

Banks and the Real Economy: An Assessment of the Research*

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Abstract

We review research on the effects of banks on the real economy, including, but not limited to articles in this *Special Issue* of the *Journal of Corporate Finance*. We focus primarily on US and European policy interventions that provide quasi-natural experiments with relatively exogenous shocks to bank output. We concentrate on single-country settings, avoiding potentially confounding differences in language, culture, law, currency, and so on, that complicate cross-country investigations. We also largely avoid the effects of financial crises, which are not exogenous to the banking system. The evidence strongly suggests positive effects of banks on the real economy.

Keywords Banks, Consolidation, Credit Supply Shocks, Deregulation, Firms, Households, Real Economy, Regulatory Interventions

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1. Introduction

This paper reviews research that examines the effects of banks on the real economy. Banks play many important roles in the economy. They act as safe havens for depositors and are major sources of credit for households, small- and medium-sized firms, corporations, and governments (Allen, Carletti, and Guan, 2020). Moreover, banks create liquidity for the nonbank public by transforming relatively illiquid assets such as loans to informationally opaque businesses into relatively liquid liabilities such as transactions deposits that allow almost instantaneous access to funds. Banks also create significant liquidity by issuing off-balance sheet guarantees like loan commitments that allow customers to draw funds under predetermined conditions (Berger and Bouwman, 2009, 2016; Bouwman, 2020). Banks also manage credit, solvency, interest rate, foreign exchange rate, liquidity, and other risks via diversification, derivatives, and other on- and off-balance sheet activities. Without banks and other financial services providers, entrepreneurs could only start new businesses that drive innovation and economic growth if they were born rich or accumulated capital over time (Zingales, 2015; Brown, Cookson and Heimer, 2019).

Cross-country empirical evidence over last few decades suggests that the development of the financial system, of which banks are a key part, stimulates economic growth, also known as the finance-growth nexus (King and Levine, 1993; Demirgüç-Kunt and Maksimovic, 1998; Levine, 1997, 1998, 1999, 2005; Levine and Zervos, 1998; Rajan and Zingales, 1998; Demirgüç-Kunt and Maksimovic, 2002; Levine, Loayza, and Beck, 2002; Berger, Hasan, and Klapper, 2004; Christopoulos and Tsionas, 2004; Bekaert, Harvey, and Lundblad, 2005; Demirgüç-Kunt and Levine, 2008; Beck, 2009). Some economists argue that beyond a certain level, there is too much finance for the well-being of the economy. This

negative link at the margin may occur due to: the allocation of fewer scarce resources (including human capital) to real economic activities; greater macroeconomic volatility; the funding of poorly performing projects; and the increased frequency of financial crises (Kindleberger, 1978; Berger, Kashyap, and Scalise, 1995; Berger and Udell, 2004; Rajan, 2005; Sahay et al, 2015; Arcand, Berkes, and Panizza, 2015; Berger and Bouwman, 2017).

There are potential difficulties with some of these studies. An issue with cross-country investigations is that countries differ in many ways besides their financial development. Differences in language, culture, law, currency, and other important disparities that may be related to financial development make it difficult to draw strong conclusions. A second issue is endogeneity problems, including reverse causality, where developments in the real economy drive changes in the financial sector. For example, firms in more affluent countries may demand more credit to fund their respective activities, yielding a spurious positive relation between banking services and real output. Similarly, individuals in more affluent countries may have more wealth handled by banks, also causing a spurious positive relation (Robinson, 1952; Lucas, 1988; Cetorelli, 2015).

Interconnections between banks and the real economy are especially evident during financial crises (Bernanke, 2018). For example, estimated economic losses from the Global Financial Crisis (GFC) are 40% to 90% of annual US GDP, or around \$6 trillion to \$14 trillion of foregone output. US households lost another 24% of their net worth, or another \$16 trillion. These estimates do not include the additional costs of government programs to mitigate the effects of the crisis. (Atkinson, Luttrell, and Rosenblum, 2013). Losses from the GFC and the European Sovereign Debt Crisis were in trillions of euros from state aid alone (Correa and Saprizza, 2015; Millaruelo and del Rio, 2017). Historical evidence for financial

crises across a large number of countries indicates that these events are associated with very substantial real effects evident from large output losses (Reinhart and Rogoff, 2009; Laeven and Valencia, 2013).

Despite large financial losses during periods of economic stress and evidence suggesting that banks reduce credit to the detriment of the real economy, it is difficult to draw precise conclusions from financial crises on the effects of banks on the real economy for several reasons. First, financial crises are not exogenous to the banking industry. Endogeneity issues are severe, given that financial crises are typically the result of the build-up of various economic and financial excesses, including credit booms and excessive liquidity creation by banks (Rajan, 1994; Thakor, 2005; Acharya and Naqvi, 2012; Berger and Bouwman, 2017). Second, financial crises tend to affect financial institutions and markets simultaneously, making it difficult to assess the effects of any crisis-related events on banks and the real economy. Third, it is difficult to differentiate the effects of bank supply from demand, because financial crises are usually associated with recessions that reduce the demand for financial services. Finally, even the obvious economic devastation from financial crises does not yield a clear, unambiguous conclusion of whether banks and other types of finance are good or bad for the real economy. One potential conclusion is that finance has strong *negative* effects on the economy because financial institutions and markets cause large economic damages during financial crises. An alternative potential conclusion is that banks and other financial institutions and markets have strong *positive* effects on the economy because much of the economic damage is caused by reductions in the supplies of banking and other financial services. We argue that positive effects is the more logical conclusion because the damages from the reductions in supplies of financial services likely

exceed the direct damages caused by the financial excesses, but the first three difficulties make it difficult to draw any strong conclusions from financial crises.

In order to address the concerns outlined above and establish causal links between banks and the real economy, econometric studies often use quasi-natural experiments with relatively exogenous shocks to bank output. We focus here on such studies that primarily use US and European policy interventions that affect some banks' output more than others, making for reasonable treatment and control groups. Typically, difference-in-difference (DiD) and regression discontinuity approaches are used, sometimes in conjunction with instrumental variables (IV), propensity score matching (PSM), Heckman sample selection models, and/or placebo tests that allow comparisons to be drawn between the treatment group impacted by an exogenous policy shock with a control group that is relatively unaffected by the same shock (Beck, Levine and Levkov, 2010; Braggion and Ongena, 2019).¹ Such approaches allow for the accurate identification of the impact on households, firms and other economic outcomes of specific exogenous policy events (such as changes in regulation, bank bailouts, etc.) affecting part of the banking sector, and their subsequent transmission to the real economy. Exogenous events that are large and appear to have a unidirectional impact are ideal for modelling the impact of sudden changes on the behavior of treated relative to control groups. We concentrate on single-country settings to avoid potentially confounding differences in language, culture, law, currency, etc. that complicate cross-country investigations, and largely avoid the effects of financial crises, which are far from

¹ Roberts and Whited (2013), Atanasov and Black (2016), Athey and Imbens (2017), and Abadie and Cattaneo (2018) review sources and implications of endogeneity for reliable inference, and provide an overview of the use of instrumental variables (IV), difference-in-difference (DID) estimators, and regression discontinuity research designs.

exogenous to the banking system and have other problems of interpretation discussed above.

In this introductory essay to the *Journal of Corporate Finance Special Issue* on Banks and the Real Economy, we provide an overview of prior research, as well as current contributions to the *Special Issue*. Most of the research papers are econometric studies of the type discussed above that primarily use single-country US and European policy interventions as quasi-natural experiments with relatively exogenous shocks to bank output, and examine subsequent effects on real economic outcomes.

The rest of this article is structured as follows. Section 2 examines the US evidence using quasi-natural experiments, including the impacts of US geographic bank deregulation, bailouts other policy shocks, natural resource discoveries, and natural disaster/weather shocks to bank output on real economic outcomes. In Section 3, we review the European and rest-of-the world evidence, and discuss the impact of changes in bank capital requirements, liquidity injections, credit supply shocks, bank taxation, and extreme weather and other events on households and firms. Section 4 provides a discussion of research that investigates the impact of financial crises on the real economy. Section 5 briefly describes the articles presented in this *Special Issue* of the *Journal of Corporate Finance* on Banks and the Real Economy.

2. US Evidence

We begin our review of the research by focusing on US evidence. US data often provides an excellent laboratory for studying the effects of banks on the real economy. Data on US banks

and the US economy are of high quality, allowing for relatively accurate measurement of the effects. The US also has many quasi-natural experiments in the form of changes in regulation, bailouts, and other shocks to bank supply of financial services. These events often only directly affect some banks or only some states, allowing for meaningful comparisons between treatment and control groups. In addition, use of a single country avoids potentially confounding differences in language, culture, law, currency, and other important disparities that often plague international studies. We discuss how geographic deregulation, bailouts, and a variety of other types of shocks to the US banking industry impact firms, households, and general economic outcomes.

Geographic Deregulation

By way of background, the 1927 McFadden Act prohibited interstate branch banking, so US banks could only operate in one state. Many states also had unit banking laws, restricting banks to one building in the state. From 1978 to 1994, individual states started allowing bank holding companies (BHCs) to own commercial banks across state lines (so-called interstate banking), albeit interstate branching was still prohibited. During the same period, some states repealed unit banking laws, and other intrastate restrictions on competition within the states.

The Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994 allowed BHCs to cross state lines and consolidate their commercial banks in different states into branches of a single bank (so-called interstate branching) with some restrictions. Some restrictions on interstate branching remain to this day. The most important restriction prohibits mergers and acquisitions (M&As) involving commercial banks that would raise a BHC's national market share of bank and thrift deposits to more than 10%. Three large BHCs

(Bank of America, Wells Fargo and JPMorgan Chase) received waivers and are currently above the limit, but can no longer merge with or acquire other commercial banking organizations. Other restrictions, such as those on *de novo* branching (opening up branch offices across state lines) were left to the discretion of the individual states.²

The state deregulations up to and including the Riegle-Neal Act, as well as changes in state restrictions on interstate branching that have continued since that time, are regulatory shocks that provide excellent quasi-natural experiments to study the effects of banks on the real economy. Many of these changes occurred at different times across the states, so the impacts may be seen on the different state economies.

These deregulatory events very significantly increased banking competition and efficiency. They reduced the protection from competition for inefficient local banks by allowing more efficient banking organizations to enter, so they may be viewed as increasing bank output (Flannery, 1984; Akhavein, Berger, and Humphrey, 1997; DeYoung, Hasan, and Kirchhoff, 1998; Jayaratne and Strahan, 1998; Stiroh and Strahan, 2003; Rice and Strahan, 2010; Kroszner and Strahan, 2013). Thus, their effects on the income and economic growth of the states in which these events occurred, as well as their effects on the economic outcomes for firms and households in these states may be viewed as credible evidence of the influence of banks on the real economy.³

The results of empirical research suggest that the geographic deregulation of the US banking industry has positive effects on nonfinancial firms (with a few exceptions). In states

² Berger, Kashyap, and Scalise (1995), Rice and Strahan (2010), Kroszner and Strahan (2013), and DeYoung (2020) provide extensive discussion of the deregulation and evolution of the US banking industry.

³ We acknowledge that that at least one research paper suggests that deregulation reduced bank output as measured by bank liquidity creation (Jiang, Levine, and Lin, 2019a).

where deregulation took place more quickly, there were: more new business incorporations (Black and Strahan 2002); greater firm turnover (Kerr and Nanda, 2009); increased access to and reduced cost of credit (Rice and Strahan, 2010); improved firm productivity (Krishnan, Nandy, and Puri, 2015); increased investment (Zarutskie 2006); reduced risk (Jiang, Levine, and Lin, 2019b); high levels of mergers, acquisitions and divestiture activity (Karakaya and Ors, 2019); and a decline in the concentration of manufacturing industries (Cetorelli and Strahan 2006). Berger, Chen, El Ghouli, and Guedhami (2019) also find that interstate deregulation improved access to credit for larger firms without financing constraints, while access to credit declined for smaller, more financially constrained firms.⁴

Deregulation also impacted firm innovation (measured by the number of patents filed as well as citations to the same patents) albeit the results of empirical studies are somewhat mixed. Amore, Schneider, and Žaldokas (2013) find that interstate banking deregulation increased both the quantity and quality of innovation, especially for firms more dependent on bank finance. Chava, Oettl, Subramanian, and Subramanian (2013), find that intrastate banking deregulation led to an increase in the market power of incumbent banks, and also a decline in innovatory activity by younger, smaller firms. Interstate banking deregulation in contrast, decreased the market power of incumbent banks and led to an increase in the innovation of younger smaller firms. These findings are confirmed by Cornaggia, Mao, Tian, and Wolfe (2015) who note that interstate banking deregulation afforded smaller firms greater access to funding for innovation. Hombert and Matray, (2017) also find that

⁴ Berger and Black (2020) provide a comprehensive overview of the economics and evolution of small business lending.

deregulation increased access to credit for non-innovative firms, but tightened credit conditions for innovative firms.

Geographic deregulation leads to: increased lending (but also increased bankruptcies) to households (Dick and Lehnert, 2010); greater home ownership (Tewari, 2014); increased house prices (Favara and Imbs, 2015); increased incomes, especially for females and non-white minorities (Demyanyk, 2008, Levine, Levkov, and Rubinstein 2014); reduced income inequality (Beck, Levine, and Levkov, 2010), and improved mental health outcomes (Hu, Levine, Lin and Tai, 2019). Deregulation also results in households becoming more involved in stock market investments as well as a greater use of banking services (Kozak and Sosyura, 2015; Célérier and Matray, 2016). There is also a general consensus that deregulation significantly increases both economic growth (Jayaratne and Strahan, 1996; Huang, 2008) and trade (Michalski and Ors, 2012), as well as reducing economic growth fluctuations (Morgan, Rime, and Strahan, 2004). On balance, the evidence suggests that US geographic deregulation has had a positive impact on firms, households and the overall economic environment.

US Bank Bailouts

Bank bailouts take the form of guarantees for bank liabilities, recapitalizations, measures to support relief for troubled assets, increased deposit insurance coverage, nationalizations, and many other measures. During the GFC, US authorities engaged in many types of bank bailouts.

We limit attention here to the Troubled Asset Relief Program (TARP), in which preferred equity was injected into banks. Like the US geographic deregulation discussed

above, TARP is often used as a quasi-natural experiment to investigate various economic outcomes. While the decision regarding which banks received TARP funds is not entirely exogenous, most studies verify that their research findings are robust to a range of model set-ups and alternative approaches (including instrumental variables). Here we discuss the impact of TARP on bank lending, systemic risk, and real economic outcomes.⁵

Studies of the effects of TARP on lending typically use a DiD framework to analyze the lending behavior of banks that received TARP funds relative to those that did not. Most of these studies examine changes in quantities of credit supplied, and the overwhelming majority find positive effects of TARP. Some of these studies find increased lending generally (e.g., Taliaferro, 2009; Berrospide and Edge, 2010; Li, 2013). Others find increases in small business lending (Puddu and Wälchli, 2015; Jang, 2017; Chavaz and Rose, forthcoming) and mortgage lending (Chavaz and Rose, forthcoming). One study finds increases in commercial and industrial (C&I) lending, and larger increases in commercial real estate (CRE) lending (Berger and Roman, 2017), while another finds C&I loan increases only for small banks (Black and Hazelwood, 2013). Others study syndicated lending to large business and find increased credit (Berger, Makaew, and Roman, 2019; Chu, Zhang, and Zhao, 2019).

In contrast, a smaller number of studies find no increases and in other cases decreases in credit by TARP banks relative to non-TARP banks. A study of large, publicly traded banks finds no change in credit supply quantities for large corporate loans or residential mortgages (Duchin and Sosyura, 2014). Another finds decreased C&I loans for large TARP banks (Black and Hazelwood, 2013). Using somewhat different economic approaches, some studies find

⁵ See Calomiris and Khan (2015), Berger (2018), Tooze (2018), Berger and Roman (2020), and Roman (2020) for more general TARP discussions.

no significant change in credit (Wu, 2015; Bassett, Demiralp, and Lloyd, forthcoming), or decreases in lending (Montgomery and Takahashi, 2014).

Some research includes the supply of credit through off-balance sheet guarantees, such as loan commitments. Two studies find that TARP increased credit supply through loan commitments (Li, 2013; Berger and Roman, 2017), while another finds no effect of TARP on loan commitments by large banks (Duchin and Sosyura, 2014).

Finally, one study examines the effects of TARP on credit supply at the intensive margin, finding that relative to non-TARP banks, TARP banks granted loans on more favorable terms (lower interest rate spreads, larger amounts, longer maturities, less frequency of collateral, and less restrictive covenants) to borrowers (Berger, Makaew, and Roman, 2019).

The findings of the vast majority of these studies suggest increased credit supply by TARP banks relative to non-TARP banks. At first glance, this appears to suggest that TARP improved economic outcomes through increased lending. However, these studies generally do not test for whether TARP increased *total* lending. The DiD framework measures only the change in lending of TARP banks relative to non-TARP counterparts, rather than the total change in lending, the sum of the changes in lending by the two sets of banks. If non-TARP banks decreased their lending, then the total effect may not be positive. This could have occurred for various reasons. TARP may have made the recipient banks more aggressive in taking market share from non-TARP banks, with no overall increase in lending. The US Treasury's "healthy and viable banks" approval criteria for TARP applications may have also

inadvertently branded some non-TARP banks as “unhealthy or nonviable,” reducing the demand for loans from these banks.

Another shortcoming of this literature on TARP and lending is that it does not take the final step of showing that the lending increases had effects on the real economy. That is, the increase in lending might not have resulted in increased spending (such as investment, hiring, or purchases of home or other consumption goods) by borrowers that boosts the real economy. Instead, the borrowed funds might have been saved or replaced other sources of funding. Determination of the effects on the real economy requires a study of such real effects.

Berger and Roman (2017) conduct such a study of real economic effects. They use the DID methodology to compare state economies in which greater versus fewer banks received TARP funds. They investigate the impact of TARP on net job creation and net hiring, as well as business and personal bankruptcies. Overall, they find that TARP led to significant improvements in job creation and hiring and reductions in personal and corporate bankruptcies.

These effects on real economic outcomes may be only part of the story as the findings only measure the differences in real output among states with different amounts of TARP. They exclude the effects at the national level of potentially saving the financial system from a bigger collapse. For the complete picture, we also need to know the effects of TARP on systemic risk. If TARP saved the financial system, even only partially, then the real economic effects may be much larger than the measured state-level effects. In other words, TARP may

have helped both TARP and non-TARP banks, so the differences between them may understate the total effects on the real economy.

Berger, Roman, and Sedunov (2019) investigate the possibility that TARP reduced systemic risk by using a DID approach to examine the effects of TARP on the systemic risk contributions of the recipient banks.⁶ They find that TARP banks significantly reduced their contributions to systemic risk, as measured by the standard systemic risk indicators, SRISK, SES, and ΔCoVaR . The results are strongest for larger and safer banks located in high growth local economies. These findings are consistent with the notion that the recapitalization of stronger rather than weaker banks could more effectively reduce systemic risk (Choi, 2014). While this does not explain any direct effect on the real economy, it is almost surely the case that keeping the banking system safe augmented positive economic outcomes arising from TARP interventions. However, even these results may understate the benefits to the financial system and the real economy. The DID framework measures only reduced contributions to systemic risk of the TARP banks relative to non-TARP banks, but the non-TARP banks were almost surely made safer as well.

Other Events

There are also studies of other US government policies that find significant effects on bank lending. The Federal Reserve introduced stress tests on the largest US bank holding companies (BHCs) in the wake of the GFC, and they continue today. Stress tests require that banking organizations have enough capital to be able to lend and perform other normal

⁶ Useful overviews of the measurement and evolution of systemic risk can be found in: Bisias, Flood, Lo and Valamis (2012); Acharya, Pederson, Phillipon and Richardson (2017); and De Bandt and Hartmann (2020).

banking functions in simulated adverse scenarios that emulate possible future financial crises or difficult periods. These tests are essentially forward-looking capital requirements that mandate that capital be sufficient to absorb future risks, in contrast to conventional capital requirements that mandate minimum capital ratios based on perceptions of portfolio risks derived from past experiences.

Two studies find that the stress tested BHCs reduced their risks as intended, but also reduced their credit supplies, appearing to suggest that stress tests harmed the real economy through reduced lending. One study finds that stress-tested BHCs reduced their supplies of credit, particularly the riskiest credit, in terms of C&I and CRE loans to both corporations and small businesses, and credit card credit to consumers (Acharya, Berger, and Roman, 2018), while the other study also finds reduced small business credit by stress-tested BHCs (Cortés, Demyanyk, Li, Loutskina, Strahan, forthcoming). Similar to the TARP research, there is the issue that untreated banking organizations may have changed their credit supplies in the opposite direction, and there is some evidence of this for small business credit in the latter study. The research also stops short of investigating the effects on the real economy from the lending changes.

We just briefly discuss a few other US government policy interventions during the GFC that have been studied. The Federal Reserve injected massive amounts of liquidity into banks by expanding Discount Window access and opening the Term Auction Facilities (TAF), which are similar to the Discount Window, but designed to avoid the stigma of borrowing from the Federal Reserve. The research suggests significantly more lending by the borrowing banks relative to other banks (Berger, Black, Bouwman, and Dlugosz, 2017). The 2010 Dodd-Frank Act imposed additional regulatory requirements for banks with asset size exceeding

\$10 billion and \$50 billion. A study finds that total bank lending tends to slow for banks just below the regulatory thresholds suggesting some form of credit portfolio re-structuring in an attempt to avoid increased regulatory burden (Bouwman, Hu, and Johnson, 2018). Again, the research does not investigate the effects of the lending changes on the real economy.

Other US studies use natural resource discoveries as quasi-natural experiments. The results suggest that increases in bank deposits following resource discoveries lead to an increase in bank lending and borrower productivity (Butler and Cornaggia, 2011; Gilje, Loutskina, and Strahan, 2016; Gilje, 2019).

Other studies also use natural disaster / weather shocks, such as hurricanes, which are similarly exogenous. Garmaise and Moskowitz (2009) show that banks lend less to Californian commercial real estate borrowers that are subject to heightened earthquake risk. These findings are also confirmed for various hurricane risks.⁷ However, an issue with these studies is that it is often difficult to disentangle the shocks to credit demand from those to credit supply (Chavaz, 2016; Cortes and Strahan, 2017; Schüwer, Lambert and Noth, 2019). Bos and Sanders (2018) find that US commercial banks increase real estate lending after natural disasters and sell government bonds to finance a demand driven credit surge post-disaster. They argue that this behavior helps smooth consumption and supports local economic recovery.

There is also evidence to suggest that bank consolidation can lead to detrimental effects for households, firms and the wider economy.⁸ Bord (2018) finds that households

⁷ Strobl (2011) investigates the impact of hurricane strikes on local economic growth rates and shows that a county's annual growth rate declines on average by 0.45%. Over a quarter of this decline is explained by wealthier households moving out of the areas affected.

⁸ Reviews of the vast literature that examines the causes and consequences of consolidation on the financial services industry can be found in Berger, Demsetz, and Strahan, (1999); DeYoung, Evanoff, and Molyneux (2009); and Buch and DeLong (2020).

located in areas affected by bank consolidation are less likely to maintain access to a bank account and more likely to be evicted following a negative financial shock. Nguyen (2019) finds that branch closures lead to a reduction in small business lending with adverse consequences for entrepreneurial activity.⁹ Garmaise and Moskowitz (2006) find that areas experiencing high levels of consolidation via bank mergers are subject to higher interest rates, an increase in the proportion of poorer households and higher rates of property crime.

Overall, US evidence clearly suggests that banks have positive effects on the real economy. In some cases, the evidence is weaker because it does not show that the increases in lending have direct positive real economic effects. Evidence on the real economic effects of other parts of the financial sector are more mixed (Berger and Roman, 2018).¹⁰

3. Europe and Rest-of-the-World Evidence

In this section, we review literature from Europe and the rest of the world, which investigates the impact on the real economy of: changes in bank capital requirements and funding shocks; bank support schemes including liquidity injections; unexpected changes in taxation; fiscal shocks; variation in mortgage loan-to-value ratios; and extreme weather and other events.

Deregulation, Capital Requirements, and Liquidity Injections

⁹ Danisewicz, McGowan, Onali, and Schaeck (2018) find that supervisory enforcement actions on single-market banks lead to reductions in personal income growth, the number of small firms and county level growth and an increase in the local unemployment rate. Cornaggia and Li (2019) find that firms with good access to bank finance can attract acquirers who seek improved financing efficiency.

¹⁰ Benmelech, Meisenzahl, and Ramcharan (2017) find a link between the collapse of the asset-backed commercial paper market and auto sales. This impacted the financing capacity of nonbank auto lenders. Ramcharan, Verani, and Van den Heuvel (2016) also find that credit unions reduced real estate and consumer lending during the GFC.

Bertrand, Schoar and Thesmar (2007) show that French banking deregulation leads to a more efficient and competitive banking system, with banks less willing to provide credit to poorly performing firms.

Other research investigates the impact of increased capital requirements on bank behavior and the real economy. The bulk of evidence suggests that higher capital requirements reduce lending to corporate and retail customers, and this in turn has an adverse impact on employment and investment. Aiyar et al. (2014) investigate the influence of changes in UK bank capital requirements on cross-border loan supply. They find that an increase in capital requirements reduces cross-border lending by 5.5%. Blattner, Farihan, and Rebelo (2017) show that when the European Banking Authority (EBA) in 2011 unexpectedly increased capital requirements the most affected subset of Portuguese banks reduced lending to all firms except those deemed to be in financial distress. This perverse lending behavior took place as affected banks sought to avoid realizing substantial loan-losses in the event of firm insolvencies. Fraisse and Thesmar (2017) use French loan-level data to investigate the impact of bank capital requirements on corporate borrowing and investment. They find that an increase in capital requirements reduces lending to firms, which in turn has a negative impact on firm-level investment. Gropp, Mosk, Ongena, and Wix (2019) investigate the impact of the European Banking Authority's capital exercise of 2011 (which increased capital requirements for 61 major European banks, while leaving others unaffected). They find that affected banks reduced lending to corporate and retail customers, resulting in lower firm-level asset, investment and sales growth.

Jimenez, Ongena, Peydro and Saurina (2018) investigate the effects of Spanish dynamic provisioning (introduced in Spain in 2000) on real economic outcomes. The authors

provide evidence that dynamic loan-loss provisioning smooths bank lending over the credit cycle and this has a resultant positive impact on corporate performance. Hasan, Wu, Hassan and Kim (2016) analyze changes in capital requirements on international bank lending. They find that variations in regulatory capital costs arising from risk weight reductions reduce the screening and monitoring efforts of banks. This results in greater lending on less productive investments and an adverse impact on economic growth in both borrower and lender countries.

A related study by Schivardi, Sette, and Tabellini (2017) uses an extensive bank-firm Italian dataset over 2004 to 2013 to investigate the impact of bank capital on lending to firms during the Eurozone crisis. A particular focus is the behavior of poorly capitalized banks and their lending to zombie (unviable) firms. They show that undercapitalized Italian banks are less likely to cut lending to zombie firms. In addition, this misallocation of credit results in increased failure of healthy firms and lower failure of zombie firms. Overall, however, the impact of this credit misallocation on healthy firms overall is modest as is the impact on total factor productivity.

Several studies focus on liquidity injections made under the European Central Bank's Longer-Term Refinancing Operations (LTRO), which increased credit to Eurozone banks with expanded eligible collateral. Carpinelli and Crosignani (2017) examine the impact of the LTRO on Italian banks. They find that for banks affected by the tightening in the wholesale funding market, liquidity injections helped restore lending to firms. Daetz, Subrahmanyam, Tang, and Wang, (2019) examine the LTRO on banks and corporates in the Eurozone. They find that corporates held more cash in countries where LTRO injections were larger.

Consequently, the ECB liquidity injections helped maintain non-financial firm liquidity. However, this had little impact on corporate investment and employment.

Other studies investigate ECB corporate debt purchases, which freed-up bank funds for more lending, Arce, Gimeno, and Mayordomo, (2017) examine the impact of the ECB's purchases of corporate bonds (Corporate Sector Purchase Program) on the financing of Spanish non-financial firms. They find that the aforementioned program reduced firm financing costs, stimulated new bond issuance and led to a reallocation of credit from large to small firms.

Koetter (2019) investigates the impact of the ECB's Securities Markets Program on German regional bank lending to corporates.¹¹ Around 17% of German regional banks held SMP securities in the first quarter of 2010 so the intervention was expected to impact their balance sheet behavior. Overall, the main finding is that banks that held SMP securities boosted corporate lending by 4% and the program also had a positive impact on aggregate lending, bank profits and liquidity.

Ferrando, Popov, and Udell (2019) utilize data on SME banking relationships in order to evaluate the impact of the ECB's Outright Monetary Transactions Program (OMT) on Eurozone small business credit access. Under this Program, the ECB committed to purchasing unlimited amounts of sovereign debt issued by Eurozone governments. The authors find that the announcement of the OMT Program resulted in an improvement in access and terms of credit by firms borrowing from banks with significant balance sheet

¹¹ The SMP was designed to stabilize stressed sovereign debt markets through the purchases in the secondary market. The SMP purchases covered the sovereign debt of Italy, Ireland, Spain, Portugal, and Greece worth €218 billion between May 10, 2010 and February 29, 2012

exposures to impaired sovereign debt. Moreover, the improved credit market conditions led to increased fixed capital investment on the part of affected firms.

Credit Supply, Investment and Relationship Lending

Complementing the above literature are a range of studies that model the impact of credit supply shocks over time. Peek and Rosengren (2000) examine how the Japanese banking crisis in the 1990s was transmitted to the US. They find that the crisis caused Japanese banks to retrench by reducing lending, resulting in a negative impact on real estate markets in US states where Japanese banks had a significant presence previously.

There are several recent studies modelling credit supply shocks and real effects. Alfaro, Garcia-Santana, and Moral-Benito (2018) estimate the impact of firm-specific exogenous credit supply shocks on real economic activity in Spain over the period 2003 to 2013. They find that these shocks have a sizable direct and downstream effect on investment and output. Amador and Nagengast (2016) use a detailed dataset of matched bank-firm loans in Portugal over the period 2005 to 2013. They find that adverse bank shocks impair firm-level investment, particularly for small firms and those without access to alternative sources of finance. Berg (2018) finds that German SMEs increase cash holdings following a loan rejection, and this has negative implications for investment, employment and firm-level growth. Degryse, De Jonghe, Jakovljevic, Mulier and Schepens (2019) employ bank-firm matched credit information (for firms with only single bank relationships) in Belgium over the period 2002-2012. The authors find that firms borrowing from banks subject to negative shocks exhibit slower growth, lower investment and lower employment relative to counterparts borrowing from banks not subject to shocks. Amiti and Weinstein (2018)

decompose aggregate loan movements in Japan for the period 1990–2010 into bank, firm, industry, and common shocks. They find that idiosyncratic bank supply shocks explain 30 to 40 percent of observed fluctuations in aggregate bank lending and investment.

Prior borrowing relationships for bank dependent borrowers may impact real economic outcomes following a credit supply shock. Various studies focus on the importance of relationship banking. Beck, Degryse, De Haas, and van Horen (2018) classify approximately 400 banks operating across 20 countries as relationship or transaction lenders, and then use the geographic location of bank branches and borrowing firms to examine their respective behavior at varying points in the credit cycle. During cyclical downturns, in geographic areas with a greater presence of banks purporting to be relationship lenders, fewer firms face credit constraints. Liberti and Sturgess (2018) trace the impact of a credit supply shock on borrowers using micro-level data from a multinational bank. They find that borrowers face less credit rationing if they have stronger existing lending relationships and pledge collateral (especially outside assets and real estate). Nakashima and Takahashi (2018) investigate what happens when Japanese bank-borrower relationships are terminated. They find that bank-driven terminations lead to significant declines in investment. This is especially the case for firms that find it difficult to establish new banking relationships.

Other Events

Other studies focus on a wide range of shocks to banks and their subsequent impact on real economic outcomes. Khwaja and Mian (2008) examine the impact of unanticipated nuclear tests in Pakistan and how these are transmitted via bank liquidity shocks to the real

economy. They show (by comparing firms that borrow from multiple banks) that banks faced by a decline in liquidity reduce their lending, particularly to small firms. Larger firms are less affected as they can access credit from other sources.¹²

Several studies assess the real effects of natural disasters, including extreme weather events. Berg and Schrader (2012), for instance, examine whether volcanic eruptions influence the lending behavior of an Ecuadorian microfinance institution. They find that credit demand increases in response to volcanic eruptions yet credit supply is restricted. Nevertheless, borrowers that have a relationship with the microfinance institution are more likely to obtain credit. Hosono et al (2016) analyze how Japan's Great Hanshin-Awaji (Kobe) earthquake in 1995 impacted bank credit to firms and how this influenced investment. Using data on banks and firms located both inside and outside the disaster area the study seeks to see if / how lending and company investment behavior was affected. They find that investment of companies based outside the earthquake-affected areas, but having a main bank in these areas, is significantly lower than for firms located outside the areas and having a main bank *outside* the areas.¹³ Koetter, Noth, and Rehbein (2019) investigate how banks respon to the flooding of the river Elbe in Germany in 2013. Using data on over one million firms matched with constituent banks, they find that compared to the pre-flooding period, banks with relationships to flooded firms lend more than banks without such customers.

¹² The estimation approach (which has become prevalent in studies utlising matched bank-firm data) uses firm-time fixed effects in order to control for changes in firm-level demand.

¹³ Cavallo et al (2013) investigates how catastrophic natural disasters (earthquakes, storms and floods) across 196 countries between 1970 and 2008 impact economic growth. Comparing countries impacted by natural disaster and similar countries unaffected by such events (synthetic control groups) they find that only very large disasters have an adverse impact on economic growth. This study, however, does not cover bank behavior.

Nguyen and Wilson (2019) investigate the impact of the Indian Ocean Tsunami of 2004 on the aggregate supply of credit in Thailand provinces. They find long-term adverse effects on bank lending with the largest declines in geographic areas most affected by the Tsunami.

Changes in bank taxation are also found to have significant effects on bank credit supply, but limited effects on firm level investment and employment (Chronopoulos, Sobiech, and Wilson, 2018). Banks exposed to bail-ins in Europe are also found to reduce credit supply, resulting in lower firm investment and employment (Beck, Da-Rocha-Lopes, and Silva, 2018). In contrast, fiscal stimulus in China boosts credit supply and increases investment and employment (Cong, Gao, Ponticelli, and Yang, 2019). Restrictions on loan-to-value (LTV) ratios in Japan are also found to inhibit growing firms from borrowing (Ono, Uchida, Udell, and Uesugi, 2019). Deep local banking markets lead to higher firm-level innovatory activity, which in turn translates into higher firm- and local-level growth (Bircan and De Haas, 2019).

Overall, in common with the US literature, most of the European and rest of the world studies find that shocks to the banking system have a significant impact on bank lending and the real economy. Higher capital requirements that reduce bank output have negative real economic effects. Increases in bank liquidity from central bank operations that increase bank output have positive real economic effects. Decreases in bank funding from government-imposed bail-in exposures reduce bank output, and this has negative real economic effects. Adverse credit supply shocks reduce employment and investment, albeit stronger bank-firm relationships can help mitigate such shocks. Increases in bank output from government fiscal stimulus also have positive real economic effects.

4. Evidence from Financial Crises

We noted previously that while the importance of banks for the real economy is brought into sharp focus especially during crises periods, there are significant econometric challenges in using such periods as research laboratories due to endogeneity concerns. Nevertheless, an extensive literature has emerged examining the effects of financial crises on the real economy, often addressing some of the aforementioned limitations. The following provides a review of the impact of financial crises on the real economy.

US Evidence

The results of the majority of studies find that banks reduced lending following the onset of the GFC. Banks with a higher proportion of deposit funding reduced lending by a smaller amount, and the overall decline in bank lending was not made up by other lenders (Ivashina and Scharfstein, 2010; Cornett, McNutt, Strahan, and Tehranian, 2011; Dagner and Kazimov, 2015; Berrospide, Black, and Keeton, 2016). Dursun-de Neef (2019) show that banks transmitted liquidity shocks by reducing loan supply, particularly in real estate lending. She shows that house prices declined in Metropolitan Statistical Areas (MSAs) where these banks branch. Other evidence from the international syndicated loan market, shows that large banks from a number of countries affected by the failure of Lehman's also decreased their cross-border lending (De Haas and Van Horen, 2013).¹⁴

¹⁴ This study investigates the cross-border lending of 117 banks from 36 different countries. The main finding is that the Lehman's failure resulted in banks reducing syndicated lending less in markets that were geographically close; where they were more experienced and operated subsidiaries.

Another strand of the literature uses firm-level datasets to investigate the impact of the GFC. Almeida, Campello, Laranjeira, and Weisbenner (2011) examine firm debt contracting over the crisis periods, and use a matching approach to compare firms that had to renegotiate debt issues with similar (matched) firms that did not have to restructure debt. They then link this to firm investment behavior. The authors find that firms that had to renegotiate debt contracts during the crisis were hit by a shock that fed through into lower investment (compared to firms that did not have to renegotiate debt contracts). Chodorow-Reich (2014) uses a sample of non-financial firms with pre-crisis banking relationships to investigate the impact of the failure of Lehman Brothers. He finds that firms that had a relationship with less healthy banks prior to the crisis had a lower likelihood of obtaining credit following the bankruptcy of Lehman's. Those firms which did borrow paid a higher interest rates, and reduced employment to a greater degree relative to banks that had a relationship with more healthy banks prior to the onset of the crisis.¹⁵ Oesch, Schuette, and Walter (2015) investigate whether the nature of relationships between corporates and investment banks impact on capital spending during the GFC. The authors compare changes in investment spending and financing of corporate clients of troubled investment banks with those of other investment banks. They find that clients of troubled investment banks reduce their investment expenditures and financing activities significantly more than counterparts with ongoing relationships at unaffected investment banks.

¹⁵ Evidence that credit supply shocks impact small firms most is widespread (e.g., Mach and Wolken, 2012; Duygan-Bump, Lekov, and Montoriol-Garriga, 2015; Kennickell, Kwast, and Pogach, 2015; Berger, Bouwman and Kim, 2017; Siemer, 2019).

Duchin, Ozbas, and Sensoy (2010) assess the impact of the GFC on corporate investment. They compare the investment of firms pre- and post-GFC based upon their financial strength, external financing constraints and dependence on external finance. The results suggest that investment declines following the onset of the crisis are greater for firms that have: low cash reserves; high short-term debt; financial constraints; or operate in industries dependent on external finance. Giroud and Mueller (2017) find that highly levered firms cut employment significantly more than less levered counterparts following the onset of the financial crisis. Gilchrist, Schoenle, Sim, and Zakrajšek (2017) examine the effects of firms' balance sheets on their pricing behavior, finding that firms with limited internal liquidity and high operating leverage raised (rather than reduced) their prices as a result of the onset of the GFC.

Chen, Hanson, and Stein (2017) consider the evolution of credit to small firms following the onset of the GFC. The authors focus on the lending behavior of the four largest (Top 4) US banks, which reduced credit proportionately more than other banks. The authors compare counties where the Top 4 banks had a higher initial market share with counties where they had a smaller share. The results show that small business credit declined and interest rates increased in counties where the Top 4 banks had higher initial market shares. Economic activity also contracted in these affected counties: fewer businesses hired; unemployment increased; and wages declined.

Adelino, Schoar, and Severino (2016) point out that mortgage borrowing increased for borrowers of all income levels and risk profiles in the period prior to the GFC. In addition

to low-income and sub-prime borrowers, middle-income and higher income prime borrowers also saw large increases in delinquencies after the onset of the GFC.

Mian and Sufi (2018) explore the credit-market sources of the build-up to the GFC and find that households that were most exposed to the 2003 acceleration of the private-label mortgage securitization market experienced a sudden subsequent increase in mortgage originations and house prices, followed by sharp housing price collapses. This complements prior research, which suggests that deteriorating household balance sheets were an important correlate of declining employment in the US following the onset of the GFC (Mian and Sufi, 2014). Gropp, Mosk, Ongena and Wix (2018) investigate the impact of regulatory forbearance on distressed US banks in the US and the link to economic activity. The study examines the period encompassing the GFC, and uses a model to predict bank failure and looks to see which banks predicted to fail actually survived over the period. They find that regions with higher regulatory forbearance experienced less restructuring in the real sector – more firms and jobs were lost if more distressed banks remained in business. Greenstone, Mas, and Nguyen (2019) investigate the impact of adverse supply shocks on small business lending. Using data on bank lending to establishments, the authors predict county-level lending shocks using variation in pre-existing bank market shares and estimated bank supply-shifts. They find that for counties with negative predicted supply shocks small business loan originations declined over the sample period.

Recent work on the GFC has spawned renewed interest in bank behavior during the Great Depression of the 1930s. Following Bernanke (1983), which uses aggregate time series

data to draw inferences on bank and household behavior during the Depression era,¹⁶ recent studies use new micro data sets that allow endogeneity concerns to be addressed. Benmelech, Frydman, and Papanikolaou (2019) examine large firm financing during the Great Depression when banks were failing and bond markets were drying up. They find that such adverse financing conditions explain a significant decline in employment at large corporates. Other studies that focus on the Depression period consider: the mechanisms through which banking distress channels through into credit availability (Carlson and Rose, 2015); the impact of bank fire sales on local financing and land prices (Ramcharan and Rajan, 2014); and how the failure of long-term bank-firm relationships influenced economic recovery (Cohen, Hachem, and Richardson, 2018). Overall, this literature finds that adverse shocks to banks and other parts of the financial system accentuated the severity and duration of the Great Depression for real economic outcomes.¹⁷

Europe and Rest-of-the-World Evidence

Puri, Rocholl, and Steffen (2011) examine the broader effects of the US financial crisis on global lending via an investigation of retail lending in Germany. To do so, the authors examine the evolution of lending of savings banks that were exposed to Landesbanken sub-prime losses relative to unaffected counterparts. They find that the US crisis induced a contraction in the supply of retail lending in Germany. Giannetti and Simonov (2013) find that the re-capitalization of Japanese banks during their banking crisis of the late 1990s was

¹⁶ Bernanke and James (1991) and Bernanke (1994). Calomiris, 2020 provides a detailed overview of bank distress during the Great Depression.

¹⁷ Mitchener and Richardson (2016) investigate the influence of correspondent banking relationships in the interwar period, and show that bank financial distress reduced credit availability to business customers as well as to their (regionally diversified) correspondents.

followed by an increase in bank lending. This led to an increase in investment by borrowing corporates.

In a major cross-country study, Laeven and Valencia (2013) investigate the impact of official policy interventions during the GFC on firm growth across 50 countries. Their findings suggest that bank recapitalization policies boosted the growth of firms that were more financially dependent. Franklin, Rostom, and Thwaites (2015) identify the impact of the reduction in credit supply following the GFC on UK labor productivity, investment behavior and average pay. The authors exploit information on pre-crisis lending relationships within a large firm-level dataset. The results suggest that a contraction in credit supply reduced labor productivity, wages and the capital intensity of production at the firm level. Firms experiencing adverse credit shocks were also more likely to fail.

A number of studies analyze the impact of the dry-up of the European interbank markets and other GFC effects.¹⁸ Albertazzi and Marchetti (2010), for instance, consider the credit crunch in Italy over a six-month period following the collapse of Lehman Brothers. Using a detailed matched sample of bank and borrowing firms, the authors find that banks with low capital and liquidity cut back lending most. Firms with limited relationships found it difficult to find new credit. Financially constrained large banks tended to shift credit to less risky firms, but this was not the case for their smaller counterparts. Subsidiaries and branches of foreign-owned banks reduced lending much more than domestic counterparts. Aiyar (2012) investigates the impact of the GFC liquidity shock to UK banks between 2008:Q1 and the end of 2009:Q3, defined as a “shock” period when external liabilities

¹⁸ Da Silva Fernandes, Kontonikas and Tsoukas (2019) present evidence that financial pressure has a negative effect on firm-level employment especially during the financial crisis. Moreover, this observed effect is more pronounced for bank-dependent, small and privately held firms operating in peripheral European countries.

collapsed. Using a dataset on all UK banks reporting to the Bank of England, he finds that the shock to bank funding from non-resident creditors was transmitted in the UK via a significant decline in bank credit supply. In particular, resident subsidiaries and branches of foreign-owned banks reduced lending by much more than domestic banks. The latter reduced domestic lending more in-line with the size of the adverse funding shock.

Iyer, Peydro, da Rocha-Lopes, and Schoar (2014) use an extensive matched bank-firm dataset for Portugal and show that banks more dependent on interbank funding reduced lending to firms to a greater degree than counterparts less reliant on wholesale funding. Firms that were small, with weaker banking relationships were most affected. Cingano, Manaresi, and Sette (2016) also use a large bank-firm sample to investigate the same interbank liquidity shock on Italian firms. They show the interbank liquidity freeze had a negative effect on firm investment, employment, trade credit and value added.

Jensen and Johannesen (2017) examine the impact of bank behavior on households during the GFC. The authors use a unique matched Danish household-bank sample of deposits and loan data for all Danish individuals between 2003 and 2011. Banks with relatively high loan-to-deposit ratios reduced their lending significantly more than counterparts with relatively low loan-to-deposit ratios in the aftermath of the GFC. Customers of the more exposed banks also reduced their total borrowing and consumption relative to customers of less exposed banks.

Blickle (2018) investigates the impact of a sudden increase in the supply of local mortgage credit caused by a large-scale customer migration from UBS following the financial crisis on local house prices and employment in Switzerland. The author finds that banks experiencing an exogenous positive funding shock increase local mortgage lending leading

to a substantial increase in house prices. Employment at small firms reliant on real estate collateral also increased.

Dwenger, Fossen, and Simmler (2018) use information on firm-banking relationships in Germany, and find that banks with losses from proprietary trading during the GFC reduced lending. This led firms to reduce real investments and employment. Huber (2018) considers the impact of lending reductions made by a major German bank, Commerzbank, in the light of trading losses incurred over 2008-2009. The study constructs an instrument for the regional (county-by-county) exposure of firms to this lending reduction. Overall, the decline in lending reduced the output and employment of firms in counties that were more dependent on Commerzbank.¹⁹ Popov and Rocholl (2019) examine the influence of exogenous funding shocks to German savings banks during the US subprime mortgage crisis on the labor decisions of private and public firms in Germany. They find that firms that had credit relationships with affected banks experience a significant decline in labor demand relative to firms with credit relationships with healthy banks. This employment effect is more pronounced for larger firms. Berton, Mocetti, Presbitero, and Richiardi (2018) use data on job contracts, matched with the universe of firms and their lending banks in one Italian region during the period 2008-2012. They find that the credit contraction that took place during the sample period is linked to around a 25% overall decline in employment. Moreover, the reduction in employment was concentrated in more levered and less productive firms. Relatively less-educated and less-skilled workers with temporary contracts were the most affected.

¹⁹ Berg and Streitz (2019) that the direct effect of Commerzbank's lending cut on affected firms reported is larger once spillover effects are accounted for.

A number of studies also investigate the impact of the 1998 Russian default and its subsequent transmission to banks and firms in other countries. Chava and Purnanandam (2011) investigate the transmission of the aforementioned shock to US banks. They find that firms that were more dependent on banks reduced their credit (compared to those that could access public debt markets) and had to pay more for their loans. This reduced capital spending and firm profitability. Schnabl (2012) investigates the transmission to Peruvian banks and firms. He finds that the shock was transmitted via domestic banks that were locally funded, and these cut lending to local firms most.

5. New Research on Banks and the Real Economy in this *Special Issue*

The extant research reviewed thus far generally suggests positive effects of banks on the real economy. In the remainder of this lead article, we briefly summarize the new contributions to this research in this *Special Issue*. The summaries (which are organized by geographic area) generally reinforce the conclusion that banks have positive effects on the real economy.

Starting with US studies, Jiang, Levine, and Lin (2019b) investigate the impact of increased bank competition on corporate risk. The authors find that regulatory reforms that increased bank competition reduced corporate risk by providing increasing access to liquidity.

Norden, Udell, and Wang (2019) consider the influence of TARP on the provision of trade credit granted to the customers of commercial borrowers of US banks. The authors find

that corporate borrowers of TARP banks increased their supply of trade credit, while counterparts borrowing from non-TARP banks did not.

Roman (2019) investigates the influence on borrowers of various supervisory enforcement actions against US banks. She finds that supervisory enforcement actions lead to a reduction in credit to small borrowers, but this only has limited effects on large borrowers.

Sedunov (2019) examines the impact of the composition of local banking markets on customer satisfaction. Using US county-level customer complaints data from 2012-2017, he finds that there are fewer customer complaints in counties where there is a larger presence of small banks.

Bindal, Bouwman, Hu, and Johnson (2019) present a new approach to estimate the direct and indirect treatment effects of size-based bank regulations. They use this to investigate how size-based regulatory thresholds, especially those created by the Dodd-Frank Act of 2010, affect mergers and acquisitions and the associated real effects, in particular small business lending. The authors find that banks just below the \$10 billion regulatory size threshold increase acquisition activity and this behavior is accelerated if merger deals result in a large jump in size over the threshold. They also find that small business lending tends to increase for banks just under the \$10 billion threshold. In contrast, small business lending declines for banks over the threshold. Overall, the results suggest that additional regulatory requirements on larger banks adversely affect real economic outcomes.

Moving to European studies, Bersch, Degryse, Kick, and Stein (2019) consider the effects of bank distress (evidenced by a bailout) on firm default in Germany over the period 2000-2012. In general, the authors find that bank distress leads to an increase in the probability of nonfinancial firm default. However, these effects differ depending on whether distressed banks are transaction or relationship-based lenders. For distressed transaction banks, the probability of customer default increases for those with above-median riskiness, while relationship banks appear to insulate higher risk corporate customers from such risk.

De Jonghe, Dewachter, and Ongena (2019) explore how the failure of Lehman Brothers and the resultant negative funding shock – the collapse of the interbank market – was transmitted to firms via a restructuring of Belgium bank loan portfolios. The authors show that banks reallocate lending toward lower risk firms and to industry sectors where they have a high market share.

In a study of India, Ayyagari, Beck, and Hoseini (2019) investigate the impact of financial depth and financial inclusion on household poverty. Using state-level indicators on financial depth, branch penetration and poverty for 1983 to 2005 across 15 Indian states, the authors find that financial deepening leads to a decline in rural poverty via increased entrepreneurship and migration of poorer households to more developed states.

Finally, in a cross-country study, Demirguc-Kunt, Martinez Peria, and Tressel (2019) investigate the evolution of corporate financing structures during the GFC and its immediate aftermath. They find evidence of a widespread deleveraging for firms located in both developing and high-income countries.

References

- Abadie, A., Cattaneo, M.D. 2018. Econometric Methods for Program Evaluation, *Annual Review of Economics*, 10, 465-503.
- Acharya, V.V., Navqi, H. 2012. The Seeds of a Crisis: A Theory of Bank Liquidity and Risk Taking over the Business Cycle. *Journal of Financial Economics*, 106, 349-366.
- Acharya, V.V., Berger, A.N., Roman, R.A., 2018. Lending Implications of US Bank Stress Tests: Costs or Benefits? *Journal of Financial Intermediation* 34, 58-90.
- Acharya, V.V., Pedersen, L.H., Phillipon, T., Richardson, M. 2017. Measures of Systemic Risk. *Review of Financial Studies*, 30, 2-47.
- Adelino, M., Schoar, A., Severino, F. 2016. Loan Originations and Defaults in the Mortgage Crisis: The Role of the Middle Class. *Review of Financial Studies*, 29, 1535-1670.
- Akhavein, J.D., Berger, A.N., Humphrey, D.B. 1997. The Effects of Bank Megamergers on Efficiency and Prices: Evidence from the profit function. *Review of Industrial Organization* 12, 95-139.
- Aiyar, S., 2012. From Financial Crisis to Great Recession: The Role of Globalized Banks. *American Economic Review* 102, 225-30.
- Aiyar, S., Calomiris, C.W., Hooley, J., Korniyenko, Y., Wieladek, T., 2014. The International Transmission of Bank Capital Requirements: Evidence from the UK. *Journal of Financial Economics*, 113, 368-382.
- Albertazzi, U., Marchetti, D.J. 2010. Credit Supply, Flight to Quality and Evergreening: An

- Analysis of Bank-Firm Relationships after Lehman. *Bank of Italy Working Paper*, Number 756.
- Alfaro, L, García-Santana, M., Moral-Benito, E., 2018. On the Direct and Indirect Real Effects of Credit Supply Shocks. *Centre for Economic Policy Research Discussion Paper* Number 12794.
- Allen, F., Carletti, E., Guan, X. 2020. The Role of Banks in Financial Systems, in Berger, A.N., Molyneux, P., Wilson, J.O.S. (eds.) *Oxford Handbook of Banking*, 3rd Edition. Oxford: Oxford University Press.
- Amador, J., Nagengast, A.J., 2016. The Effect of Bank Shocks on Firm-Level and Aggregate Investment. *European Central Bank Working Paper*, Number 1914.
- Almeida, H., Campello, M., Laranjeira, B., Weisbenner, S. 2011. Corporate Debt Maturity and the Real Effects of the 2007 Credit Crisis. *Critical Finance Review* 1, 3–58.
- Amiti, M., Weinstein, D. E., 2018. How Much Do Idiosyncratic Bank Shocks Affect Investment? Evidence from Matched Bank-Firm Loan Data. *Journal of Political Economy*, 126, 525-587.
- Amore, M.D., Schneider, C., Žaldokas, A., 2013. Credit Supply and Corporate Innovation. *Journal of Financial Economics*, 109, 835-855.
- Arce, O., Gimeno, R., Mayordomo, S., 2017. Making Room for the Needy: The Credit-Reallocation Effects of the ECB's Corporate QE. *Bank of Spain Working Paper* Number 1743.
- Arcand, J.L., Berkes, E., Panizza, U., 2015. Too Much Finance? *Journal of Economic Growth*, 20, 105-148.

- Atanasov, V., Black, B. 2016. Shock-Based Causal Inference in Corporate Finance and Accounting Research. *Critical Finance Review*, 5, 207-304.
- Athey, S. and Imbens, G. 2017. The State of Applied Econometrics: Causality and Policy Evaluation. *Journal of Economic Perspectives*, 31, 3-32.
- Atkinson, T., Luttrell, D., Rosenblum, H., 2013. How Bad Was It? The Costs and Consequences of the 2007-09 Financial Crisis. *Federal Reserve Bank of Dallas Staff Papers*, Number 20.
- Ayyagari, M, Beck, T., Hoseini, M. 2019. Finance, Law and Poverty: Evidence from India, *Journal of Corporate Finance*, this issue.
- Bassett, W., Demiralp, S. and Lloyd, N. 2019. Government Support of Banks and Bank Lending. *Journal of Banking & Finance*, forthcoming.
- Beck, T. (2009) Econometrics of Finance and Growth, in: Mills, T. and Patterson, K. (Eds.) *Palgrave Handbook of Econometrics*, Volume 2. Basingstoke: Palgrave Macmillan.
- Beck, T., Levine, R., Levkov, A., 2010. Big Bad Banks? The Winners and Losers from Bank Deregulation in the United States. *Journal of Finance*, 65, 1637-1667.
- Beck, T., Degryse, H., De Haas, R., van Horen, N., 2018. When Arm's Length is too Far. Relationship Banking over the Business Cycle. *Journal of Financial Economics*, 127, 174-196.
- Beck, T., Da-Rocha-Lopes, S., Silva, A.F., 2018. Sharing the Pain? Credit Supply and Real Effects of Bank Bail-ins. *European Banking Authority Staff Paper* Number 1.
- Bekaert, G., Harvey, C.R., Lundblad, C., 2005. Does Financial Liberalization Spur Growth? *Journal of Financial Economics*, 77, 3-55.

- Benmelech, E., Frydman, C., Papanikolaou, D. 2019. Financial frictions and Employment During the Great Depression. *Journal of Financial Economics*, forthcoming.
- Benmelech, E., Meisenzahl, R.R., Ramcharan, R., 2017. The Real Effects of Liquidity during the financial Crisis: Evidence from Automobiles. *Quarterly Journal of Economics* 132, 317–65.
- Berg, G., Schrader, J., 2012. Access to Credit, Natural Disasters, and Relationship Lending. *Journal of Financial Intermediation*, 21, 549-568.
- Berg, T. 2018. Got rejected? Real Effects of *Not Getting* a Loan. *Review of Financial Studies*, 31, 4912-4957.
- Berg, T., Streitz, D. 2019. Handling Spillover Effects in Empirical Research: An Application using Credit Supply Shocks. <https://dx.doi.org/10.2139/ssrn.3377457>.
- Berger, A.N., 2018. The Benefits and Costs of the TARP Bailouts: A Critical Assessment. *Quarterly Journal of Finance* 8, 1850011-1 – 1850011-29.
- Berger, A.N., Black 2020. Small Business Lending: The Roles of Technology and Regulation from Pre-Crisis to Crisis to Recovery. In: Berger, A., Molyneux, P., Wilson, J.O.S. (eds.) *Oxford Handbook of Banking*, 3rd ed. Oxford: Oxford University Press.
- Berger, A.N., Black, L.K., Bouwman, C.H.S., Dlugosz, J.L., 2017. Bank Loan Supply Responses to Federal Reserve Emergency Liquidity Facilities. *Journal of Financial Intermediation*, 32, 1-15.
- Berger, A.N., Bouwman, C.H.S. 2009. Bank Liquidity Creation. *Review of Financial Studies* 22, 3779-3837.

- Berger, A.N., Bouwman, C.H.S. 2016. *Bank Liquidity Creation and Financial Crises*. Amsterdam: Elsevier.
- Berger, A.N., Bouwman, C.H.S. 2017. Bank Liquidity Creation, Monetary Policy, and Financial Crises. *Journal of Financial Stability*, 30, 139–155.
- Berger, A.N., Bouwman, C.H.S., Kim, D., 2017. Small Bank Comparative Advantages in Alleviating Financial Constraints and Providing Liquidity Insurance over Time. *Review of Financial Studies*, 30, 3416-3545.
- Berger, A.N., Chen, R., El Ghouli, S., Guedhami, O., 2019. Who Wins and Who Loses from Bank Geographic Deregulation? Analysis of Financially Constrained and Unconstrained Firms. Working Paper.
- Berger, A.N., Demsetz, R., Strahan, P. (1999) The Consolidation of the Financial Services Industry: Causes, Consequences and Implications for the Future, *Journal of Banking & Finance*, 23, 135-194
- Berger, A.N., Hasan, I., Klapper, L.F., 2004. Further Evidence on the Link between Finance and Growth: An International Analysis of Community Banking and Economic Performance. *Journal of Financial Services Research*, 25, 169-202.
- Berger, A.N., Kashyap, A.K., Scalise, J.M., 1995. The Transformation of the US Banking Industry: What a Long, Strange Trip It's Been. *Brookings Papers on Economic Activity*, 26, 55-218.
- Berger, A.N., Makaew, T., Roman, R.A., 2019. Do Borrowers Benefit from Bank Bailouts during Financial Crises? The Effects of TARP on Loan Contract Terms. *Financial Management* 48, 575-639.

- Berger, A.N. Roman, R.A. 2017. Did Saving Wall Street Really Save Main Street? The Real Effects of TARP on Local Economic Conditions. *Journal of Financial and Quantitative Analysis*, 52, 1827-1867.
- Berger, A.N., Roman, R.A. 2018. Finance and the Real Economy: Evidence from the US. Beck, T. and Levine, R. (eds.) *Handbook of Finance and Development*. Cheltenham: Edward Elgar, 261-288.
- Berger, A.N., Roman, R.A., 2020. *TARP and other Bank Bailouts and Bail-Ins around the World: Connecting Wall Street, Main Street, and the Financial System*. Amsterdam: Elsevier.
- Berger, A.N., Roman, R. A., Sedunov, J. 2019. Did TARP Reduce or Increase Systemic Risk? The Effects of TARP on Financial System Stability. *Journal of Financial Intermediation*, forthcoming.
- Berger, A.N., Udell, G.F., 2004. The Institutional Memory Hypothesis and the Procyclicality of Bank Lending Behavior. *Journal of Financial Intermediation*, 13, 458-495.
- Bernanke, B.S. 1983. Non-Monetary Effects of the Financial Crisis in the Propagation of the Great Depression. *American Economic Review*, 73, 257-76.
- Bernanke, B.S. 1994. The Macroeconomics of the Great Depression: A Comparative Approach. *National Bureau of Economic Research Working Paper* Number 4814.
- Bernanke, B.S. 2018. The Real Effects of the Financial Crisis, *Brookings Papers on Economic Activity*, *BPEA Conference Drafts*. Washington DC. Brookings Institution.
- Bernanke, B.S., James, H. 1991. The Gold Standard, Deflation, and Financial Crisis in the Great Depression: An International Comparison." In *Financial Markets and Financial Crises*, 33-68. National Bureau of Economic Research. Chicago. University of Chicago Press.

- Berrospide, J.M., Black, L.K., Keeton, W.R. 2016. The Cross-Market Spillover of Economic Shocks through Multimarket Banks. *Journal of Money, Credit and Banking*, 48, 957-988.
- Berrospide, J.M., Edge, R.M. 2010. The Effects of Bank Capital on Lending: What Do We Know, and What Does It Mean? *FEDS Working Paper* Number 2010-44.
- Bersch, J., Degryse, H., Kick, T., Stein, I. 2019. The Real Effects of Bank Distress: Evidence from Bank Bailouts in Germany, *Journal of Corporate Finance*, this issue.
- Berton, F., Mocetti, S., Presbitero, A.F., Richiardi, M., 2018. Banks, Firms and Jobs, *Review of Financial Studies*, 31, 2113–2156.
- Bertrand, M., Schoar, A., Thesmar, D. 2007. Banking Deregulation and Industry Structure: Evidence from the French Banking Reforms of 1985, *Journal of Finance*, 62, 597-628.
- Bindal, S., Bouwman, C., Johnson, S., Hu, S. 2019. Bank Regulatory Size Thresholds, Merger and Acquisition Behavior, and Small Business Lending, *Journal of Corporate Finance*, this issue.
- Bircan, C., De Haas, R., 2019. The Limits of Lending? Banks and Technology Adoption Across Russia, *Review of Financial Studies*, forthcoming.
- Bisias, D., Flood, M., Lo, A.W., Valavanis, S. 2012. A Survey of Systemic Risk Analytics, *NUAL Review of Financial Economics*, 4, 255-296.
- Black, L., Hazelwood, L., 2013. The Effect of TARP on Bank Risk-taking. *Journal of Financial Stability*, 9, 790-803.
- Black, S.E., Strahan, P.E., 2002. Entrepreneurship and Bank Credit Availability. *Journal of Finance*, 57, 2807-2833.

- Blattner, L., Farihan, L., Rebelo F., 2017. When Losses Turn into Loans: The Cost of Undercapitalized Banks, *European Central Bank Working Paper*, 2228.
- Blickle, K. 2018. Local Banks, Credit Supply, and House Prices, *Federal Reserve Bank of New York Staff Report*, Number 874.
- Bord, V. 2018. Bank Consolidation and Financial Inclusion: The Adverse Effects of Bank Mergers on Depositors, Harvard Business School mimeo.
- Bos, J., Li, R., Sanders, M. 2018. Hazardous lending: The Impact of Natural Disasters on Banks' Asset Portfolio. Graduate School of Business and Economics Research Memoranda, 18/021, University of Maastricht, Netherlands.
- Bouwman, C. 2020. Creation and Regulation of Bank Liquidity, in In: Berger, A., Molyneux, P. and Wilson, J.O.S. (eds.) *Oxford Handbook of Banking*, 3rd ed. Oxford: Oxford University Press.
- Bouwman, C., Hu, S., Johnson, S. 2018. Differential Bank Behaviors around the Dodd–Frank Size Thresholds, *Journal of Financial Intermediation*, 34, 47-57.
- Braggion, F., Ongena, S., 2019. Banking Sector Deregulation, Bank–Firm Relationships and Corporate Leverage, *Economic Journal*, 129, 765–789.
- Brown, J.R., Cookson, J.A., Heimer, R.Z. 2019. Growing Up without Finance, *Journal of Financial Economics*, forthcoming.
- Buch, C.M., DeLong, G.L. 2020. Cross-Border Entry, Complexity and Systematic Risk, in Berger, A.N., Molyneux, P., Wilson, J.O.S. (eds.) *Oxford Handbook of Banking*, 3rd Edition. Oxford: Oxford University Press.

- Butler, A.W., Cornaggia, J., 2011. Does Access to External Finance Improve Productivity? Evidence from a Natural Experiment. *Journal of Financial Economics*, 99, 184-203.
- Calomiris, C.W. 2020. Bank failures, the Great Depression and Other Contagious Events, in Berger, A.N., Molyneux, P., Wilson, J.O.S. (eds.) *Oxford Handbook of Banking*, 3rd Edition. Oxford: Oxford University Press.
- Calomiris, C.W., Khan, U., 2015. An Assessment of TARP Assistance to Financial Institutions. *Journal of Economic Perspectives* 29, 53-80.
- Carlson, M., Rose, J.D., 2015. Credit Availability and the Collapse of the Banking Sector in the 1930s. *Journal of Money, Credit and Banking*, 47, 239-71.
- Carpinelli, L., Crosignani, M, 2017. The Effect of Central Bank Liquidity Injections on Bank Credit Supply, Board of Governors of the Federal Reserve System Finance and Economics Discussion Number 2017-038. Washington DC. Federal Reserve Board.
- Cavallo, E., Galiani, S., Noy, I., Pantano, J. 2013. Catastrophic Natural Disasters and Economic Growth. *Review of Economics and Statistics*, 95, 1549-1561.
- Celerier, C., Kick, T.K. Ongena, S. 2018. Taxing Bank Leverage: The Effects on Bank Capital Structure, Credit Supply and Risk-taking. Available at SSRN: <https://ssrn.com/abstract=2829326>
- Célérier, C., Matray, A., 2016. Unbanked Households: Evidence of Supply-Side Factors, *mimeo*
- Cetorelli, N., 2015. Banking and Real Economic Activity, in Berger, A.N., Molyneux, P., Wilson, J.O.S., Eds., *Oxford Handbook of Banking, Second Edition*. Oxford: Oxford University Press.

- Cetorelli, N., Strahan, P.E. 2006. Finance as a Barrier to Entry: Bank Competition and Industry Structure in Local US Markets. *Journal of Finance*, 61, 437–461.
- Chava, S., Oettl, A., Subramanian, A., Subramanian, K.V. 2013. Banking Deregulation and Innovation. *Journal of Financial Economics*, 109, 759-774.
- Chavaz, M., 2016. Dis-Integrating Credit Markets: Diversification, Securitization, and Lending in a Recovery. *Bank of England Working Paper* Number 617.
- Chavaz, M., Rose, A.K. 2019. Political Borders and Bank Lending in Post-Crisis America, *Review of Finance*, forthcoming.
- Chava, S., Purnanandam, A., 2011. The Effect of Banking Crisis on Bank-Dependent Borrowers. *Journal of Financial Economics* 99, 116–135.
- Chen, B.S., Hanson, S.G., Stein, J.C., 2017. The Decline of Big-bank Lending to Small Business: Dynamic Impacts on Local Credit and Labor Markets, *National Bureau of Economic Research Working Paper* Number 23843.
- Chodorow-Reich, G., 2014. The Employment Effects of Credit Market Disruptions: Firm-level Evidence from the 2008–9 Financial Crisis, *Quarterly Journal of Economics*, 129, 1-59.
- Choi, D. B., 2014. Heterogeneity and Stability: Bolster the Strong, not the Weak. *Review of Financial Studies*, 27, 1830-1867.
- Christopoulos, D.K., Tsionas, E.G., 2004. Financial Development and Economic Growth: Evidence from Panel Unit Root and Cointegration Tests. *Journal of Development Economics*, 73, 55-74.

- Chronopoulos, D., Sobiech, A., Wilson, J.O.S., 2019. The Real Effects of Bank Taxation, mimeo.
- Chu, Y., Zhang, D., Zhao, Y., 2019. Bank Capital and Lending: Evidence from Syndicated Loans. *Journal of Financial and Quantitative Analysis* 54, 667-692.
- Cingano, F., Manaresi, F., Sette, E. 2016. Does Credit Crunch Investment Down? New Evidence on the Real Effects of the Bank-Lending Channel, *Review of Financial Studies* 29, 2737–2773.
- Cohen, J., Hachem, K.C., Richardson, G. 2018. Relationship Lending and the Great Depression. *National Bureau of Economic Research Working Paper* Number 22891.
- Cong, L.W., Gao, H., Ponticelli, J., Yang, X., 2019. Credit Allocation under Economic Stimulus: Evidence from China. *Review of Financial Studies*, forthcoming.
- Cornaggia, J., Mao, Y., Tian, X., Wolfe, B. 2015. Does Banking Competition Affect Innovation? *Journal of Financial Economics*, 115, 189-209.
- Cornaggia, J., Li, Y.L. 2019. The Value of Access to Finance: Evidence from M&As, *Journal of Financial Economics* 131, 232–250.
- Cornett, M.M., McNutt, J.J., Strahan, P.E., Tehranian, H., 2011. Liquidity Risk Management and Credit Supply in the Financial Crisis. *Journal of Financial Economics*, 101, 297-312.
- Correa, R. and Sapriza, H. 2015. Sovereign Debt Crises, In: Berger, A., Molyneux, P. and Wilson, J.O.S. (eds.) *Oxford Handbook of Banking*, 2nd ed. Oxford: Oxford University Press.
- Cortés, K.R., Demyanyk, Y., Li, L., Loutskina, E., Strahan, P.E. forthcoming. Stress tests and Small Business Lending. *Journal of Financial Economics*.

- Cortés, K.R., Strahan, P.E., 2017. Tracing out Capital Flows: How Financially Integrated Banks Respond to Natural Disasters. *Journal of Financial Economics*, 125, 182-199.
- Da Silva Fernandes, F., Kontonikas, A., Tsoukas, S. 2019. On the Real Effect of Financial Pressure: Evidence from Firm-Level Employment During the Euro-Area Crisis. *Oxford Bulletin of Economics and Statistics*, 81, 617-646.
- Daetz, S.L., Subrahmanyam, M.G., Tang, D.Y., Wang, S., 2019. Did ECB Liquidity Injections Help The Real Economy? *mimeo*.
- Dagher, J., Kazimov, K., 2015. Banks' Liability Structure and Mortgage Lending during the Financial Crisis. *Journal of Financial Economics*, 116, 565-582.
- Danisewicz, P., McGowan, D., Onali, E., Schaeck, K. 2018. The Real Effects of Banking Supervision: Evidence from Enforcement Actions, *Journal of Financial Intermediation*, 35, 86-101.
- DeBandt, O., Hartmann, P. 2020. Systemic Risk in Banking after the Great Financial Crisis, In: Berger, A., Molyneux, P. and Wilson, J.O.S. (eds.) *Oxford Handbook of Banking*, 3rd ed. Oxford: Oxford University Press.
- De Haas, R. and Van Horen, N., 2013. Running for the Exit? International Bank Lending during a Financial Crisis. *Review of Financial Studies*, 26, 244-285.
- Degryse, H., De Jonghe, O., Jakovljević, S., Mulier, K., Schepens, G. 2019. Identifying Credit Supply Shocks with Bank-Firm Data: Methods and Applications, *Journal of Financial Intermediation*, forthcoming.

- De Jonghe, O., Dewachter, H., Ongena, S. 2019. Bank Capital (Requirements) and Credit Supply: Evidence from Pillar 2 Decisions, *Journal of Corporate Finance*, this issue.
- Demirgüç-Kunt, A., Levine, R. 2008. Finance, Financial Sector Policies, and Long-run Growth, *World Bank Commission on Growth and Development Working Paper Number 11*.
- Demirgüç-Kunt, A., Maksimovic, V. 1998. Law, Finance, and Firm Growth. *Journal of Finance*, 53, 2107-2137.
- Demirgüç-Kunt, A., Maksimovic, V. 2002. Funding Growth in Bank-Based and Market-Based Financial Systems: Evidence from Firm-Level Data. *Journal of Financial Economics*, 65, 337-363.
- Demirguc-Kunt, A., Martinez Peria, M., Tressel, T. (2019) The Global Financial Crisis and the Capital Structure of Firms: Was the Impact More Severe among SMEs and Non-Listed Firms? *Journal of Corporate Finance*,
- Demyanyk, Y. 2008. US Banking Deregulation and Self-Employment: A Differential Impact on those in Need. *Journal of Economics and Business*, 60, 165-178.
- DeYoung, R., 2020. Banking in the United States. In: Berger, A., Molyneux, P. and Wilson, J.O.S. (eds.) *Oxford Handbook of Banking*, 3rd ed. Oxford: Oxford University Press.
- DeYoung R., Hasan, I., Kirchhoff, B., 1998. The Impact of Out-of-State Entry on the Cost Efficiency of Local Commercial Banks. *Journal of Economics and Business*, 50, 191-203.
- DeYoung, R., Evanoff, D., Molyneux, P. 2009. Mergers and Acquisitions of Financial Institutions: A Review of the Post-2000 Literature. *Journal of Financial Services Research*, 36, 87-110.

- Dick, A.A., Lehnert, A. 2010. Personal Bankruptcy and Credit Market Competition. *Journal of Finance*, 65, 655-686.
- Duchin, R., Sosyura, D. 2014. Safer Ratios, Riskier Portfolios: Banks' Response to Government Aid. *Journal of Financial Economics*, 113, 1-28.
- Duchin, R., Ozbas, O., Sensoy, B.A. 2010. Costly External Finance, Corporate Investment, and the Subprime Mortgage Credit Crisis. *Journal of Financial Economics*, 97, 418-435.
- Dursun-de Neef, H.O. 2019. The Transmission of Bank Liquidity Shocks: Evidence from House Prices, *Review of Finance*, 23, 629-658.
- Duygan-Bump, B., Levkov, A., Montoriol-Garrigac, J. 2015. Financing constraints and unemployment: Evidence from the Great Recession, *Journal of Monetary Economics*, 75, 89-105
- Dwenger, N., Fossen, F.M., Simmler, M., 2019. Firms' Financial and Real Responses to Credit Supply Shocks: Evidence from Firm-bank Relationships in Germany. *Journal of Financial Intermediation*, forthcoming.
- Favara, G., Imbs, J., 2015. Credit Supply and the Price of Housing. *American Economic Review*, 105, 958-992.
- Ferrando, A., Popov, A., Udell, G.F. 2019. Do SMEs Benefit from Unconventional Monetary Policy and How? Microevidence from the Eurozone, *Journal of Money, Credit and Banking*, 51, 895-928.
- Flannery, M.J., 1984. The Social Costs of Unit Banking Restrictions. *Journal of Monetary Economics*, 13, 237-249.

- Fraisse, H. and Le, M., Thesmar, D. 2017. The Real Effects of Bank Capital Requirements, *European Systemic Risk Board Working Paper Number 47*.
- Franklin, J., Rostom, M., Thwaites G. 2015. The Banks That Said No: Banking Relationships, Credit Supply and Productivity in the UK. Bank of England Working Paper Number 557.
- Garmaise, M.J., Moskowitz, T.J. 2006. Bank Mergers and Crime: The Real and Social Effects of Credit Market Competition, *Journal of Finance*, 61, 495-538.
- Garmaise, M.J., Moskowitz, T.J. 2009. Catastrophic Risk and Credit Markets. *Journal of Finance*, 64, 657-707.
- Giannetti, M., Simonov, A. 2013. On the Real Effects of Bank Bailouts: Micro Evidence from Japan. *American Economic Journal: Macroeconomics*, 5, 135–167.
- Gilchrist, S., Schoenle, R., Sim, J., Zakrajšek, E. 2017. Inflation Dynamics during the Financial Crisis. *American Economic Review*, 107, 785–823.
- Gilje, E.P., 2019. Does Local Access to Finance Matter? Evidence from US Oil and Natural Gas Shale Booms. *Management Science*, forthcoming.
- Gilje, E.P., Loutskina, E., Strahan, P.E. 2016. Exporting Liquidity: Branch Banking and Financial Integration. *Journal of Finance*, 71, 1159-1184.
- Giroud, X., Mueller, H.M., 2017. Firm Leverage, Consumer Demand, and Employment Losses during the Great Recession. *Quarterly Journal of Economics*, 132, 271-316.

- Greenstone, M., Mas, A., Nguyen, H-L. 2019. Do Credit Market Shocks Affect the Real Economy? Quasi-Experimental Evidence from the Great Recession and 'Normal' Economic Times. *American Economic Journal* forthcoming.
- Gropp, R., Ongena, S., Rocholl, Saadi, V. 2018. The Cleansing Effect of Banking Crises, mimeo
- Gropp, R., Mosk, T., Ongena, S., Wix, C. 2019. Bank Response to Higher Capital Requirements: Evidence from a Natural Experiment. *Review of Financial Studies*, 32, 266-291.
- Hasan, I., Wu, E., Hassan, G. M., Kim, S.-J. 2016. The Real Impact of Ratings-based Capital Rules on the Finance-growth Nexus, *Financial Network Research Paper* Number 2737912.
- Hombert, J., Matray, A., 2017. The Real Effects of Lending Relationships on Innovative Firms and Inventor Mobility. *Review of Financial Studies*, 30, 2413-2445.
- Hosono, K., Miyakawa, D., Uchino, T., Hazama, M., Ono, A., Uchida, H., Uesugi, I., 2016. Natural Disasters, Damage to Banks, and Firm Investment. *International Economic Review*, 57, 1335-1370.
- Hu, Q., Levine, R., Lin, C., Tai, M. 2019. Mentally Spent: Credit Conditions and Mental Health, *National Bureau of Economic Research Working Paper* Number 25584.
- Huang, R.R., 2008. Evaluating the Real Effect of Bank Branching Deregulation: Comparing Contiguous Counties across US State Borders. *Journal of Financial Economics*, 87, 678-705.
- Huber, K., 2018. Disentangling the Effects of a Banking Crisis: Evidence from German Firms and Counties. *American Economic Review*, 108, 868-898.

- Ivashina, V., Scharfstein, D., 2010. Bank Lending during the Financial Crisis of 2008. *Journal of Financial Economics*, 97, 319-338.
- Iyer, R., Peydro, J.L., da Rocha-Lopes, S., Schoar, A. 2014. Interbank Liquidity Crunch and the Firm Credit Crunch: Evidence from the 2007-2009 Crisis, *Review of Financial Studies*, 27, 347-72.
- Jang, K.Y. 2017. The Effect of TARP on the Propagation of Real Estate Shocks: Evidence from Geographically Diversified Banks, *Journal of Banking & Finance* 83, 173–192.
- Jayaratne, J., Strahan, P.E., 1996. The Finance-Growth Nexus: Evidence from Bank Branch Deregulation. *Quarterly Journal of Economics*, 111, 639-670.
- Jayaratne, J., Strahan, P.E. 1998. Entry Restrictions, Industry Evolution, and Dynamic Efficiency: Evidence from Commercial Banking. *Journal of Law and Economics*, 41, 239-274.
- Jensen, T.L., Johannesen, N. 2017. The Consumption Effects of the 2007-2008 Financial Crisis: Evidence from Households in Denmark. *American Economic Review*, 107, 3386–3414.
- Jiang, L., Levine, R., Lin, C., 2019a. Competition and Bank Liquidity Creation. *Journal of Financial and Quantitative Analysis*, 54, 513-548.
- Jiang, L., Levine, R., Lin, C. 2019b. Bank Deregulation and Corporate Risk, *Journal of Corporate Finance*,
- Jimenez, G., Ongena, S., Peydro, J.L., Saurina, J., 2018. Macroprudential Policy, Countercyclical Bank Capital Buffers, and Credit Supply: Evidence from the Spanish Dynamic Provisioning Experiments, *Journal of Political Economy*, 126, 2126-2177.

- Johnson C., Rice T. 2008. Assessing a Decade of Interstate Bank Branching, *Washington and Lee Law Review*, 65, 73-127.
- Kerr, W.R., Nanda, R. 2009., Democratizing Entry: Banking Deregulations, Financing Constraints, and Entrepreneurship, *Journal of Financial Economics*, 94, 124–149.
- Karakaya, N., Ors, E., 2019. Did Banking Integration Affect Corporate M&As and Divestitures in the US? Working Paper.
- Kennickell, A., Kwast, M.L., Pogach, J. 2017. Small Businesses and Small Business Finance during the Financial Crisis and the Great Recession: New Evidence from the Survey of Consumer Finances in Haltiwanger, J, Hurst, E., Miranda, J., Schoar, A. (eds.) *Measuring Entrepreneurial Businesses: Current Knowledge and Challenges*. Cambridge, Mass.: National Bureau of Economic Research.
- Khwaja, A., Mian, A. 2008. Tracing the Impact of Bank Liquidity Shocks: Evidence from an Emerging Market. *American Economic Review*, 98(4), 1413–1442.
- Kindleberger, C.P., 1978. *Manias, Panics, and Crashes: A History of Financial Crises*. Basic Books, New York.
- King, R.G., Levine, R., 1993. Finance and Growth: Schumpeter might be Right. *Quarterly Journal of Economics*, 108, 717-737.
- Koetter, M. 2019. Lending effects of the ECBs asset purchase, *Journal of Monetary Economics*, forthcoming.
- Koetter, M., Noth, F., Rehbein, O. 2019. Borrowers under Water! Rare Disasters, Regional Banks, and Recovery Lending, *Journal of Financial Intermediation*, forthcoming.

- Kozak, S., Sosyura, D., 2015. Access to Credit and Stock Market Participation. Working Paper.
- Krishnan, K., Nandy, D., Puri, M., 2015. Does Financing Spur Small Business Productivity? Evidence from a Natural Experiment. *Review of Financial Studies*, 28, 1768-1809.
- Kroszner, R.S., Strahan, P.E., 2013. Regulation and Deregulation of the US Banking Industry: Causes, Consequences and Implications for the Future, in Rose, N.L., Ed., *Economic Regulation and its Reform: What Have We Learned?* Chicago: Chicago University Press.
- Laeven, L. Valencia, F., 2013. The Real Effects of Financial Sector Interventions during Crises. *Journal of Money, Credit and Banking*, 45, 147-177.
- Levine, R. 1997. Financial Development and Economic Growth: Views and Agenda. *Journal of Economic Literature* 35, 688–726.
- Levine, R., 1998. The Legal Environment, Banks, and Long Run Economic Growth. *Journal of Money, Credit, and Banking*, 30, 596-613.
- Levine, R., 1999. Law, Finance, and Economic Growth. *Journal of Financial Intermediation*, 8, 8-35.
- Levine, R., 2005. Finance and Growth: Theory and Evidence, in Aghion, P., Durlauf, S., Eds., *Handbook of Economic Growth*. Amsterdam: Elsevier.
- Levine, R., Levkov, A., Rubinstein, Y., 2014. Bank Deregulation and Racial Inequality in America. *Critical Finance Review*, 3, 1-48.
- Levine, R., Loayza, N., Beck, T., 2002. Financial Intermediation and Growth: Causality and Causes. *Journal of Monetary Economics*, 46, 31-77.

- Levine, R., Zervos, S., 1998. Stock Markets, Banks, and Economic Growth. *American Economic Review*, 88, 537-558.
- Li, L., 2013. TARP Funds Distribution and Bank Loan Supply. *Journal of Banking & Finance*, 37, 4777-4792.
- Liberti, J.M., Sturgess, J., 2018. The Anatomy of a Credit Supply Shock: Evidence from an Internal Credit Market. *Journal of Financial and Quantitative Analysis*, 53, 547-579.
- Lucas, R. 1988. On the Mechanics of Economic Development. *Journal of Monetary Economics*, 22, 3-42.
- Mach, T.L., Wolken, J.D. 2012. Examining the Impact of Credit Access on Small Firm Survivability, in Calcagnini, G., Favaretto, I. (eds.) *Small Businesses in the Aftermath of the Crisis: International Analyses and Policies*. Heidelberg, Ohio: Springer.
- Mian, A., Sufi, A. 2014. What Explains the 2007-2009 Drop in Employment? *Econometrica* 82, 2197-2223.
- Mian, A., Sufi, A. 2018. Credit Supply and Housing Speculation. National Bureau of Economic Research Working Paper Number 24823.
- Michalski, T., Ors, E. 2012. (Interstate) Banking and (Interstate) Trade: Does Real Integration Follow Financial Integration? *Journal of Financial Economics* 104, 89-117.
- Millaruelo, A., del Rio, A. 2017. The Cost of Interventions in the Financial Sector since 2008. *Bank of Spain Analytical Articles*. April.
- Mitchener, K.J., Richardson, G. 2016. Network Contagion and Interbank Amplification during

the Great Depression. *National Bureau of Economic Research Working Paper* Number 22074.

Montgomery, H., Takahashi, Y. 2014. The Economic Consequences of the TARP: The Effectiveness of Bank Recapitalization Policies in the US. *Japan and the World Economy*, 32, 49-64.

Morgan, D., Rime, B., Strahan, P.E. 2004. Bank Integration and State Business Cycles. *Quarterly Journal of Economics*, 119, 1555-1585.

Nakashima, K., Takahashi, K., 2018. The Real Effects of Bank-driven Termination of Relationships: Evidence from Loan-level Matched Data, *Journal of Financial Stability*, 39, 46-65.

Norden, L., Udell, G., Wang, T. 2019. Do Bank Bailouts affect the Provision of Trade Credit? *Journal of Corporate Finance*, this issue.

Nguyen, H-L.Q.. 2019. Are Credit Markets Still Local? Evidence from Bank Branch Closings, *American Economic Journal: Applied Economics*, 11, 1-32.

Nguyen, L., Wilson, J.O.S. 2019. How Does Credit Supply React to a Natural Disaster? Evidence from the Indian Ocean Tsunami. *European Journal of Finance*, forthcoming

Oesch, D., Schuette, D.R., Walter, I., 2015. Real Effects of Investment Banking Relationships: Evidence from the Financial Crisis. Available at SSRN: <https://ssrn.com/abstract=2391397>

Ono, A., Uchida, H., Udell, G., Uesugi, I. 2019. Lending Pro-Cyclicality and Macroprudential Policy: Evidence from Japanese LTV Ratios. Working Paper.

- Peek, J., & Rosengren, E. S. 2000. Collateral Damage: Effects of the Japanese Bank Crisis on Real Activity in the United States. *American Economic Review*, 90, 30–45.
- Popov, A., Rocholl, J., 2019. Financing Constraints, Employment, and Labor Compensation: Evidence from the Subprime Mortgage Crisis. *Journal of Financial Intermediation*. Forthcoming.
- Puddu, S., Wälchli, A., 2015. TARP Effect on Bank Lending Behavior: Evidence from the Last Financial Crisis. *University of Neuchatel Institute of Economic Research Working Paper* 15-06.
- Puri, M., Rocholl, J., Steffen, S. 2011. Global Retail Lending in the Aftermath of the US Financial Crisis: Distinguishing between Supply and Demand Effects. *Journal of Financial Economics*, 100, 556-578.
- Rajan, R.G. 1994. Why Bank Credit Policies Fluctuate: A Theory and Some Evidence, *Quarterly Journal of Economics* 109, 399–441.
- Rajan, R.G., 2005. Has Financial Development Made the World Riskier? *National Bureau of Economic Research Working Paper* Number 11728..
- Rajan, R.G., Zingales, L. 1998. Which Capitalism? Lessons from the East Asian Crisis. *Journal of Applied Corporate Finance*, 11, 40-48.
- Ramcharan, R., Rajan, R. 2014. Financial Fire Sales: Evidence from Bank Failures. *Finance and Economics Discussion Paper* Number 67. Washington DC: Federal Reserve.
- Ramcharan, R, Verani, S., Van den Heuvel, S., 2016. From Wall Street to Main Street: The Impact of the Financial Crisis on Consumer Credit Supply. *Journal of Finance* 71, 323–56.

- Reinhart, C.M., Rogoff, K.S., 2009. *This Time is Different: Eight Centuries of Financial Folly*, Princeton: Princeton University Press.
- Rice, T., Strahan, P.E., 2010. Does Credit Competition Affect Small-Firm Finance? *Journal of Finance*, 65, 861-889.
- Roberts M.R, Whited T.M. 2012. Endogeneity in Empirical Corporate Finance. Constantinides G, Harris M, Stulz R, eds. *Handbook of the Economics of Finance*, Vol. 2, Part A PP. 493–572. Amsterdam: Elsevier.
- Robinson, J. 1952. *The Rate of Interest and Other Essays*. London: MacMillan.
- Roman, R. 2019. Winners and Losers from Supervisory Enforcement Actions against Banks, *Journal of Corporate Finance*, this issue
- Roman, R., 2020. Bank Bailouts and Bail-ins, in Berger, A.N., Molyneux, P., Wilson, J.O.S. (eds.) *Oxford Handbook of Banking*, 3rd Edition. Oxford: Oxford University Press.
- Sahay, R., Cihak M., N'Diaye, P., Barajas, A., Bi, R., Ayala, D., Gao, Y., Kyobe, A., Nguyen, L., Saborowski, C., Svirydenka, K., Yousefi, S.R. 2015. Rethinking Financial Deepening: Stability and Growth in Emerging Markets. *IMF Staff Discussion Note* Number 15/08.
- Schivardi, F., Sette, E., Tabellini, G. 2017. Credit Misallocation during the European Financial Crisis. *Bank of Italy Working Paper*, Number 1139
- Schnabl, P. 2012. The International Transmission of Bank Liquidity Shocks: Evidence from an Emerging Market, *Journal of Finance*, 67, 897-932.
- Schüwer U., Lambert C., Noth F. 2019. How do Banks React to Catastrophic Events? Evidence

- from Hurricane Katrina. *Review of Financial Studies*, 23, 75-116.
- Sedunov, J. 2019. Small Banks and Consumer Satisfaction, *Journal of Corporate Finance*, this issue.
- Siemer, M. 2019. Employment Effects of Financial Constraints during the Great Recession. *Review of Economics & Statistics*, 101, 16-29.
- Stiroh, K.J., Strahan, P.E., 2003. Competitive Dynamics of Deregulation, Evidence from U. S. Banking. *Journal of Money, Credit, and Banking*, 35, 801-828.
- Strobl, E., 2011. The Economic Growth Impact of Hurricanes: Evidence from US Coastal Counties. *Review of Economics and Statistics*, 93, 575-589.
- Taliaferro, R., 2009. How Do Banks use Bailout Money? Optimal Capital Structure, New Equity, and the TARP. Working Paper. Available at SSRN: <https://ssrn.com/abstract=1481256>
- Tewari, I. 2014. The Distributive Impacts of Financial Development: Evidence from Mortgage Markets during US Bank Branch Deregulation. *American Economic Journal: Applied Economics*, 6, 175-96.
- Thakor, A.V. 2005. Do Loan Commitments cause Overlending? *Journal of Money, Credit and Banking* 37, 1067-1099.
- Tooze, A. 2018. *Crashed: How a Decade of Financial Crises Changed the World*. New York: Allen Lane.

Wu, D. 2015. The Effects of Government Capital and Liquidity Support Programs on Bank Lending: Evidence from the Syndicated Corporate Credit Market. *Journal of Financial Stability*, 21, 13-25.

Zarutskie, R. 2006. Evidence on the Effects of Bank Competition on Firm Borrowing and Investment. *Journal of Financial Economics*, 81, 503-537.

Zingales, L. 2015. Does Finance Benefit Society? *Journal of Finance* 70, 1327- 1363.