Credit Reallocation and the Macroeconomy

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JEL Codes: E44, G20.

Keywords: Credit Market, Credit Reallocation, Economic Activity, Deregulation

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Abstract

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1 Introduction

In an economy with heterogeneous firms and imperfect financial markets, the allocation of financial resources can be a primary channel through which structural reforms and aggregate shocks affect the macroeconomy. Several studies document that reforms of financial markets influence not only the total volume of liquidity flowing to the business sector but also the allocation of liquidity across businesses. This appears to be the case for the credit market liberalization that occurred in the United States between the late 1970s and the early 1990s (Jayaratne and Strahan, 1996) and for the financial liberalizations that have taken place in several industrialized and emerging economies in the last two decades (Beck, Levine and Loayza, 2000; Wurgler, 2000; Galindo, Schiantarelli and Weiss, 2007). In a similar vein, there is growing evidence that financial crises can have a long-lasting impact on the allocation of liquidity across firms, in some cases boosting allocative efficiency (see,
e.g., Chen and Irazabal, 2012), in others depressing it (Neumeyer and Sandleris, 2010).

In spite of this view, and in contrast with the rich evidence on the growth of financial aggregates, we know very little about the continuous, dynamic process of reallocation of financial resources and its interaction with aggregate economic activity. Does a process of financial liberalization intensify or depress the dynamic process of reallocation of liquidity across firms? In turn, does a systematically more intense reallocation of liquidity foster the dynamism of the economy or can it instead lead to excessive instability of financial relationships, hindering investment and production? To grasp the importance of these questions, consider the debate about the credit booms that often follow financial liberalization episodes and precede financial crises (Gourinchas and Obstfeld, 2012; Mendoza and Terrones, 2012; IMF, 2004).

In addition to tracking the behavior of aggregate credit growth, can we learn useful information from tracking the dynamism with which credit is reallocated during a credit boom? And, similarly, how should policy makers respond to the creditless recoveries that typically follow financial crises? Should they react to anemic credit growth by promoting the creation of lines of credit, thus accelerating both credit growth and the reallocation of credit? Or should they instead focus on preventing the breakdown of existing credit relationships, thus accelerating credit growth but possibly slowing down the reallocation of credit?

This paper takes a step towards addressing these questions. The liberalization of the credit markets of the U.S. states that occurred from the late 1970s to the early 1990s constitutes a suitable empirical laboratory for our purposes. During this period, the U.S. states relaxed the regulatory restrictions that prohibited entry by out-of-state banks, thus allowing interstate banking. Moreover, the states relaxed the restrictions on the creation of bank branches within their territory, thus permitting intrastate branching. The liberalization process deeply influenced the management of credit-granting institutions. For instance, it increased the competitive pressure
on their managers and strengthened the ties between managers’ remuneration and their performance (Hubbard and Palia, 1995). The liberalization had also profound effects on the structure of the credit markets of the states, letting banks enter new geographical areas and expand branch networks (Berger, Leusner and Mingo, 1995; Radecki, 1998; Hughes, Lang, Mester and Moon, 1996).

The policy change we consider offers an ideal natural experiment to study the impact of financial liberalization on the process of inter-firm credit reallocation and, in turn, the effect of credit reallocation on economic activity. First, the deregulation of the credit market took place in different years across states. Jayaratne and Strahan (1996) and Morgan, Rime and Strahan (2004) document that the moment in which the single states deregulated did not reflect legislators’ expectations of faster growth or their desire to boost the volume or quality of investments. Furthermore, they demonstrate that the moment of deregulation did not coincide with any particular phase of the state business cycle and, hence, was not driven by contemporaneous business fluctuations in a state. We can then exploit the heterogeneous timing of the deregulation of the credit market across states to identify an exogenous shock to the process of credit reallocation in the states. Second, previous work suggests that the main channel through which the deregulation promoted state economic activity was not an increase in credit growth but an improvement in the quality of lending, as reflected in ex-post measures such as the share of non-performing loans and lenders’ profitability (Jayaratne and Strahan, 1996; Clarke, 2004). This naturally leads to wonder what changes in the dynamic process of allocation of liquidity across firms allowed to accomplish such an improvement in the quality of lending.

To measure inter-firm credit reallocation, we adopt the approach of Herrera, Kolar and Minetti (2011), which in turn replicates the statistical methodology developed by Davis and Haltiwanger (1992) for the measurement of job reallocation. The measurement of credit reallocation across firms cannot rely on aggregate data on credit (e.g., those provided by the Flow of Funds Accounts compiled by the
Board of Governors) but requires comprehensive firm-level data. Further, one needs sufficiently long time series to exploit the staggered timing of the credit market deregulation across states. With these needs in mind, we employ firm balance sheet data from U.S. Compustat tapes and compute inter-firm annual flows of total and long-term credit in the states (excluding firms in the “finance, insurance, and real estate” sector). We then estimate a two-stage model that in the first stage projects the rate of credit reallocation in a state onto indicators of interstate and intrastate credit market regulation and in the second stage projects a measure of state economic activity onto the value of credit reallocation in the state defined by the regulatory indicators. The first result we obtain is that the interstate liberalization of the credit markets of the states significantly boosted credit reallocation in the states.¹ This supports the hypothesis that the liberalization enhanced the efficiency and dynamism of the credit market, ameliorating frictions in the process of reallocation of credit across firms. In line with prior studies (e.g., Jayaratne and Strahan, 1996), we find instead no evidence that the liberalization boosted credit growth in the states. The second result we obtain is that, in turn, the intensification of credit reallocation prompted by interstate liberalization significantly promoted state economic activity. The estimates suggest that an increase in the annual reallocation rate of total credit by one percentage point (about five percent of the average annual reallocation rate) leads to a 0.27 percentage point increase in annual real per capita GDP growth, a 0.13 percentage point increase in annual employment growth, and a 0.14 percentage point increase in the annual growth of real per capita personal income. These results survive a broad array of robustness tests, such as allowing for non-linearities in the effects and accounting for the possible different tightness of the credit market regulation across states.

To further probe our findings, we then turn to disentangle the channels whereby

¹We do not estimate a significant effect of intrastate liberalization on credit reallocation. In the paper, we discuss possible interpretations for the different impact of interstate and intrastate liberalization.
the intensification of credit reallocation after interstate liberalization altered the
path of economic activity. To this end, we first measure the growth of total factor
productivity (TFP) in each state using a standard growth accounting methodology.
Next, we project the obtained measure of TFP growth onto the value of credit reallo-
cation in the state defined by the regulatory indicators. The results reveal that over
half (56%) of the effect of credit reallocation on state real per capita GDP growth
reflected an increase in TFP growth, which implies that the enhanced dynamism
of credit reallocation raised the contribution of TFP growth to GDP growth. And,
notably, this holds true even if we restrict attention to the intensive margin effect
of credit reallocation, that is, the reallocation of credit across continuing firms. Al-
though our results on this are suggestive, we further uncover evidence that this TFP
effect of credit reallocation stemmed from increased flexibility in the reallocation of
credit across firms with heterogenous productivity.

The remainder of the paper unfolds as follows. Section 2 relates the analysis to
prior literature. Section 3 describes the deregulation process and the data. In Sec-
section 4, we detail the empirical methodology. Section 5 presents the main empirical
results. Section 6 disentangles the mechanisms through which credit reallocation af-
facts economic activity. Section 7 considers robustness issues. Section 8 concludes.
Details on the data and their sources are relegated to online Appendix 1, while
details on the robustness tests are gathered in online Appendix 2.

2 Prior literature

Building on the theoretical paradigm of homogeneous firms (the “representative
firm” assumption), in the past most empirical literature focused on the impact of
measures of the total volume of credit (e.g., credit growth or credit over GDP) on
aggregate economic activity (see, e.g., Levine and Zervos, 1998; Levine and Renelt,
1992; Tornell, Westermann and Martinez, 2003). There is now established evi-
dence that, because of pronounced firm heterogeneity, the allocation of liquidity
across firms plays a role as relevant as its total volume for the macroeconomy (see, e.g., Eisfeldt and Rampini, 2006, and Caballero and Hammour, 2005, for in-depth discussions of the allocative channel). This paper relates to three strands of empirical literature that explore the impact of financial liberalization and financial development on the real sector through the allocative channel. A first strand of studies investigate the reduced-form effects of financial liberalization and financial development on the macroeconomy. Beck, Levine and Loayza (2000) treat total factor productivity as a proxy for the quality of capital allocation in the real sector. Examining a large set of countries, they obtain that the development of financial intermediaries has a more substantive impact on productivity than on the rate of physical capital accumulation. Wurgler (2000) finds that in countries with higher financial development the accumulation of physical capital is relatively faster in growing industries than in declining ones. Galindo, Schiantarelli and Weiss (2007) focus on developing economies and uncover evidence that, following financial liberalization, physical capital accumulation becomes relatively more intense in firms with higher productivity. These studies take a reduced-form approach and do not aim at disentangling the changes in the dynamic process of allocation of liquidity in the financial sector that induce the observed improvements in the allocation of physical capital.

A second strand of studies in this literature take a microeconomic perspective and investigate the impact of financial liberalization and financial development on the lending practices of credit-granting institutions. Bertrand, Schoar and Thesmar (2007) demonstrate that, following the 1985 French banking deregulation, banks became less willing to grant credit to businesses with declining performance.² They also show that in the real sector the French deregulation promoted firms’ restructuring activity. Studying the efficiency of the Japanese credit market in the 1990s, Caballero, Hoshi and Kashyap (2008) construct an index to capture whether a firm

²They also find that the cost of credit rose for firms with poor performance.
received subsidized credit (meant as credit less costly than a hypothetical lower bound). They estimate that firms operating in industries with more subsidized firms (“zombies”) experienced lower total factor productivity growth. Relative to this strand of studies, in this paper we take a macroeconomic perspective. We construct an aggregate indicator of credit reallocation that, together with measures of total credit volume such as credit growth or credit over GDP, can be employed by macroeconomists for tracking the dynamics of the credit market. This aggregate indicator summarizes the dynamism and flexibility with which the credit market performs its allocative function.

Finally, a third strand of studies in this literature investigate the impact of financial liberalization and financial development on ex-post, static measures of credit market performance. Examining the credit market liberalization implemented in the United States from the late seventies to the early nineties, Jaratyne and Strahn (1996) find that the liberalization did not increase loan growth but reduced non-performing loans and raised the profitability and X-efficiency of credit-granting institutions. Jaratyne and Strahn (1996) argue that this improvement in the quality of lending played a key role in the positive impact of the liberalization on the growth of U.S. states. Cho (1988) demonstrates that the financial liberalization occurred in Korea in the 1980s reduced differences in the cost of credit across sectors. Our paper can help understand what changes in the dynamic process of allocation of liquidity across firms allowed to attain the improvement in the ex-post indicators of lending quality (non-performing loans, lenders’ profitability) and the stimulus to economic activity detected by these prior studies.

Recently, some works have started to study the continuous, dynamic process of reallocation of credit. Using data from U.S. banks’ Call Report Files, Dell’Ariccia and Garibaldi (2005) uncover an intense inter-bank reallocation of loans. Herrera, Kolar and Minetti (2011) find that the inter-firm reallocation of credit is a continuous, mildly procyclical process. However, Herrera et al. (2011) only characterize
stylized facts of inter-firm credit reallocation and do not study either the impact of financial liberalization on inter-firm credit reallocation or the effect of inter-firm credit reallocation on aggregate economic activity.

3 Data and measurement

This section describes the liberalization process and the measurement of credit reallocation.

3.1 The credit market liberalization

The deregulation of the credit markets of the U.S. states carried out between the late 1970s and the early 1990s offers an ideal natural experiment to identify an exogenous shock to the process of credit reallocation. A critical feature of the deregulation is that the states removed regulatory restrictions in different years. This staggered timing enables us to separate the effect of the deregulation from macroeconomic and industry trends.

The McFadden Act of 1927 prohibited banks from opening branches outside their home state and attributed to the single states the power to govern the intrastate opening of branches. Until the 1970s, most U.S. states chose to restrict the ability of banks to open branches within their territory: at the beginning of the 1970s only twelve states allowed unrestricted intrastate branching. Between 1970 and 1994, 38 states removed their intrastate branching restrictions. When a state removed such restrictions it could do so by allowing banks to buy other banks or branches of local banks (merger and acquisition) or to open new branches (unrestricted de novo branching). In addition to imposing intrastate branching restrictions, until the late 1970s states prohibited cross-state ownership of banks by applying the Douglas Amendment to the 1956 Bank Holding Company Act. Between 1978 and the early 1990s, almost all states removed the restrictions that prohibited out-of-state holding companies from acquiring in-state bank subsidiaries. The interstate banking
deregulation was almost completed by 1992 (only Hawaii retained the restrictions). Finally, the Riegle-Neal Interstate Banking and Branching Efficiency Act completed the deregulation process. This federal act fully liberalized intrastate and interstate banking and branching for every state from 1997.

Prior studies demonstrate that the liberalization process had profound effects on the efficiency and structure of the credit markets of the states. Regarding the market structure, banks entered new local markets and eroded the market shares of smaller incumbent banks, expanded their branch networks, and consolidated subsidiaries into branches (Radecki, 1998; Hughes, Lang, Mester and Moon, 1996). Concerning the efficiency of financial institutions, bank managers faced stronger competitive pressure for stepping up the quality of their management, especially in screening and monitoring borrowing firms (Hubbard and Palia, 1995; Berger, Leusner and Mingo, 1995; DeYoung, Hasan and Kirchhoff, 1998). We expect that the improvement in managerial efficiency and the structural changes mitigated frictions to the process of reallocation of credit across firms. Financial institutions that are more effective at screening borrowers encounter less adverse selection problems and thus have more incentives to open new lines of credit (Boyd and Prescott, 1986; Gorton and Winton, 2003). Moreover, a more efficient monitoring of existing customers helps detect a deterioration in the quality of their investments and promptly liquidate bad projects. Thus, financial institutions should have less incentives to inertially roll over lines of credit (Gorton and Khan, 2000; Repullo and Suarez, 1998). Finally, a denser structure of bank branches should mitigate frictions in the process of matching between lenders and firms, facilitating the formation of new credit relationships and the termination of old ones (Wasmer and Weil, 2004).

A caveat is in order here. While the liberalization involved only the banking sector, our data also include non-bank credit. However, this does not constitute a concern. First, bank credit accounts for an important share of the financing of U.S. non-financial businesses (approximately ranging between 25% and 35% during
the eighties and nineties). Second, the geographic deregulation of branching and banking, and the possible consequent changes in the process of reallocation of bank credit, is very likely to have prompted a reshuffling of the whole borrowing portfolios, affecting non-bank credit as well. Finally, even if non-bank credit was not significantly affected, our results would be biased towards not finding an effect of credit market liberalization on the process of credit reallocation. Thus, we do not risk overestimating the impact of liberalization on inter-firm credit flows.

3.2 Measurement of credit reallocation

Following Herrera et al. (2011), to measure inter-firm credit reallocation we use information from the Standard and Poor’s Full-Coverage Compustat tapes, which provide details on the balance sheets and income statements of all publicly traded U.S. firms. We drop from the database all firms belonging to the “finance, insurance, and real estate” industry group because we want to include firms that demand rather than supply credit. Although a drawback of Compustat is that small businesses are underrepresented, Compustat firms account for a very large share of economic activity in the United States. Chun, Kim, Morck and Yeung (2008) calculate that on average between 1971 and 2000 the sales of Compustat firms, net of the sales of intermediate products, amounted to about half of the GDP of the United States. In 1995, the firms in our sample accounted for about half of the stock of debt of non-financial U.S. businesses. In addition to being very comprehensive, Compustat has the advantage of including data for several contiguous years. This is crucial for constructing time series that span the years of staggered deregulation of the state credit markets and, hence, for using the liberalization process as a natural

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3 This information can be inferred from the annual releases of the Flow of Funds Accounts of the United States (Board of Governors of the Federal Reserve System). See, for example, Table L.102.  
4 In 1995, for example, on average the net sales of non-financial Compustat firms equalled 784.54 million dollars. At the median (25th percentile), the net sales amounted to 61.11 (11.11) million dollars. In 1995, firms with less than 500 employees were 51% of the total.
experiment. Compustat comprises annual data from 1950, although we will work with approximately 30 years because of some discontinuities in the time series and missing data on some variables.

Throughout, we consider the reallocation of both total debt and long-term debt. Analyzing long-term credit separately can yield useful insights because long-term credit finances many long-term investment plans. Following an established practice in the finance literature, and as in Herrera et al. (2011), we define debt as all forms of financial debt except accounts payable to suppliers. We exclude trade credit because of its peculiar properties. Unlike other forms of debt, it is for transaction purposes rather than for financial purposes and it is based on relationships with suppliers rather than with financial institutions. Moreover, trade credit is extended by firms under specific contracts and, because of its high cost, it is used by firms only when they cannot obtain cheaper financing (Petersen and Rajan, 1994). These properties make trade credit a very limited substitute for other forms of debt (Rajan and Zingales 1995; Nilsen, 2002).

We follow Herrera et al. (2011) in tackling some methodological issues in the measurement of inter-firm credit reallocation. The first issue regards firm entry and exit. Some firms that appear in the database for the first time are newborn while others are existing firms that file with the Securities and Exchange Commission, become incorporated, or originate from the divestiture of bigger firms. We do not want to count the debt of existing firms as additions to aggregate credit. Following the approach of Ramey and Shapiro (1998) and Herrera et al. (2011), we drop firms that enter the data set and have a ratio between the end-of-period gross capital and the end-of-period net capital that exceeds 120%. The rationale for this criterion is that generally the gross book value of physical capital of a new firm is similar to its net book value. Regarding firm exit, we treat exits due to bankruptcy or liquidation and to merger or acquisition as credit subtractions, while we do not count exits for other reasons (see Ramey and Shapiro, 1998, and Herrera et al.,
2011, for an analogous approach). There is a strong reason to consider the exit of a merged or acquired firm as a credit subtraction. In the merger of two firms, the management and workforce of either acquire control over the financial resources of the other. Thus, for the financiers this is at least partly equivalent to reallocating credit between two firms. Indeed, several studies (e.g., Servaes, 1991) find that the announcement of a merger has a significant impact on the stock market value of target and acquirer, which suggests that mergers have large real effects.

Another methodological issue regards the mismatch between fiscal year and calendar year that occurs for a small portion of the firms in the sample. In line with the approach followed by Compustat, if the fiscal year ends after May 31st, the data of the firm are not reallocated as if there was no mismatch problem. If, instead, the fiscal year ends before May 31st, we allocate the data to the previous year. The results remain virtually unaffected if we recompute credit flows apportioning fiscal year data proportionally to calendar years. The final issue regards inflation. To measure changes in firms’ real exposure to financiers, we deflate the data using the implicit GDP deflator.

### 3.3 Constructing inter-firm credit flows

To measure inter-firm credit flows in the states, we replicate the methodology proposed by Davis and Haltiwanger (1992) and Davis, Haltiwanger and Schuh (1996) for measuring inter-firm job flows (see Herrera et al., 2011, for an application to credit). Let $c_{ft}$ denote the average of the debt of a firm $f$ at time $t - 1$ and at time $t$. The debt growth rate of a firm is computed by dividing the change in debt from year $t - 1$ to year $t$ by $c_{ft}$. This debt growth rate takes values in the $[-2, +2]$ interval and has the advantages of symmetry and boundedness (for further discussion of the statistical properties of this growth rate, see Davis and Haltiwanger, 1992, and Törnqvist, Vartia and Vartia, 1985). If a firm is founded, its debt growth rate

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5 Other reasons for exit include conversion to a private company, leveraged buyout, or unspecified.
equals +2; if it dies, it equals −2.

Exploiting Compustat information on the state in which firms have their principal location, we then construct five annual credit flows for each state by aggregating firms’ debt growth rates. Credit creation ($\text{POS}_{it}$) in state $i$ and year $t$ is computed as the weighted sum of the debt growth rates of the firms with growing debt, where the weights are given by the firm debt $c_{ft}$ over the debt $C_{it}$ of the firms located in the state. Credit destruction ($\text{NEG}_{it}$) is calculated as the weighted sum of the debt growth rates of the firms with decreasing debt. Gross credit reallocation ($\text{SUM}_{it}$) is obtained as the sum of credit creation and credit destruction. Net credit growth ($\text{NET}_{it}$) is constructed as credit creation less credit destruction. Finally, excess credit reallocation ($\text{EXC}_{it}$) equals gross credit reallocation less the absolute value of net credit growth. Thus, $\text{EXC}_{it}$ constitutes credit reallocation in excess of the minimum necessary to accommodate net credit growth. These credit flows can be written as

$$\text{POS}_{it} = \sum_{f \in s_t, \ g_{ft} > 0} g_{ft} \left( \frac{c_{ft}}{C_{it}} \right),$$

(1)

$$\text{NEG}_{it} = \sum_{f \in s_t, \ g_{ft} < 0} |g_{ft}| \left( \frac{c_{ft}}{C_{it}} \right),$$

(2)

$$\text{SUM}_{it} = \text{POS}_{it} + \text{NEG}_{it},$$

(3)

$$\text{NET}_{it} = \text{POS}_{it} - \text{NEG}_{it},$$

(4)

$$\text{EXC}_{it} = \text{SUM}_{it} - |\text{NET}_{it}|.$$  

(5)

3.4 Discussion

Our analysis investigates whether the credit market deregulation altered the dynamic process of credit reallocation and, in turn, any resulting change in the credit reallocation process affected state economic activity. Two aspects of our data are worth discussing in this respect. While small firms (allegedly, the most financially
vulnerable) are underrepresented in Compustat, there is extensive evidence that financial factors play a key role in the decisions of Compustat firms and that financial imperfections hinder the substitutability of different kinds of finance for Compustat firms (see, e.g., Moyen, 2004; Murfin and Njoroge, 2012; Dimitrov and Tice, 2013; Whited, 1992; Acharya, Davydenko and Streubalaev, 2012, and references therein). There is also evidence that the credit markets of the U.S. states are (partially) segmented, so firms, including Compustat ones, are sensitive to the structure and efficiency of the banking market of the state where they are located (Becker, 2007). Indeed, studying Compustat firms, Dass and Massa (2011), Sufi (2007) and Arena and Dewally (2012) find that banks obtain better information and grant easier access to credit when they are geographically closer to firms. Clearly, the degree of sensi
tiveness to the banking conditions in the state will differ across firms, so in our sample some firms (e.g., big firms with hundreds of employees) will be less sensitive than others (e.g., firms with a few dozens employees). However, not only this is not a source of concern but it is actually an integral part of the phenomenon we seek to capture. Our aggregate measures of credit reallocation precisely aim at summarizing the dynamism and flexibility with which credit can be reallocated across firms. And the flexibility with which credit flows, say, between cash-abundant firms less exposed to financial imperfections and firms more exposed to financial imperfections is an essential part of the dynamism of the credit market in reallocating liquidity that our measures of credit reallocation seek to reflect. Finally, if anything, the underrepresentation of small firms in the data set can lead us to underestimate the impact of credit reallocation on economic activity.

The second aspect worth discussing concerns the influence that changes in firms’ decisions can have on state economic activity. As noted, Compustat firms account for a large share of economic activity. In line with numerous studies, to determine the location of a firm we use the firm’s headquarter location reported by Compustat. This is the approach followed in several strands of empirical literature when
employing Compustat data and reflects the idea that the core business and the main activities of a firm are often performed close to its headquarter (see, e.g., Seasholes and Zhu, 2010; Giroud and Mueller, 2010; Gompers, Ishii and Metrick, 2010; Orlando, 2004; Coval and Moskowitz, 1999; Francis, Reichelt and Wang, 2005; Ivkovic and Weisbenner, 2005, and references therein). Clearly, a share of the business of a firm will take place outside the state where its headquarter is located. Again, if anything, we may then tend to underestimate the impact of credit reallocation on state economic activity.

Later in the analysis, we will return to these issues. We will perform a sensitivity analysis by removing the biggest firms from our data set. Further, we will discuss how the above aspects can help explain the differential impact of interstate and intrastate deregulation on credit reallocation.

4 The empirical model

Credit reallocation can be endogenous to economic activity. For instance, downturns may slow down the creation of new lines of credit and the expansion of existing ones and, hence, depress credit creation. Moreover, unobserved factors that affect economic activity in a state-year may be correlated with credit reallocation. Our empirical strategy for addressing these endogeneity issues consists of estimating a two-stage model that in the first stage projects the rate of inter-firm credit reallocation in a state onto regulatory indicators and in the second stage projects a measure of state economic activity onto the rate of credit reallocation in the state defined by the regulatory indicators.

We measure state economic activity with the log difference of three variables: real per capita gross domestic product, employment, and real per capita personal income (measured before tax and excluding transfer payments). The first two variables are standard measures of economic activity. We add personal income because it can help capture further aspects of economic activity, since it is computed not using the
physical location of productive capital but the state of residence of the owners of capital. As discussed by Morgan, Rime and Strahan (2004), when estimating the effects on state economic activity, it is important to control for the sectorial labor force composition in the state because, for example, a shift of sectorial weights towards rapidly expanding industries could accelerate the economic growth of a state. In the analysis, we report regressions that control for the labor shares of the one-digit SIC sectors in total non-farm employment and also report the estimates obtained by excluding sectorial labor shares. The results are virtually identical whether we include or exclude the sectorial labor shares.

Following a common practice in the studies on the U.S. credit market deregulation (see, e.g., Beck, Levine and Levkov, 2010, for a discussion), we drop Delaware and South Dakota from the analysis. In fact, the credit market of these two states was deeply affected by laws that made them the centers of the credit card industry (for example, in Delaware a law passed in 1982 introduced tax incentives for credit cards). Thus, we use data for 48 states plus the District of Columbia. As detailed in the Appendix 1, after accounting for missing data on some variables and some discontinuities in the time series and after computing rates of growth, we end up with data spanning 32 years (1970-2001) in the regressions for employment, 33 years (1969-2001) in the regressions for real per capita personal income, and 29 years (1969-1997) in the regressions for real per capita GDP. Inspection of the sample summary statistics in Table 1 reveals that in 1969-2001 the annual gross reallocation rate ($SUM$) of total credit (averaged across states and years) equalled 19.60%, while the average annual excess credit reallocation rate ($EXC$) equalled 9.52%. There is substantial variation in the intensity of credit reallocation in the sample: the annual gross reallocation of total credit equals 11.05% at the 25th percentile and 22.77% at the 75th percentile; the annual excess reallocation of total credit equals 4.30% at the 25th percentile and 12.92% at the 75th percentile. In the 1969-1997 period, the average growth rate of real per capita GDP equalled 2.15%,
In 1970-2001 the average growth rate of employment was 2.03%, and in 1969-2001 the average growth rate of real per capita personal income equalled 2.35%.

The empirical fixed effects model can be expressed as follows

\[ \Delta Y_{it} = \alpha_t + \beta_i + \gamma C r e_{it} + \sum_h \delta_h s h a r e_{hit} + \varepsilon_{it}, \]  

(6)

\[ C r e_{it} = \kappa_t + \eta_i + \sum_j \zeta_j r e g u l_{jit} + \sum_h \theta_h s h a r e_{hit} + \nu_{it}. \]  

(7)

In equation (6) (the second stage), \( \Delta Y_{it} \) is the log difference of the chosen measure of economic activity in state \( i \) in year \( t \), \( \alpha_t \) is a time fixed effect that captures nation-wide shocks to economic activity in year \( t \), \( \beta_i \) is a state fixed effect that measures the component of economic activity specific to state \( i \) (reflecting time-invariant unexplained factors that differ across states such as income and property tax rates, environmental regulations, public rates of investment),\(^6\) \( C r e_{it} \) is the rate of credit reallocation or credit growth in state \( i \) in year \( t \), \( s h a r e_{hit} \) is the labor share of sector \( h \) in total non-farm employment in state \( i \) in year \( t \), and \( \varepsilon_{it} \) is the residual.\(^7\) In addition to time and state fixed effects and sectorial labor shares, equation (7) (the first stage) includes \( r e g u l_{jit} \), instrumental variables that capture changes in credit market regulation and that we expect to be correlated with credit reallocation but to affect economic activity only through the credit market. The first instrument, \( i n t e r s t a t e_{it} \), is an indicator variable that takes the value of one starting on the year when state \( i \) permitted entry by out-of-state banks, zero otherwise. The second instrument, \( i n t r a s t a t e_{it} \), is an indicator variable that takes the value of one starting on the year when state \( i \) permitted branching within the state via merger and acquisition, zero otherwise.\(^8\) Since these dates reflect the year in which

\(^6\)State fixed effects can also account for the convergence phenomenon studied by Barro and Sala-i-Martin (1992).

\(^7\)We treat “agricultural services, forestry, fishing and other” as the omitted industry.

\(^8\)In line with Clarke (2004), Jarayatne and Strahan (1996) and Morgan, Rime and Strahan (2004), we use the dates in which legislators allowed mergers and acquisitions within the state. These are highly correlated with the dates in which intrastate de-novo branching was allowed.
the legislation was implemented, the instrumental variables reflect treatment and
not intention to treat. The dates of intrastate and interstate deregulation (not
tabulated) are from Amel (1993).

5 Main estimation results

In this section, we first present the baseline empirical results. We then account for
possible non-linearities in the effects. Robustness tests are discussed in Section 7.

5.1 Baseline estimates

Table 2 reports coefficient estimates and (in parentheses) associated heteroskedasticity-
robust standard errors for the first-stage regressions. We start by discussing the es-
timates for gross credit reallocation ($SUM$). The results displayed in columns 2 and
8 suggest that interstate deregulation significantly increased the gross reallocation
of total and long-term credit. For example, in the regressions that do not include
the indicator of intrastate deregulation (Panels A and B), the estimated coefficients
on interstate imply that a state that allowed entry by out-of-state banks would have
experienced a 5.8% larger annual gross reallocation of total credit and a 6.7% larger
annual gross reallocation of long-term credit. And the coefficients on the indicator
for interstate deregulation are virtually identical if we control for intrastate deregu-
lation (Panels C and D). By contrast, we do not find a statistically significant effect
on gross credit reallocation of the indicator for intrastate deregulation. Below, we
will interpret these different findings for interstate and intrastate deregulation.

All in all, the results of this first stage are thus consistent with the hypothesis
that the improvement in the efficiency and structure of the credit market induced by
the liberalization process made the process of reallocation of credit across businesses
more flexible and dynamic. For example, the increased competitive pressure induced

Moreover, bank expansion into new markets generally occurs through the purchase of whole banks
or branches of banks located in those new markets, not through the opening of new branches.
by the entry of out-of-state banks could have raised managerial efficiency in financial institutions. In turn, this would have led to more effective screening, hence higher flexibility and dynamism in extending credit, and more effective monitoring, hence less inertia in cutting existing credit lines. In the table, we also report an $F$-test for joint significance of the two regulatory indicators. The results of the test indicate that using both indicators as instrumental variables can lead to weak identification of the parameters in the second stage. In fact, the value of the $F$-statistic is below the 7.03 (16.38) critical value for two (one) endogenous variables and two instruments needed to obtain a 10% maximal size of a 5% Wald test on the coefficient of interest (see Table 5.2 of Stock and Yogo, 2005). Consequently, our preferred 2SLS model employs the indicator for interstate deregulation as the only instrument.

The second-stage estimates for the impact of gross credit reallocation on state economic activity are in Table 3, Panels A-F, first row. The estimates reveal that the intensification of credit reallocation induced by interstate credit market liberalization spurred state economic activity, whether the latter is measured by the growth of real per capita GDP, employment, or real per capita personal income. As it can be gleaned from column 2 (8) in Panel A (B), an increase in the annual gross reallocation of total (long-term) credit by one percentage point would have led to a 0.27 (0.23) percent increase in real per capita GDP growth. Given that the average growth rate of state real per capita GDP was 2.15\% during the 1969-1997 period, this effect appears to be sizeable. The same increase in the gross reallocation of total (long-term) credit would have led to a 0.13 (0.12) percent higher employment growth – see column 2 (8) in Panel C (D) – and to a 0.14 (0.13) percent higher growth of real per capita personal income – see column 2 (8) in Panel E (F).

As noted, gross credit reallocation includes both the reallocation of credit strictly needed to accommodate net credit growth and the reallocation of credit over and above that. The reader could wonder whether the effects picked up by the estimates reflect inter-firm flows of credit that occur solely to accommodate changes in
the total amount of credit granted to the business sector. We then reestimate the empirical model using excess credit reallocation (EXC), which nets out the minimum reallocation needed to accommodate net credit growth. We also reestimate the model using both excess credit reallocation and net credit growth (NET) and only net credit growth. Consider first the model with excess credit reallocation only. The results carry through: the estimates in Table 2, columns 4 and 10, suggest that interstate deregulation stimulated the excess reallocation of total and long-term credit, with a rise of 3.1% and 4.1%, respectively. Moreover, the second-stage estimates in Table 3, second row of Panels A-F, reveal that the excess credit reallocation defined by interstate liberalization boosted state economic activity. An increase in the annual excess reallocation rate of total credit by one percentage point would have been associated with accelerations in economic activity that range between 0.27% for employment growth (column 4, Panel C) and 0.51% for real per capita GDP growth (column 4, Panel A). Similarly, the estimated effect of the excess reallocation of long-term credit is statistically and economically significant.

Next, we experimented inserting both excess credit reallocation and net credit growth in the regressions (the second stage results are not tabulated to conserve space). As detailed above, because the indicator of intrastate deregulation is not significant in the first stage, the second stage of this model – which employs both regulatory indicators as instruments – yields quite unreliable results. Nevertheless, two aspects are worth noting. First, we generally continue to find a positive effect of excess credit reallocation on economic activity. Second, as shown in Table 2, columns 6 and 12, in the first stage neither intrastate nor interstate deregulation appear to affect net credit growth in a statistically significant manner (even in the specifications in which interstate deregulation has a marginally significant effect, the statistical significance will vanish in the robustness checks). This result is fully in line with that of Jayaratne and Strahan (1996) and Morgan, Rime and Strahan (2004), who indeed document that the deregulation did not trigger an acceleration
in loan growth in the states. All in all, the results corroborate the idea that credit growth was not the channel through which the liberalization of the credit market affected state economic activity. By contrast, our results indicate that credit market liberalization reduced the obstacles to the dynamic process of reallocation of liquidity. In turn, the increased dynamism and flexibility of the credit market in allocating liquidity would have promoted state economic activity (outweighing any possible negative effect due to increased instability of credit relationships). The enhanced dynamism in the credit reallocation process may have been instrumental to the improvement in the ex-post measures of the quality of lending (non-performing loans, lenders’ profitability) detected by prior studies (Jayaratne and Strahan, 1996).

5.2 Interstate and intrastate liberalization

A natural question is why in the first stage we find that interstate deregulation affected the intensity of credit reallocation while we uncover no such evidence for intrastate deregulation. A first interpretation relies on the presence of segmentation in the credit market. Small banks were allegedly those more affected by the removal of intrastate branching restrictions. Prior research finds some evidence that small banks especially focus on serving small firms (see, e.g., Calem, 1994; Amel and Prager, 2013), and, as noted, small firms are underrepresented in Compustat. So, we may tend to underestimate the impact of intrastate deregulation on inter-firm credit reallocation. Thus, our analysis is probably better suited for investigating the impact of interstate liberalization than that of intrastate liberalization. A second interpretation relies on the different channels through which the two margins of liberalization may exert an impact. Prior research finds that interstate deregulation primarily affected managers’ effectiveness at screening and monitoring borrowing firms (Hubbard and Palia, 1995), while intrastate deregulation especially altered the diffusion of branches in the states, possibly enhancing firms’ ability to identify nearby branches (Berger, Leusner and Mingo, 1995). Our results can reflect the
fact that it was especially the improved efficiency and incentives of managers that influenced the flexibility and dynamism with which liquidity was reallocated.

5.3 Non-linearities: Large credit flows

Recent studies suggest the presence of non-convex adjustment costs in credit changes (Eisfeldt and Muir, 2013; Bazdresch, 2013). Such non-convex costs can induce lumpy adjustments in credit rather than frequent small changes. This naturally leads to wonder to what extent large credit changes drive our results. We partition firms into three groups: those with a debt growth rate $g_{ft}$ above 18%, those with $g_{ft}$ below -18%, and those with $-18\% \leq g_{ft} \leq 18\%$. The choice of the threshold growth rates is somewhat arbitrary. We choose these thresholds following the analysis on large capital changes (investment spikes) by Gourio and Kashyap (2007).10

After allocating firms to these three groups, we sum credit growth rates in each group and for each state we compute the annual credit creation rate due to large credit increases ($POS_{big_{it}}$) and the annual credit destruction rate due to large credit decreases ($NEG_{big_{it}}$). We then calculate the gross and excess credit reallocation due to large credit changes as $SUM_{big_{it}} = POS_{big_{it}} + NEG_{big_{it}}$ and $EXC_{big_{it}} = SUM_{big_{it}} - |NET_{big_{it}}|$, where $NET_{big_{it}} = POS_{big_{it}} - NEG_{big_{it}}$. Table 4, Panels A and B, reports regressions that use these modified credit flows. The inferences we draw are unchanged. In the first stage, interstate liberalization positively affects gross and excess credit reallocation, while leaving credit growth essentially unaltered. In the second stage, credit reallocation exerts a positive impact on state economic activity. The estimated coefficients are similar to those of the baseline regressions. However, notably, in the first stage we estimate a slightly more pronounced impact of interstate deregulation on the gross reallocation due to large credit changes.

9See also Minetti (2007) for a model rationalizing non-convex adjustment costs in credit changes.
10Gourio and Kashyap (2007) study large changes in physical capital (investment spikes) and set a threshold of 20% for the percentage change of physical capital. Following their approach, we choose $|g_{ft}| = 18\%$ (which corresponds to a canonical growth rate of 20%).
5.4 Non-linearities: Intensive margin effects

The estimates above suggest that large credit changes play a pivotal role in the baseline results. The reader could wonder to what extent this pivotal role reflects the influence of extensive margin effects, that is, the creation of credit for the financing of newborn firms and the destruction of credit associated with the death of incumbent firms. In Table 4, Panels C and D, we then focus on the contribution of intensive margin effects, meant as the reallocation of credit among continuing firms. To this end, we recompute the credit flows in (1)-(5) after dropping entering and exiting firms. The results reveal that intensive margin effects are a fundamental driver of the baseline results. In particular, the estimated effect of interstate liberalization on the gross and excess reallocation of credit across continuing firms is only slightly smaller than in the baseline estimates. As for the second stage, the estimated effects are of a magnitude similar to the baseline regressions.

5.5 Non-linearities: Recessions

Credit market imperfections can especially influence firms’ access to credit during recessions (Bernanke, Gertler and Gilchrist, 1996, 2000). The reader may then wonder whether the estimated effects are symmetric over the business cycle. We now experiment with interacting the measures of deregulation (in the first stage) and credit reallocation (in the second stage) with a recession dummy. This dummy takes the value of one if the year marked the onset or the end of one of the six recessions that occurred during our sample period (as identified by the NBER), zero otherwise. The first-stage regressions are in Panels E and F of Table 4, columns 1-3. The estimates suggest that the positive impact of interstate deregulation on the gross reallocation of long-term credit was weaker during recessions. This is consistent with the hypothesis that the stronger obstacles to credit reallocation during downturns diluted the positive impact of interstate liberalization on the dynamism of the credit market in reallocating liquidity.
In the second-stage regressions (see columns 4-14 in Panels E and F), the estimated coefficients of the credit flows are materially unchanged, while the interaction terms between the credit flows and the recession dummy are statistically insignificant. Thus, the effect of credit reallocation on economic activity does not appear to vary between expansions and recessions.

6 Credit reallocation and productivity

The baseline results are silent on the channels through which credit reallocation affects economic activity. The hypothesis we want to test in this section is whether the intensification of credit reallocation prompted by interstate liberalization promoted total factor productivity. This is a natural conjecture: the increased dynamism of credit reallocation may have allowed to transfer funds more swiftly from low-productivity to high-productivity businesses.

6.1 The TFP effect of credit reallocation

To test the impact of credit reallocation on TFP, we first obtain a measure of total factor productivity for each year and state. We follow a standard growth accounting approach to compute total factor productivity by state. We posit that the production function for each state \( \tau \) and year \( \tau \) is a Cobb-Douglas

\[
Y_{it} = A_{it} K_{it}^\alpha N_{it}^{1-\alpha},
\]

where \( Y_{it} \) is the state annual real GDP, \( A_{it} \) stands for total factor productivity, \( K_{it} \) denotes the state physical capital stock, and \( N_{it} \) measures the annual hours worked in the state. The data on annual aggregate physical capital by state were obtained from Peri (2012).\textsuperscript{11} As for labor, because annual data by state on hours worked are

\textsuperscript{11}The construction of the state capital stocks follows Garofalo and Yamarik (2002). This involves distributing the national capital stock by industry and year, obtained from the Bureau of Economic Analysis (BEA), to each state, industry and year according to the percentage of value added for
only available from 2007 onwards, we use the total number of non-farm employees by state and year obtained from the Bureau of Labor Statistics, multiplied by the number of hours worked by an average worker in the state in the year. To compute the annual hours worked by an average worker in a state, we obtain data for each state on the number of hours worked by an average worker during a work week from the March Current Population Survey of the U.S. Census Bureau and the U.S. Bureau of Labor Statistics. We then multiply this number by 46.2, which is the number of weeks worked per year by the average U.S. worker according to Alesina, Glaeser and Sacerdote (2005). In line with the literature, we set the value of the parameter \( \alpha \) (the share of output accruing to capital) equal to 1/3. Total factor productivity is then obtained by solving equation (8) for \( A_{it} \).\(^{12}\) The growth rate of state total factor productivity, averaged across states and years, was 0.77 percent. This figure is very close to that obtained for similar periods for the whole United States by Cette, Kocoglu and Mairesse (2009) and by Maddison (2007).\(^{13}\)

The second-stage estimates reveal a positive and marginally significant effect of gross credit reallocation on total factor productivity growth (see Table 5, columns 1 and 4). An increase in the annual gross reallocation rate of total (long-term) credit by one percentage point would have led to a 0.15 (0.13) percent increase in state TFP growth. Given that the average TFP growth during the sample period was 0.77 percent, this effect is economically significant. Indeed, the increase in TFP growth generated by the increase in the reallocation of credit accounts for roughly 56% of the increase in state-level real per capita GDP growth.\(^{14}\) This figure is substantially

\(^{12}\)Due to lack of data on hours worked before 1976 for some states and before 1977 for most states, we estimate the productivity regressions on a shorter sample that starts in 1977.

\(^{13}\)Cette, Kocoglu and Mairesse (2009) calculate that in the United States in 1980-2006 TFP growth equalled 0.9%. Maddison (2007) calculates that in 1973-2003 TFP growth was 0.7%.

\(^{14}\)We estimate the regressions for state-level real GDP focusing on the same sub-period for which
larger than the average contribution (39%) of TFP growth to real per capita GDP growth over the sample. Thus, the TFP effect of credit reallocation appears to have played a pivotal role in the acceleration of state economic activity. Next, we reestimate the model inserting separately excess credit reallocation and net credit growth. The estimates in columns 2 and 5 of Table 5 reveal that the TFP effect of excess credit reallocation is larger than the TFP effect of gross credit reallocation.\footnote{Panels E and F in the table report the results obtained using large credit flows.}

In the context of productivity effects, it is particularly interesting to investigate to what degree such effects occur along the extensive margin, that is, are driven by the extension of credit to new, possibly highly-productive, firms and the exit of low productive firms from the credit market. To probe this point, we reestimate the regressions after excluding entering and exiting firms. The results remain similar if we restrict attention to the intensive margin (see Panels C and D), which is in line with what found in the baseline tests.

6.2 The role of reallocated efficiency

The above results indicate that the increase in credit reallocation induced by the liberalization fostered TFP growth in the states. The Solow residual is driven by various factors, including the level of technology, managerial and organizational efficiency, the level of human capital. Most interestingly for our analysis, recent research finds that in an environment in which firms exhibit different productivity, the Solow residual can largely reflect the efficiency with which resources are allocated across firms (Hsieh and Klenow, 2009; Restuccia and Rogerson, 2008). The latter channel is a natural candidate for explaining the impact of the enhanced dynamism of credit reallocation on state TFP. As noted, following interstate liberalization and the resulting increase in competition, the higher efficiency of the management of financial institutions could have induced managers to transfer funds from less...
productive to more productive businesses in a more flexible way.

Since we lack firm-level information on hours worked, computing firm-level TFP would entail strong assumptions. We thus choose to rely on (a proxy for) firm-level capital productivity, which reflects both TFP and capital intensity. As suggested by Galindo, Schiantarelli and Weiss (2007), as a proxy for firm capital productivity, we use the sales to capital ratio because firm profits are significantly more noisy than sales. We then obtain evidence on the efficiency of the process of inter-firm credit reallocation adapting the index put forth by Galindo, Schiantarelli and Weiss (2007) to study the efficiency of investment allocation. The index is a ratio. In the numerator, in state \( i \) and year \( t \), the ratio includes the weighted sum of the sales to capital ratios of the firms \( (s_{fit}/k_{fit}) \), where for each firm the weight is given by the contribution of the firm debt to the total debt of the firms in the state in that year \( (c_{fit}/C_{it}) \). In the denominator, the ratio includes the sum of the sales to capital ratios of the same firms weighted by the contribution of the firm debt to the total debt of the firms in the previous year \( (c_{fit-1}/C_{it-1}) \). Formally, the index reads

\[
I_{it} = \frac{\sum_{f} s_{fit} c_{fit}}{\sum_{f} s_{fit} c_{fit-1} / C_{it-1}}.
\]

A value of the \( I_{it} \) index greater than one thus signals that in state \( i \) credit was allocated to more productive firms in year \( t \) than if the credit distribution had remained as in year \( t - 1 \). After computing the index for each year and state, we take the weighted average of the index across states (with weights given by the total sales in the state or by the state GDP). Precisely, the state average for year \( t \) prior or after liberalization is constructed using the values of the index for the states \( t \) years before or after the interstate liberalization of their credit market. The graph of the index, plotted in Figure 1, suggests that the efficiency of credit reallocation jumped up after interstate credit market liberalization. This is consistent with the hypothesis that the estimated TFP effect of credit reallocation was driven by an
enhanced ability to swiftly reallocate credit towards the most productive firms.

7 Robustness

We performed a broad array of tests to assess the robustness of the baseline results. To conserve space, details and tables are in the Appendix 2. The reader could be concerned that, in states with a relatively smaller business sector, our measures of credit flows reflect the credit changes of relatively few businesses. We reestimated the baseline regressions dropping the five states that on average have the smallest number of firms over the sample period. Estimation results remained virtually unaltered. Next, we accounted for the fact that some states chose to impose very tight regulatory restrictions, referred to as “unit banking” rules, which limited banks in the state to a single location (i.e., to have no branches). We then reestimated the empirical model by interacting the indicators of credit market deregulation in the first stage with a dummy taking the value of one if the state was one of the sixteen unit banking states, zero otherwise. Again, we detected no difference in the results.

As noted, large firms could be less sensitive than smaller ones to credit market conditions. In a third robustness check, we then recomputed credit flows after removing the top 5% firms in terms of employees. If anything, the estimates suggest a slightly stronger impact of credit reallocation on economic activity once we remove large firms. In a fourth robustness check, we reestimated the model inserting a proxy for government expenditure on public infrastructure, the real growth rate of highway expenditures. The results remained virtually unchanged, while the coefficient on (our proxy for) the expenditure on public infrastructure was seldom significant.\textsuperscript{16}

Finally, we carried out placebo tests by pretending that the treatment (policy change) occurred in years different from the actual year of deregulation. As expected, moving the threshold date away from the year of liberalization tended to reduce the magnitude and statistical significance of the coefficient for interstate deregulation.

\textsuperscript{16}Inserting this proxy in the regressions for TFP growth also left the results materially unaltered.
8 Conclusion

Aggregate credit growth masks a continuous, intense process of reallocation of credit across firms. This paper has investigated the impact of credit market liberalization on the process of credit reallocation and, in turn, the effect of credit reallocation on aggregate economic activity. We have exploited the staggered liberalization of the credit markets of the U.S. states that occurred from the late seventies to the early nineties as a natural experiment. We have found that the lifting of the interstate banking restrictions intensified the inter-firm reallocation of credit and that, in turn, the resulting intensification of credit reallocation boosted state economic activity. We have found instead no evidence that the credit market deregulation affected aggregate credit growth. We have also sought to disentangle the channels through which credit reallocation affects economic activity. The results suggest that a sizeable portion of the increase in GDP growth triggered by the enhanced dynamism of credit reallocation is attributable to an increase in total factor productivity growth.

We believe that our results convey two important messages. First, they support the idea that financial regulation can have a significant impact on the reallocation of financial resources across firms. Second, more broadly, they suggest that the dynamic process of reallocation of credit is a key channel through which aggregate shocks and structural reforms can affect economic activity. More work is clearly needed to understand the properties and the quantitative importance of this channel.

References


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### Table 1
Sample summary statistics

The table reports the definitions and summary statistics for the variables included in the regression analysis. The statistics are computed across all of the year-state observations in the sample period. For all variables, summary statistics refer to the 1969-2001 period, except GDP per capita growth that refers to the 1969-1997 period, employment growth that refers to the 1970-2001 period, and productivity growth that refers to the 1977-2001 period. Year-state credit flows (SUM, EXC, NET) are computed from the firm-level credit changes using the methodology described in the paper.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Definitions</th>
<th>Number of observations</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>First quartile</th>
<th>Median</th>
<th>Third quartile</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent variable</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP per capita growth</td>
<td>log difference of state real per capita GDP, in percent</td>
<td>1416</td>
<td>2.15</td>
<td>3.83</td>
<td>0.31</td>
<td>2.35</td>
<td>4.29</td>
</tr>
<tr>
<td>Employment growth</td>
<td>log difference of state employment, in percent</td>
<td>1557</td>
<td>2.03</td>
<td>2.15</td>
<td>0.88</td>
<td>2.05</td>
<td>3.30</td>
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<tr>
<td>Personal income per capita growth</td>
<td>log difference of state real per capita personal income, in percent</td>
<td>1606</td>
<td>2.35</td>
<td>2.60</td>
<td>0.96</td>
<td>2.45</td>
<td>3.76</td>
</tr>
<tr>
<td>Productivity growth</td>
<td>log difference of state total factor productivity, in percent</td>
<td>1180</td>
<td>0.77</td>
<td>2.62</td>
<td>-0.61</td>
<td>0.81</td>
<td>2.19</td>
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<tr>
<td><strong>Endogenous variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Total SUM</td>
<td>gross total credit reallocation in the state, in percent</td>
<td>1606</td>
<td>19.60</td>
<td>16.10</td>
<td>11.04</td>
<td>15.63</td>
<td>22.77</td>
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<td>Total EXC</td>
<td>excess total credit reallocation in the state, in percent</td>
<td>1606</td>
<td>9.52</td>
<td>7.80</td>
<td>4.30</td>
<td>8.05</td>
<td>12.92</td>
</tr>
<tr>
<td>Total NET</td>
<td>net total credit growth in the state, in percent</td>
<td>1606</td>
<td>4.03</td>
<td>17.74</td>
<td>-2.70</td>
<td>2.83</td>
<td>8.77</td>
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<tr>
<td>Long-term SUM</td>
<td>gross long-term credit reallocation in the state, in percent</td>
<td>1606</td>
<td>20.89</td>
<td>18.76</td>
<td>11.49</td>
<td>16.25</td>
<td>24.18</td>
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<td>Long-term EXC</td>
<td>excess long-term credit reallocation in the state, in percent</td>
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<td>8.66</td>
<td>4.59</td>
<td>8.85</td>
<td>13.56</td>
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<td>Long-term NET</td>
<td>net long-term credit growth in the state, in percent</td>
<td>1606</td>
<td>3.74</td>
<td>20.44</td>
<td>-2.97</td>
<td>2.15</td>
<td>8.89</td>
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<tr>
<td>Total SUMbig</td>
<td>gross total credit reallocation due to large credit changes in the state</td>
<td>1606</td>
<td>14.57</td>
<td>17.08</td>
<td>5.03</td>
<td>9.77</td>
<td>18.39</td>
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<tr>
<td>Total EXCb</td>
<td>excess total credit reallocation due to large credit changes in the state</td>
<td>1606</td>
<td>5.93</td>
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<td>1.16</td>
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<tr>
<td>Total NETbig</td>
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<td>-1.29</td>
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<td>7.12</td>
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<td>15.81</td>
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<td>10.73</td>
<td>19.79</td>
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<td>excess long-term credit reallocation due to large credit changes in the state, in percent</td>
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<td>6.42</td>
<td>8.20</td>
<td>1.15</td>
<td>3.90</td>
<td>9.03</td>
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<tr>
<td>Long-term NETbig</td>
<td>net long-term credit growth due to large credit changes in the state, in percent</td>
<td>1606</td>
<td>4.10</td>
<td>19.96</td>
<td>-0.83</td>
<td>1.95</td>
<td>7.26</td>
</tr>
<tr>
<td><strong>Instrumental variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interstate</td>
<td>=1 starting on the year a state allowed interstate banking</td>
<td>1606</td>
<td>0.47</td>
<td>0.50</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Intrastate</td>
<td>=1 starting on the year a state allowed intrastate branching</td>
<td>1606</td>
<td>0.60</td>
<td>0.49</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Controls</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mining</td>
<td>labor share of the mining sector in total non-farm state employment, in percent</td>
<td>1606</td>
<td>1.24</td>
<td>1.95</td>
<td>0.17</td>
<td>0.41</td>
<td>1.41</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>labor share of the manufacturing sector in total non-farm state employment, in percent</td>
<td>1606</td>
<td>15.32</td>
<td>7.06</td>
<td>10.67</td>
<td>14.97</td>
<td>20.32</td>
</tr>
<tr>
<td>Construction</td>
<td>labor share of the construction sector in total non-farm state employment, in percent</td>
<td>1606</td>
<td>5.57</td>
<td>1.19</td>
<td>4.80</td>
<td>5.54</td>
<td>6.23</td>
</tr>
<tr>
<td>Transportation</td>
<td>labor share of the transportation sector in total non-farm state employment, in percent</td>
<td>1606</td>
<td>5.09</td>
<td>0.90</td>
<td>4.47</td>
<td>5.02</td>
<td>5.66</td>
</tr>
<tr>
<td>Trade</td>
<td>labor share of the trade sector in total non-farm state employment, in percent</td>
<td>1606</td>
<td>21.31</td>
<td>2.39</td>
<td>20.49</td>
<td>21.70</td>
<td>22.56</td>
</tr>
<tr>
<td>Finance</td>
<td>labor share of the finance sector in total non-farm state employment, in percent</td>
<td>1606</td>
<td>7.19</td>
<td>1.39</td>
<td>6.21</td>
<td>7.04</td>
<td>7.98</td>
</tr>
<tr>
<td>Services</td>
<td>labor share of the services sector in total non-farm state employment, in percent</td>
<td>1606</td>
<td>25.29</td>
<td>5.53</td>
<td>20.73</td>
<td>24.86</td>
<td>28.86</td>
</tr>
<tr>
<td>Government</td>
<td>labor share of the government sector in total non-farm state employment, in percent</td>
<td>1606</td>
<td>17.98</td>
<td>5.42</td>
<td>14.37</td>
<td>16.78</td>
<td>19.89</td>
</tr>
<tr>
<td>Recession</td>
<td>=1 if any part of the year is associated with a recession</td>
<td>1606</td>
<td>0.33</td>
<td>0.47</td>
<td>0</td>
<td>0</td>
<td>1</td>
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</tbody>
</table>
Credit market deregulation and credit reallocation (first stage results)

The table reports regression coefficients of the first stage for the impact of deregulation on credit flows within states. Robust standard errors are in parentheses. All coefficients and standard errors are multiplied by 100 for an easier interpretation. The regressions are estimated by ordinary least squares. The dependent variables are gross credit reallocation (SUM) in columns (1), (2), (7) and (8), excess credit reallocation (EXC) in columns (3), (4), (9) and (10), and net credit growth (NET) in columns (5), (6), (11) and (12). Panels A) and C) refer to total credit, Panels B) and D) to long-term credit. Interstate (Intrastate) is an indicator variable taking the value of one starting on the year a state allowed interstate banking (intrastate branching), zero otherwise. Panels A and B include Interstate but not Intrastate; Panels C and D include both Interstate and Intrastate. Mining, manufacturing, construction, transportation, trade, finance, services, and government are the labor shares of the various sectors in total non-farm employment, in percent. All regressions include state and year effects. *, **, and *** denote statistical significance at the 10, 5 and 1% level, respectively. Panels C and D of the table also report the F-statistic and the corresponding p-value for an F-test of joint significance of the instruments.

<table>
<thead>
<tr>
<th>Explanatory variables</th>
<th>Panel A: Total Credit</th>
<th>Panel B: Long-term Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SUM (1)</td>
<td>SUM (2)</td>
</tr>
<tr>
<td>Instrumental variables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interstate</td>
<td>6.36***</td>
<td>5.78***</td>
</tr>
<tr>
<td></td>
<td>(1.87)</td>
<td>(1.74)</td>
</tr>
<tr>
<td>Exogenous variables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mining</td>
<td>-0.35</td>
<td>0.30</td>
</tr>
<tr>
<td></td>
<td>(8.63)</td>
<td>(1.58)</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>-0.74</td>
<td>-0.78</td>
</tr>
<tr>
<td></td>
<td>(8.98)</td>
<td>(1.53)</td>
</tr>
<tr>
<td>Construction</td>
<td>-0.73</td>
<td>-0.01</td>
</tr>
<tr>
<td></td>
<td>(8.83)</td>
<td>(1.55)</td>
</tr>
<tr>
<td>Transportation</td>
<td>-0.84</td>
<td>-1.75</td>
</tr>
<tr>
<td></td>
<td>(9.40)</td>
<td>(1.60)</td>
</tr>
<tr>
<td>Trade</td>
<td>-0.84</td>
<td>-0.95</td>
</tr>
<tr>
<td></td>
<td>(8.96)</td>
<td>(1.57)</td>
</tr>
<tr>
<td>Finance</td>
<td>-0.85</td>
<td>-0.84</td>
</tr>
<tr>
<td></td>
<td>(8.44)</td>
<td>(1.43)</td>
</tr>
<tr>
<td>Services</td>
<td>-0.81</td>
<td>-0.73</td>
</tr>
<tr>
<td></td>
<td>(8.96)</td>
<td>(1.55)</td>
</tr>
<tr>
<td>Government</td>
<td>-0.29</td>
<td>-0.78</td>
</tr>
<tr>
<td></td>
<td>(8.99)</td>
<td>(1.52)</td>
</tr>
<tr>
<td>Number of observations</td>
<td>1416</td>
<td>1416</td>
</tr>
</tbody>
</table>
Credit reallocation and economic activity (second stage results)

The table reports regression coefficients of the second stage for the impact of credit flows on state economic activity. Robust standard errors are in parentheses. Coefficients and standard errors for the labor share variables (displayed only in Panels A and B to conserve space) are multiplied by 100 for an easier interpretation. The regressions are estimated by two-stage least squares to control for the endogeneity of credit flows. The dependent variable is the log difference of state real per capita GDP in Panels A and B, the log difference of state real per capita personal income in Panels E and F. Panels A, C, and E report regressions using total credit flows, panels B, D, and F report regressions using long-term credit flows. SUM is gross credit reallocation in columns (1), (2), (7), and (8), EXC is excess credit reallocation in columns (3), (4), (9) and (10), NET is net credit growth in columns (5), (6), (11) and (12). Mining, manufacturing, construction, transportation, trade, finance, services, and government are the labor shares of the various sectors in total non-farm employment, in percent. All regressions include state and year effects. *, **, and *** denote statistical significance at the 10, 5 and 1% level, respectively.

<table>
<thead>
<tr>
<th>Explanatory variables</th>
<th>Panel A: Total Credit</th>
<th>Panel B: Long-term Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GDP growth</td>
<td>GDP growth</td>
</tr>
<tr>
<td></td>
<td>(1) (2) (3) (4) (5) (6)</td>
<td>(7) (8) (9) (10) (11) (12)</td>
</tr>
<tr>
<td>SUM</td>
<td>0.28** (0.12)</td>
<td>0.23*** (0.09)</td>
</tr>
<tr>
<td>EXC</td>
<td>0.57** (0.22)</td>
<td>0.41*** (0.15)</td>
</tr>
<tr>
<td>NET</td>
<td>0.42* (0.25)</td>
<td>0.38*** (0.15)</td>
</tr>
<tr>
<td>Mining</td>
<td>3.59 (3.73)</td>
<td>5.24 (3.33)</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>4.01 (3.95)</td>
<td>5.65 (3.49)</td>
</tr>
<tr>
<td>Construction</td>
<td>4.52 (3.98)</td>
<td>6.18* (3.47)</td>
</tr>
<tr>
<td>Transportation</td>
<td>4.73 (4.36)</td>
<td>6.10 (3.82)</td>
</tr>
<tr>
<td>Trade</td>
<td>3.81 (3.84)</td>
<td>5.26 (3.41)</td>
</tr>
<tr>
<td>Finance</td>
<td>3.68 (3.72)</td>
<td>5.49* (3.30)</td>
</tr>
<tr>
<td>Services</td>
<td>4.28 (3.95)</td>
<td>5.75* (3.49)</td>
</tr>
<tr>
<td>Government</td>
<td>4.24 (3.92)</td>
<td>5.81* (3.48)</td>
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</table>

Number of observations 1416 1416 1416 1416 1416 1416 1416 1416 1416 1416 1416 1416

<table>
<thead>
<tr>
<th>Explanatory variables</th>
<th>Panel C: Total Credit</th>
<th>Panel D: Long-term Credit</th>
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<tr>
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<td>Employment growth</td>
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</tr>
<tr>
<td></td>
<td>(1) (2) (3) (4) (5) (6)</td>
<td>(7) (8) (9) (10) (11) (12)</td>
</tr>
<tr>
<td>SUM</td>
<td>0.15*** (0.06)</td>
<td>0.13*** (0.05)</td>
</tr>
<tr>
<td>EXC</td>
<td>0.34** (0.14)</td>
<td>0.20* (0.11)</td>
</tr>
<tr>
<td>NET</td>
<td>0.21* (0.11)</td>
<td>0.23* (0.13)</td>
</tr>
<tr>
<td>Labor shares</td>
<td>No Yes No Yes No Yes</td>
<td>No Yes No Yes No Yes</td>
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Number of observations 1557 1557 1557 1557 1557 1557 1557 1557 1557 1557 1557 1557

<table>
<thead>
<tr>
<th>Explanatory variables</th>
<th>Panel E: Total Credit</th>
<th>Panel F: Long-term Credit</th>
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<tr>
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<td>Personal income growth</td>
<td>Personal income growth</td>
</tr>
<tr>
<td></td>
<td>(1) (2) (3) (4) (5) (6)</td>
<td>(7) (8) (9) (10) (11) (12)</td>
</tr>
<tr>
<td>SUM</td>
<td>0.15** (0.07)</td>
<td>0.13** (0.05)</td>
</tr>
<tr>
<td>EXC</td>
<td>0.34** (0.17)</td>
<td>0.21* (0.11)</td>
</tr>
<tr>
<td>NET</td>
<td>0.21* (0.11)</td>
<td>0.23* (0.14)</td>
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<tr>
<td>Labor shares</td>
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<td>No Yes No Yes No Yes</td>
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</table>

Number of observations 1606 1606 1606 1606 1606 1606 1606 1606 1606 1606 1606 1606
The table reports regression coefficients of the first stage for the impact of deregulation on credit flows within states and of the second stage for the impact of credit flows on measures of economic activity after accounting for possible non-linearities due to large credit changes (Panels A and B), to intensive margin effects (Panels C and D), or to recessions (Panels E and F). Robust standard errors are in parentheses. All regressions include state and year effects and the labor shares of the various sectors in total non-farm employment (coefficients and standard errors are not reported to conserve space). The regressions in the first stage are estimated by ordinary least squares, 2SLS to control for the endogeneity of credit flows. The dependent variables in Panels A, C and E are gross total credit reallocation (SUM) in column (1), excess total credit destruction of at least 18% in absolute value. In Panel C all the flows are constructed using only credit changes of continuing firms. The dependent variables in Panels B, D and F are gross long-term credit reallocation (EXC) in column (2), and net long-term credit growth (NET) in column (3). In Panel B all these flows are constructed using large credit changes. In Panel D all the flows are constructed using only credit changes of continuing firms. In columns (4) - (6) of all panels, the dependent variable is the log difference of state real per capita GDP. In columns (7) - (9) of all panels, the dependent variable is the log difference of state employment. In columns (10) - (12) of all panels, the dependent variable is the log difference of real per capita state personal income. In Panels E and F, recession is a dummy that takes the value of one for the six NBER recessions that occurred during the sample period, zero otherwise. Recession interaction is the interaction term between the recession dummy and the credit flow of interest (SUM, EXC or NET). In all panels, regressions have 146 observations, regressions (1)-(6) have 146 observations, regressions (7)-(12) have 146 observations.

<table>
<thead>
<tr>
<th>Panel</th>
<th>First Stage</th>
<th>Second Stage</th>
<th>GDP Growth</th>
<th>Employment Growth</th>
<th>Personal Income Growth</th>
</tr>
</thead>
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<tr>
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<td>SUMbig/EXCbig/NETbig</td>
<td>SUMbig/EXCbig/NETbig</td>
<td>SUMbig/EXCbig/NETbig</td>
<td>SUMbig/EXCbig/NETbig</td>
<td>SUMbig/EXCbig/NETbig</td>
</tr>
<tr>
<td></td>
<td>(1) 6.37*** (1.88)</td>
<td>(1) 3.35*** (1.87)</td>
<td>(1) 6.87*** (1.88)</td>
<td>(1) 6.87*** (1.88)</td>
<td>(1) 6.87*** (1.88)</td>
</tr>
<tr>
<td></td>
<td>(2) 2.76*** (1.91)</td>
<td>(2) 2.76*** (1.91)</td>
<td>(2) 2.76*** (1.91)</td>
<td>(2) 2.76*** (1.91)</td>
<td>(2) 2.76*** (1.91)</td>
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<tr>
<td></td>
<td>(3) 0.23** (1.11)</td>
<td>(3) 0.23** (1.11)</td>
<td>(3) 0.23** (1.11)</td>
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<tr>
<td></td>
<td>(4) 0.48*** (0.26)</td>
<td>(4) 0.48*** (0.26)</td>
<td>(4) 0.48*** (0.26)</td>
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<tr>
<td></td>
<td>(5) 0.17*** (0.25)</td>
<td>(5) 0.17*** (0.25)</td>
<td>(5) 0.17*** (0.25)</td>
<td>(5) 0.17*** (0.25)</td>
<td>(5) 0.17*** (0.25)</td>
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<tr>
<td></td>
<td>(6) 0.25** (0.26)</td>
<td>(6) 0.25** (0.26)</td>
<td>(6) 0.25** (0.26)</td>
<td>(6) 0.25** (0.26)</td>
<td>(6) 0.25** (0.26)</td>
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<tr>
<td></td>
<td>(7) 0.12** (0.11)</td>
<td>(7) 0.12** (0.11)</td>
<td>(7) 0.12** (0.11)</td>
<td>(7) 0.12** (0.11)</td>
<td>(7) 0.12** (0.11)</td>
</tr>
<tr>
<td></td>
<td>(8) 0.23* (0.14)</td>
<td>(8) 0.23* (0.14)</td>
<td>(8) 0.23* (0.14)</td>
<td>(8) 0.23* (0.14)</td>
<td>(8) 0.23* (0.14)</td>
</tr>
<tr>
<td></td>
<td>(9) 0.21* (0.10)</td>
<td>(9) 0.21* (0.10)</td>
<td>(9) 0.21* (0.10)</td>
<td>(9) 0.21* (0.10)</td>
<td>(9) 0.21* (0.10)</td>
</tr>
<tr>
<td></td>
<td>(10) 0.12** (0.06)</td>
<td>(10) 0.12** (0.06)</td>
<td>(10) 0.12** (0.06)</td>
<td>(10) 0.12** (0.06)</td>
<td>(10) 0.12** (0.06)</td>
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<td>(11) 0.27** (0.10)</td>
<td>(11) 0.27** (0.10)</td>
<td>(11) 0.27** (0.10)</td>
<td>(11) 0.27** (0.10)</td>
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</tr>
<tr>
<td></td>
<td>(12) 0.24* (0.06)</td>
<td>(12) 0.24* (0.06)</td>
<td>(12) 0.24* (0.06)</td>
<td>(12) 0.24* (0.06)</td>
<td>(12) 0.24* (0.06)</td>
</tr>
</tbody>
</table>

* denotes statistical significance at the 10%, ** at the 5%, and *** at the 1% level, respectively.
The table reports regression coefficients of the second stage for the impact of credit flows on the growth of state total factor productivity. Robust standard errors are in parentheses. Coefficients and standard errors for the labor share variables are multiplied by 100 for an easier interpretation. The regressions are estimated by two-stage least squares to control for the endogeneity of credit flows. The dependent variable is the log difference of state total factor productivity. In columns (1) and (4) SUM is gross credit reallocation, in columns (2) and (5) EXC is excess credit reallocation, in columns (3) and (6) NET is net credit growth. In columns (7) and (10) SUM' is gross credit reallocation with new and dying firms excluded, in columns (8) and (11) EXC' is excess credit reallocation with new and dying firms excluded, in columns (9) and (12) NET' is net credit growth with new and dying firms excluded. In columns (13) and (16) SUMbig is gross credit reallocation due to large credit changes, in columns (14) and (17) EXCbig is excess credit reallocation due to large credit changes, in columns (15) and (18) NETbig is net credit growth due to large credit changes. Mining, manufacturing, construction, transportation, trade, finance, services, and government are the labor shares of the various sectors in total non-farm employment, in percent. All regressions include state and year effects. *, **, and *** denote statistical significance at the 10, 5 and 1% level, respectively.

<table>
<thead>
<tr>
<th>Explanatory variables</th>
<th>Panel A: Total Credit Growth</th>
<th>Panel B: Long-Term Credit Growth</th>
<th>Panel C: Total Credit Growth (Flows w/o Entry and Exit)</th>
<th>Panel D: Long-Term Credit Growth (Flows w/o Entry and Exit)</th>
<th>Panel E: Total Credit Growth (Large Flows)</th>
<th>Panel F: Long-Term Credit Growth (Large Flows)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Productivity growth)</td>
<td>(Productivity growth)</td>
<td>(Productivity growth)</td>
<td>(Productivity growth)</td>
<td>(Productivity growth)</td>
<td>(Productivity growth)</td>
</tr>
<tr>
<td>SUM / SUM' / SUMbig</td>
<td>0.15* (0.08)</td>
<td>0.13* (0.07)</td>
<td>0.14** (0.07)</td>
<td>0.12** (0.06)</td>
<td>0.13* (0.07)</td>
<td>0.12* (0.06)</td>
</tr>
<tr>
<td>EXC / EXC' / EXCbig</td>
<td>0.31* (0.19)</td>
<td>0.21* (0.11)</td>
<td>0.29* (0.16)</td>
<td>0.19** (0.09)</td>
<td>0.28* (0.16)</td>
<td>0.21* (0.11)</td>
</tr>
<tr>
<td>NET / NET' / NETbig</td>
<td>0.25 (0.19)</td>
<td>0.30 (0.27)</td>
<td>0.26 (0.18)</td>
<td>0.28 (0.21)</td>
<td>0.26 (0.21)</td>
<td>0.29 (0.25)</td>
</tr>
<tr>
<td>Mining</td>
<td>3.44 (1.88)</td>
<td>2.76 (2.68)</td>
<td>3.89 (1.86)</td>
<td>4.61 (1.91)</td>
<td>2.89 (1.84)</td>
<td>2.29 (1.84)</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>3.41 (2.11)</td>
<td>2.68 (2.97)</td>
<td>3.89 (2.91)</td>
<td>4.90 (4.00)</td>
<td>2.87 (2.63)</td>
<td>1.93 (2.77)</td>
</tr>
<tr>
<td>Construction</td>
<td>3.19 (1.81)</td>
<td>2.60 (2.59)</td>
<td>3.61 (1.92)</td>
<td>4.60 (4.00)</td>
<td>2.76 (3.03)</td>
<td>1.59 (3.75)</td>
</tr>
<tr>
<td>Transportation</td>
<td>3.84 (2.45)</td>
<td>3.63 (2.56)</td>
<td>4.71 (2.04)</td>
<td>5.05 (2.04)</td>
<td>3.21 (2.85)</td>
<td>1.94 (3.47)</td>
</tr>
<tr>
<td>Trade</td>
<td>3.46 (1.22)</td>
<td>2.31 (1.93)</td>
<td>3.88 (3.01)</td>
<td>4.29 (3.96)</td>
<td>2.77 (2.67)</td>
<td>2.22 (3.96)</td>
</tr>
<tr>
<td>Finance</td>
<td>3.50 (1.39)</td>
<td>3.06 (2.16)</td>
<td>3.91 (1.93)</td>
<td>5.10 (1.98)</td>
<td>3.14 (2.67)</td>
<td>1.84 (3.96)</td>
</tr>
<tr>
<td>Services</td>
<td>3.53 (1.28)</td>
<td>2.95 (2.39)</td>
<td>3.91 (1.93)</td>
<td>5.10 (1.98)</td>
<td>2.93 (2.67)</td>
<td>2.21 (3.96)</td>
</tr>
<tr>
<td>Government</td>
<td>3.36 (1.13)</td>
<td>3.09 (2.12)</td>
<td>3.80 (2.09)</td>
<td>5.28 (2.00)</td>
<td>2.80 (2.57)</td>
<td>2.09 (4.86)</td>
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Figure 1. Efficiency of Credit Reallocation

Note: This figure plots the efficiency index from ten years before the interstate deregulation to ten years after the interstate deregulation. The efficiency index is defined in the main text.