Summary statistics for Non-affected Institutions after 2012)

|	Mean	Standard Deviation	Max	Min
Amount of Loans	222541.51	1400474.63	90552832.00	0.00
Assets	1752766.80	11123923.18	3.19e+08	19834.00
Deposits	1395089.61	8867691.33	2.71e+08	0.00
Non-interest income	20063.78	181204.85	7685000.00	-108208.00
Total Interest Expense	6226.54	43353.90	1753000.00	-23.00
Return on Assets	0.84	0.78	9.16	-12.08
Efficiency Ratio	72.98	18.77	446.48	-201.41
Tier 1 capital ratio	16.53	29.41	3873.02	-4.67
Observations	33354			

Notes: This table shows the summary statistics for the affected and non-affected institutions in the pre-control and post-control period. The unit of observation is lending institution. Amount of loans is given in thousands of dollars.

Figure 1: Exposure to Affected Banks
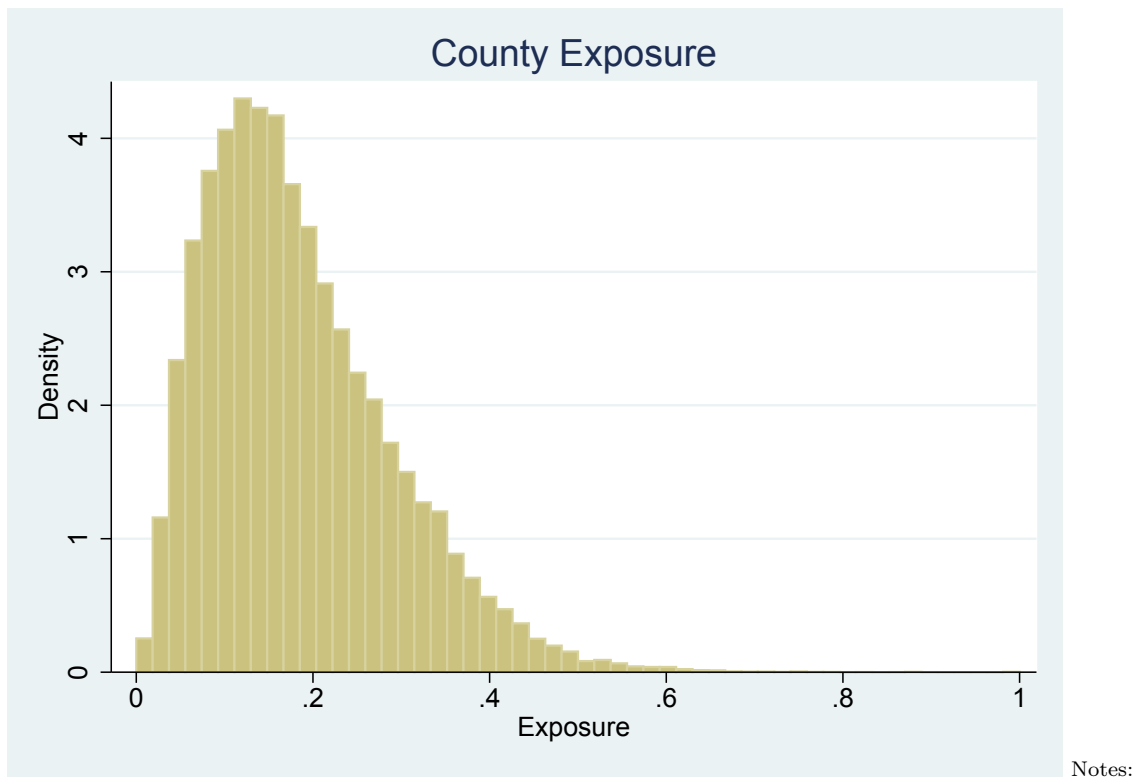
County Exposure

This graph illustrates the distribution of county exposure to affected institutions. Exposure is calculated by dividing the sum of market shares of each affected institution in a year by the total amount of mortgage loans, and then further dividing by the number of years used in the calculation. It is evident that the majority of counties exhibit exposure to affected institutions. Few counties have exposure above 0.5, while only a handful have exposure around 0. This indicates that we anticipate observing the effects of a reduction in mortgage lending from these institutions on the economy.
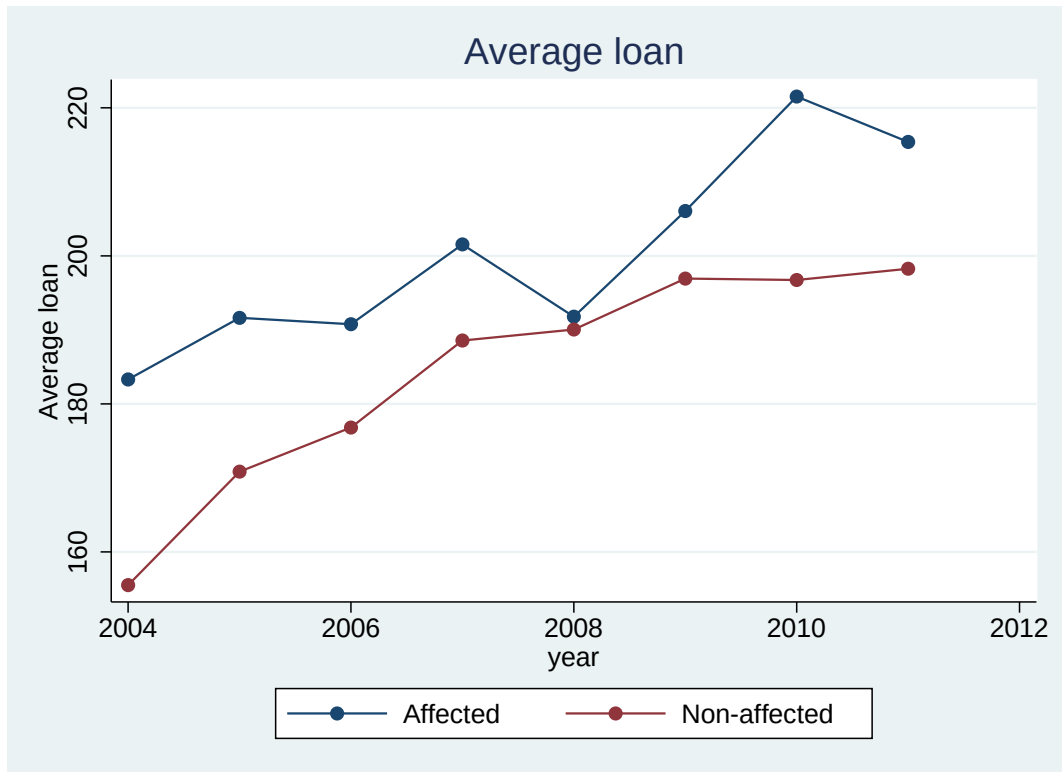
Figure 2: Average Income for Affected and Non-affected
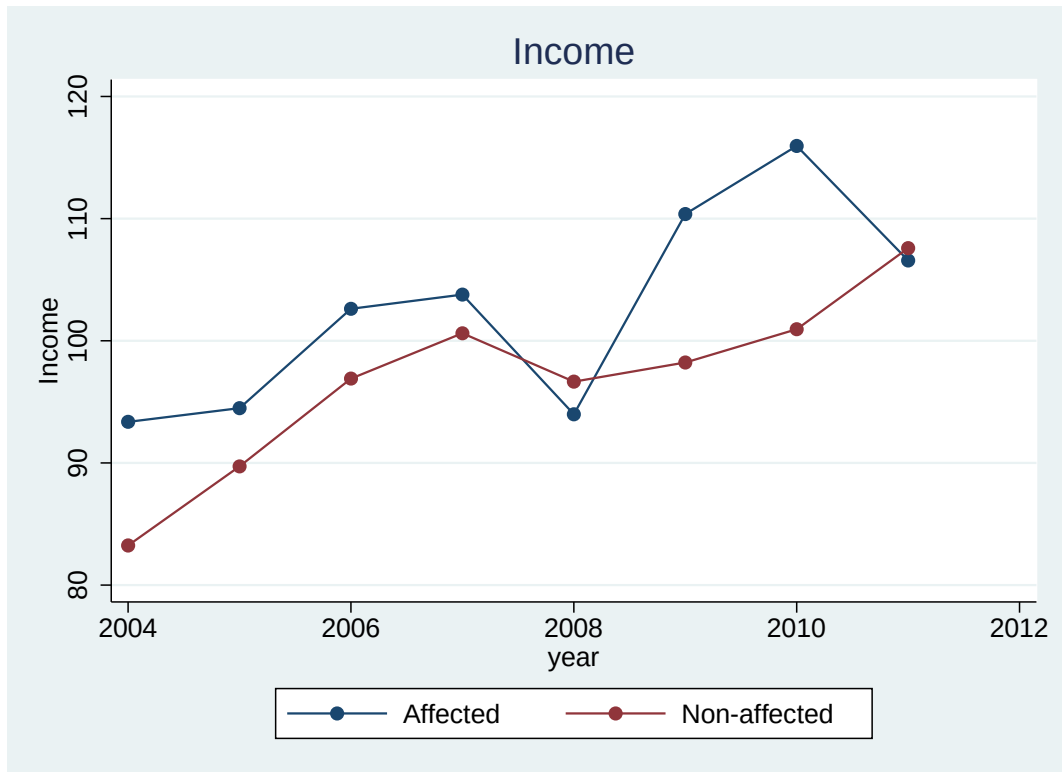
Notes: This graph displays the average income of borrowers in both groups of institutions. We aggregate all accepted mortgage applications and categorize them based on whether they were accepted by affected or non-affected institutions. The average income is computed conditionally within each group. Prior to the foreclosure crisis, there is no notable difference in trends.

Figure 3: Average Loan Amount for Affected and Non-affected

Notes: This graph illustrates the average loan amount of borrowers in both groups of institutions. We aggregate all accepted mortgage applications and categorize them based on whether they were accepted by affected or non-affected institutions. The average loan amount is computed conditionally within each group. Prior to the foreclosure crisis, there is no significant difference in trends.
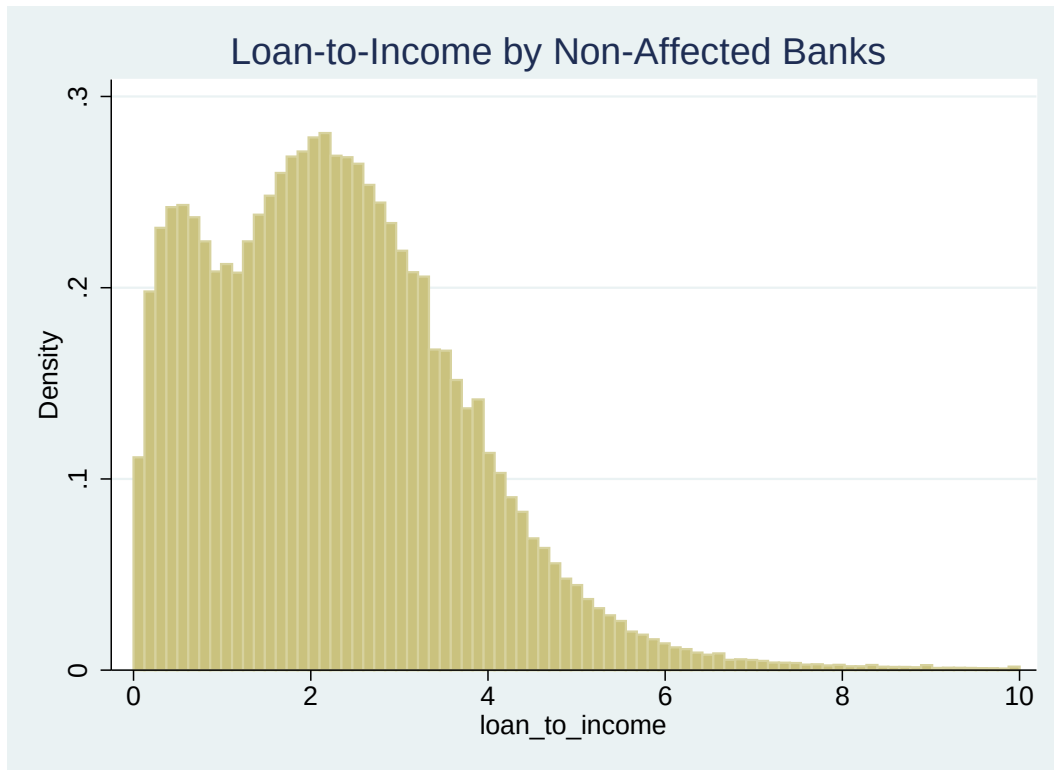
1.2 LTI ratio distribution of Affected and Non-Affected Banks

Figure 4: LTI distribution for Affected Banks
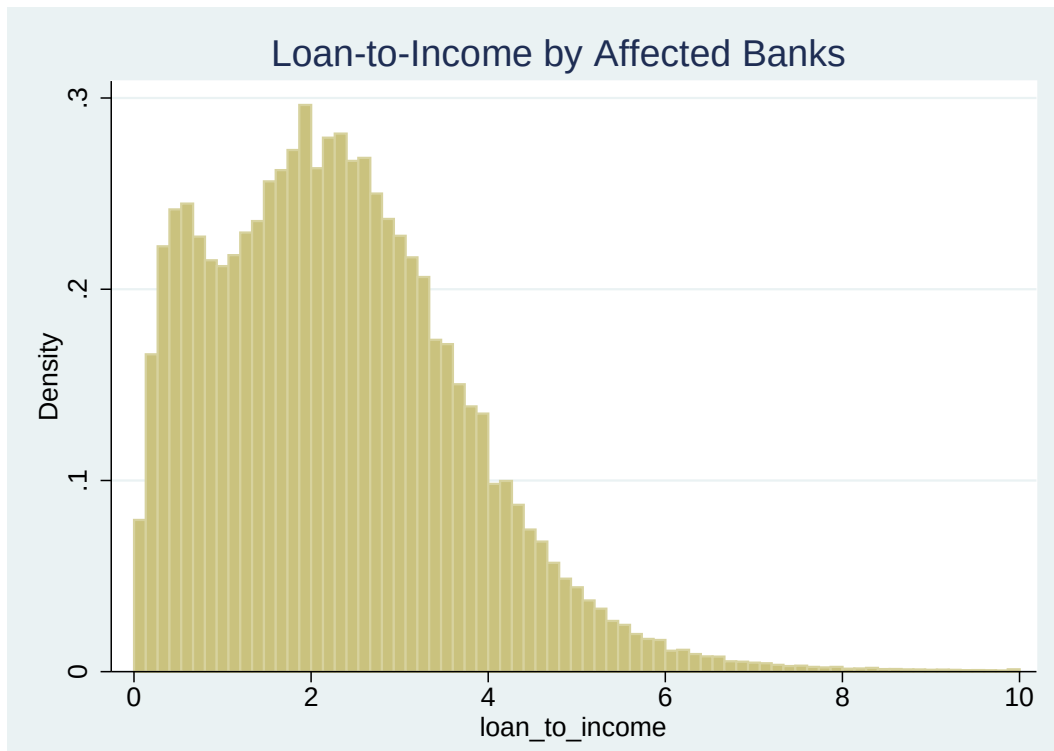
Notes: This graph displays the distribution of loan-to-income ratios of affected banks. Loan-to-income ratios are calculated at the application level by dividing the loan amount by the income of the applicants. It encompasses the LTI ratio of all accepted applications. The distribution of LTI is unconditional and presents the distribution for all banks that are affected.

Figure 5: LTI distribution for Non-affected Banks

Notes: This graph displays the distribution of loan-to-income ratios for non-affected banks. Loan-to-income ratios are calculated at the application level by dividing the loan amount by the income of the applicants. It encompasses the LTI ratio of all accepted applications. The distribution of LTI is unconditional and presents the distribution for all banks that are not affected.
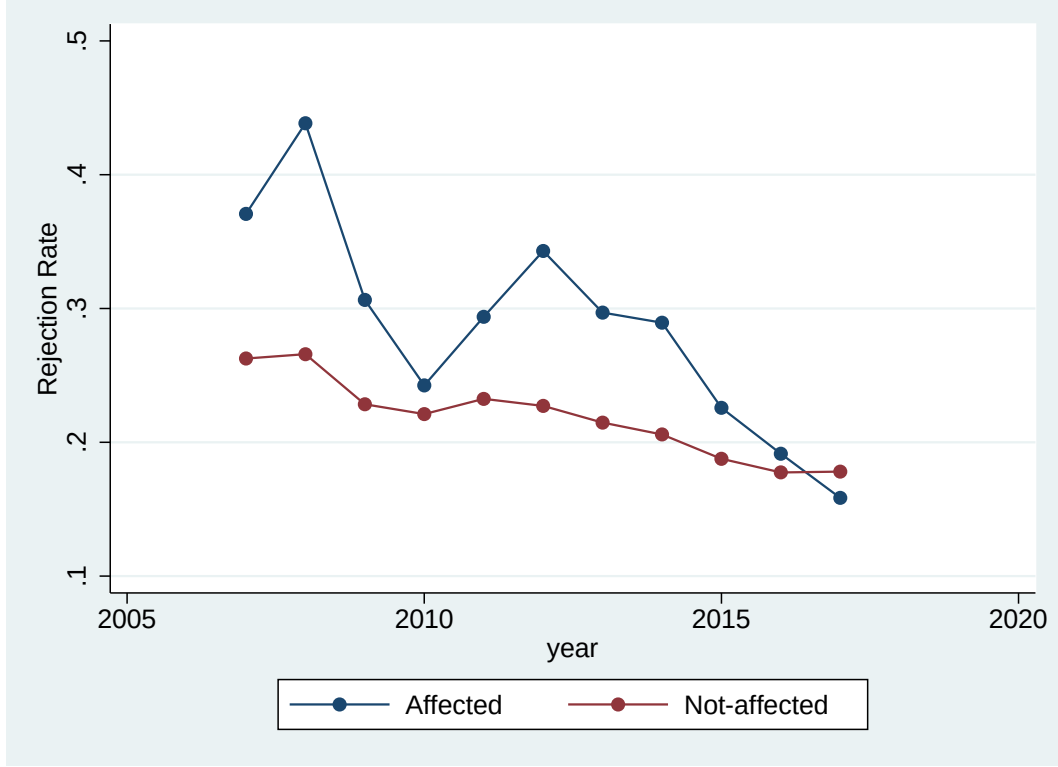
1.3 Rejection Rates for Loans

Figure 6: Rejection Rates for Refinance Loans
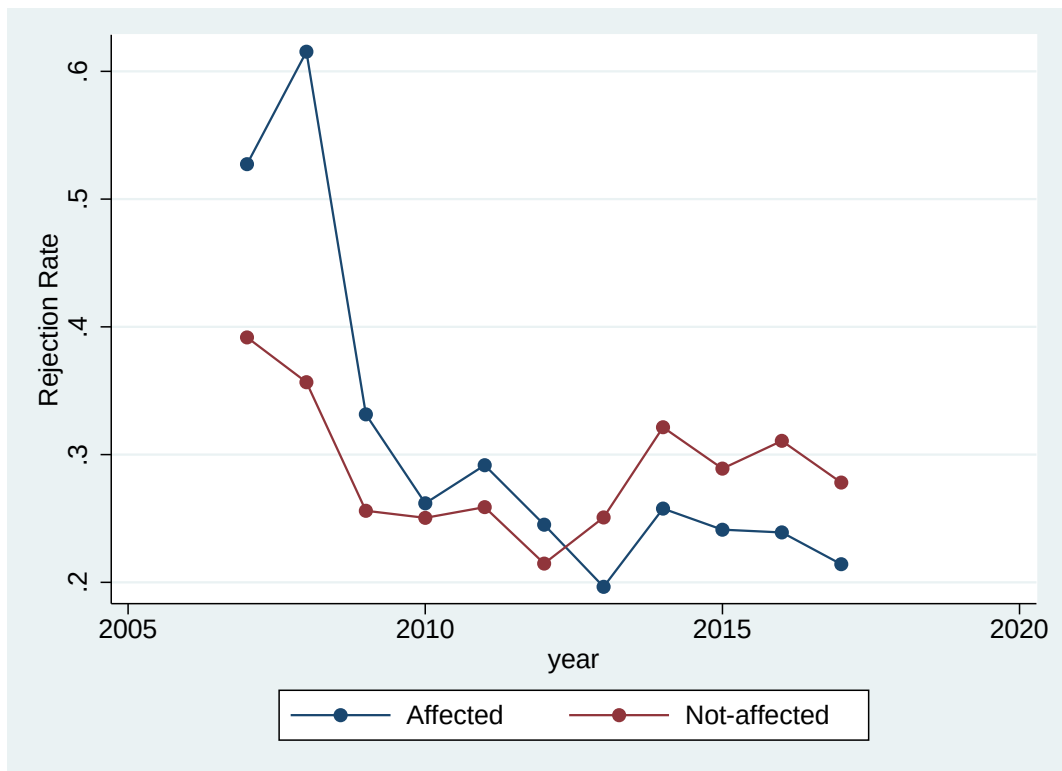
Notes: This graph presents the rejection rates for mortgage applications for refinance loans, illustrating the development for both affected and non-affected institutions.

Figure 7: Rejection Rates for Other Loans

Notes: This graph presents the rejection rates for mortgage applications for non-refinance loans, illustrating the development for both affected and non-affected institutions.

1.4 Alternative Exposure Measure

One challenge for identification is the potential endogeneity of county exposure to affected banks. For example, affected banks may have expanded more aggressively into economically growing counties before the crisis. If these counties later experience slower growth due to mean reversion or business cycle dynamics, we could observe a spurious correlation between bank exposure and negative economic outcomes.

To address this concern, we implement an instrumental variable approach inspired by Hoffmann and Stewen (2019). Our instrument exploits the staggered rollout of interstate banking deregulation from 1980 to 1995, which governed when banks from one state could establish branches in another. The core idea is to compute a hypothetical market share for each bank–county pair, reflecting the number of years a bank could have operated in that county after deregulation, assuming it had entered immediately.

We define the instrument as:

$$\omega_{bc} = \frac{min\{open^{s(c)}, open^{s(b)}\}\mathbf{1}_{s(c) \neq s(b)} + \mathbf{1}_{s(c)=s(b)}d(c)}{\sum_{b \in B_c} min\{open^{s(c)}, open^{s(b)}\}\mathbf{1}_{s(c) \neq s(b)} + \mathbf{1}_{s(c)=s(b)d(c)d(c)}} \tag{1}$$

where $\omega_{b,c}$ is the hypothetical share of bank b in county c, $open^s$ is the number of years since state s deregulated until 1995, and $d(c) = 15$ is the number of years local banks could have operated since 1980. The numerator reflects how long bank b could have been active in county c, while the denominator sums this across all banks potentially serving the county. This yields a counterfactual measure of bank presence based only on regulation - not on actual economic activity or observed entry.

Next, we regress the actual pre-crisis county-level share of each bank on this hypothetical share:

$$sh_{bct} = \beta_0 + \beta_1 \omega_{bc} + \gamma_b + \gamma_c + \epsilon_{bct} \tag{2}$$

Using the fitted values $\hat{sh}_{bc}$, we compute the predicted exposure of each county to affected banks:

$$exp_{d,c} = \sum_{b=B_{\text{affected}}} \hat{sh}_{bc}, \tag{3}$$

This instrument is relevant because the deregulation timing shaped where banks built up presence. It is plausibly exogenous to local post-crisis conditions, as the timing was driven by state-level policy rather than county-level trends. Our goal is to isolate the variation in bank exposure that is not influenced by short-run local economic factors, but rather by long-run institutional differences in branching opportunities. The exclusion restriction is that the hypothetical market share affects house prices only through its effect on the county exposure to banks.

1.5 Industry Correspondence

This section explains the correspondence that we construct between industries in the employment dataset by BEA and products in personal consumption expenditure by BEA. There is no clear cut correspondence between the two classifications, as one entails industries and the other is related to major products in the consumption basked. However, consumption aggregates in the personal consumption expenditure data also rely on the North America Industry Classification System (NAICS). The data on the products produced by each industry in NAICS enables us to construct a correspondence between the two classifications.

The idea behind our correspondence is the following. In one of the previous chapters, we have identified fast and slow-growing consumption aggregates by constructing growth rates in the aftermath of two previous recessions. Our results suggest that most of the categories in the consumption basket have experienced a significantly lower growth. Our analysis requires us to identify those sectors that have slowed down the consumption growth the most. For any of the consumption categories to be able to affect the total consumption it has to have a high share in the total consumption. Additionally, these categories have to grow slower compared to the previous recovery period. This motivates the construction of our correspondence between categories of consumption and employment by industry. We construct the ranking of the importance

of each sector in the following way. First, we calculate the change in the growth rate of consumption categories in percentages in the following way:

$$\gamma_{c,j} = \frac{\sum_{i=1}^{T} \phi_{i,c}}{T},\tag{4}$$

where c is the category of consumption, j is the recovery period, which is either 1 or 2, and T is the total number of periods in each of the recovery periods. $\phi_{i,c}$ is the growth rate of a category c in period i. Then we obtain the change in growth rates by dividing average growth rates over two periods:

$$\eta_c = (\frac{\gamma_{c,2}}{\gamma c, 1} - 1),\tag{5}$$

which gives us the rate of change in growth rates across two periods. Next, we multiply each of the categories of consumption by their respective shares to obtain our measure we us for ranking.

Having obtained this measure, we split all the categories into roughly three groups, that represent high, medium and slow-growing sectors. We then identify the slow-growing sectors as Housing and Utilities, Health Care, Recreation services, Food services and accommodation and Financial Services and Insurance. In the next step, we want to identify sectors that provide these groups of products/services and that are present. First, in our industry-level employment we don't take into account government sub-sectors, but instead, treat them as one. Housing and utilities category of consumption corresponds to two industries in employment classification - utilities and real estate and rental and leasing, which we treat as one sector in our analysis. Health care consumption category corresponds to the health care and social assistance. Recreation services in the consumption category entail purchases such as membership clubs, sports centers, theaters and museums,audio-video, photographic, and information processing equipment services, veterinary and other services. If we look at the employment information, people working in arts, entertainment and recreation include actors, amusement and recreation attendants, fitness trainers and aerobics instructors, gaming supervisors and musicians. These two, therefore, correspond to each other. Food and accommodation category entails purchased meal and beverages, food furnished to employees and accommodation expenses for hotels and motels. Bureau of Labor Statistics shows that the biggest categories of the accommodation and food industry are cooks in fast food establishments and restaurants, hotel, motel and desk clerks and waiters. These sectors clearly correspond to each other. Financial services consumption category has several categories of consumption: financial services, furnished without payment, financial services charges and fees, securities commissions, portfolio management and investment advice services, trust, fiduciary and custody activities, life insurance, net health insurance, vehicle insurance. Finance and insurance industry in the employment classification has workers in accounting and audit, insurance sales agents, loan officers, securities,

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commodities and financial services agents and tellers, and corresponds to the previous consumption category. Also, part of the category other services in the employment classification corresponds to household utilities, like water supply and for that reason we include it in our classification.

Product - Industry Correspondence			
Motor vehicles and parts	4	Farm employment	70
Furnishings and durable household equipment	5	Forestry, fishing, and related activities	100
Recreational goods and vehicles	6	Mining, quarrying, and oil and gas extraction	200
Other durable goods	7	Utilities	300
Food and beverages purchased for off-premises consumption	9	Construction	400
Clothing and footwear	10	Manufacturing	500
Gasoline and other energy goods	11	Wholesale trade	600
Other nondurable goods	12	Retail trade	700
Household consumption expenditures (for services)	14	Transportation and warehousing	800
Housing and utilities	15	Information	900
Health care	16	Finance and insurance	1000
Transportation services	17	Real estate and rental and leasing	1100
Recreation services	18	Professional, scientific, and technical services	1200
Food services and accommodations	19	Management of companies and enterprises	1300
Financial services and insurance	20	Administrative and support and waste management and remediation services	1400
Other services	21	Educational services	1500
		Health care and social assistance	1600
		Arts, entertainment, and recreation	1700
		Accommodation and food services	1800
		Other services (except government and government enterprises)	1900
		Government and government enterprises	2000