In Defense of Wall Street:

The Social Productivity of the Financial System

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Abstract: Today, many might agree with the second President of the United States, John Adams, who argued that "… banks have done more harm to the morality, tranquillity, and even wealth of this nation than they have done or ever will do good." In this paper, I take a step back from recent—and past—rhetoric and re-evaluate the evidence on the socially productive role of the financial system. A considerable body of research suggests that a well-functioning financial system is critical for fostering sustained improvements in living standards, especially for those at the lower end of the income distribution. It is in this sense, that I title the paper "In Defense of Wall Street."

I. Introduction

Finance is powerful. It mobilizes savings, allocates those savings, monitors the use of these resources by firms and individuals, pools and diversifies risks, and organizes trade in goods, services, and securities. How well financial institutions and markets perform these functions can exert a powerful influence—for good or bad—on economic prosperity.

When financial systems perform these functions well, they tend to promote growth and expand economic opportunities. For example, when banks screen borrowers effectively and identify firms with the most promising prospects, this is a first step in boosting productivity growth. When financial markets and institutions mobilize savings from disparate households to invest in these promising projects, this represents a second crucial step in fostering growth. When financial institutions monitor the use of investments and scrutinize managerial performance, this is an additional, essential ingredient in boosting the operational efficiency of corporations and reducing waste, fraud, and the extraction of private rents by corporate insiders. But, that is not all. When securities markets ease the diversification of risk, this encourages investment in higher-return projects that might be shunned without effective risk management vehicles. And, when financial systems lower transactions costs, this facilitates trade and specialization, which are fundamental inputs into technological innovation and economic growth.

But, when financial systems perform these functions poorly, they tend to hinder economic growth and curtail economic opportunities. For example, if financial systems simply collect funds with one hand and pass them along to cronies, the wealthy, and the politically-connected with the other hand, this produces a less efficient allocation of resources, implying slower economic growth. If financial institutions fail to exert sound

corporate governance, this makes it easier for managers to pursue projects that benefit themselves rather than the firm and the overall economy. Thus, poorly functioning financial systems can become an effective tool for restricting credit—and hence opportunity—to the already rich and powerful rather than a mechanism for financing the best projects and entrepreneurial ideas. And, when financial institutions create new fangled financial instruments and fob them off onto unsophisticated investors, this might boost the bonuses of financial engineers and executives but it might be socially destructive, distorting credit allocation and attracting talented individuals into these socially unproductive activities as suggested by Philippon and Reshef (2011).

This paper uses evidence from cross-country studies and from research on the states of the United States to assess the impact of the financial system on economic growth and inequality. Many have criticized "Wall Street"—which I use as a shorthand phrase for the financial services industry in general—for its role in the recent global economic crisis and in fostering greater income inequality (Krugman 2007; Stiglitz 2010; and Johnson and Kwak, 2010. Many suggest that the financial system has little to do with fostering "creative destruction," whereby financial systems fund the initiation and expansion of new and better products and production process, and more to do with "destructive creations," whereby financial institutions invent new ways to extract ever larger bonuses for financial institution executives with potentially detrimental effects on the overall economy.[1] Many suggest that Wall Street too often uses its prodigious resources to shape the design, interpretation, and implementation of financial regulations in ways that advance the

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[1] In private conversations, the Brown University political scientist, Mark Blyth, has emphasized to me this distinction between the Schumpeterian notion of "creative destruction," which is key factor in many models of economic growth, and the view that "destructive creations" by financial institution have exerted deleterious effects on most individuals.

private interests of bankers at the expense of the public at large (Barth, Caprio, and Levine 2006, 2012). Indeed, such critiques of Wall Street are not new. The second President of the United States, John Adams, argued that "... banks have done more harm to the morality, tranquillity, and even wealth of this nation than they have done or ever will do good." In this paper, I take a step back from current and past rhetoric to re-evaluate the evidence on the socially productive role of the financial system. The results of this re-evaluation are not a "defense" of all actions by Wall Street. I am not defencing all financial innovations or Wall Street's influence over politicians, central bankers, and regulators. Rather, I am simply noting that considerable research finds that a well-functioning financial system is critical for fostering sustained improvements in living standards. It is only in this sense, that I title the paper "In Defense of Wall Street."

The first major finding emerging from the literature is that the financial system exerts a powerful influence over the economy primarily by affecting the quality of capital allocation, not the quantity of investment—a result that is summarized in Levine (1997, 2005). Thus, finance should not be viewed as a plumbing system, where pouring more credit in one end yields more growth at the other. Rather, finance is like an economy's central nervous system, *choosing* where to allocate resources. It is the incentives shaping these choices that influence economic prosperity—by which I mean economic growth and the economic opportunities available to all individuals. Thus, when regulations incentivize financial systems to allocate credit to those with the best entrepreneurial ideas and abilities and not simply to those with the most wealth and political connections, this boosts growth and expands economic opportunities.

Second, a growing and diverse body of empirical research produces a remarkably consistent, though by no means unanimous, narrative: The services provided by the financial system exert a first-order impact on (1) the rate of long-run economic growth and (2) the distribution of income, primarily by affecting the earnings of lower income individuals. Improvements in the functioning of the financial system are associated with disproportionately large increases in the incomes of those at the lower end of the income distribution, accelerations in total factor productivity growth, and sustained improvements in income per capita. As I emphasize below, these same findings emerge from cross-country analyses and detailed analyses of the individual states of the United States, which had distinct banking systems until the last quarter of the 20th century.

Finally, this paper considers the dynamics of financial development—financial innovation. Due to the roles of credit default swaps (CDSs) and collateralized debt obligations (CDOs) in the crisis of 2007-2009, many analysts criticize financial innovation and question its role in promoting economic growth (Stigltiz 2010). They argue that financial innovations are often used to fool investors, circumvent regulations, and facilitate the extraction of large bonuses by financial executives. In fact, the former Chairman of the Federal Reserve, Paul Volcker, made the following skeptical request in a Wall Street Journal (2009) interview, "I wish that somebody would give me some shred of neutral evidence about the relationship between financial innovation recently and the growth of the economy, just one shred of information." While it is impossible to evaluate the long-run growth effects of such recent financial innovations as CDSs and CDOs, recent research addresses Mr. Volcker's general skepticism of financial innovation.

Historical evidence and cross-country empirical findings indicate that financial innovation is *necessary* for sustaining technological change and economic growth (Levine, 2010). The very nature of economic growth involves greater specialization and technological complexity. Thus growth itself makes the "old" financial system less effective at screening and monitoring the new, more complex technologies. Without commensurate improvements in financial systems, economies become less effective at identifying and financing growth-inducing endeavors. Laeven, Levine, and Michalopoulos (2011) show that financial systems that rapidly adopt and adapt improved screening methodologies exert a positive effect on growth, while more stagnant financial systems slow economic progress.

These findings, of course, do not mean that *all*—or even most—financial innovations are socially productive. Just as some medical innovations have proven to be harmful to the public, some financial innovations are destructive. But, just as it is difficult to imagine broad-based increases in longevity and the quality of human life without medical innovation, it is difficult to imagine a continuous stream of technological innovations that boost living standards without a complementary stream of financial innovations that facilitate the funding those technological advances.

The remainder of this paper is organized as follows. Section II reviews the cross-country evidence on linkages between the functioning of the financial system and both economic growth and the distribution of income. I provide information both from cross-country comparisons and from studies of the United States. Section III discusses the evidence on the connection between financial innovation and economic growth. In this section, I primarily discuss anecdotal evidence from across history, but also review recent

cross-country regressions on the financial innovation and growth nexus. Section IV

concludes.

II. Finance and growth, inequality, and poverty

This section presents evidence that the operation of the financial system exerts a powerful

effect on national rates of long-run economic growth, the distribution of income, and the

proportion of people living in poverty. Moreover, the evidence shows that financial

institutions and markets affect the economy primarily by influencing the allocation of

resources, not by altering the aggregate savings rate. Therefore, financial regulation can

materially influence economic prosperity by shaping the operation of the financial system

and hence the economy's capital allocation choices. Rather than reviewing the entire

empirical literature on finance and growth as in Levine (1997, 2005), I illustrate the

literature's major findings first by using cross-country comparisons and then by presenting

evidence from the United States. Although I use simple ordinary least squares regressions

and figures to illustrate the results, an extensive body of research confirms these findings

when using instrumental variables and other techniques to identify the causal impact of

financial development on economic performance.

II.A. Banks, growth, inequality, and the poor

II.A.i. Cross-country evidence

Broad cross-country evaluations of the impact of financial development on growth

use one observation per country, where the data are typically averaged over 30 or 40 years.

The studies control for many other possible determinants of economic growth such as

initial income, educational attainment, inflation, government spending, openness to trade, and political instability (King and Levine 1993; Levine 1998, 1999; Levine, Loayza, and Beck 2000; Beck, Levine, and Loayza 2000). These studies also examine whether financial development is associated with productivity growth and capital accumulation, which are two channels through which the operation of the financial system can influence growth.

To measure financial development, cross-country studies typically use *Private Credit*, which equals banks credit to the private sector as a share of gross domestic product. This is a problem. We would like to measure the quality of the financial services available in an economy. But, *Private Credit* does not directly measure the effectiveness of the financial system in mobilizing savings, allocating capital, monitoring the use of that capital, providing risk managements services, and easing transactions. Rather, *Private Credit* measures the size of the financial intermediary sector. Another problem is that Private Credit focuses on banks and does not consider the broader array of financial institutions and markets. In its defense, *Private Credit* excludes loans to the government and state-owned enterprises and therefore gauges the intermediation of private credit. Furthermore the same results hold when using a broader measure that includes credits issues by nonbank financial institutions (not just bank credit) and when incorporating measures of stock market development.

Figure 1 illustrates that countries with better-developed financial systems grow faster. Based on Levine, Loayza, and Beck (2000), this partial scatter plot shows the relationship between growth and *Private Credit* over the 35 years between 1960 and 1995 while controlling for some of the other potential growth determinants noted above. Furthermore, Beck, Levine, and Loayza (2000) show that financial development boosts

growth primarily by enhancing the efficiency of capital allocation. The connection between financial development and the savings rate is weaker. Thus, it is the choices that the financial system makes in allocating society's resources that shape national growth rates.

The operation of the financial system can also influence the distribution of income in a variety of ways, some of which disproportionately help the poor and others primarily boosting the incomes of the rich. First, better-functioning banks focus more on a person's ideas and abilities than on family wealth and political connections when allocating credit. Second, by enhancing the quality of financial services, financial development will naturally benefit heavy users of financial services, which are primarily wealthy families and large firms. Finally, finance can also affect the distribution of income through its effects on labor markets. For example, improvements in finance that boost the demand for low-skilled workers will tend to tighten the distribution of income. And, the financial system helps determine whether people live in a dynamic, growing economy or whether they must find work in a more stagnant environment.

Figure 2 illustrates that countries with better developed financial systems tend to experience reductions in income inequality, as measured by the growth rate of the Gini coefficient of income inequality. Critically, this result holds when controlling for the economy's aggregate growth rate and the level of overall economic development, as well as a wide array of other country-specific characteristics (Beck, Demirguc-Kunt, and Levine 2007). Thus, financial development tightens the distribution of income above and beyond any effect running through economic growth on the level of economic development.

Figures 3 and 4 show that financial development disproportionately boosts the incomes of those at the lower end of the distribution of income, including the incomes of

the extremely poor. As illustrated in Figure 3, *Private Credit* boosts the income growth of

the poorest quintile, even after controlling for many other country characteristics,

including the rate of economic growth and the level of economic development (Beck,

Demirguc-Kunt, and Levine 2007). One can push this further and focus on the extremely

poor, i.e., those living on less than two-dollars per day.[2] Figure 4 shows that financial

development is associated with a reduction in the fraction of the population living in

extreme poverty. Critically, these results hold when controlling for average growth. It is not

just that finance accelerates economic growth, which trickles down to the poor; finance

exerts a *disproportionately* positive influence on lower income individuals.

II.A.ii. U.S. evidence on finance, growth, inequality, and the poor

The U.S. states provide a unique setting in which to examine further the causal

impact of improvements in the quality of banking services on economic growth, the

distribution of income, and the poor. From the mid-1970s to the mid-1990s, individual U.S.

states removed regulatory restrictions on opening banks branches within its boundaries.

States changed their regulatory policies in different years. The reforms intensified

competition and triggered improvements in banking services, reducing interest rates on

loans, raising them on deposits, lowering overhead costs, spurring the development of

better techniques for screening and monitoring firms, and reducing the proportion of bad

loans on the books of banks(Hubbard and Palia 1995, Jayaratne and Strahan 1998).

The driving forces behind the financial reforms that enhanced the quality of

financial services were largely independent of state-specific changes in growth, income

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[2] Data on the fraction of the population living on less than $2/day is limited to less developed countries over the period from 1980 to 2005.

inequality, and labor market conditions. Kroszner and Strahan (1999) show that technological, legal, and financial innovations diminished the economic and political power of banks benefiting from geographic restrictions on banking. The invention of automatic teller machines (ATMs), in conjunction with court rulings that ATMs are not bank branches, weakened the geographical bond between customers and banks. Furthermore, checkable money market mutual funds facilitated banking by mail and telephone, which weakened local bank monopolies. And, improvements in credit scoring techniques, information processing, and telecommunications reduced the informational advantages of local banks. These innovations reduced the monopoly power of local banks and therefore weakened their ability and desire to fight for the maintenance of these restrictions on competition. State by state, the authorities removed these restrictions over the last quarter of the 20th century.

Although a slight digression, it is valuable to recognize that policymakers did not remove these regulations because of new, convincing information that they were hindering competition and the provision of high-quality financial services. There was already plenty of information about the adverse effects of the regulatory restrictions. Rather, technological innovation reduced the rents that banks earned from these protective regulatory restrictions, which weakened their desire to lobby for their continuation. Perhaps if the regulatory institutions had better represented the interests of the public, these growth-retarding policies would have been removed earlier. As I will emphasize below, effective governance of financial regulatory institutions can materially influence growth.

To examine growth, I trace out the year-by-year effects of the removal of geographic restrictions on intrastate bank branching on the logarithm of Gross State Product per capita (*GSP*). I plot *GSP* during the decade before a state deregulated and then plot what happens after a state removed restrictions on competition. GSP in each year is measured relative to *GSP* in the year of deregulation. Figure 5 plots the results and the 95% confidence intervals. In the figure, the zero date is the year in which a state removed these restrictions on competition, which differs across the states because they deregulated in different years.

Figure 5 illustrates that the removal of geographic restrictions on intrastate banking—which improved the quality of banking services—boosted economic growth. There is a significant increase in *GSP* immediately after deregulation and this impact grows over time.

Figures 6 - 8 demonstrate that easing restrictions on intrastate banking (1) reduced income inequality by increasing the incomes of those at the lower end of the distribution of income and (2) lowered the unemployment rate (Beck, Levine, and Levkov 2010). Figure 6 illustrates that the impact of deregulation on inequality grows for about eight years and then the effect levels off. Ultimately, there is a drop in the Gini coefficient of income inequality of about 4%. Figure 7 shows that intrastate branch deregulation tightened the distribution of income by disproportionately raising incomes in the lower part of the income distribution. Finally, Figure 8 shows that the removal of restrictions on intrastate branching was associated with a significant drop in the unemployment rate, with a cumulative effect of more than two percentage points after 15 years.

II.B. Banks, markets and growth

While the evidence above indicates that the functioning of banks influences economic growth and the distribution of income, this ignores equity and bond markets. Are securities markets simply casinos where the rich come to place their bets, or do the services provided by financial markets also affect the allocation of capital and long-run rates of economic growth? A considerable body of theoretical and empirical research tackles this question.

Theory suggests that financial markets matter for growth too (Levine 1991). For example, as securities markets become larger and more liquid, it is easier for an investor who has acquired information to profit by quickly trading in the market based on that information (Holmstrom and Tirole 1993). Thus, larger, more liquid markets will increase the incentives of investors to expend resources researching firms, enhancing the efficiency of resource allocation and fostering growth. As another example, liquid, well-functioning stock markets can improve corporate governance. For example, public trading of shares in stock markets that efficiently reflect information about firms allows owners align the interests of managers with those of owners by linking managerial compensation to stock prices (Jensen and Murphy 1990). Similarly, if takeovers are easier in well-developed stock markets and if managers of under-performing firms are fired following a takeover, then better stock markets can promote better corporate control. The threat of a takeover will also help align managerial incentives with those of the owners (Scharfstein 1988).

The empirical evidence indicates that better-developed securities markets encourage economic growth by boosting the efficiency of resource allocation (Levine and Zervos 1998; Beck and Levine 2002). Measures of stock market liquidity—how much

trading occurs in the market—are closely associated with economic growth. However, simple measures of the size of the market, as measured by stock market capitalization, are not robustly linked with economic performance.

Furthermore, both bank and stock market development are independently associated with growth, suggesting that the policy debate about whether to promote a bank-based system or a market-based financial system misses the big point. Banks *and* markets matter for growth. This does not imply banks and markets play the same roles in all economies. Indeed, as countries become more developed, new research indicates that markets become increasingly important for promoting economic activity (Demirguc-Kunt, Feyen, and Levine 2011). While still requiring additional work, this suggests that poor bank regulations are particularly costly in countries at low-levels of economic development, while regulations impeding market development have larger adverse effect in richer countries.

III. Financial innovation and growth

So far, I have ignored the dynamics of financial development: How does financial innovation fit into the process of economic growth? Given the roles of credit default swaps, collateralized debt obligations, and other new financial instruments in the recent financial crisis, financial innovation has gotten a bad reputation. From this perspective financial innovations are mechanisms for fooling investors, circumventing regulatory intent, and boosting the bonuses of financiers without enhancing the quality of the services provided by the financial services industry. But, such a perspective is too narrow.

A broader, long-run consideration of financial development suggests that financial innovation is *essential* for growth, which is the focus of Laeven, Levine, and Michalopoulos (2011). Adam Smith argued that economic growth is a process in which production become increasingly specialized and technologies more complex. As firms become more complex, however, the "old" financial system becomes less effective at screening and monitoring firms. Therefore, without corresponding innovations in finance that match the increases in complexity associated with economic growth, the quality of the financial services diminishes, slowing future growth.

Several examples from history illustrate the crucial role of financial innovation in sustaining economic growth. Consider first the financial impediments to railroad expansion in the 19th century. The novelty and complexity of railroad made preexisting financial systems ineffective at screening and monitoring them. Although prominent local investors with close ties to those operating the railroad were the primary sources of capital for railroads during the early decades of this new technology, this reliance on local finance restricted growth.

So, financiers innovated. Specialized financiers and investment banks emerged to mobilize capital from individuals, screen and invest in railroads, and monitor the use of those investments, often by serving on the boards of directors of railroad corporations (Carosso, 1970). Based on their expertise and reputation, these investment banks mobilized funds from wealthy investors, evaluated proposals from railroads, allocated capital, and governed the operations of railroad companies for investors. And, since the geographical size and complexity of railroads made it difficult for investors to collect,

organize, and assess price, usage, breakdown, and repair information, financiers developed new accounting and financial reporting methods.

Next, consider the information technology revolution of the 20th century, which could not have been financed with the financial system that fueled the railroad revolution of the 19th century. Indeed, as nascent high-tech information and communication firms struggled to emerge in the 1970s and 1980s, traditional commercial banks were reluctant to finance them because these new firms did not yet generate sufficient cash flows to cover loan payments and the firms were run by scientists with little experience in operating profitable companies (Gompers and Lerner, 2001). Conventional debt and equity markets were also wary because the technologies were too complex for investors to evaluate.

Again, financiers innovated. Venture capital firms arose to screen entrepreneurs and provide technical, managerial, and financial advice to new high-technology firms. In many cases, venture capitalists had become wealthy through their own successful high-tech innovations, which provided a basis of expertise for evaluating and guiding new entrepreneurs. In terms of funding, venture capitalists typically took large, private equity stakes that established a long-term commitment to the enterprise, and they generally became active investors, taking seats on the board of directors and helping to solve managerial and financial problems.

Finally, consider the biotechnology revolution of the 21st century, for which the venture capital modality did not work well. Venture capitalists could not effectively screen biotech firms because of the scientific breadth of biotechnologies, which frequently require inputs from biologists, chemists, geneticists, engineers, bioroboticists, as well as experts on the myriad of laws, regulations, and commercial barriers associated with successfully

bringing new medical products to market. It was unfeasible to house all of this expertise in banks or venture capital firms. Again, a new technology promised growth, but the existing financial system could not fuel it.

Yet again, financiers innovated. They formed new financial partnerships with the one kind of organization with the breadth of skills to screen bio-tech firms: large pharmaceutical companies. Pharmaceutical companies employ, or are in regular contact with, a large assortment of scientists and engineers, have close connections with those delivering medical products to customers, and employ lawyers well versed in drug regulations. Furthermore, when an expert pharmaceutical company invests in a bio-tech firm this encourages others to invest in the firm as well. Without financial innovation, improvements in diagnostic and surgical procedures, prosthetic devices, parasite-resistant crops, and other innovations linked to bio-technology would almost certainly be occurring at a far slower pace.

The co-evolution of financial and economic systems has a valuable policy implication. Without denying the potentially harmful effects of some forms of financial innovation, these historical examples and new cross-country empirical findings by Laeven, Levine, and Michalopoulos (2011) suggest that financial innovation is necessary for fostering technological innovations and sustaining economic growth. Thus financial regulations that stymie healthy financial innovation could slow, or even stop, economic growth.

IV. Conclusions

Considerable evidence suggests that a well-functioning financial system is vital for fostering economic growth and expanding economic opportunities, especially for those at the lower end of the distribution of income. This evidence does not imply that the social productivity of all financial systems is everywhere and always positive. But, it does suggest that sustained improvements in living standards are much less likely when financial systems are underdeveloped. Finance is not just about crises; it also shapes long-run growth and the contours of economic possibilities available to individuals.

   Although this paper does not make policy recommendations, it does yield a powerful policy message. Since finance exerts a first-order impact on economic prosperity and since finance primarily exerts this impact by *choosing* where to allocate capital, the financial policies, regulations, and supervisory practices shaping the incentives underlying those capital allocation choices are critically important for human welfare. The design and implementation of financial policies matter. Thus, as argued by Barth, Caprio, and Levine (2012), the institutions and governance systems that actually design and implement financial policies are *the* decisive ingredients in determining the social productivity of the financial sector.

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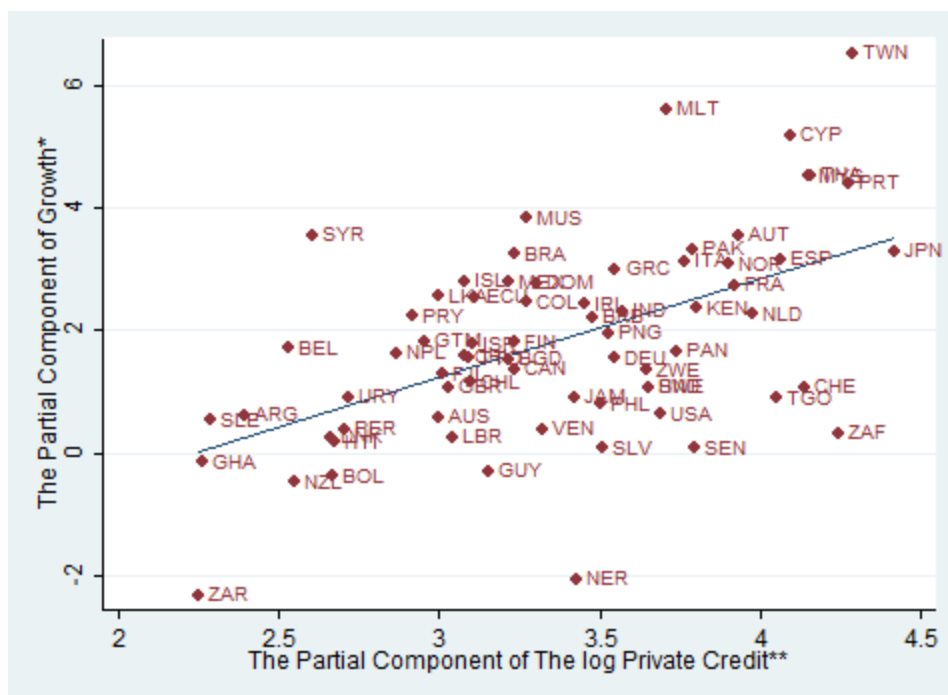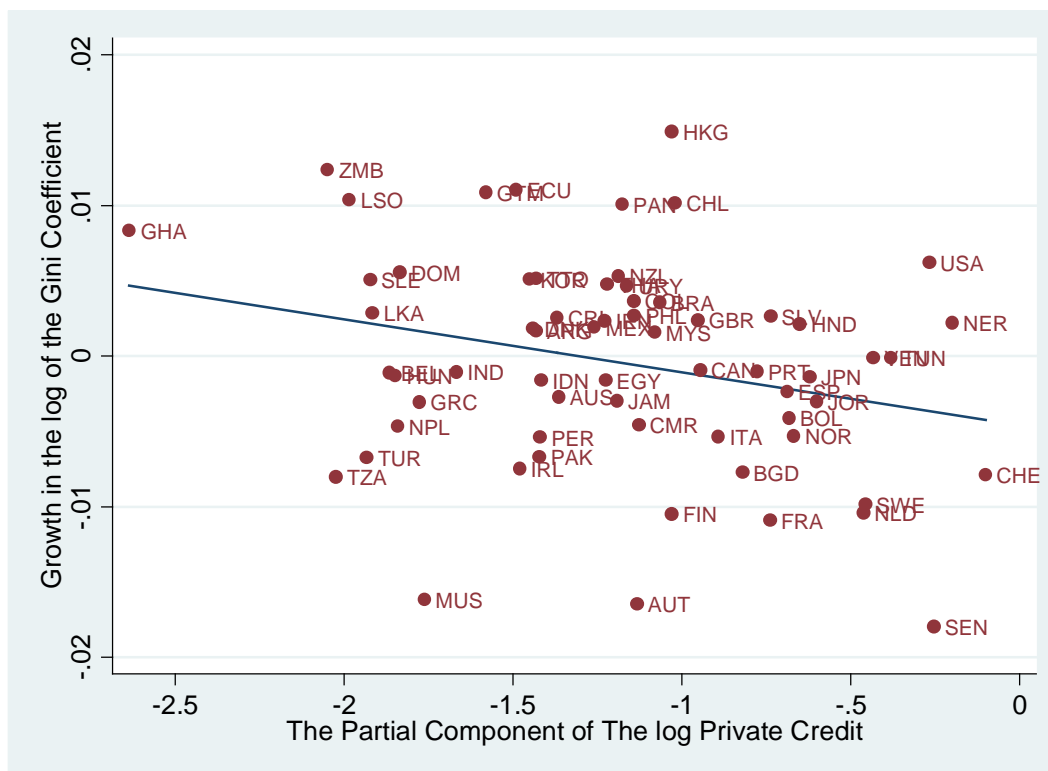
Figure 1: Growth in GDP per capita and the log of Private Credit.

Notes: This is a partial scatter plot of the regression:

$$Growth = \beta_0 + \beta_1 Log(Private\ Credit) + \beta_2 X + \varepsilon,$$

where *Growth* is average real GDP per capita growth over the 1960 to 1995 period, *Private Credit* is the claims on the private sector by banks and other financial institutions as a share of GDP, and *X* is a vector of the following control variables: log of initial GDP, and secondary schooling attainment in 1960. The regression includes 71 observations and the estimated coefficient, β_1, equals 1.77, with a p-value of 0.00. To construct the figure, first regress *Growth* on *X* and collect the residuals. These residuals are called the *Partial Component of Growth*. Second, regress *Private Credit* on *X* and collect the residuals. These residuals are called the *Partial Component of Private Credit*. Finally, plot the *Partial Component of Growth* against the *Partial Component of Private Credit*. This represents the two-dimensional representation of the regression plane in Growth-Private Credit space while conditioning on X.

Source: Levine, Loayza, and Beck (2000) in the spirit of Table 3 Regression Set 1, which is available at http://www.econ.brown.edu/fac/Ross_Levine/Publications.htm
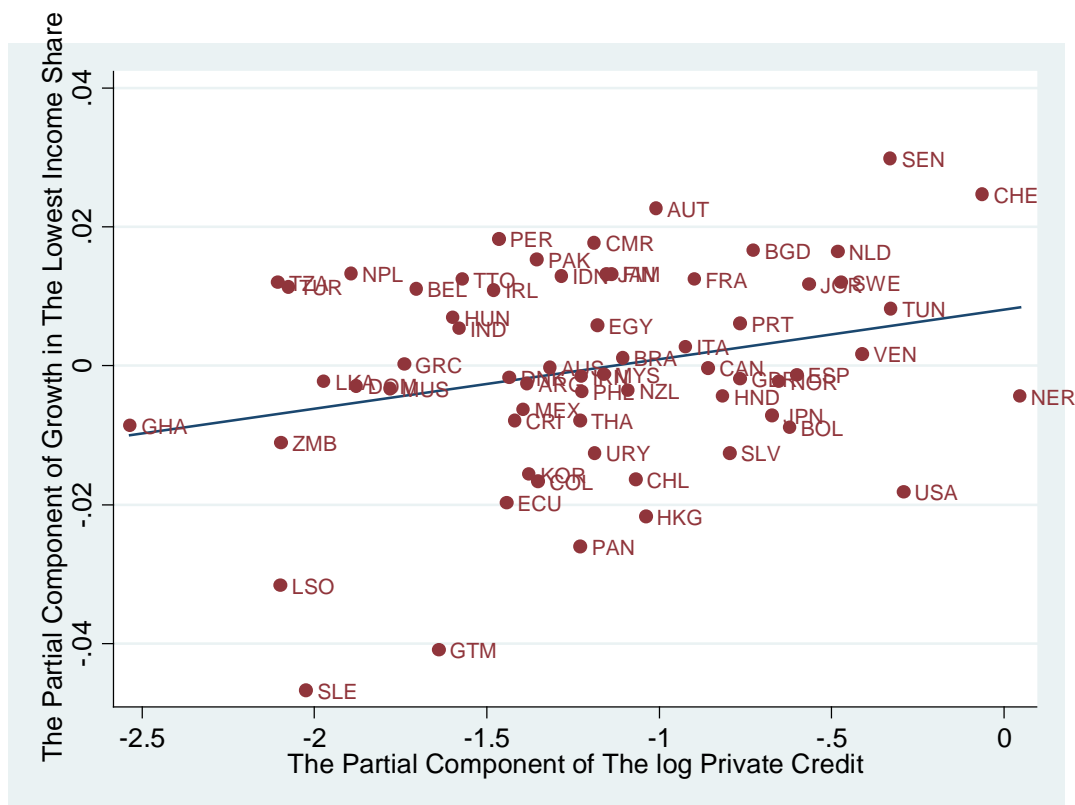
Figure 2: Growth in the log of the Gini Coefficient and the log of Private Credit.

Notes: This is a partial scatter plot of the regression:

$$Growth\ in\ the\ Gini\ Coefficient = \beta_0 + \beta_1 Log(Private\ Credit) + \beta_2 X + \varepsilon,$$

where *Growth in the Gini Coefficient* is the ratio of the area below the Lorenz Curve, which plots share of population against income share received, to the area below the diagonal from 1960 to 2005, *Private Credit* is the claims on the private sector by banks and other financial institutions as a share of GDP, and *X* is a vector of the following control variables: inflation, the log of exports as a fraction of GDP, government consumption as a share of GDP, log of initial Gini Coefficient, GDP per capita growth, and secondary schooling attainment in 1960. The regression includes 65 observations and the estimated coefficient, β_1, equals -0.005, with a p-value of 0.014. To construct the figure, first regress *Growth in the Gini Coefficient* on *X* and collect the residuals. These residuals are called the *Partial Component of Growth in the Gini Coefficient*. Second, regress *Private Credit* on *X* and collect the residuals. These residuals are called the *Partial Component of Private Credit*. Finally, plot the *Partial Component of Growth in the Gini Coefficient* against the *Partial Component of Private Credit*. This represents the two-dimensional representation of the regression plane in Growth in the Gini Coefficient -Private Credit space while conditioning on X.

Source: Beck, Demirgüc-Kunt, and Levine (2007) Table 2 Regression 3, which is available at http://www.econ.brown.edu/fac/Ross_Levine/Publications.htm

Figure 3: Growth in The log of the Lowest Income and the log of Private Credit.

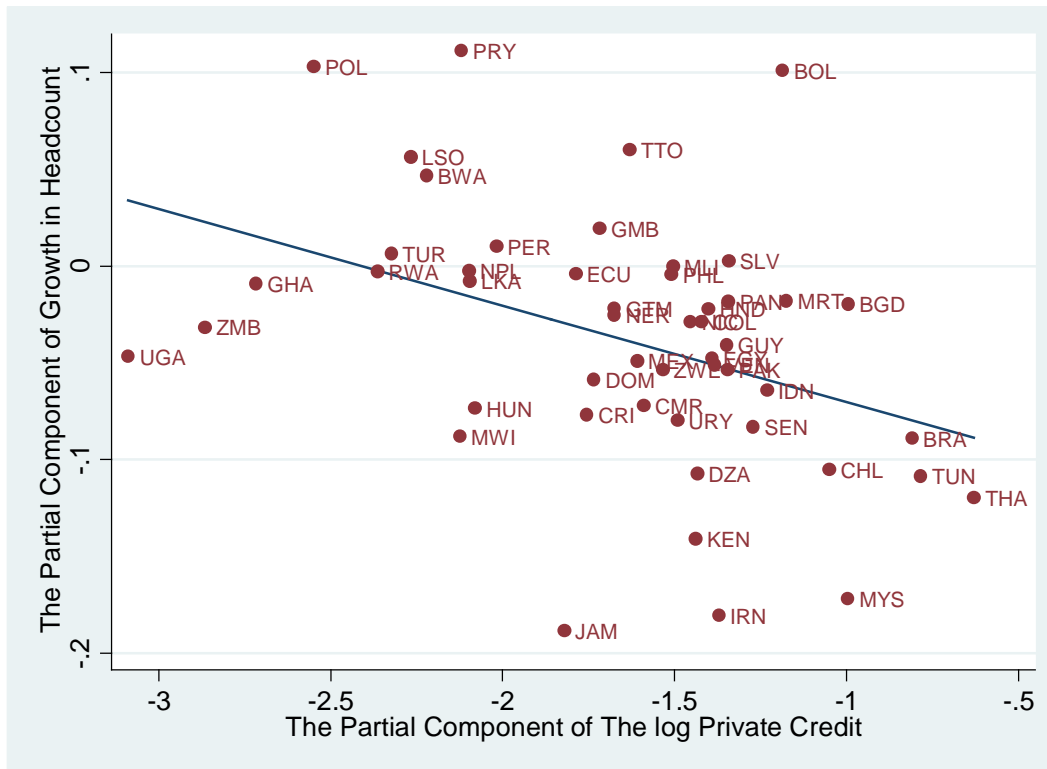Notes: This is a partial scatter plot of the regression:

$$Growth\ in\ the\ Lowest\ Income\ = \beta_0 + \beta_1 Log(Private\ Credit) + \beta_2 X + \varepsilon,$$

where *Growth in the Lowest Income* is the log of the average annual growth of the income share of the poorest quintile computed as a log difference between 1960 and 2005, *Private Credit* is the claims on the private sector by banks and other financial institutions as a share of GDP, and X is a vector of the following control variables: inflation, the log of exports as a fraction of GDP, log of initial Lowest Income, GDP per capita growth, and secondary schooling attainment in 1960. The regression includes 65 observations and the estimated coefficient, β_1, equals 0.009, with a p-value of 0.014. To construct the figure, first regress *Growth in the Lowest Income* on *X* and collect the residuals. These residuals are called the *Partial Component of Growth in the Lowest Income*. Second, regress *Private Credit* on *X* and collect the residuals. These residuals are called the *Partial Component of Private Credit*. Finally, plot the *Partial Component of Growth in the Lowest Income* against the *Partial Component of Private Credit*. This represents the two-dimensional representation of the regression plane in Growth in the Lowest Income -Private Credit space while conditioning on X.

Source: Beck Demirgüc-Kunt and Levine (2007) Table 3 Regression 3, which is available at http://www.econ.brown.edu/fac/Ross_Levine/Publications.htm.

Figure 4: Growth in Headcount and the log of Private Credit.

Notes: This is a partial scatter plot of the regression:

$$Growth\ in\ Headcount = \beta_0 + \beta_1 Log(Private\ Credit) + \beta_2 X + \varepsilon,$$

where *Growth in Headcount* is the growth rate of the percentage of the population living below $1 dollar per day, *Private Credit* is the claims on the private sector by banks and other financial institutions as a share of GDP, and X is a vector of the following control variables: inflation, the log of exports as a fraction of GDP, government effectiveness, initial Poverty Gap, Population Growth, Growth in mean income and secondary schooling attainment in 1960. The regression includes 51 observations and the estimated coefficient, β_1, equals -0.050, with a p-value of 0.009. To construct the figure, first regress *Growth in Headcount* on *X* and collect the residuals. These residuals are called the *Partial Component of Growth in Headcount*. Second, regress *Private Credit* on *X* and collect the residuals. These residuals are called the *Partial Component of Private Credit*. Finally, plot the *Partial Component of Growth in Headcount* against the *Partial Component of Private Credit*. This represents the two-dimensional representation of the regression plane in Growth in The Poverty Gap -Private Credit space while conditioning on X.

Source: Beck Demirgüc-Kunt and Levine (2007) Table 4 Regression 3, which is available at http://www.econ.brown.edu/fac/Ross_Levine/Publications.htm
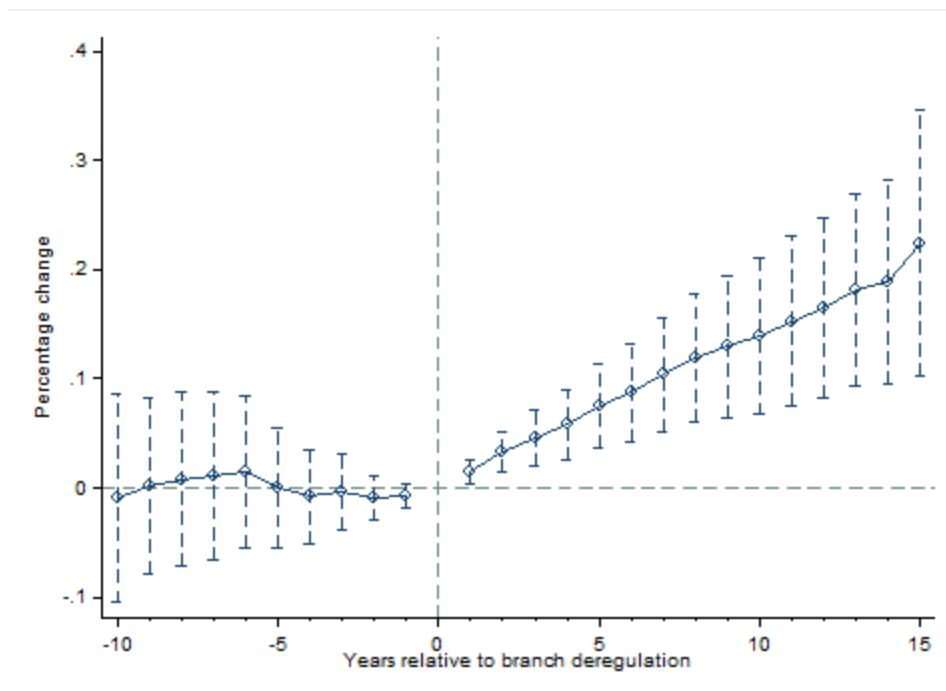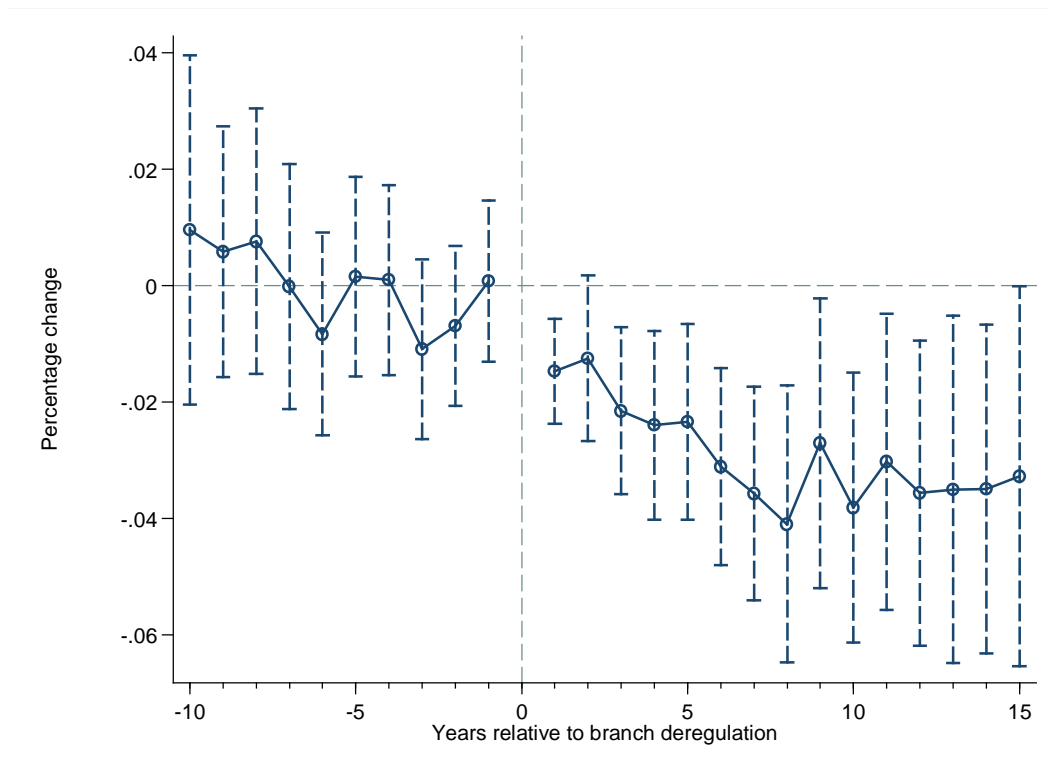
Figure 5. The Dynamic Impact of Deregulation on the Gross State Product.

The figure plots the impact of intrastate bank deregulation on per capita Gross State Product (2000 dollars). First we de-trend the Gross State Product per capita data subtracting out the mean and time trend before deregulation. We then consider a 25 year window, spanning from 10 years before deregulation until 15 years after deregulation. The dashed lines represent 95% confidence intervals, adjusted for state-level clustering. Specifically, we report estimated coefficients from the following regression:

$$\log(GSP)_{st} = \alpha + \beta_1 D^{-10}_{st} + \beta_2 D^{-9}_{st} + \ldots + \beta_{25} D^{+15}_{st} + \mathbf{A}_s + \mathbf{B}_t + \varepsilon_{st}$$

The D's equal zero, except as follows: D^{-j} equals one for states in the jth year before deregulation, while D^{+j} equals one for states in the jth year after deregulation. We exclude the year of deregulation, thus estimating the dynamic effect of deregulation on the Gross State Product relative to the year of deregulation. $\mathbf{A}_s$ and $\mathbf{B}_t$ are vectors of state and year dummy variables that account for state and year fixed effects, respectively.

Source: Beck Levine and Levkov(2010), which is available at
http://www.econ.brown.edu/fac/Ross_Levine/Publications.htm

Figure 6. The Dynamic Impact of Deregulation on Gini Coefficient of Income Inequality.

The figure plots the impact of intrastate bank deregulation on the natural logarithm of the Gini coefficient of income inequality. We consider a 25 year window, spanning from 10 years before deregulation until 15 years after deregulation. The dashed lines represent 95% confidence intervals, adjusted for state-level clustering. Specifically, we report estimated coefficients from the following regression:

$$\log(\text{Gini})_{st} = \alpha + \beta_1 D^{-10}{}_{st} + \beta_2 D^{-9}{}_{st} + \dots + \beta_{25} D^{+15}{}_{st} + \mathbf{A}_s + \mathbf{B}_t + \varepsilon_{st.}$$

The D's equal zero, except as follows: D^{-j} equals one for states in the jth year before deregulation, while D^{+j} equals one for states in the jth year after deregulation. We exclude the year of deregulation, thus estimating the dynamic effect of deregulation on the different percentiles of income distribution relative to the year of deregulation. $\mathbf{A}_s$ and $\mathbf{B}_t$ are vectors of state and year dummy variables that account for state and year fixed effects, respectively.

Source: Beck Levine and Levkov(2010), which is available at http://www.econ.brown.edu/fac/Ross_Levine/Publications.htm
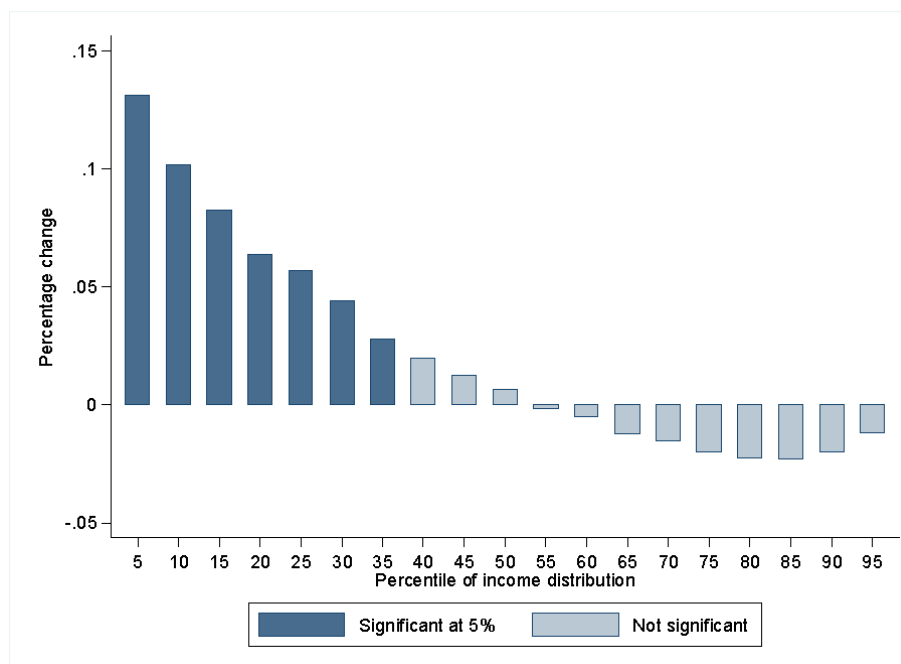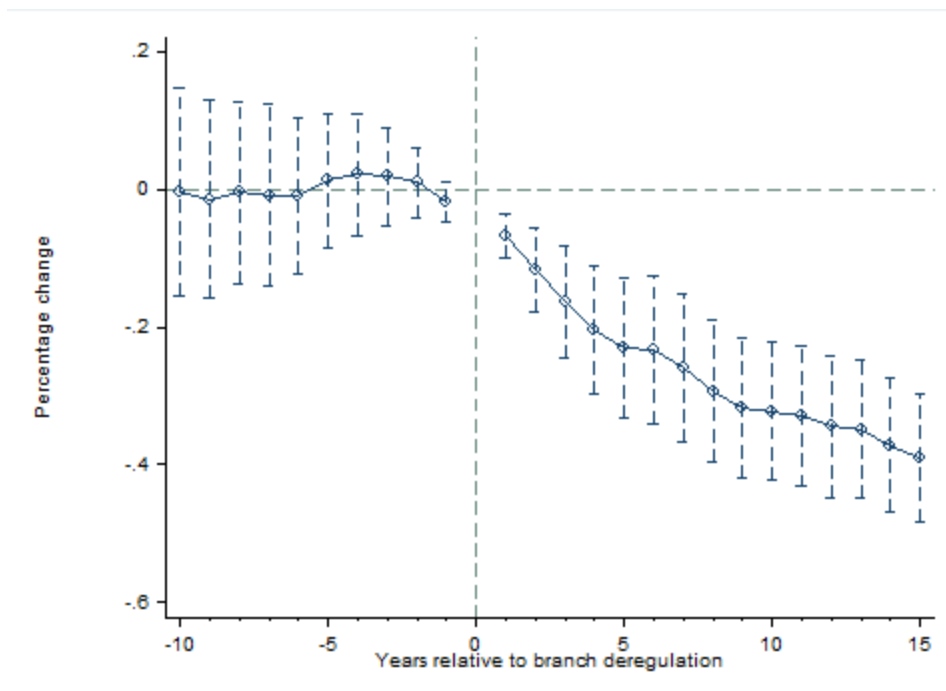
Figure 7: The Impact of Deregulation on Different Percentiles of Income Distribution.

Each bar in the figure represents the estimated impact of bank deregulation on a natural logarithm of a specific percentile of income distribution. Dark bars represent estimates significant at 5% after adjusting the standard errors for clustering. Light bars represent statistically insignificant estimates. Specifically, we report the estimates of γ from 19 separate regressions of the following form:

$$Y(i)_{st} = \alpha + \gamma D_{st} + A_s + B_t + \varepsilon_{st}$$

where $Y(i)_{st}$ is the natural logarithm of ith percentile of income distribution in state s and year t. D_{st} is a dummy variable which equals to zero prior to bank deregulation and equals to one afterwards. A_s and B_t are vectors of state and year dummy variables that account for state and year fixed effects, respectively. Each of the 19 regressions has 1,519 observations corresponding to 49 states (we exclude Delaware and South Dakota) times 31 years between 1976 and 2006.

Source: Beck Levine and Levkov(2010) Figure 2,
which is available at http://www.econ.brown.edu/fac/Ross_Levine/Publications.htm

Figure 8: The Dynamic Impact of Deregulation on the Unemployment rate.

The figure plots the impact of intrastate bank deregulation on Unemployment. At first we de-trend Unemployment by subtracting out the mean and time trend before deregulation. We then consider a 25 year window, spanning from 10 years before deregulation until 15 years after deregulation. The dashed lines represent 95% confidence intervals, adjusted for state-level clustering. Specifically, we report estimated coefficients from the following regression:

$$\log(\text{Unemployment})_{st} = \alpha + \beta_1 D^{-10}_{st} + \beta_2 D^{-9}_{st} + \dots + \beta_{25} D^{+15}_{st} + \mathbf{A}_s + \mathbf{B}_t + \varepsilon_{st.}$$

The D's equal zero, except as follows: D^{-j} equals one for states in the jth year before deregulation, while D^{+j} equals one for states in the jth year after deregulation. We exclude the year of deregulation, thus estimating the dynamic effect of deregulation on Unemployment relative to the year of deregulation. $\mathbf{A}_s$ and $\mathbf{B}_t$ are vectors of state and year dummy variables that account for state and year fixed effects, respectively.

Source: Beck Levine and Levkov(2010), which is available at
http://www.econ.brown.edu/fac/Ross_Levine/Publications.htm