The Cleansing Effect of Banking Crises

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In this paper, we test the cleansing effects of banking crises. We show that in U.S. regions with higher levels of regulatory forbearance on distressed banks during the financial crisis, there is less restructuring in the real sector: fewer establishments, firms, and jobs are lost if more distressed banks remain in business. Consistent with the cleansing hypothesis, regions with less regulatory forbearance during the crisis experience a better productivity growth path after the crisis with more establishment entries, job creation, employment and wage, patent, and output growth. We provide evidence that banks under regulatory forbearance reduce lending to their out-of-state branch borrowers plausibly to redistribute it to their home-state borrowers in return for the regulatory forbearance favour they receive at home. Furthermore, we show that regulatory forbearance is larger for state-chartered banks, and in regions with weaker banking competition and more independent banks. Finally, we find that recapitalization of distressed banks through TARP does not appear to be cleansing.

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1. Introduction

The recent global financial crisis disrupted the banking sector and resulted in significant negative outcomes in the real economy. Surviving banks reduced lending (Ivashnia and Scharfstein, 2010), surviving firms reduced investments and employment (Campello, Garaham, and Harvey, 2010 and Chodorow-Reich, 2014), while many other banks and firms exited the market. As a consequence, recessions slow down productivity growth, for example, by intensifying credit frictions. One important case of such credit frictions is the accumulation of legacy assets in the banking sector. On the other hand, these dynamics, however painful, could improve productivity in the longer run (Caballero and Hammour, 1994). Recessions are times of low opportunity cost of time and resources and hence can be times of more productivity-enhancing reallocations (Foster, Grim, and Haltiwanger, 2016), giving lead to unavoidable and still necessary cleansing. In this paper, we focus on the recent financial crisis and ask whether more restructuring in the banking sector during the crisis leads to better productivity growth after the crisis.

During the financial crisis, regulators and policy-makers were mainly concerned with containing the crisis and preventing its systemic implications. This implies that even those banks that were crippled by the crisis, but were not systemically important had a chance to remain in the market. They could benefit from the liquidity and/or capital injections, or regulatory forbearance. This paper focuses on comparing the effects of restructuring versus forbearance in the banking sector during the crisis on measures of destruction and creation in the real sector during and after the financial crisis, as well as their implications for productivity growth. While we do not intend to analyse the welfare effects of banking crises in general, we aim to compare the real effects of regulatory responses to the problem of weak banks in the midst of a crisis.

Inefficient banks are a strain on growth by miss-allocating capital to the real sector (Peek and Rosengren, 2005 and Caballero, Hoshi and Kashyap, 2008). There are at least two reasons why inefficient lending relationships can be sticky too. First, Dewatripont and Maskin (1995) show that in markets with ex-ante asymmetric information *sunk costs* may encourage banks to maintain lending to inefficient borrowers even after the type of the borrower is revealed. Second, Caballero, et al. (2008) argue that for marginal banks it may be optimal to refinance inefficient projects due to the *soft budget constraint problem*, which in extreme cases can create zombie banks. In this paper, we show that banking crises give rise to an opportunity to get rid of these sticky, inefficient lending relationships, and facilitate redistribution of funds to borrowers with a higher marginal product of capital. Enhanced reallocation of capital and increased efficiency of capital allocation triggers creative destruction by new entrants to the market in the real sector, which presumably are the drivers of productivity growth (Schumpeter, 1942 and Aghion and Howitt, 1994).

Marginal banks, i.e. those banks that are very close to the minimum capital requirement, have a high opportunity cost to engage in restructuring activities in *good times*. These banks are hesitant to realize losses, hence, they evergreen the firms that are unproductive and unprofitable, in the hope that these firms recover at some point in the future, closely related to the notion of gambling for resurrection. The zombie firms stay in the market, depress productivity on their own accord, and distort competition: given that loans to such firms are essentially a subsidy to an inefficient firm, new, more efficient firms have a harder time entering the market or increasing market share. This channel further reduces productivity. The occurrence of a financial crisis can be a boon for the economy because the market may be cleansed of such inefficient banks and firms. Marginal banks fall below capital requirements, supervisors intervene, and bad assets are put in a bad bank or the bank is closed altogether. Both putting assets in a bad bank and closing the bank implies that the poorly performing firms no longer get funding and close as well. They disappear form the market. The remaining banks and the cleaned banks that get rid of their bad assets (legacy assets) subsequently tend to lend to better and more productive firms. These better firms get more loans and no longer have subsidized competitors, and hence they can grow more quickly. Moreover, there will be more new entrants. We test these hypotheses in this paper.

Our identification relies on the following: There may be forbearance on the part of the supervisor, i.e. the supervisor may not close a bank, even though the bank should have been closed. This implies that legacy assets remain on the balance sheet and the bank continues to have incentives to avoid realizing losses. Hence, poor firms continue to be funded and none of the positive effects of them disappearing from the market will be realized. Hence, the long-term effects of financial crises should ceteris paribus depend on the degree of forbearance by the supervisor.

Comparing Italy and Spain after the outburst of the financial and the European debt crises clarifies the central theme of our paper. Figure 1 presents the evolution of non-performing loans in the banking sectors of Italy and Spain. Both countries suffered from a rapid accumulation of non-performing loans starting from 2009. Unlike in Italy, the bank restructuring and recapitalization programs undertaken in Spain reversed the growth of non-performing loans in 2014 and later. Around the same time, we also observe that Spanish GDP starts to grow significantly faster than that of Italy. The challenge is, however, to understand the direction of causality. Is resolving legacy assets creates growth, or is it the growing economy that helps banks restructure their balance sheet faster? To test these ideas in the context of the EU is challenging for several reasons: EU countries experienced the crisis quite differently, and controlling for these differences in a cross-country analysis is difficult. Regulatory environments are also diverse in these countries. Micro data that are consistent across countries is both rare and of low quality. Because of these reasons, we test our hypotheses using data on the US metropolitan statistical areas (MSA) for the 2007/2009 financial crisis.

We find that, *during the crisis* MSAs with more regulatory forbearance on distressed banks experience lower exits at the establishment and firm level, and similarly, fewer job losses in their real sector. In contrast, *post-crisis medium-term* new job creation and job reallocation, as well as, wages, employment, patent, and output growth are higher for MSAs in which regulatory forbearance was lower during the crisis. We further define *Bank Restructuring* as the share of local banking sector's commercial and industrial loans that are resolved by the Federal Deposit Insurance Corporation (FDIC) and show that higher restructuring in the banking sector during the crisis has opposite effects of regulatory forbearance. It results in more destruction of firms and jobs during the crisis, but predicts better productivity proxies after the crisis. Nevertheless, we also show that the marginal effect of *Bank Restructuring* is non-linear and extreme levels of restructuring can be detrimental to post-crisis growth.

Banks that are active in multiple states may exhibit an asymmetric response with respect to their credit decision in and out of state, when they are under regulatory forbearance and are given time to recover. We show that out-of-state MSAs with more exposure to banks under forbearance experience a higher rate of establishment and firm exit, as well as job losses, during the crisis. This can be rationalized by noting that the local supervisor expects the bank to preserve local jobs in return for its forbearance. Thus, repatriation of credit from out-of-state to home-state borrowers might be an optimal response of a bank under regulatory forbearance.

There are potential endogeneity problems that we need to address. In particular, the regulators' decision to close a bank or to forbear may depend on their expectation of output growth. For example, they may be more willing to close a bank if the dismal growth expectations make it less credible that the bank can recover at all. The other side of this argument is that if regulators expect a quick recovery of the local economy, they may be more willing to save the bank expecting that the healthy recovery of the local economy will enable the bank to pay back the favour. We also know from the literature that supervisors are laxer on distressed banks if growth expectations are already gloomy (Agarwal, Luca, Seru and Trebbi, 2014). Hence, to tackle such endogeneity issues we need an instrument that correlates with banking supervisors' forbearance level but is not associated with economic growth through any other channel. Degreyse and Ongena (2005) show that higher geographical distance leads to higher costs of communication and information, while Hauswald and Marquez (2006) and Agarwal and Hauswald (2010) show that banks' information advantage diminish with the distance to the sources of information. In this vain, Lambert (2015) shows that banks distance to Washington D.C. also affects their ability to acquire better returns on their lobbying expenditure. There is also ample anecdotal evidence that having closer ties with the supervisors can partially determine regulatory treatment of banks.[1] To the extent that maintaining close ties with the supervisors is affected by geographical distance between the banker and the supervisor, distance to Washington D.C. will be important and, as we will show later, significantly correlates with the level of

[1] Christopher Whalen, Chairman of Whalen Global Advisors, explains that *"though the capital regulations appear binding, banks that maintain a genial relationship with regulators can often angle for a hall pass, winning approval to maintain a mathematically riskier balance sheet than the letter of the law permits."* https://commercialobserver.com/2017/11/regulators-to-clarify-which-loans-considered-dangerous/#.WiAhEfTT3bk.twitter

regulatory forbearance. Therefore, in this paper, we argue that banks that are geographically closer to Washington D.C. have an advantage of being close to the supervisors and having access to information, lobbying, and legal advice, which then, ceteris paribus, helps them to stay afloat in case of supervisory interference triggered by financial distress.[2] The identification assumption is that, after controlling for observable differences, distance to Washington D.C. does not affect MSA-level post-crisis output growth in no way but regulatory forbearance on distressed banks. In a similar approach, Dam and Koetter (2012), show that political influence on banks during election years decays with distance to the municipality in which the election occurs. Another example is Saunders and Steffen (2011) who use distance to London as an instrumental variable arguing that it correlates with firms' access to capital markets, but not with loan spreads.

Our paper is closely related to the literature on real effects of financial distress in the banking industry. Ivashina and Scharfstein (2010) show that the collapse of Lehman resulted in significant decline in loan availability. This negative shock, however, was not confined within the U.S. capital market and had far-reaching global impacts, as shown by Puri, Rocholl and Steffen (2011) for the German retail lending market, or by Damar, Gropp and Mordel (2014) in the case of Canadian households' consumer credits. Moreover, Popov and Rocholl (2017) show that the German banks that were exposed to the US banking sector experienced a negative funding shock and that temporarily lowered labour demand by those banks' borrowers. Our paper adds to this literature by going beyond the short-term crisis-period dynamics and by shedding light on longer term and post-crisis effects of heterogeneous policy responses taken during the crisis.

More recently, Schivardi, Sette, and Tabellini (2017) show that undercapitalized Italian banks engage in zombie lending but the aggregate productivity effects are small. Similarly, Acharya, Eisert, Eufinger, and Hirsch (2017) find that (exogenously-)

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[2] Bank solvency examination in the US is partly carried out at a local level. For example, even though the FDIC is headquartered in Washington DC, it has local offices in Atlanta, Boston, Chicago, Dallas, Kansas City, Memphis, New York, and San Francisco. Although regular bank examinations are done by these local supervisors, when a bank is in distress and likely to fail, the final decisions on its fate are most likely taken at the FDIC's headquarter. In Section 4.4 we use bank solvency ratings assigned by local supervisors (CAMELS ratings) and show that proximity to the corresponding local supervisors leads to an underestimation of banks' solvency risk. We then use this underestimation of banks' solvency risk as an alternative measure of regulatory forbearance and instrument it with distance to local supervisors as an alternative approach to our main analysis.

recapitalized banks continue lending to their zombie borrowers. Using the TARP experiment, we show similar results to these papers by fining that recapitalization of banks in the US, at least through TARP, did not foster restructuring in the real sector. Furthermore, we show that TARP-receiving regions exhibit worse productivity proxies for several years after the financial crisis.

Foster, Grim and Haltiwanger (2016) argue that unlike previous modern crises, the recent financial crisis has had relatively less of a cleansing effect. They show that on average the rate of job reallocation falls during the recent recession. Hence, they suggest that credit frictions may be one major factor that differentiates this crisis from the other post-1980s crises. In a related work, Homar and van Wijnbergen (2015) study all crises after 1980 and conclude that recapitalizing banks eliminates the problem of zombie banks, hence reduces the duration of the crises. Our paper, in contrast, shows that in fact it is forbearance on marginal banks that reduces the short-term restructuring and long-term growth. Another possible channel through which banking crises foster cleansing in the market is through intensified reallocations in the market for corporate control (Mukherjee and Proebsting, 2015). Our paper contributes to this literature by showing that increased reallocations in the banking industry during the financial crisis led to higher growth and job creation in the medium-term.

The remainder of this paper is as follows: in Section 2, we explain the data, sample selection, and the structure of the final samples we use in our estimations. Section 3 covers the empirical strategy. We present the results in Sections 4 and 5. Robustness checks are discussed in Section 6. Finally, we conclude in Section7.

2. Data

The data come from a number of different sources. In this section, we introduce the sources and elaborate on the approach that we follow to generate the final sample. Our final sample will be cross-sectional observations at the MSA level, containing information about the crisis period and the post-crisis period real outcomes, as well as regulatory forbearance and bank restructuring.

2.1. Bank-level Data

We construct the annual FDIC-insured commercial banks data from SNL Financial. Following Wheelock and Wilson (2000), we collect the variables that are needed to replicate the CAMEL ratings that are assigned by regulators as an outcome of their regular evaluations of individual banks. CAMEL stands for capital adequacy, asset quality, management quality, earnings, and liquidity. Therefore, we use equity ratio, loan ratio, real estate assets, commercial and industrial loans (C&I), other real estate owned, non-performing assets, ROA, efficiency, and liquidity. We augment this data by adding size, age, and location information of each individual commercial bank from 2001 until 2015. It is essential for our study to link banks to their respective MSA. We do this by making use of the ZIP code information of banks. We then use a link file between ZIP codes and MSAs provided by the Office of Workers' Compensation Plan of the United States Department of Labour[3], to map each bank to its respective MSA.

We obtain data on bank failures from the Federal Deposit Insurance Corporation (FDIC)[4]. The FDIC assumes receivership of troubled banks and designs a plan to market their assets and liabilities. Approximately 94% of the failures from 1999 to 2014 ended up in assisted mergers in which the acquiring institutions purchase and assume certain assets and liabilities of failing banks. In the remaining cases, the FDIC pools the loans acquired from the failing banks according to known characteristics, such as size, performance status, type, collateral, and location, and sells them through sealed bid auctions.[5] Because both cases result in significant restructuring in the failing banks' loan portfolios, we do not distinguish between these two types and generally associate more failing banks with more restructuring of loan portfolios in the local banking market.

The FDIC data include, most crucial for our purpose, the name, city, FDIC certificate number and date of closures. We make use of these variables to identify the failing banks in our bank-level data. We generate a dummy variable called *failed*, which equals one for bank-

[3] http://www.dol.gov/owcp/regs/feeschedule/accept.htm
[4] https://www.fdic.gov/bank/individual/failed/banklist.html
[5] Bennet and Unal (2015) offer a detailed description of the FDIC's resolution mechanisms.

year observations at which the bank fails, and zero otherwise. We use this dataset to calculate the MSA-level measure of bank restructuring defined as the failed banks' share of commercial and industrial loans weighted by their relative size. Furthermore, we estimate bank-level regulatory forbearance and consequently the aggregate MSA-level forbearance measure using the same data. We explain our approach in detail in Section 3.

Our final bank-level data contains 45,581 bank-year observations for the period of 2003 to 2014. On average, we observe approximately 3800 unique banks each year, but the number of banks is larger in the early years of our data. Because our analysis is ultimately at the MSA-level, banks that are not recorded as having their main office in a MSA will not be included in our analysis. The excluded banks have on average $194 million in assets, which in comparison to our final sample's average bank assets of $1.3 billion, indicates that these banks are small local banks and their exclusion should not be detrimental to our analysis. About 66% of the banks in our sample are supervised by the Federal Deposit Insurance Corporation (FDIC). Federal Reserve Board (FED) supervises around 14% and the Office of the Comptroller of the Currency (OCC) supervises the remaining 20%. Finally, out of the 5224 unique banks that we observe in our sample, 4196 (80%) are incorporated under a state charter while the rest are federally chartered.

2.2. MSA-level Economic Activity Indicators

We collect several variables at the MSA level that are generally used in the literature to as measures of economic activity and proxy for the level and/or growth in productivity. The Census Bureau's Business Dynamics Statistics provides annual data on establishments for each MSA. The data include the number of active establishments and firms and total employment in each MSA, the number and rate of entries and exists, job creation, and job destruction both at the intensive and extensive margin, and finally the rate of reallocation. Reallocation is defined as the sum of job creation rate and job destruction rate. To proxy for labour productivity growth we use average annual wage growth at the MSA level. The data come from the Quarterly Census of Employment and Wages. For each MSA we collect the average annual private sector wage across all industries.

The Patent Technology Monitoring Team (PTMT) of the U.S. Patent and Trademark Office publishes the annual number of utility patents, i.e., patents for innovation.[6] We collect this data at the MSA level for the period under study. Finally, we use the U.S. Department of Commerce Bureau of Economic Analysis data on regional economic accounts. This data provide different measures of production per MSA and industry in an annual frequency. In this study, we use annual GDP growth and per-capita GDP growth for each MSA from 2001 until 2014.

3. Empirical Strategy

We start by studying the relation between regulatory forbearance in the banking sector and real economic outcomes during the crisis period, defined as 2007 to 2010. We extend the NBER definition of the end date of the recession because the number of bank failures in 2010, as depicted in Figure 1, were still much higher than the pre-crisis period.[7] The regressions we estimate are as follows:

$$\bar{y}_i^{\{2007 \leq t \leq 2010\}} = \beta_0 + \beta_1 \bar{x}_i^{\{2007 \leq t \leq 2010\}} + \mathrm{B}X_i + \epsilon_i \qquad (1)$$

where the outcome variables are establishment and firm exit rates and rate of job destruction (in aggregate as well as by firm exits (extensive margin) or layoffs (intensive margin) separately). All these outcome variables are averaged over the four years (2007-2010) of annual data. Our variables of interest, shown by $\bar{x}_i^{\{2007 \leq t \leq 2010\}}$ is MSA-level regulatory forbearance during the period from 2007 to 2010. We also use an alternative measure, named *Bank Restructuring*, to check for the robustness of our results to the choice of independent variable. Bank restructuring is defined as the share of commercial and industrial loans that have been restructured by the FDIC in an MSA during the crisis. We include only commercial and industrial loans because we are interested in the production and service sectors, and less so in the retail and mortgage markets. Nevertheless, in unreported results we confirm that the same implications hold if we use total bank assets.

[6] https://www.uspto.gov/web/offices/ac/ido/oeip/taf/cls_cbsa/explan_cls_cbsa.htm
[7] http://www.nber.org/cycles/sept2010.html

In the next step, we study the relationship between growth in productivity proxies during the post-crisis period (i.e., between 2011 and 2014) and regulatory forbearance during the crisis. Hence, we estimate:

$$\bar{y}_i^{\{t \geq 2011\}} = \gamma_0 + \gamma_1 \bar{x}_i^{\{2007 \leq t \leq 2010\}} + \Gamma X_i + \varepsilon_i \qquad (2)$$

where $y_i^{\{t \geq 2011\}}$ represents the outcome variables: average annual rate of establishment ad firm entries, job creation (in aggregate and also separately by new entrants (extensive margin) and continuers (intensive margin)), average annual rate of reallocation, and employment, wage, number of patents, GDP and GDP per capita growth from 2011 to 2014, at the MSA level. Again, as in (1), $\bar{x}_i^{\{2007 \leq t \leq 2010\}}$ is the variable of interest, i.e., MSA-level average regulatory forbearance during the period from 2007 until 2010. Finally, in both regressions in (1) and (2) we control for MSA-level house price growth during the crisis, pre-crisis bank-to-GDP ratio and GDP growth. [8] These variables control for MSAs' exposure to the bust in housing prices, and to the banking crisis, as well as taking into account MSAs' structural growth differences. Note that we do not control for state fixed effects. The reason has to do with the United States' dual banking supervisory system. Commercial banks in the US are supervised by both federal and state regulators. This setting leaves little room for variations in regulatory supervision *within* states. Hence, adding state fixed effects will limit the analysis to a within-state comparison of MSA-level outcomes, while there is little variation in the quality of regulatory supervision within each state.[9]

The variable of interest is these models is regulatory forbearance. Regulatory forbearance is defined as in Hoffman and Santomero (1998). The regulator may find it optimal to grant some time to a distressed bank with the hope that management turn-around, orderly disposal of assets, or profit generation can enable the bank to absorb the losses and return to a healthy state.[10] We estimate the level of forbearance for individual banks

[8] The pre-crisis period in our analysis is 2000 to 2006.

[9] Agarwal, et al. (2014) show that there are systematic inconsistencies between state and federal supervisors. They show federal regulators are tougher than state regulators and argue that it can be partly explained by different regulatory resources and weights given to local economic conditions.

[10] Hoffman and Santomero (1998) define forbearance as the following: "An institution which is experiencing financial distress may be able to resolve its problems if given time. The granting of time for a management turn-around, the orderly disposal of problem assets, and/or the generation of positive profits against which to charge

headquartered in the same state where the MSA is located and aggregate them up to the level of the MSA using the share of deposits (as of 2007) in that MSA.[11] If during the crisis banks in an MSA benefit from higher levels of regulatory forbearance, we would expect to observe lower restructuring in real economy in that region during the crisis. The cleansing hypothesis would then predict lower growth for those regions during the post-crisis period. Therefore, β_1 and γ_1 in regression models (1) and (2) are expected to have a negative sign when we study the effect of regulatory forbearance.

To measure MSA-level regulatory forbearance, we first estimate a binary model of bank failure in a pooled OLS regression model following Wheelock and Wilson (2000), where the predictor variables are chosen such that they replicate the CAMEL ratings: [12]

$$failed_{i,t} = \alpha_0 + \alpha_1\, equiry\ ratio_{it-1} + \alpha_2 loan\ ratio_{it-1} + \alpha_3 real\ estate_{it-1} + \alpha_4 C\&I_{it-1} + \alpha_5 other\ real\ estate_{it-1} + \alpha_6 NPA_{it-1} + \alpha_7 ROA_{it-1} + \alpha_8 liquidity_{it-1} + \alpha_9 efficiency_{it-1} + \alpha_{10}\log(assets)_{it-1} + \alpha_{11}\log(age)_{it-1} + \sum_{j=1}^{2}\alpha_{11+j} GDPG_{t-j}^{MSA_i} + Industry_i + \varepsilon_{i,t} \quad (3)$$

In this model, $failed$ is a dummy variable that equals one for the bank-year observations in which the bank is closed, and zero otherwise. The variables that predict failure are defined as follows: *equity ratio* is the total equity capital as a percent of assets; *loan ratio* is total loans and leases, net of unearned income divided by total assets; *real estate* is total domestic offices real estate loans divided by total consolidated loans and leases (net of unearned income and gross of reserve); *C&I* is total domestic commercial and industrial

off losses is defined as forbearance. As this suggests, forbearance can occur for two separate reasons. Either the firm is thought to be bankrupt but the timing of the liquidation is deferred for market reasons, or the firm is perceived as salvageable if given enough time to recover from an unexpected and large loss. In the first case it is sometimes alleged that immediate liquidation of assets is not possible in the real world. It is argued that pressure to liquidate assets can lead to returns which do not reflect fair market value. Therefore, to achieve maximum return an institution is given leeway to liquidate its assets as favorable bids are received. However, the institution is viewed as managing to liquidation, rather than solvency."

[11] This variable measures regulatory forbearance enjoyed by banks that are headquartered in the same state as each MSA. In section 4.3 we also study the effect of forbearance on banks that are headquartered outside of the state of the MSA and discuss the different implications.

[12] The true form of the failure model, whether linear or non-linear, is unobservable to the econometrician. Hence, we stick to the linear model in the main analysis but check for the sensitivity of the results by alternatively using the logistic regression model in which the results (not reported) remain statistically equal to what we report in the main text.

loans divided by total loans and leases; *other real estate* is the sum of foreclosed real estate, other real estate owned and direct and indirect real estate investments as a percent of total assets; *NPA* is total nonperforming assets (nonperforming loans plus other real estate owned plus other nonaccrual assets) divided by total assets; *ROA* is net income as a percentage of average total assets; *liquidity* is liquidity ratio (i.e., cash and balances due plus securities plus fed funds sold and repos plus trading account assets minus pledged securities divided by total liabilities); and finally, *efficiency* is noninterest expense less amortization of intangible assets divided by net interest income on a fully taxable equivalent basis and noninterest income. Furthermore, we control for contemporaneous and lagged GDP growth at the MSA level, and the local industry mix. To construct this latter variable, we measure average share of output of each industry at the 1-digit SIC code level (11 sectors in total) during the 2001-06 period in each MSA. The idea is to account for structural industry differences among the MSAs, and that it may affect banks' health.

We estimate (3) by using bank-level data from 2001 to 2015. The residual term in regression (3) with a reversed sign is then a measure of forbearance for each individual bank. For example, a positive estimate of forbearance for a bank tells us that this surviving bank would have to be closed if the supervisor followed the estimated closure rule consistently across all banks and years throughout the sample period. On the other hand, a negative estimate implies that the supervisors have been too though on that specific bank, again relative to what the model predicts. Note that for our analysis only the relative values of these estimates are important. Next, to calculate an annual MSA-level measure of forbearance, we calculate the deposit-weighted average of bank-level forbearance on banks that are headquartered in the state of each particular MSA in each year. Finally, we take the average over the years 2007 to 2010 to construct a time-constant aggregate measure of forbearance at the MSA level. In Section 5, we demonstrate that this measure exhibits the known characteristics of regulatory forbearance in the U.S. banking sector.

3.1. Instrumental Variable

The supervisor's decision to close a bank or to forebear may depend on their expectation of output growth. For example, they may be more willing to close a bank if the dismal growth expectations make it less credible that the bank can recover at all in the near future. On the other hand, local supervisors may be laxer on distressed banks if growth expectations are already gloomy (Agarwal, Luca, Seru and Trebbi, 2014). Therefore, the endogeneity can be positive or negative, depending on the specific circumstances at the local economy. Furthermore, the decision for regulatory intervention depends on the banking industry's exposure to the crisis as a whole. For example, the too-many-to-fail problem as in Acharya and Yorulmazer (2007) may force the regulator to bail out some or all failed banks. This may introduce an omitted variable bias into our regressions. Therefore, to tackle both reverse causality and omitted variable problems we need an instrument that correlates with bank supervisors' forbearance level but is not associated with economic growth or banking industry's health through any other channel. Degreyse and Ongena (2005) show that higher geographical distance leads to higher costs of communication and information in the banking sector. Similarly, Lambert (2015) shows that distance to Washington D.C. affects banks' lobbying costs, and consequently, the severity of the regulatory enforcement actions they encounter. Dam and Koetter (2012), in the same vein, show that political influence on banks during election years decays with distance to the municipality in which the election occurs. Anecdotal evidence also suggests that closer relationships between bankers and supervisors may affect banks' regulatory treatment. Revolving doors between banks and supervisory and regulatory institutions can also determine the tightness of the relationships supervisors are willing to maintain with bankers, and vice versa. In this paper, we argue that banks that are geographically closer to Washington D.C. have an advantage in making closer ties with the supervisors, to collect information, to lobby, and finally to receive legal advice. These advantages, ceteris paribus, help banks stay afloat in case of supervisory intervention triggered by financial distress.[13] Hence, we use MSAs' distance to Washington D.C. as an instrumental variable where the identification assumption is that distance to D.C. does not affect MSA-level post-crisis output growth or banking industry's performance during the crisis in any way but regulatory forbearance on distressed banks. To address skewness we

[13] A similar example is Saunders and Steffen (2011) who use distance to London as an instrumental variable arguing that it correlates with firms' access to capital markets but not with loan spreads.

use *log(distance + 1)* as the instrument.[14]

4. Main Results

We will present the results in two sub-sections. First, we will look at the effects of forbearance during the crisis on rates of establishment and firm exits from the market and rates of job destruction. We will also show that banks in forbearing regions will be weaker after the crisis. Next, we analyse how post-crisis rates of entry of establishments and firms, as well as, job creation and reallocation differs in regions with differing intensity of restructuring/forbearance during the crisis. We will also study the effects on wages, employment, number of patents, and output growth.

4.1. Crisis-period restructurings

Table 1 presents the summary statistics of our MSA-level cross sectional sample. It indicates that during the crisis, 9.6 percent of the establishments and 7.5 percent of firms left the market in an average MSA in each year. Job destruction rate was on average 14.2 percent, out of which 10.2 percentage points were through lay-offs by continuing firms, while 4.1 points were due to exiting firms. The variable *Bank Restructuring* indicates that during the crisis, failed banks accounted for 0.0 to 2.5 percent of all the outstanding commercial and industrial loans in their MSAs. Figure 3 shows the distribution of estimated MSA-level forbearance. The majority of MSAs have on average a positive value for forbearance (164 out of 262), which indicates that bank failures would have been higher had regulators followed the estimated model of bank failure and did not exert any discretionary forbearance.

Table 3 presents the estimate of the failure models by linear and logistic binary

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[14] One might argue that distance to Washington D.C. may also affect non-financial firms the same way as it affects the banking sector. It may well be that firms closer to Washington have access to subsidies and rents that give them an advantage over firms farther away. As we will see later in the results, in fact we show that regions farther away perform better after the crisis and thus even if there are confounded effects, they work against what we find. Furthermore, as our focus is on the financial crisis, the distribution of TARP funds across industries is a relevant indicator of the relative significance of regulatory forbearance between financial and nonfinancial firms. In fact, only about 10% of the funds go to the non-financial sector, and only to two automotive companies (GM and Chrysler).

regression models. The variables we employ are similar to Wheelock and Wilson (2000). In addition, we control for local output growth and industry mix. The summary statistics of the variables used in estimating these models are presented in Table 2. The residual from these two models are used to construct the MSA-level proxy of forbearance. We will discuss the properties of this measure in more detail in Section 5. The model predicts higher failure likelihoods for marginal banks, i.e., banks with lower equity ratios and more non-performing assets.

Panel A of Figure 4 presents the geographical distribution of regulatory forbearance, showing some preliminary evidence of higher values closer to Washington D.C. The formal tests of the first-stage regressions of the IV estimations are presented in Table 4. The usual tests of weak instrument are strongly rejected and the instrument is significantly correlated with the endogenous variables. Panel B of Figure 4 presents the geographical distribution of establishment exits during the crisis throughout the US states. These two panels are suggestive of our main findings in this section. Table 5 presents our 2SLS estimates of the model in (1). The estimates imply that the higher regulatory forbearance in a region, the less is the extent of restructuring in the real sector in that region during the crisis. We observe fewer establishments and firms exit the market, as well as less job destruction rates by both existing and continuing firms. The results are also economically significant. One standard deviation higher regulatory forbearance during the crisis would lead to approximately 4.8 percentage points lower rate of establishment exits and job destructions. These findings are robust to using *Bank Restructuring* instead of regulatory forbearance, as presented in Table A 2. As expected, our OLS results, however, in Table A 1 are not statistically significant at conventional levels. This implies that the OLS estimate of $\beta_1$contaninates the true $\beta_1$in equation (1) by adding to it the product of two correlations arising from the omitted variables, such as economic expectations of the regulators. For example, let us consider establishment exit regression. The first correlation is between economic expectations and establishment exit and the second correlation between economic expectations and regulatory forbearance. If the product of these two correlations is positive it will bias the true β_1 upward, which in our hypothesis has to be negative. The product of the two correlations is positive if either both correlations are positive or if both are negative. Assuming that the first correlation is positive, i.e., more exits from the market being signs of a healthier economy in the future, the second correlation turns out to be positive too, which indicates that positive outlook makes regulators more forbearing. On the contrary, if we assume that the first correlation is negative, i.e., more exits from the market forecast a worse outlook for the future, the second correlation has to be negative, which implies that negative outlook makes regulators more forbearing. For our results in this paper to be valid, it does not matter which of these two scenarios hold in reality. Moreover, these two cases need not be mutually exclusive. Nonetheless, while these are admittedly important questions, they are beyond the scope of this paper and hence we leave them for future research.

W showed in Table 3 that failing banks are more likely to be the marginal ones. Therefore, higher forbearance means more distressed banks staying in business and continuing to operate, perhaps even out-living the crisis. The consequence of this will be having a weaker banking sector down the road in highly forbearing regions. Figure 5 presents some suggestive evidence of this effect. MSAs with higher levels of regulatory forbearance see a sharp increase in their share of non-performing assets during the crisis and carry forward for several years after the financial crisis with significantly more non-performing assets relative to other MSAs. We explicitly test for bank health differentials across MSAs with high levels of regulatory forbearance and others. Results are presented in Table 6 and show that banks in highly forbearing regions (those in the fourth quartile) will have lower equity rations, more non-performing assets, and lower ROA during 2011 to 2014.

4.2. Post-crisis productivity

Now we turn to the medium to long-term post-crisis effects of forbearance in the banking sector during the crisis. Our hypothesis predicts that if distressed banks' assets are restructured during the crisis, there will be fewer impaired banks and impaired borrowers left in the market, which in turn will increase the chances of other firms to enter the market in the medium to long run. The lack of restructuring in the banking sector, imposed by regulatory forbearance, will hinder this process. Marginal banks that are kept alive will not be able to cut off their borrowers and will be more likely to engage in zombie lending. In this section, we will show some evidence in supporting this hypothesis.

The results of our 2SLS estimation of model (2) are presented in Table 7. We find that the higher the level of crisis-period regulatory forbearance in an MSA, there is less entry of new establishments to the market. The same holds for the entry rate of firms, and also the rate of job creation. Our results show comparable effects on job creation by new entrants and incumbents. Garcia-Macia and Hsie (2016) find that most of the growth in the economy takes place by the incumbents, as they comprise a bigger share of the employment. Following their findings, and knowing that our variables are in terms of *rates*, our findings imply a bigger number of jobs created by the incumbent firms.

Moreover, we find that overall post-crisis reallocation rate (a measure of employment turnover) is higher in MSAs with less crisis-period forbearance. The higher job creation and reallocation rate results are complimented by the finding that, post crisis, employment also grows faster in less forbearing regions. The next question is whether these developments translate into higher productivity. Foster et al. (2016) argue that productivity growth in the U.S. is closely linked to high reallocation rates. Thus, our findings imply a depressed productivity growth due to forbearance and vice versa. Consistent with this view, we find that post-crisis wage growth, a measure of enhancement in labour productivity, is faster in MSAs with less crisis-period forbearance. The number of patents granted, that can be viewed as a proxy for potential productivity growth, shows the same pattern as wages. Finally, we find similar indications using GDP per capita growth. The effects are economically significant. One standard deviation higher regulatory forbearance implies an 80% of standard deviation lower MSA-level GDP per capita growth post crisis. In short, our findings in this section indicate a better productivity growth path for regions with more restructuring in the banking industry, and in contrast, a worse productivity path for regions with more regulatory forbearance on distressed banks.

Our findings manifest the inherent trade-off between short-run pains and long-run gains. Especially, in the case of regulatory forbearance, political incentives are the key determinants of the policies taken during the crisis, and therefore, the chances that incumbent politicians forego long-run benefits (as they do not fully recuperate them) for the sake of less short-term distress are quite high. Our results in Table 8 show that for every one lost establishment (firm) due to lower regulatory forbearance during the crisis there will be 1.04

(1.24) new establishments (firms) that will enter into business after the crisis. Similarly, for every one job lost due to lower regulatory forbearance during the crisis there will be 1.05 new jobs created after the crisis. Therefore, the long run costs of regulatory forbearance appear to be substantial.

Our results are robust to using a measure of Bank Restructuring instead of regulatory forbearance, as presented in Table A 3. We define Bank Restructuring in each MSA as the total commercial and industrial loans belonging to the failed banks headquartered in that MSA as a share of MSA's total banking assets. We believe that our findings are to the larger extent driven by restructuring (or the lack thereof) of the incumbent banks rather than entrance of new banks. In fact, Adams and Gramlich (2016) show that the period from 2009 to 2013 is exceptional in the US banking history in that only 7 new banks have been chartered (fewer than 2 per year), whereas in the period from 1990 to 2008 more than 2000 banks were formed (more than 100 per year). Low interest rates made traditional banking a less attractive business, while heightened regulatory requirements of the Dodd-Frank Financial Reform Act have increased entry barriers (Cochrane, 2014).

4.3. Redistribution of Credit by Banks under Regulatory Forbearance across In- and Out-of-State Branches

As long as banks are under distress and are given time by the supervisor (regulatory forbearance) in the hope of recovery, they might seek an asymmetric approach towards their home-state versus their out-of-state credit policies. In return for regulatory forbearance by the local supervisor, banks may be expected to preserve local jobs. To meet such expectations banks may redistribute credit from their out-of-state branches to their home-state branches, which can help them in extending credit to the borrowers that would otherwise go bankrupt and worsen local unemployment. In fact, the literature has documented the home bias effect in credit crunches using Italian data (Presbitero, Udell, and Zazzaro, 2014). While the negative credit shock to banks' out-of-state branch borrowers may affect all types of borrowers similarly, the redistribution of that credit to home-state borrowers will more likely go to the weakest borrowers to feed the zombie firms at home. Therefore, in an MSA in which a large share of banking activity comes from branches of out-of-state distressed banks, the negative credit shock is less likely to be cleansing so long as it does not specifically target cutting credit from the weaker borrowers.

We test this hypothesis by isolating regulatory forbearance that is spilled over to each MSA from out-of-state banks. We collect data on the level of deposits each bank holds on each of its branches across the country as of June 30, 2006. The assumption here is that the share of deposits correlates highly with the credit activity of the branch in each locality. The MSA-level out-of-state regulatory forbearance is then defined as the deposit-weighted sum of bank-level regulatory forbearance of out-of-state banks that have one or more branches in that specific MSA, averaged over the period from 2007 to 2010. Next, we run similar regressions as presented in equations (1) and (2) and only replace this new variable with our previous variable, Forbearance, expect that we do not need to instrument this new variable. The reason the out-of-state forbearance does not need instrumentation is that it is exogenous to the receiving state's supervisors' expectation of future economic activity and is simply imported to the state because of distress in banks located in other states. Our results, presented in Table 9 and Table 10 show that, in MSAs with a high exposure to out-of-state banks under regulatory forbearance, the rate of establishment and firm exit, as well as job loss, during the crisis are higher than in MSAs with less exposure to out-of-state forbearance. During the post-crisis period, MSAs that had been more exposed to out-of-state forbearance exhibit some positive effect on job creation and reallocation rates, but these do not seem to improve productivity. Most of the other proxies for productivity growth exhibit a negative sign while being statistically insignificant. These findings suggests that banks that are under regulatory forbearance may redistribute credit to their home-state branches from out-of-state branches in order to keep the local credit disruption to the minimum, as it is expected by the supervisors upon granting forbearance to a distressed bank. It also suggests that the higher exit rates created by the decline of lending in out-of-state MSAs is not cleansing as it is not necessarily driven by cutting credit from the weakest borrowers.

4.4. Alternative Instrument: Distance to local supervisors

When a federally insured bank has critical solvency problems the FDIC is the arbiter of its fate on whether the bank can continue its operations or should be put under the FDIC's receivership. This matter for the FDIC because of the deposit insurance costs that a bank failure will create for the FDIC. That is the reason in our main analysis, distance to Washington DC appears to be significantly correlated with how much regulatory forbearance is enjoyed by a distressed bank. In this section, however, we turn to local supervisors and their share of forbearance as an integral part of the bank supervision process.

FDIC, FED, and the OCC have local offices whose task is to perform regular examinations of each bank and to produce a solvency rating called the CAMELS rating, scaled from one (the safest banks) to five (banks with extreme supervisory concerns). In fact, if a bank receives a CAMELS rating of four or five it will be given a 90-day period to address the problem and get a rating of three or better. If the bank fails to do so by the end of the 90-day period, the FDIC will start a bidding process with other banks that may be interested in acquiring the troubled bank.[15] The CAMELS rating therefore seem to be a key factor for the regulatory treatment of banks. Especially, whether a bank receives a three instead of a four can determine its future course and perhaps its fate. To the extent that personal relationships with the local supervisor can turn a marginal four to a marginal three, banks would have great incentive to invest in such relationships and influence the supervisor's decision making. We show that the closer an MSA is to the local supervisor of the banks headquartered in it, the more favorable rating its banks will receive. In particular, we create a binary variable that takes a value of one for banks with a CAMELS rating of four or five and zero otherwise. We regress this variable (using a logistic regression model) on bank characteristics that determine banks' solvency and risk profile (the same bank-level variables as in equation 3) and use the estimated model to predict its corresponding binary CAMELS rating. The difference between the estimated rating and the actual binary CAMELS rating gives us a measure of local supervisors' forbearance. We use this variable as an alternative to our measure of forbearance that we used in the main analysis and rely on distance to local supervisors as an instrumental variable. The idea is that banks closer to their local supervisor are more likely to form stronger personal relationships with their supervisors who may have the discretion to over-report banks' ratings in certain cases. To measure an average distance of all banks in an MSA

[15] https://www.bankinfosecurity.com/anatomy-bank-failure-what-happens-when-fdic-pulls-plug-a-975

to the local supervisors, we find the distance of each bank in that MSA to its corresponding supervisor (local FDIC, FED, or OCC) and create a weighted sum of all these distances using banks' share of deposits in that MSA as the weights.

We use the average distance of each MSA to its banks' local supervisors as an instrument for local supervisors' forbearance on banks solvency. Distance to local supervisor significantly matters for the CAMELS rating and can be used as an instrumental variable as it rejects the tests of weak instrumental variables ($p = 0.049$). Next, we find that the larger the over-reporting of banks' CAMELS rating the lower is the extent of establishment and firm exist, as well as, job destruction in that MSA during the crisis. This is similar to our main result where we used bank failures to estimate a measure of regulatory forbearance on distressed banks. The difference, however, is that the effect of ratings over-reporting on the real economy is weaker than our main results. This finding seems natural as not all the banks that are assigned a better rating than deserved would have failed otherwise. Consequently, the post-crisis cleansing implications of this lack of restructuring during the crisis do not seem particularly strong. Although we observe a negative effect from over-reporting of banks ratings on post-crisis productivity growth, the estimates are not statistically significant. These results are available from the authors upon request.

5. Regulatory Forbearance

We know from the literature that banks are treated differently by their corresponding supervisors, depending on whether they are chartered at the state or at the federal level. Agarwal et al. (2010) show that state supervisor may be more concerned about the local economy and hence treat banks less stringently in case of a trouble. Furthermore, local competition may affect the regulatory treatment of troubled banks. Kang, Lowery, and Wardlaw (2014) argue that in neighbourhoods with scarce banking services, regulators may be more willing to postpone bank closures. Regulatory forbearance may be also driven by local political factors that are rather stable through time. This in turn may imply that regulatory forbearance is persistent through time within a neighbourhood, hence making some neighbourhoods always more forbearing than others. Finally, Ashcraft (2005) shows that the Financial Institutions Reform, Recovery, and Enforcement Act of 1989 (FIRREA) allowed supervisors to use equity capital of other subsidiaries which the same holding to pay for the losses of another failing subsidiary. This relatively lower regulatory cost of closing subsidiaries than independent banks, hence, has to be reflected in our regulatory forbearance measure. In this section we test these properties of the regulatory forbearance, using our estimated measure and confirm that it exhibits all the known properties.

Banks in the U.S. are chartered either at the federal or at the state level. Federally chartered banks are supervised by the federal supervisors while state-chartered banks are examined intermittently by both national and state supervisors. Agarwal et al. (2010) find that there are inconsistencies in the stringency of the supervision by these two types of regulators. In particular, they find that state supervisors more heavily weigh in the local economic factors, and hence appear to be more lenient on distressed banks. We find similar results using our measure of forbearance. Figure 6 plots the distribution of regulatory forbearance across the two types of bank charters. We observe that the distribution of forbearance on state-chartered banks exhibits a longer right tail and with more mass, whereas in the low and middle parts of the distribution federal-chartered banks have a larger mass. We confirm these findings formally in Table 13. The results indicate that federally chartered banks appear to be healthier, in terms of equity, profitability, and efficiency, while at the same time they seem to benefit less from regulatory forbearance.

We also find some evidence consistent with the findings in Kang et al. (2014). The results in Table 14 show that in MSAs where there are fewer banks per capita, regulators exert more forbearance. The reason is that the closure of one bank may marginally be more detrimental to providing banking services in the region. On the other hand, in regions with more banks, it is easier for the regulators to find a bank that is willing to acquire the assets of the failing bank, and therefore, they hesitate less in closing banks.

Forbearance at the state-level is highly persistent. Figure 7 shows that states with the highest level of forbearance in 2007 and 2008 stay highly forbearing for the rest of the sample period and vice versa. Furthermore, we formally test for the persistency of forbearance at the state level. Our between-state comparison of average state-level forbearance in Panel A of Table 15 indicate that if in the last year a state was more forbearing than another one by one unit, it will be more forbearing by around one unit this year too. Moreover, the state fixed effects estimations also indicate that more forbearing states tend to become more so and vice versa. Moreover, if we rank states each year based on their level of forbearance, we can show that their rankings are also highly persistent. *Between* regressions show that if a state was ranked one level higher last year relative to another state, it will be ranked by one level higher this year too. Finally, the fixed effect estimates show that there is a divergence in state-level forbearance, i.e., more forbearing states become more so and less forbearing states less.

Finally, the cross-guarantee provision of the Financial Institutions Reform, Recovery, and Enforcement Act of 1989 (FIRREA) reduces the supervisor's expenses of closing banks and hence facilitates restructuring of subsidiary banks relative to independent banks (Ashcraft, 2005). It further may result in closure of healthy subsidiaries whose equity drop below minimum requirements in case they have to cover another subsidiary's losses in case of distress. We show that our regulatory forbearance reflects this characteristic too. We construct a measure of the relative share of subsidiary banks in an MSA relative to total size of the banking sector, and show that forbearance correlates positively with this measure, as presented in Table 16. The estimates indicate that regulatory forbearance is lower in regions where subsidiaries are more prevalent, and therefore, banking restructuring in these regions happened more extensively during the crisis.

One could use the share of subsidiary banks in a region as an alternative IV in our regression models. Assuming that the relative presence of subsidiaries, ceteris paribus, does not impact real economic activity, finding that it affects regulatory forbearance, makes it an IV candidate. In unreported results, we find that the first-stage results are valid, while the second-stage results, while having the correct sign, are not statistically significant.

6. Robustness

6.1. Mean reversion

One may argue that MSAs that were hit harder by the crisis and lost a bigger fraction of their productive capacity have higher marginal productivity of capital and labour, hence will grow faster post-crisis. A similar argument is that such regions need to catch up, hence they will grow faster. To examine this hypothesis we test for mean reversion in our variables of interest, using the following model:

$$\bar{y}_i^{post-crisis} = \alpha + \beta \bar{y}_i^{crisis} + \varepsilon_i \qquad (4)$$

where y_i represents the outcome variables under study, such as establishment entry rate, job creation rate, employment growth, wage growth, patent growth, and finally GDP per capita growth. The mean reversion hypothesis predicts a negative β. The results of our estimations of this model are presented in Table A 4. For none of the variables we find a significantly negative estimate for the mean reversion parameter. This indicates that, for example, it is not true that MSAs with the biggest loss in employment during the crisis generally experience faster employment growth after the crisis. It further means that apart from the forbearance channel, there might exist other channels that undermine the overall recovery of hardly-hit regions.

Finally, as we observed in Figure 7, regulatory forbearance is not mean reverting either. This is also shown in our results in Table 15. That is, highly forbearing states do not become least forbearing and vice versa. Therefore, the results cannot be attributed to mean reversion or different timing of regulatory forbearance. Furthermore, knowing that regulatory forbearance is rather time-invariant, highly forbearing regions perhaps suffer from worse bank supervision even before the crisis, requiring more stringent intervention during the crisis, which does not happen as we show in this paper. Hence, in fact there are two additive effects of banking supervision on the real economy: first, sustained lack of supervision in normal times leads to emergence of inefficient banks, and second, lack of intervention during turbulent times exacerbates the state of exactly those inefficient banks that in fact require stronger interventions.

6.2. Recapitalization

Recapitalization of distressed banks has been argued to eliminate the friction arising from the legacy assets by allowing the distressed banks to realize losses and cut funding to their unprofitable borrowers (Giannetti and Simonov, 2014 and Homar and Van Wijnbergen, 2015). During the financial crisis the US government executed one of the biggest bank recapitalization programs in response to the crisis. If this recapitalization helped distressed banks stay afloat while at the same time enabled them to curtail funding to their unprofitable borrowers, we should expect to observe more establishment exits and job destructions in regions that received more of such recapitalization funds. To test this idea, we use the TARP experiment. We first calculate the total amount of funds received by each state as a share of the size of banking sector in that state. We then use this variable as our main independent variable and run similar regression models as in our main analysis. The results in Table A 5 show that regions that received more TARP money in fact experienced lower establishment exits and job destructions during the crisis. This finding is in sharp contrast to the idea that recapitalization of distressed banks helps them realize losses and consequently favours the process of restructuring in the real sector. Furthermore, if we control for TARP in our results do not change. An alternative interpretation of TARP in our setting is to view it as one form of regulatory forbearance, rather than a solution to it. TARP certainly saved some distressed banks (regulatory forbearance) but it did not lead to productivity-enhancing cleansing forces in the real sector. Consistent with this view, we in fact find that post-crisis productivity is negatively affected by the exposure to TARP funds, as presented in Table A 6.

6.3. Bank restructuring

We check the robustness of our results to an alternative way of measuring regulatory forbearance. We proxy the extent of restructuring of banking assets in a region by constructing a variable named *Bank Restructuring* that equals the share of commercial and industrial loans of failed banks in a region relative to total banking sector's outstanding commercial and industrial loans. As we discussed earlier, FDIC restructures the assets of failed banks and either helps find an acquirer or sells them through an auction. Both of these channels entail a substantial haircut, charge offs, and revaluation and therefore, overall restructuring. We use this measure and re-estimate our main results. The results are presented in Table A 2 and Table A 3 and indicate that more banking restructuring during the crisis results in more concurrent restructuring in the real economy, and is followed by better productivity growth after the crisis.

6.4. Non-linear effects of bank restructuring

The linear specifications we used so far tell us that bank restructuring, on average, improves the efficiency of financial intermediation in a linear sense. However, we can enhance our estimation in ways that help us clarify the likely non-linear effects of bank restructuring on real outcomes. After all, it is natural to believe that *too much* restructuring in the banking sector may have detrimental long-term effects on economic growth by impairing the process of financial intermediation. It is important to know whether there is an optimal level of restructuring below which there is marginal gains from more restructuring and above which there is marginal loss.

To analyse such possible non-linear effects, we rely on a quadratic form of regression equation (2). Specifically, we use *Bank Restructuring* and its squared term as our main independent variables. The challenge to estimate non-linear IV regressions is to find a suitable second instrument to make the quadratic regression just-identified. Following Wooldridge (2002), we use square of the fitted values of the first-stage regression, where we regressed *Bank Restructuring* on *log(distance + 1)* (our instrument) and other control variables. We use 2SLS to estimate the quadratic form regressions, using our main instrument and the new generated instrument. Finally, we plot marginal effects of Bank Restructuring on our main outcome variables during the post-crisis period.

The marginal effect plots are presented in Figure 8. These plots show an inverse-U shape for the marginal effect of bank restructuring on real outcomes in the longer run. There is an optimal level of bank restructuring beyond which there is diminishing marginal benefits from an extra unit of restructuring. Importantly, for extreme levels of bank restructuring the marginal effect becomes negative, thus leading to negative consequences of *too much* restructuring. In particular, the marginal effects on employment, wages, and GDP per capita growth become negative if the failing banks in an MSA account for more than about 1.0% of the MSA-level commercial and industrial loans. This finding complements our main results by showing that although on average levels there are gains to make from bank restructuring, too much of it can be detrimental.

7. Conclusion

We show in this paper that restructuring of distressed banks during the crisis has positive long-term effects on productivity. During the crises, politicians' first priority is to contain the systemic implications of bank defaults. However, not all banks are systemically important. Resolving the impaired assets of such banks eliminates the problem of zombie lending and hence cleanses the market for loans to better borrowers and new entrants. Given the emergence of a banking crisis, keeping distressed banks alive, despite being less destructive for the crisis period, thus does not seem to be beneficial for the long-term productivity growth.

Our paper sheds some light on why the recent financial crisis was not as cleansing as the previous crises. For example, the number of bank failures during the recent financial crisis has been much lower, compared to the number of bank failures during and after the Savings and Loan crisis of the 1980s. Therefore, our results indicate that regulatory forbearance on distressed banks and hence lower restructuring in the banking sector may be one reason why the financial crisis had such a long recovery period.

Finally, our paper highlights the importance of long-term productivity considerations in the design of optimal bank resolution mechanisms. Our results indicate that the challenge is the inherent trade-off between the short and the long run effects, which can exacerbate the political economy of the problem. For instance, in the short run bailouts may look appealing to the governments especially because the long run costs bear less weight in their decision making process.

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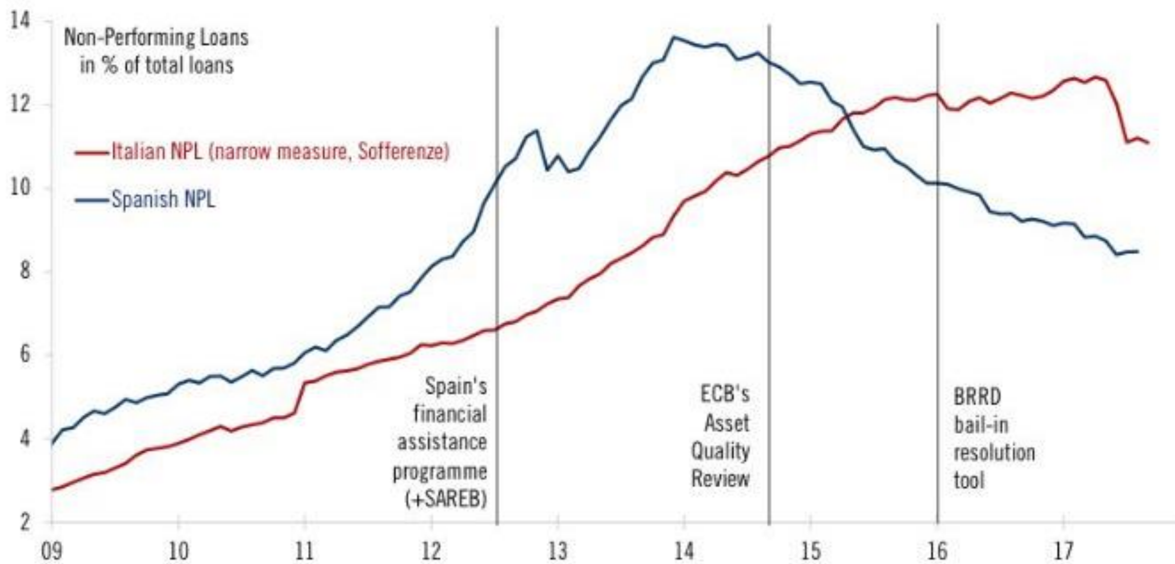
Figures

Figure 1- Non-performing Loans and Growth: Italy versus Spain

The figure on the top shows the evolution of non-performing loans in Italy and Spain. The figure in the bottom shows annual GDP growth rates for Italy and Spain.



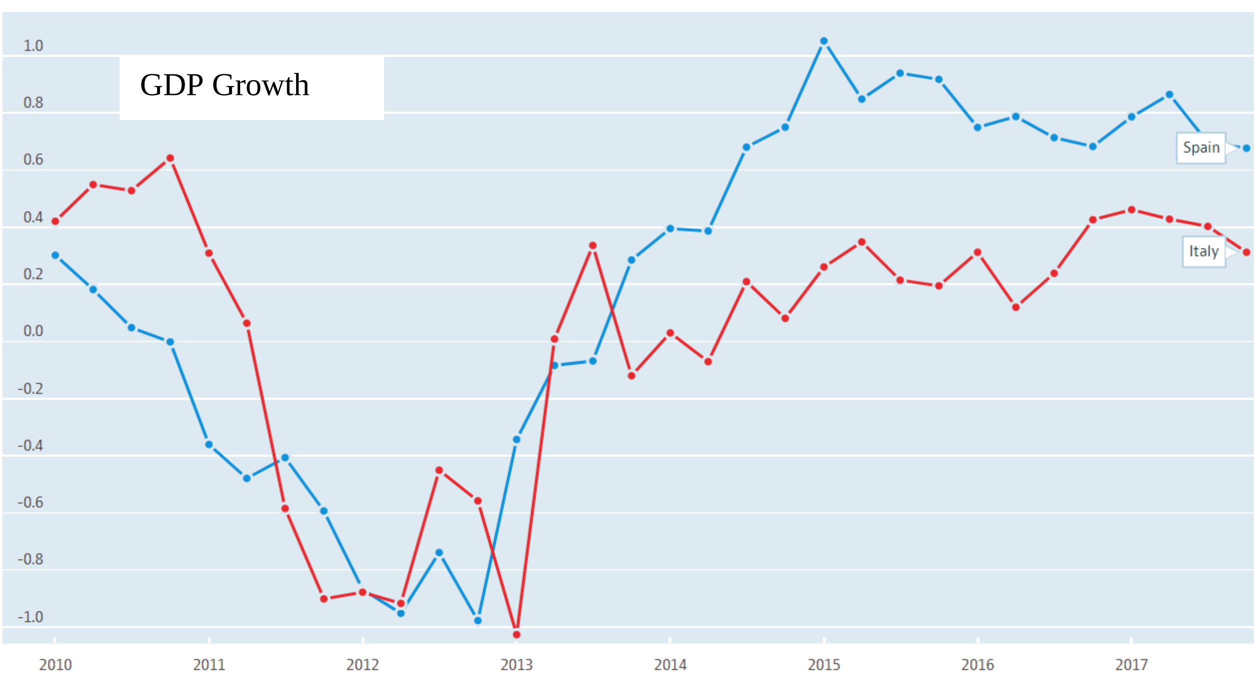


Figure 2- Bank failures

This figure show annual number of bank failures in the United States. The data is collected from the FDIC list of bank failures.

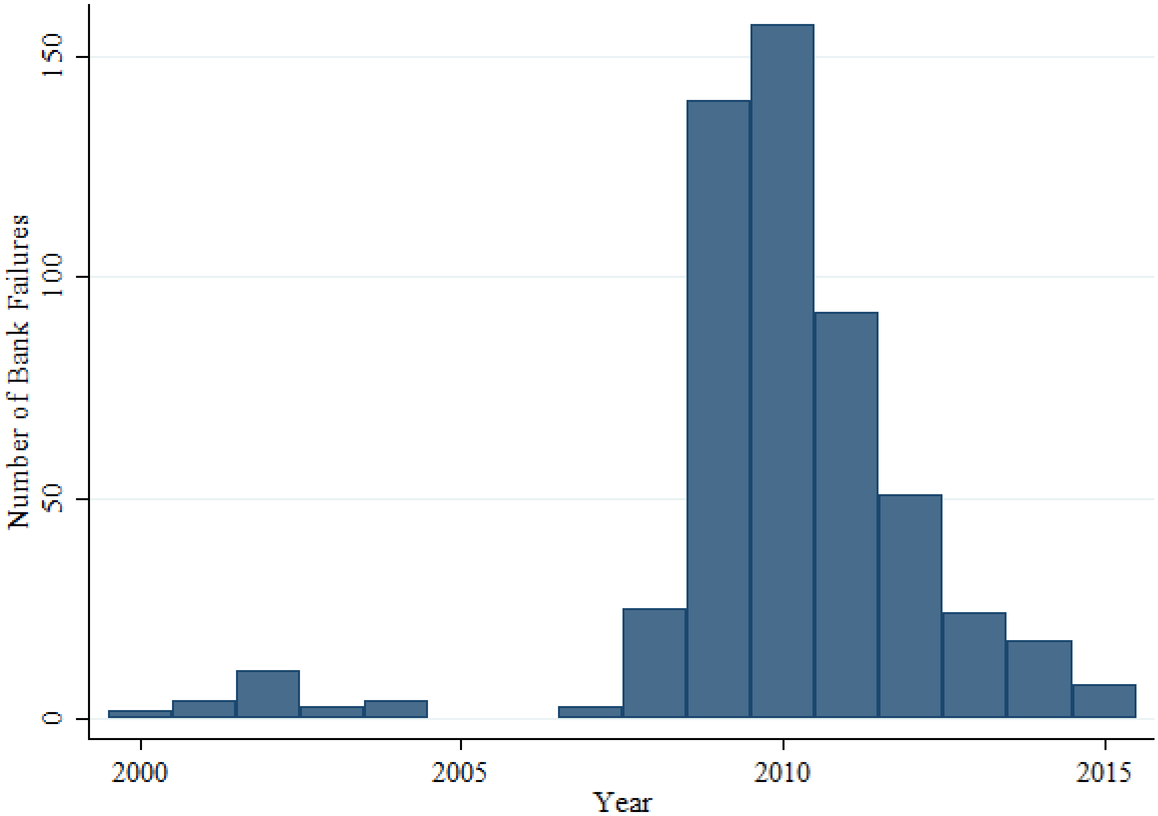


Figure 3- MSA-level Regulatory Forbearance

This figure shows the distribution of our estimated measure of regulatory forbearance on banks that are headquartered in the same state as the MSA, using a linear binary model. The data are the MSA-level average of bank-level estimates during 2007-2010.

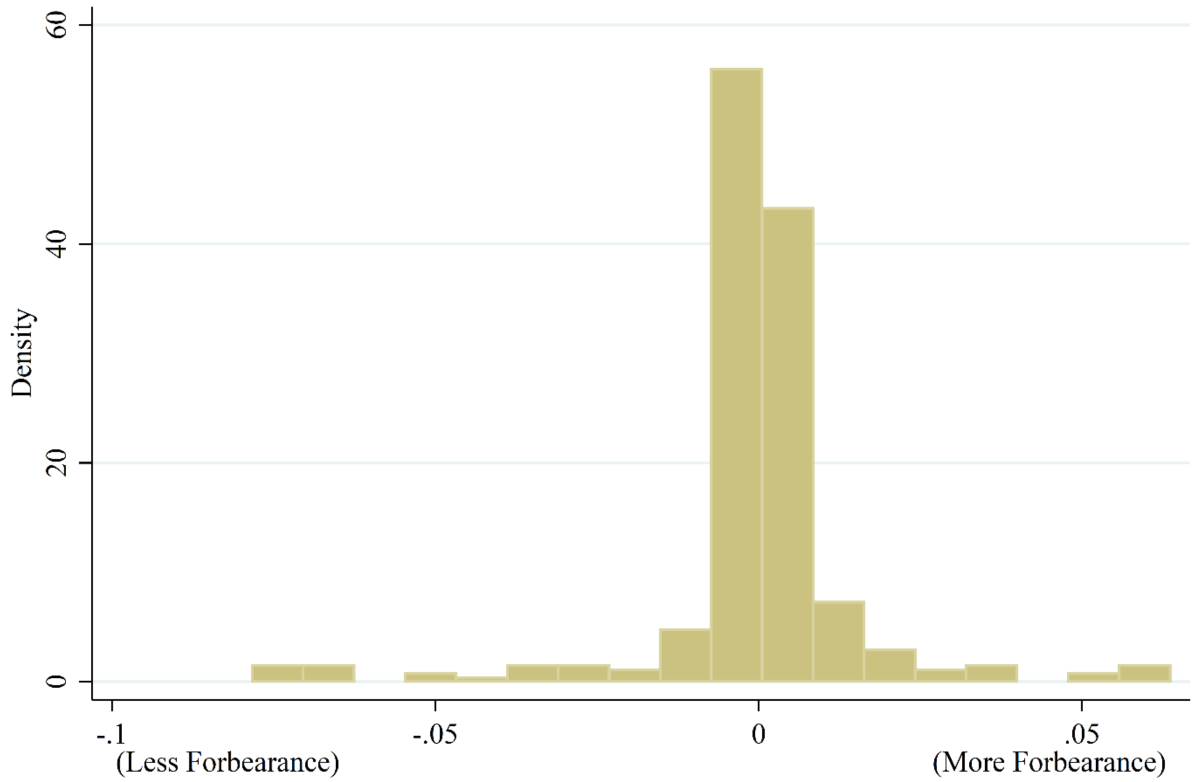
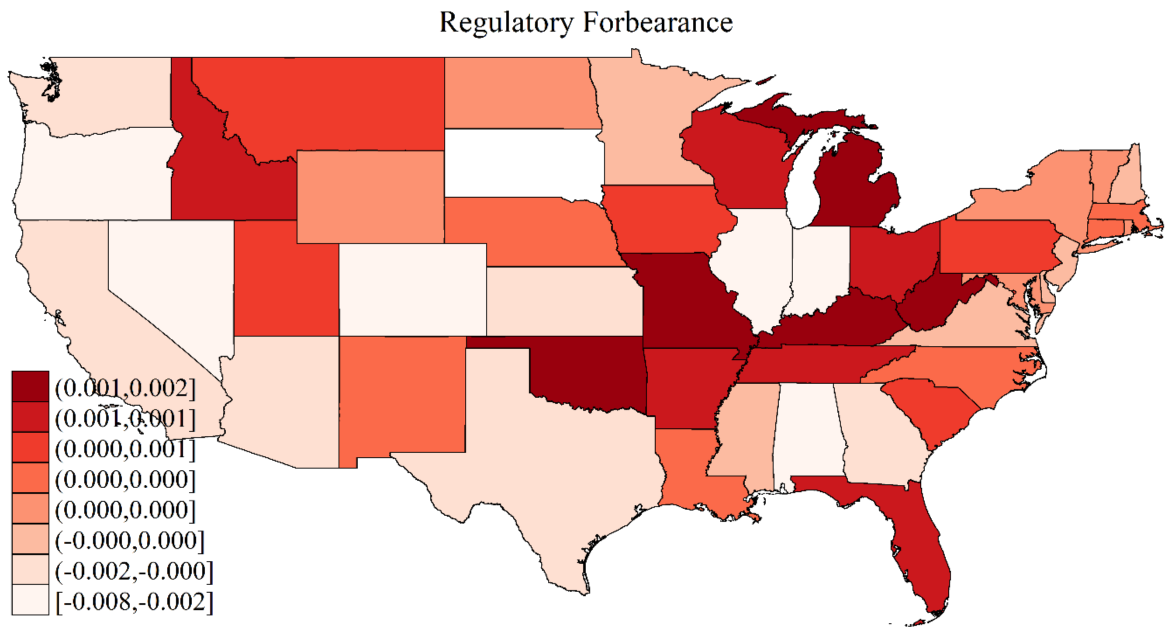


Figure 4- Geographical Distribution of Regulatory Forbearance and Establishment Exits

The figure on the top shows the geographical distribution of regulatory forbearance in MSAs where banks are headquartered. We take the average of our MSA-level measure to construct the state-level variable. The figure in the bottom shows the average rate of establishment exits for each US state during the years from 2007 to 2010.



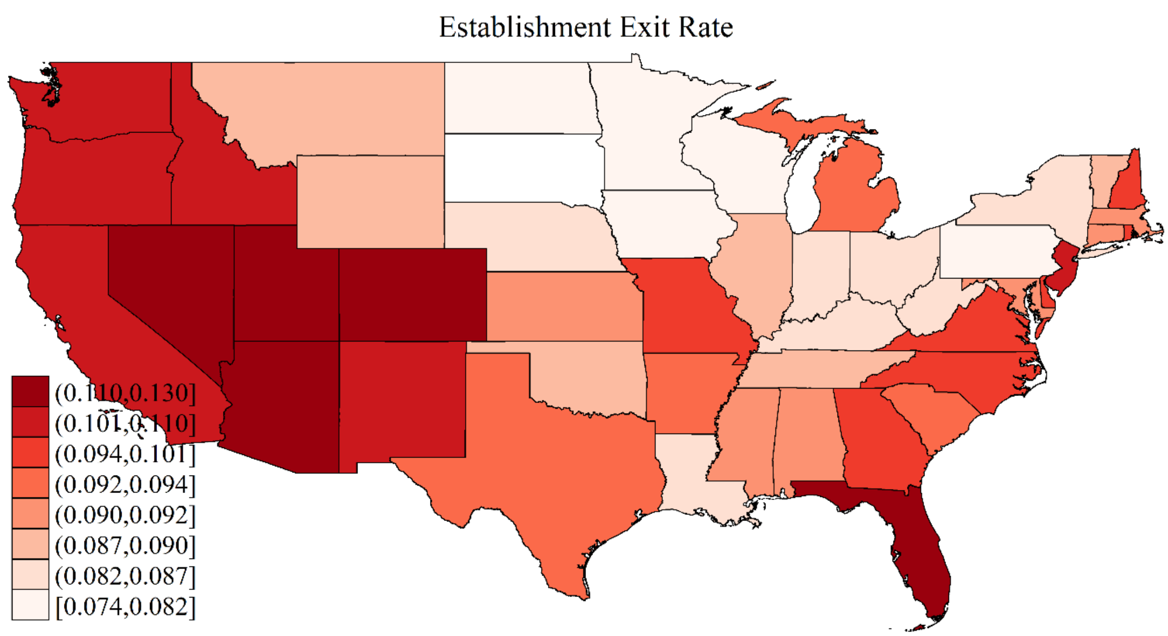


Figure 5- Non-performing Assets and Regulatory Forbearance

This figure plots the average MSA-level banks' non-performing assets across quartiles of average regulatory forbearance during the crisis period.

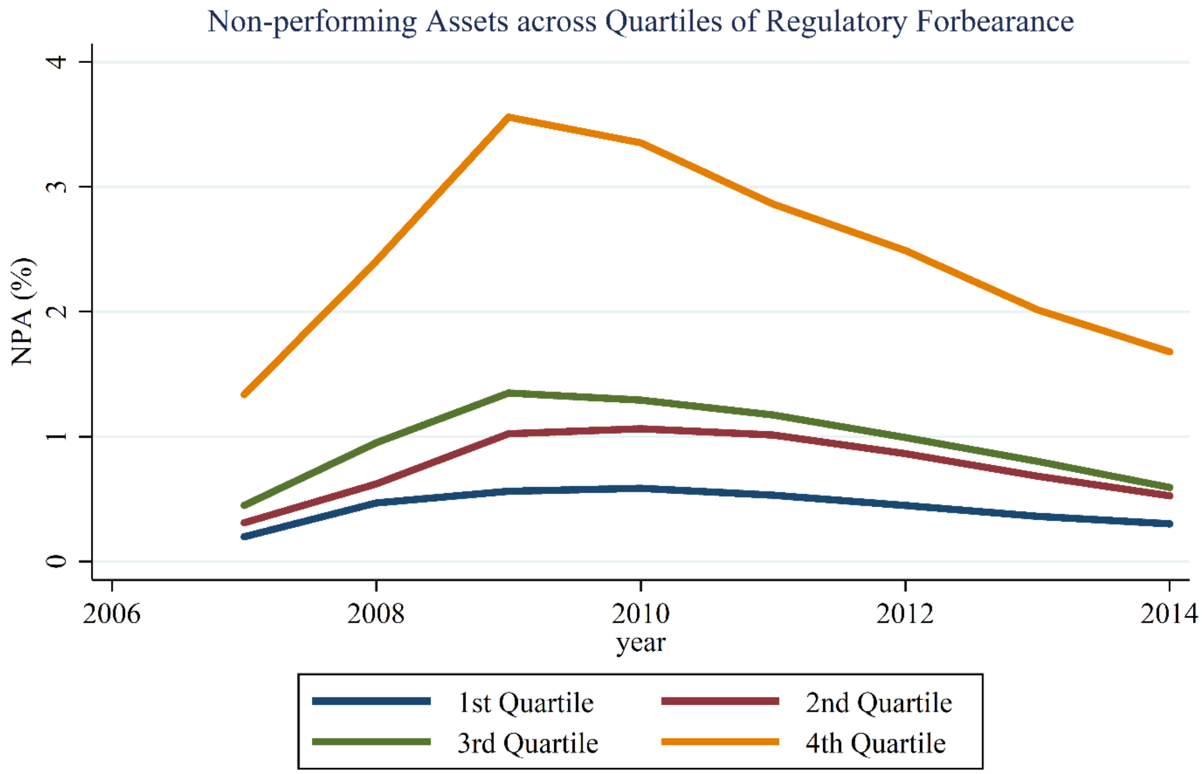


Figure 6- Regulatory Forbearance on State- versus Federally Chartered Banks

This figure plots the probability distribution function of estimated regulatory forbearance at the individual bank level separately for state-chartered and federally chartered banks. We use a Gaussian kernel function with a bandwidth equal to 0.005.

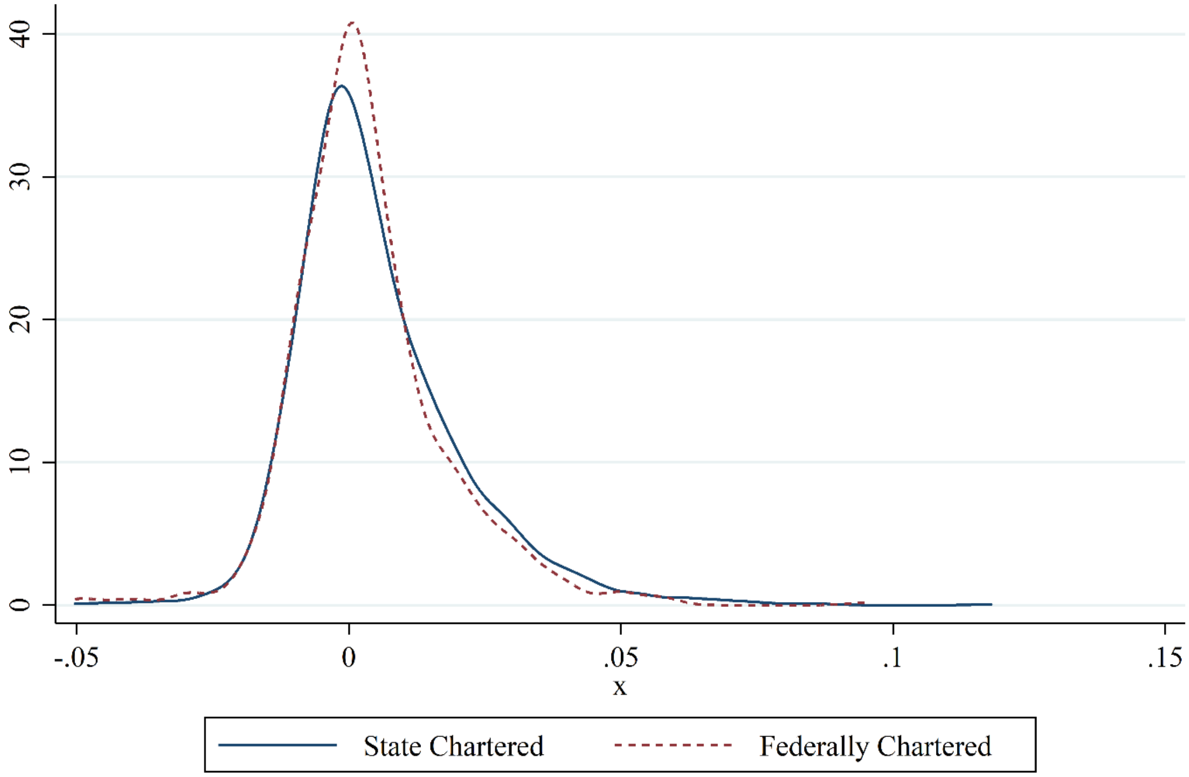


Figure 7- Relative Persistence of Regulatory Forbearance at the State Level

This figure plots the average state-level regulatory forbearance separately for four portfolios of states constructed based on the quartiles of state-level regulatory forbearance averaged in 2007 and 2008. We fix the states in each portfolio, follow them through time, and plot the annual average forbearance in each year.

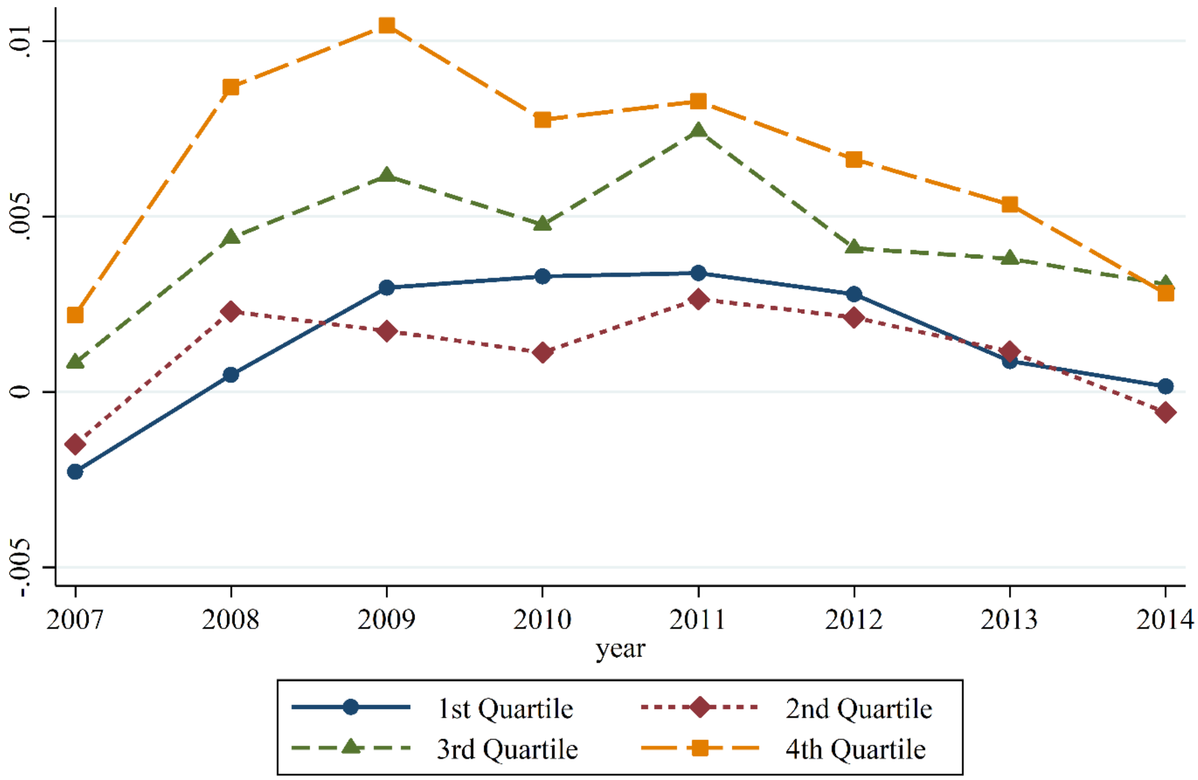
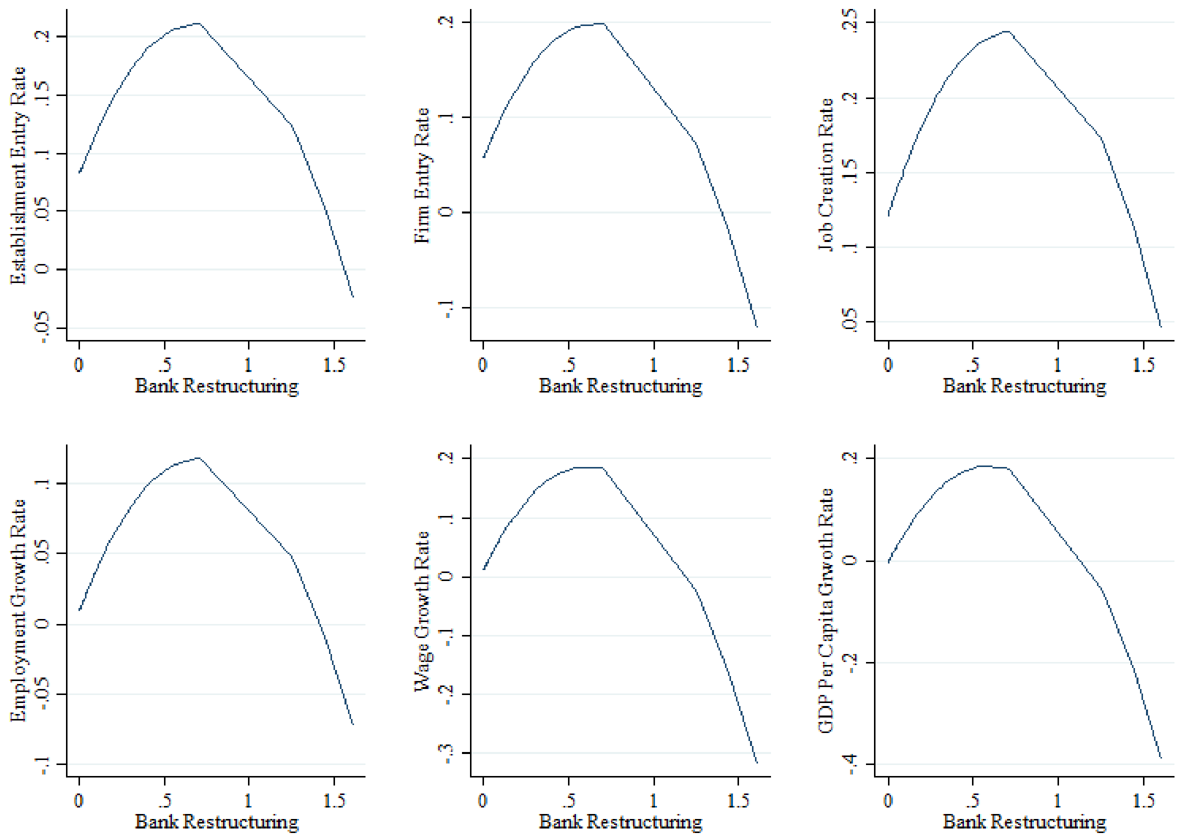


Figure 8- Non-linear Effects of Bank Restructuring

This figure presents marginal effect plots of quadratic models in which the six outcome variables are regressed on bank restructuring and its squared form. The models are estimated via a 2SLS estimator following Wooldridge (2002) where we use squared of the fitted values from the first stage regression as our second instrument.



Tables

Table 1- Summary Statistics of the MSA-level Sample

This table presents the summary statistics of the variables in the MSA-level cross sectional sample as defined in Section 2.

	Obs.	Mean	Std. Dev.	Min.	Max.
Independent variables					
Forbearance	262	-0.0055	0.0529	-0.2834	0.0601
Bank Restructuring (%)	262	0.0778	0.3260	0.0000	2.5126
Crisis period destruction variables					
Establishment Exit Rate	262	0.0961	0.0155	0.0653	0.1493
Firm Exit Rate	262	0.0752	0.0138	0.0479	0.1244
Job Destruction Rate	262	0.1427	0.0201	0.0843	0.2420
Job Destruction Rate by Deaths	262	0.0410	0.0093	0.0190	0.1128
Job Destruction Rate by Continuers	262	0.1017	0.0128	0.0614	0.1465
Post-crisis period productivity variables					
Establishment Entry Rate	243	0.0925	0.0159	0.0643	0.1483
Firm Entry Rate	243	0.0679	0.0158	0.0381	0.1203
Job Creation Rate	243	0.1316	0.0187	0.0813	0.2167
Job Creation Rate by Births	243	0.0424	0.0107	0.0207	0.0843
Job Creation Rate by Continuers	243	0.0892	0.0115	0.0576	0.1432
Reallocation Rate	243	0.2233	0.0267	0.1507	0.3093
Employment Growth	243	0.0337	0.0361	-0.1271	0.1834
Wage Growth	243	0.0641	0.0306	-0.0321	0.2560
Patent Growth	242	0.3855	0.6920	-0.8571	5.3333
PCGDP Growth	243	0.0164	0.0458	-0.1069	0.1704
Control variables					
House Price Growth during Crisis	262	-2.4710	6.6818	-23.695	14.1237
Pre-crisis Bank-to-GDP Ratio	262	0.4242	1.0732	0.0080	12.2624
Pre-crisis GDP Growth	262	0.0568	0.0204	0.0122	0.1488
Instrumental variable					
Distance (km)	262	1510.0	1188.6	0.0000	3932.0
Log(Distance + 1)	262	6.9505	0.9956	0.0000	8.2772

Table 2- Summary Statistics of the Bank-year-level Sample

This table presents the summary statistics of the variables in the bank-year panel used to estimate the measure of the bank failure model in equation (3).

	Obs.	Mean	Std. Dev.	Min.	Max.
failed	45581	0.007	0.081	0.000	1.000
equity ratio	45581	10.94	5.199	2.990	94.44
loan ratio	45581	66.02	15.81	0.000	94.37
real estate	45581	73.92	18.63	0.000	100.0
C&I	45581	14.90	11.38	0.000	70.21
other real estate	45581	0.514	1.125	0.000	8.250
NPA	45581	1.965	3.112	0.000	20.44
ROA	45581	0.398	2.273	-17.420	17.190
liquidity	45581	24.95	18.93	1.970	265.5
efficiency	45581	75.54	29.81	12.92	267.1
assets	45581	1.318	6.694	0.005	72.26
age	45581	59.65	47.60	1.000	230.0
GDPG	45581	0.039	0.035	-0.082	0.149

Table 3- Models of Bank Failure

This table presents the results of the linear and logistic binary regression models. The residuals from this model are used to calculate the *Forbearance* measure. The variables are chosen as in Wheelock and Wilson (2000). *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

	Failure models	
	Linear	Logistic
Equity ratio	-0.0012***	-0.7549***
	(0.000)	(0.045)
Loan ratio	0.0002***	0.0094
	(0.000)	(0.011)
Real estate	-0.0002***	0.0207
	(0.000)	(0.014)
C&I	-0.0002***	0.0278
	(0.000)	(0.017)
Other real estate	-0.0048***	-0.1610***
	(0.001)	(0.047)
NPA	0.0076***	0.1661***
	(0.000)	(0.021)
ROA	-0.0042***	-0.0872***
	(0.000)	(0.016)
Liquidity	0.0003***	-0.0434***
	(0.000)	(0.013)
Efficiency	0.0002***	0.0069***
	(0.000)	(0.001)
Ln(assets)	0.0016***	0.1165
	(0.000)	(0.075)
Ln(age)	-0.0006*	-0.0321
	(0.000)	(0.079)
L1.GDPG	0.0211*	-7.9228***
	(0.011)	(2.188)
GDPG	0.0705***	7.8188***
	(0.011)	(2.427)
Constant	-0.0215***	-3.7171*
	(0.007)	(2.012)
Industry shares	Yes	Yes
Adj. R-squared	0.119	
Pseudo R-squared		0.605
Observations	45581	45581

Table 4- First-stage Regression Results

This table presents the results of the first-stage regression in our two-stage least square instrumental variable model. The data is the cross-sectional MSA-level sample. Standard errors are corrected for clustering at the state level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

	Forbearance	Bank Restructuring
Log(Distance + 1)	-0.0031***	0.0554***
	(0.001)	(0.019)
House Price Growth during Crisis	0.0002	-0.0069
	(0.000)	(0.004)
Pre-crisis Bank-to-GDP Ratio	0.0035**	0.0057
	(0.002)	(0.012)
Pre-crisis GDP Growth	-0.0073	0.6181
	(0.060)	(0.793)
Constant	0.0194**	-0.3627***
	(0.008)	(0.127)
Observations	262	262
F-test of excluded instruments	7.00	8.72
Prob > F	0.008	0.003

Table 5- Regulatory Forbearance and Real Outcomes during the Crisis

This table presents the results of the regression model presented in equation (1) using a two-stage least squared (2SLS) estimator. The data is the cross-sectional MSA-level sample. Heteroscedasticity-robust standard errors are presented in parenthesis. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

	Establishment Exit Rate	Firm Exit Rate	Job Destruction Rate	Job Destruction Rate by Deaths	Job Destruction Rate by Continuers
Forbearance	-0.9952**	-0.7370**	-1.0323**	-0.5119**	-0.5233*
	(0.461)	(0.353)	(0.506)	(0.246)	(0.284)
House Price Growth during Crisis	-0.0009*	-0.0008**	-0.0011**	-0.0004*	-0.0007**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pre-crisis Bank-to-GDP Ratio	0.0043	0.0036*	0.0042	0.0022	0.0021
	(0.003)	(0.002)	(0.003)	(0.001)	(0.001)
Pre-crisis GDP Growth	0.2128***	0.2074***	0.2701***	0.0991**	0.1712***
	(0.081)	(0.064)	(0.093)	(0.046)	(0.052)
Observations	262	262	262	262	262

Table 6- Regulatory Forbearance and Post-Crisis Bank Health

This table presents the estimates of the relation between crisis-period regulatory forbearance and banks' quality after the crisis. *Highly Forbearing* is a dummy variable that equals one for banks that are in MSAs in the fourth quartile of regulatory forbearance and zero otherwise. Heteroscedasticity-robust standard errors are presented in parenthesis. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

	Equity ratio	NPA	ROA
Highly Forbearing	-0.5032**	0.7511***	-0.0631
	(0.207)	(0.070)	(0.040)
ln(Assets)	-1.8815***	-0.0853***	0.0589***
	(0.117)	(0.017)	(0.015)
Year Fixed Effects	Yes	Yes	Yes
Adj. R-squared	0.057	0.045	0.015
Observations	13939	13950	13935

Table 7- Regulatory Forbearance and Real Outcomes after the Crisis

This table presents the results of the regression model presented in equation (2) using a two-stage least squared (2SLS) estimator. The data is the cross-sectional MSA-level sample. Heteroscedasticity-robust standard errors are presented in parenthesis. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

	Establishment Entry Rate	Firm Entry Rate	Job Creation Rate	Job Creation Rate by Births	Job Creation Rate by Continuers	Reallocation Rate	Employment Growth	Wage Growth	Patent Growth	GDP per capita Growth
Forbearance	-1.243**	-1.094**	-1.243*	-0.610*	-0.631*	-1.620*	-0.982**	-0.829**	-11.695**	-0.743**
	(0.612)	(0.549)	(0.670)	(0.312)	(0.378)	(0.977)	(0.472)	(0.371)	(5.943)	(0.362)
House Price Growth during Crisis	-0.001**	-0.001***	-0.001**	-0.000**	-0.000**	-0.001**	0.000	0.000	-0.001	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)
Pre-crisis Bank-to-GDP Ratio	0.007**	0.007**	0.007*	0.003*	0.004**	0.009*	0.005	0.004	0.058*	0.004*
	(0.004)	(0.003)	(0.004)	(0.002)	(0.002)	(0.006)	(0.003)	(0.002)	(0.032)	(0.002)
Pre-crisis GDP Growth	0.275***	0.279***	0.273***	0.175***	0.098	0.365***	0.098	0.019	-0.521	-0.236***
	(0.089)	(0.083)	(0.101)	(0.047)	(0.068)	(0.123)	(0.078)	(0.062)	(0.945)	(0.059)
Observations	245	245	245	245	245	245	245	239	244	246

Table 8- Trade-off between the Short and the Long Run

This table presents the results of a trade-off analysis. In columns 1 and 2, we regress average post-crisis establishment entry rate on the average crisis-period rate of establishment exit. We do the similar in columns 3 and 4 for average firm entry rate and in columns 5 and 6 for average job creation rate. The data is the cross-sectional MSA-level sample. Heteroscedasticity-robust standard errors are presented in parenthesis. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively

	Post-crisis					
	Establishment Entry Rate		Firm Entry Rate		Job Creation Rate	
	OLS	2SLS	OLS	2SLS	OLS	2SLS
Establishment Exit Rate (Crisis)	0.862***	1.043***				
	(0.051)	(0.190)				
Firm Exit Rate (Crisis)			0.908***	1.235***		
			(0.060)	(0.258)		
Job Destruction Rate (Crisis)					0.595***	1.046***
					(0.062)	(0.277)
House Price Growth during Crisis	0.000***	0.000**	0.000**	0.000*	0	0.001*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pre-crisis Bank-to-GDP Ratio	0.001**	0.000	0.001**	0.000	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pre-crisis GDP Growth	0.108***	0.06	0.109***	0.029	0.132**	-0.014
	(0.030)	(0.057)	(0.033)	(0.068)	(0.053)	(0.109)
Adj. R-squared	0.750	0.730	0.713	0.661	0.545	0.362
Observations	262	262	262	262	262	262

Table 9- Out-of-state Forbearance and Real Outcomes during the Crisis

This table presents the results of the ordinary least squared regression model presented in equation (1) using out-of-state regulatory forbearance as the variable of interest. Out-of-state regulatory forbearance is the exposure of each MSA to regulatory forbearance on banks that are headquartered in other states but have branches in each particular MSA. The data is the cross-sectional MSA-level sample. Heteroscedasticity-robust standard errors are presented in parenthesis. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

	Establishment Exit Rate	Firm Exit Rate	Job Destruction Rate	Job Destruction Rate by Deaths	Job Destruction Rate by Continuers
Out-of-state Forbearance	0.0918*	0.0963**	0.1135***	0.0590***	0.0528**
	(0.051)	(0.045)	(0.043)	(0.022)	(0.024)
House Price Growth during Crisis	-0.0011***	-0.0009***	-0.0013***	-0.0005***	-0.0008***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pre-crisis Bank-to-GDP Ratio	-0.0011	-0.001	-0.0018*	-0.0009	-0.0009
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Pre-crisis GDP Growth	0.2662***	0.2475***	0.3259***	0.1268***	0.1994***
	(0.055)	(0.046)	(0.066)	(0.033)	(0.039)
Adj. R-squared	0.4	0.398	0.347	0.26	0.308
Observations	262	262	262	262	262

Table 10- Out-of-state Regulatory Forbearance and Real Outcomes after the Crisis

This table presents the results of the ordinary least squared regression model presented in equation (2) using out-of-state regulatory forbearance as the variable of interest. Out-of-state regulatory forbearance is the exposure of each MSA to regulatory forbearance on banks that are headquartered in other states but have branches in each particular MSA. The data is the cross-sectional MSA-level sample. Heteroscedasticity-robust standard errors are presented in parenthesis. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

	Establishment Entry Rate	Firm Entry Rate	Job Creation Rate	Job Creation Rate by Births	Job Creation Rate by Continuers	Reallocation Rate	Employment Growth	Wage Growth	Patent Growth	GDP per capita Growth
Out-of-state Forbearance	0.081	0.071	0.095*	0.036	0.058*	0.231***	-0.016	-0.006	-1.594	-0.008
	(0.067)	(0.066)	(0.052)	(0.023)	(0.034)	(0.064)	(0.034)	(0.025)	(1.770)	(0.028)
House Price Growth during Crisis	-0.001***	-0.001***	-0.001***	-0.000***	-0.000**	-0.001***	0.000	0.000**	0.000	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)
Pre-crisis Bank-to-GDP Ratio	0.000	0.000	0.000	0.000	0.000	-0.003*	0.001	0.000	0.034	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.039)	(0.001)
Pre-crisis GDP Growth	0.314***	0.314***	0.312***	0.194***	0.118**	0.419***	0.126**	0.048	-0.208	-0.215***
	(0.054)	(0.053)	(0.063)	(0.029)	(0.053)	(0.070)	(0.049)	(0.034)	(0.771)	(0.047)
Adj. R-squared	0.292	0.304	0.225	0.257	0.103	0.2	0.032	0.012	-0.005	0.08
Observations	245	245	245	245	245	245	245	239	244	246

Table 11- Forbearance on CAMELS Ratings and Real Outcomes during the Crisis

This table presents the effect of regulatory forbearance in reporting banks' CAMELS ratings (as explained in Section 4.4) on the real outcomes during the crisis. We use distance to the local supervisor as an instrument in a two-stage least squared (2SLS) model. The data is the cross-sectional MSA-level sample. Heteroscedasticity-robust standard errors are presented in parenthesis. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

	Establishment Exit Rate	Firm Exit Rate	Job Destruction Rate	Job Destruction Rate by Deaths	Job Destruction Rate by Continuers
Forbearance on CAMELS	-0.8778*	-0.6371	-1.5129*	-0.5843*	-0.9302*
	(0.505)	(0.413)	(0.829)	(0.339)	(0.505)
House Price Growth during Crisis	-0.0012***	-0.0010***	-0.0015***	-0.0006***	-0.0009***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pre-crisis Bank-to-GDP Ratio	0.0039	0.0033	0.0061	0.0025	0.0036
	(0.003)	(0.002)	(0.004)	(0.002)	(0.003)
Pre-crisis GDP Growth	0.2918***	0.2655***	0.3709**	0.1439**	0.2274**
	(0.110)	(0.084)	(0.176)	(0.070)	(0.109)
Observations	262	262	262	262	262

Table 12- Forbearance on CAMELS Ratings and Real Outcomes after the Crisis

This table presents the effect of regulatory forbearance in reporting banks' CAMELS ratings (as explained in Section 4.4) on the real outcomes after the crisis. We use distance to the local supervisor as an instrument in a two-stage least squared (2SLS) model. The data is the cross-sectional MSA-level sample. Heteroscedasticity-robust standard errors are presented in parenthesis. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

	Establishment Entry Rate	Firm Entry Rate	Job Creation Rate	Job Creation Rate by Births	Job Creation Rate by Continuers	Reallocation Rate	Employment Growth	Wage Growth	Patent Growth	GDP per capita Growth
Forbearance on CAMELS	-1.582	-1.392	-1.582	-0.777	-0.803	-2.062	-1.249	-1.072	-14.898	-0.945
	(1.586)	(1.400)	(1.637)	(0.784)	(0.867)	(2.209)	(1.215)	(1.027)	(14.616)	(0.889)
House Price Growth during Crisis	-0.001	-0.001	-0.001	0.000	0.000	-0.001	0.000	0.000	0.000	0.000
	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.005)	(0.000)
Pre-crisis Bank-to-GDP Ratio	0.008	0.008	0.009	0.004	0.005	0.011	0.006	0.004	0.068	0.005
	(0.008)	(0.007)	(0.008)	(0.004)	(0.004)	(0.011)	(0.006)	(0.005)	(0.071)	(0.004)
Pre-crisis GDP Growth	0.3398*	0.3366**	0.3377*	0.2066**	0.131	0.4496*	0.149	0.066	0.103	-0.1977*
	(0.184)	(0.165)	(0.183)	(0.089)	(0.102)	(0.236)	(0.144)	(0.130)	(1.855)	(0.115)
Observations	245	245	245	245	245	245	245	239	244	246

Table 13- Federal versus state supervisors

This table presents the results of a model in which we compare the health and regulatory forbearance of banks that are supervised by federal versus state regulators. *Federally-chartered* is a dummy variable indicating banks that are supervised by national, as opposed to state, regulators. The data is the bank-year panel from 2003 to 2014. Heteroscedasticity-robust standard errors are presented in parenthesis. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

	Equity ratio	NPA	ROAA	Forbearance	
				Linear	Logistic
Federally chartered	0.3066***	-0.2440***	0.0972***	-0.0003	-0.0007**
	(0.070)	(0.034)	(0.027)	(0.001)	(0.000)
Log(Assets)	-0.3587***	-0.0413***	0.1059***	-0.0002	0.0000
	(0.025)	(0.008)	(0.008)	(0.000)	(0.000)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.015	0.197	0.083	0.006	0.002
Observations	42006	42006	42006	42006	42006

Table 14- Bank Competition and Regulatory Forbearance

This table presents the results of a model in which we compare the bank-level regulatory forbearance based on the level of competition in the banking industry in the MSA in which the bank is active. *Bank per tsd.* measures the number of banks in each MSA, normalized by the population (in thousand) of the MSA. The data is the bank-year panel from 2001 to 2015. Heteroscedasticity-robust standard errors are presented in parenthesis. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

	Forbearance	
	Linear	Logistic
Bank per tsd.	-0.0454***	-0.0033***
	(0.003)	(0.001)
Log(Assets)	0.0003***	0.0001**
	(0.000)	(0.000)
Year Fixed Effects	Yes	Yes
Adj. R-squared	0.055	0.003
Observations	40317	40317

Table 15- State-level Persistence of Regulatory Forbearance

This table presents the between-state comparison of state-level averages of regulatory forbearance. The sample is generated by annually averaging bank-level forbearance estimates up to the state level. We regress contemporaneous forbearance (in Panel A) and states' rank in terms of forbearance (in Panel B) on their one-year lag values, using between and fixed effects estimations. Heteroscedasticity-robust standard errors are presented in parenthesis. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

	Forbearance			
Panel A	Between estimate		Fixed effects estimate	
	Linear	Logistic	Linear	Logistic
L1.Forbearance (Linear)	1.0877***		0.4591***	
	(0.024)		(0.099)	
L1.Forbearance (Logistic)		1.0877***		0.4591***
		(0.024)		(0.099)
Adj. R-squared	0.977	0.977	0.221	0.221
Observations	561	561	561	561

	State rank in Forbearance			
Panel B	Between estimate		Fixed effects estimate	
	Linear	Logistic	Linear	Logistic
L1.State rank (Linear)	1.0120***		0.4654***	
	(0.033)		(0.057)	
L1.State rank (Logistic)		1.0120***		0.4654***
		(0.033)		(0.057)
Adj. R-squared	0.95	0.95	0.223	0.223
Observations	561	561	561	561

Table 16- Regulatory Forbearance on Subsidiary Banks

This table presents the results of a model in which we compare the bank-level regulatory forbearance based on the share of subsidiary banks in the MSA in which the bank is active. *Subsidiary share in MSA* measures the size of subsidiary banks relative to the total size of the banking sector in an MSA. The data is our cross-sectional sample of MSAs. Heteroscedasticity-robust standard errors are presented in parenthesis. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

	Forbearance		Bank Restructuring
	Linear	Logistic	
Subsidiary share in MSA	-0.0256**	-0.0042*	0.4056**
	(0.013)	(0.002)	(0.182)
House Price Growth during Crisis	0.0002	0.0000	-0.0074*
	(0.000)	(0.000)	(0.004)
Pre-crisis Bank-to-GDP Ratio	0.0030*	0.0000	0.0127
	(0.002)	(0.000)	(0.015)
Pre-crisis GDP Growth	-0.0448	-0.007	1.3146
	(0.062)	(0.017)	(0.797)
Constant	0.0063	0.0008	-0.1136*
	(0.005)	(0.001)	(0.066)
Adj. R-squared	0.055	0.006	0.114
Observations	262	262	262

Appendix

Table A 1- Regulatory Forbearance and Real Outcomes during the Crisis – OLS Results

This table presents the results of the regression model presented in equation (1) using the OLS estimator. The data is the cross-sectional MSA-level sample. Heteroscedasticity-robust standard errors are presented in parenthesis. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

	Establishment Exit Rate	Firm Exit Rate	Job Destruction Rate	Job Destruction Rate by Deaths	Job Destruction Rate by Continuers
Forbearance	0.03	0.0319	0.0217	0.0093	0.012
	(0.025)	(0.025)	(0.037)	(0.013)	(0.029)
House Price Growth during Crisis	-0.0011***	-0.0009***	-0.0013***	-0.0005***	-0.0008***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pre-crisis Bank-to-GDP Ratio	0.0005	0.0007**	0.0003	0.0002	0.0001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pre-crisis GDP Growth	0.2660***	0.2473***	0.3248***	0.1262***	0.1989***
	(0.055)	(0.046)	(0.066)	(0.033)	(0.039)
Adj. R-squared	0.396	0.392	0.341	0.251	0.305
Observations	262	262	262	262	262

Table A 2- Bank Restructuring and Real Outcomes during the Crisis

This table presents the results of the regression model presented in equation (1) using a two-stage least squared (2SLS) estimator. The data is the cross-sectional MSA-level sample. Heteroscedasticity-robust standard errors are presented in parenthesis. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

	Establishment Exit Rate	Firm Exit Rate	Job Destruction Rate	Job Destruction Rate by Deaths	Job Destruction Rate by Continuers
Bank Restructuring	0.0549***	0.0407**	0.0570**	0.0282**	0.0289**
	(0.020)	(0.016)	(0.023)	(0.011)	(0.014)
House Price Growth during Crisis	-0.0007**	-0.0006***	-0.0009***	-0.0003*	-0.0005***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pre-crisis Bank-to-GDP Ratio	0.0005	0.0008	0.0002	0.0002	0.0001
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
Pre-crisis GDP Growth	0.1861***	0.1876***	0.2424***	0.0854**	0.1571***
	(0.062)	(0.052)	(0.076)	(0.038)	(0.044)
Observations	262	262	262	262	262

Table A 3- Bank Restructuring and Real Outcomes after the Crisis

This table presents the results of the regression model presented in equation (2) using a two-stage least squared (2SLS) estimator. The data is the cross-sectional MSA-level sample. Heteroscedasticity-robust standard errors are presented in parenthesis. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

	Establishment Entry Rate	Firm Entry Rate	Job Creation Rate	Job Creation Rate by Births	Job Creation Rate by Continuers	Reallocation Rate	Employment Growth	Wage Growth	Patent Growth	GDP per capita Growth
Bank Restructuring	0.092**	0.081**	0.092**	0.045**	0.047*	0.120*	0.073**	0.063**	0.864*	0.055*
	(0.041)	(0.037)	(0.044)	(0.020)	(0.026)	(0.064)	(0.035)	(0.028)	(0.457)	(0.029)
House Price Growth during Crisis	-0.000*	-0.000**	-0.000*	-0.000*	0.000	-0.001*	0.000	0.000**	0.003	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.000)
Pre-crisis Bank-to-GDP Ratio	0.002***	0.002***	0.002***	0.001**	0.002***	0.002***	0.001	0.000	0.009	0.001***
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.006)	(0.000)
Pre-crisis GDP Growth	0.263***	0.269***	0.261***	0.169***	0.092	0.349***	0.088	0.008	-0.632	-0.244***
	(0.077)	(0.072)	(0.090)	(0.042)	(0.063)	(0.107)	(0.068)	(0.053)	(0.969)	(0.052)
Observations	245	245	245	245	245	245	245	239	244	246

Table A 4- Mean Reversion

This table presents the tests of mean reversion hypothesis based on the regression equation in (4). The data is the MSA-level cross sectional sample. We regress average post-crisis growth rate of the outcome variables on their average crisis-period growth rates. Standard errors are corrected for clustering at the state level.

	Crisis-period means of:					
Post-crisis means of:	Establishment entry rate	Job creation rate	Employment growth	Wage growth	Patent growth	PCGDPG
Establishment entry rate	0.918***					
	(0.023)					
Job creation rate		0.693***				
		(0.071)				
Employment growth			-0.042			
			(0.064)			
Wage growth				0.076		
				(0.102)		
Patent growth					0.091	
					(0.064)	
GDPPCG						-0.087
						(0.057)
Const.	0.002	0.038***	0.016***	0.020***	0.125***	0.005**
	(0.002)	(0.009)	(0.002)	(0.002)	(0.016)	(0.002)
Adj. R-squared	0.888	0.53	-0.001	0.001	0.003	0.007
Obs.	294	294	294	275	292	283

Table A 5- Bank Recapitalization and the Cleansing Effect

This table presents the results of the regression model presented in equation (1) using a two-stage least squared (2SLS) estimator. The data is the cross-sectional MSA-level sample. The variable TARP is the total size of TARP funds received by banks in each state relative to the size of the states' banking sector. Heteroscedasticity-robust standard errors are presented in parenthesis. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

	Establishment Exit Rate (OLS)	Establishment Exit Rate (2SLS)	Job Destruction Rate (OLS)	Job Destruction Rate (2SLS)
TARP	-0.0002**	-0.0028**	-0.0004**	-0.0029**
	(0.000)	(0.001)	(0.000)	(0.001)
House Price Growth during Crisis	-0.0011***	-0.0013***	-0.0013***	-0.0015***
	(0.000)	(0.000)	(0.000)	(0.000)
Pre-crisis Bank-to-GDP Ratio	0.0007**	0.0021	0.0006	0.002
	(0.000)	(0.002)	(0.000)	(0.002)
Pre-crisis GDP Growth	0.2531***	0.1177	0.3031***	0.1715*
	(0.055)	(0.083)	(0.066)	(0.102)
Adj. R-squared	0.400		0.355	
Observations	262	262	262	262

Table A 6- Bank Recapitalization and Productivity after the Crisis

This table presents the results of the regression model presented in equation (1) using a two-stage least squared (2SLS) estimator. The data is the cross-sectional MSA-level sample. The variable TARP is the total size of TARP funds received by banks in each state relative to the size of the states' banking sector. Heteroscedasticity-robust standard errors are presented in parenthesis. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

	Establishment Entry Rate (OLS)	Establishment Entry Rate (2SLS)	Job Creation Rate (OLS)	Job Creation Rate (2SLS)	Employment Growth (OLS)	Employment Growth (2SLS)	Wage Growth (OLS)	Wage Growth (2SLS)
TARP	0.000	-0.003**	-0.000**	-0.003**	-0.000**	-0.003**	0.000	-0.002**
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
House Price Growth during Crisis	-0.001***	-0.001***	-0.001***	-0.001***	-0.000*	-0.000*	0.000**	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pre-crisis Bank-to-GDP Ratio	0.001***	0.003	0.002***	0.003**	0.001	0.002**	0.000	0.001
	(0.000)	(0.002)	(0.000)	(0.002)	(0.001)	(0.001)	(0.000)	(0.001)
Pre-crisis GDP Growth	0.334***	0.183**	0.308***	0.165	0.140***	0.012	0.041	-0.055
	(0.053)	(0.089)	(0.059)	(0.107)	(0.049)	(0.090)	(0.031)	(0.063)
Adj. R-squared	0.305		0.24		0.062		0.016	
Observations	262	262	262	262	262	262	255	255