U.S. Banking Deregulation, Small Businesses, and Interstate Insurance of Personal Income*

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Abstract

We estimate the effects of deregulation of U.S. banking restrictions on the amount of interstate personal income insurance during the period 1970–2001. Interstate income insurance occurs when personal income react less than one-to-one to state-specific shocks to output. We find that income insurance improved after banking deregulation, and that this effect is larger in states where small businesses are more important. We further show that the impact of deregulation is stronger for proprietors' income than for wage income. Our explanation of this result centers on the role of banks as a prime source of small business finance and on the close intertwining of the personal and business finances of small business owners. Our analysis casts light on the real effects of bank deregulation, on the insurance function of banks, and on the integration of bank markets.

Keywords: Financial deregulation, integration of bank markets, interstate risk sharing, small business finance.

*Sørensen thanks Norges Bank for its hospitality. Comments are appreciated.
1 Introduction

Since the 1970s, the structure of the U.S. banking industry has changed considerably following deregulation of restrictions on branching and interstate banking. The ensuing wave of consolidation has increased the average bank company size and allowed banks to expand into new geographical markets by operating larger branch networks or bank holding companies. Banks play a central role in the allocation of capital in the economy and is the prime source of finance to small businesses.

We examine if the changes in bank market structure has had real effects for small business owners. In particular, we measure the amount of interstate personal income insurance before and after deregulation: we compare income insurance in states where small businesses are more and less prevalent, and consider the sensitivity of proprietors’ income to state-level output shocks. By income insurance we mean the extent to which, in a given state, state-specific personal income fluctuates with state-specific shocks to output. In states that are financially integrated with other states, agents may trade (contingent) claims on output (e.g., equity or direct investments) across state-borders thereby sharing state-specific risks with residents of other states, and (partly) insulating personal income from fluctuations in state-level output. Through transactions with intermediaries such as banks, agents share output risks indirectly via the contracts they hold with the bank. If banking deregulation has improved integration of previously separated bank markets, interstate income insurance may well have improved in states where small business owners’ component of personal income is high. This follows from the close intertwining of the personal and firm finances of small business owners.¹

We examine if banking deregulation improved personal income insurance for small business owners. The effect of banking deregulation on income insurance is estimated using annual state-level data for the period 1970–2001. We find that the average level of income insurance is lower in states with many small businesses. We further find that banking deregulation has a positive effect on income insurance overall. The marginal effect of banking deregulation is in the order of 5–10 percentage point, in the sense that an additional 5–10 percent of a state-specific output shock is smoothed on average, and this effect is larger in states where small businesses are more prevalent. Hence, in states with many small businesses, the additional improvement in income insurance is in the order of 10–20 percentage point.² We provide additional evidence for our hypothesis by showing that the impact of banking reform is considerably larger for proprietors’ income than for other components of income.

¹Ang (1992), Berger and Udell (1998), and Avery, Bostic, and Samolyk (1999). Also see Section 2
²We employ two measures of deregulation; dummies for the dates of banking deregulation, first used by Jayaratne and Strahan (1996), and a measure of bank assets acquired through mergers and acquisitions, constructed from Call Reports by Rhoades (1985, 1996).
The informational opaqueness of small businesses without an established reputation for quality prevents them from raising arm’s-length finance in public markets. Banks, on the other hand, may mitigate such informational asymmetries through repeated interaction and monitoring (Diamond (1984, 1991), and Rajan (1992)). When a bank provides finance to a firm, it shares risk with the firm’s owners by bearing a part of the firm’s output risk. This may be especially important for small businesses as they depend on bank loans for their operations. In contrast, when a business is entirely self-financed by the owner, the owner bears all output risk himself and cannot insure his personal income from shocks to his business. This is reflected in the cross-sectional pattern of state-level income insurance that we establish: states with many small businesses or many proprietors, exhibit a lower average level of income insurance. This finding is consistent with Agronin (2003), who finds that income insurance is lower in states where proprietors’ income makes up a larger share of personal income.

Banking deregulation may have improved income insurance by increasing the availability of small business finance, whether to existing or new borrowers. Alternatively, even if the total volume of small business loans were unchanged, banking deregulation may have altered banks’ pattern of lending, allowing small business owners to further the separation of their personal finances from those of their firm. This latter channel points to the importance of bank-borrower relationships for the efficiency of the capital allocation process. In a valuable bank-borrower relationship, the bank may have incentives to offer (self-enforcing) implicit contracts that facilitate insurance, for example through the continued extension of credit during bad times (Allen and Gale (2000) and Boot (2000)). Each of these two channels would work to lower the correlation between state-specific output and personal income.

We conjecture that deregulation may have altered the pattern of banks’ small business lending in two main ways: 1) improved efficiency of the banks operating after deregulation and 2) improved efficiency of interbank capital allocation, in the sense that deregulation improved banks’ ability to share risks amongst themselves, the benefits of which were passed on to borrowers. We discuss the empirical evidence underlying these conjectures in Section 2.2.

*Call Report* data on the small business lending by U.S. banks has been reported only since 1994.3 Hence, we cannot directly test for changes in banks’ patterns of small business lending following deregulation. Alternatively, we provide evidence that state-specific personal income is smoothed following deregulation, and that (part of) this improvement in income insurance is related to the prevalence of small businesses and insurance of proprietors’ income, consistent with our hypothesis that banks’ small business lending is an

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3See e.g. Wolken (1998).
important channel for the insurance of small business owners’ income.4

Other papers have examined the real effects of branching deregulations in the U.S. In an important contribution, Jayaratne and Strahan (1996) show that state per capita growth increased in states that deregulated, both when measured in terms of personal income and state GDP.5 Our findings are closely related to those of Jayaratne and Strahan as both papers identify banking deregulation as an impetus for an economic process with significant real effects at the macro level. In this paper, we additionally identify the link between banks’ insurance role in the financing of small businesses as a potential channel of welfare gain from bank integration. Petersen and Rajan (1994) find evidence that small businesses in the U.S. benefit from lending relationships and our results complement theirs by pointing to the value of bank relationships in small businesses finance.6

Our paper is also related to research on the integration of U.S. states. Asdrubali, Sørensen, and Yosha (1996) study income insurance through cross-regional holdings of debt and equity (“capital market income smoothing”) and via the super-regional tax-transfer system (“federal government income smoothing”).7

The rest of the paper is organized as follows. Section 2 discusses in more detail the channels through which deregulation may affect the insurance of state-specific personal income in the light of the current empirical research. In Section 3, we briefly present the history of banking deregulation in the U.S. Section 4 presents our measure of interstate income insurance, Section 5 describes our data, and Section 6 presents the empirical results. Section 7 concludes.

4Banking deregulation may have affected interstate income insurance in other ways. One channel may work through the capital income of households. If bank finance makes it easier for firms to raise external non-bank finance, banking deregulation may have helped smooth dividends paid by such firms. Personal income may also have been smoothed through households’ capital income if changes in the size of bank organizations smoothed income streams earned by owners of securities issued by banks. Alternatively, multi-state bank organizations may disperse the effect of state-specific shocks throughout the organization. For example, following losses in one state, layoffs and cost-cuttings may be extended to include on subsidiaries and branches in other states.

5They also demonstrate, importantly, that branching deregulations are exogenous to state-level growth, that is, states did not tend to deregulate in the expectation of an imminent economic upturn.

6Other work on this issue include Morgan, Rime, and Strahan (2003) who find that integration lowers state-specific variation in (total and small business) employment.

7Atkeson and Bayoumi (1993) seem to have been the first to bring up the issue of income insurance across U.S. states through private capital markets, see also Crucini (1999) for another early paper on risk sharing across U.S. states. Sala-i Martin and Sachs (1992) suggest that the federal government in the U.S. provides substantial income insurance to states through procyclical taxes and countercyclical transfers. That paper, and many following it, focused on the U.S. states as members of a successful currency union (the United States) that should be studied as a model for the European Union.
2 Channels of improvements in personal income insurance

2.1 Evidence on small business finance in the U.S.

Our hypothesis that personal income insurance improved after deregulation through banks’ small business lending builds on two fundamental observations: 1) small firms depend heavily on bank-intermediated finance, 2) the intertwining of owners’ financial position with that of their business. In the following we discuss this evidence and its relation to our hypothesis.

It is well-established empirically that bank-intermediated finance is one of the main sources of small business funding in the U.S. For example, Berger and Udell (1998) present evidence from the 1993 National Survey of Small Business Finance (NSSBF) which demonstrates that small businesses rely heavily on commercial bank finance from their very first years. According to the survey, bank debt finance constitutes 16 percent of total assets for “infant” (0–2 years) firms, and 31 percent of “adolescent” (3–4 years) firms. For older age groups, the ratio is 17 percent (on average). This is compared to total equity stakes of 48 percent, 39 percent and 52 percent, respectively (ibid, table 1, p. 620). In fact, overall in the sample, commercial bank debt is the most important external source of finance.\(^8\)

An important characteristic of small business finance is the intertwining of the owners’ financial position with that of their business. Hence, funds (mostly in the form of equity) provided by the principal owner is the most important source, amounting to 35% of all funding. Trade credit is the third most important source of funds. Furthermore, outside finance often has personal commitments attached. Avery, Bostic, and Samolyk (1999) report that 80% of small firms with loans, have loans with personal commitments.\(^9\) Ang (1992) reports that about 40 percent of small business loans and 60 percent of loan dollars are guaranteed and/or secured by personal assets.

The 1993 NSSBF also documents the importance of finance, esp. equity, from insider sources other than the owner, that is, from family, friends and other people involved in the business. Such equity was the second most important source of equity, constituting 13 percent of total assets (Berger and Udell (1998)).

The above observations are, of course, consistent with the notion that agency conflicts rooted in asymmetries of information are severe for small businesses. As noted above,

\(^8\)The most common form of small business debt supplied by commercial banks—constituting 56 percent of total small business debt—is lines of credit. The next most important loan types are mortgage and equipment loans, 15 percent and 10 percent, respectively (Berger and Udell (1998)).

\(^9\)That is, loans with either personal collateral or a personal guarantee attached. In the case of personal collateral the creditor holds a prioritized claim on specific assets of the borrower and controls the use of the assets. A personal guarantee is a more general claim on personal wealth which places fewer restrictions on the guarantor’s use of his wealth. The figures are based on the 1987 and 1993 NSSBF, and the Survey of Consumer Finances.
the interpretation of our results centers on the dependency of small businesses on bank intermediated finance.\textsuperscript{10} It is exactly because the average small business has no real substitutes for bank finance, other than own funds or funds raised from family and friends, that part of the efficiency gain from banking deregulation is likely to work through small businesses. Through the requirement of part self-financing, collateral and guarantees, and through monitoring and repeated interaction over time, banks may mitigate problems of adverse selection and moral hazard.\textsuperscript{11}

Banking deregulation may have improved personal income insurance by increasing the availability of small business loans or by altering the lending pattern of banks. For illustration, consider an entirely self-financed sole proprietorship. In this case, the small business owner bears all the firm's output risk himself—shocks to the surplus created in the firm will be transferred one-to-one to his personal income. When the owner obtains external finance, the linkage between his personal finances and those of the business is relaxed, and the covariation of personal income with output will fall. Essentially, the larger the claim a bank has on a firm, the more of the output risk is borne by the bank as opposed to the owner. Banks may also share risk with the owner by not interrupting the lending relationship when the business hits hard times, allowing the borrower to fall behind with payments of interest and installments. Of course, banks also share risk by taking losses when businesses default. Furthermore, the availability of external finance may help small business owners smooth their income to the extent it furthers diversification of the owners' sources of income. For example, he may accumulate savings outside the business, e.g., in housing or financial investments, generating a stream of future income that is less than perfectly correlated with the success of the business.\textsuperscript{12}

\subsection{2.2 Deregulation, small business lending and risk sharing among banks}

Banking deregulation may have improved personal income insurance if either the level of bank intermediated finance to small businesses increased, or though a change in the pattern of banks' small business lending. In this section we present and discuss the existing empirical evidence on which we base our conjecture that changes in the pattern of lending plays an important role in the improved smoothing of personal income.

How may deregulation have altered the pattern of lending? Banking deregulation may

\textsuperscript{10}Although venture and angel finance is a substitute for some small firms, the above studies show that in terms of magnitude, these sources do not represent a real alternative to bank finance for the average firm.

\textsuperscript{11}See e.g. Leland and Pyle (1977), Bester (1985), Besanko and Thakor (1987), and Holmstrom and Tirole (1997).

\textsuperscript{12}When bank finance is secured by personal guarantees or collateral, business default may reduce the future scope for income insurance through the owners' loss of accumulated wealth. Theoretically it is possible that banking deregulation may have altered the use of collateral and personal guarantees in bank loan contracts, however, we have no data-means of investigating this in the current paper.
have deepened integration of bank markets due to changes in bank size and organization. Given relationships are valuable to banks and deregulation improved risk sharing between banks themselves, it may be less costly for banks to commit to an extension of finance during troubled times. In particular, the lifting of geographical barriers may have worked to improve risk sharing between banks themselves. Following deregulations, both stand-alone banks and holding companies grew in size and expanded into new markets. Some empirical evidence is available to suggest that these structural changes may well have affected banks’ ability and cost of sharing risks.

Houston, James, and Marcus (1997) demonstrate that bank holding companies manage capital and liquidity at the consolidated level. Hence, banks that belong to a multi-state organization may benefit from access to internal capital markets and share risks with borrowers at a lower cost. Houston and James (1998) show that unaffiliated banks are more cash flow constrained than banks affiliated with a holding company, and hence have less “slack”.

Also, bank size may matter. Larger banks may be less opaque and hence better able to mitigate problems of asymmetric information in capital markets. Kashyap and Stein (2000) show that small banks do not use uninsured funds to smooth the effect of monetary policy innovations, likely because of information frictions in interbank markets. Ostergaard (2001) finds evidence that these frictions are significant at the state level and that (state-level) bank lending in states dominated by small banks is more closely tied to banks’ internal liquidity position.

Furthermore, deregulation enhanced banks’ investment opportunity set. Geographical diversification may have improved banks’ ability to bear (idiosyncratic) credit risk. Demsetz and Strahan (1997) show that better diversification in large bank holding companies permits operation with higher leverage and more business loans in the portfolio.

Finally, deregulation may have altered the lending behavior of banks if incumbent banks in previously protected markets were operating inefficiently and deregulation permitted the entry of better managed banks. If entering banks were superior in the screening of potential borrowers’ prospects (identifying higher net present value projects), more high quality borrowers would be financed. Jayaratne and Strahan (1996) argue that average bank efficiency improved after deregulation and show that losses on banks’ loan portfolios diminished.

Our estimated improvement in income insurance would, however, also be consistent with an increase in the availability of small business finance following deregulation. Call Report data on small business loans by U.S. banks do not exist prior to 1994, and we know of no direct evidence on banks’ small business lending prior to this date. Jayaratne and Strahan (1996) study the effect of deregulation on total bank loan growth, and find only
weak positive effects. Hence, deregulation do no appear to have shifted banks’ total loan supply, although the data are silent on the composition of banks’ loan portfolio.

Several studies have used post–1994 data to address whether mergers and acquisitions affected the volume of small business lending. This evidence may be representative for the reorganizations that took place in the 1980s. Generally, the evidence does not seem to support the notion that small business lending contracted despite consolidation in the banking industry and the fact that larger banks typically carry fewer small business loans on their books than do smaller banks (for prudential and regulatory reasons). The process of consolidation, therefore, does not appear to have been detrimental to small firms. On the other hand, the evidence does not seem to support the opposite conclusion, that small business lending tended to increase, either.\textsuperscript{13}

Consolidation in the banking industry may have altered competition between banks, and thereby the costs to firms imbedded in banking relationships. Through the process of lending, banks acquire information about borrowers and an informed bank may use its information monopoly to extract rent from the borrower (Sharpe (1990), Rajan (1992)). Competition between lenders may limit the sustainability of implicit contracts and the sharing of intertemporal surplus between borrowers and lenders, as found by Petersen and Rajan (1995). On the other hand, Boot and Thakor (2000) argue that increased competition may induce banks to invest relatively more in relationships, as the return on relationship over transaction lending improves. If consolidation lowered competition in deregulated states, it may have improved the value of bank-borrower relationships and banks’ willingness to share risks. Alternatively, if deregulation increased competition, relationships may have been affected detrimentally.\textsuperscript{14} Whether deregulation has had an impact on income insurance through changes in competition between bank, however, is ultimately an empirical question. Our results suggest that such effects, while potentially detrimental to income insurance, were of second order. A careful investigation of these issues is outside the scope of this paper.

\textsuperscript{13}See Peek and Rosengren (1998), Strahan and Weston (1998), Goldberg and White (1998), and DeYoung (1998).

\textsuperscript{14}Considering the effect of interstate branching deregulations starting in 1994, Dick (forthcoming) reports that concentration at the regional level increased, whereas concentration at the urban (MSA) level was unchanged. See also the discussion in Black and Strahan (2002) on the effect of competition on business creation.
3 The history of U.S. banking deregulation

Restrictions on banks’ ability to branch and operate holding company structures in the U.S. has been subject to state legislation since the 1920s.15 The regulations imposed at the state-level were in the form of restrictions on the formation of multi-bank holding companies, restrictions on de novo branching, and on branching by mergers and acquisitions. Of these, restrictions on banks’ ability to establish state-wide branching networks were typically the last to be lifted.16

Until the 1980s, legislation in most states either completely prohibited branching within the state or restricted the geographical area in which a bank could open branches (for example to city or county boundaries). As late as 1985, 26 states imposed limitations on statewide branching. At the end of 1990, five states still upheld restrictions.17 Interstate banking (as opposed to branching) through bank holding companies was only gradually permitted by individual states during the 1980s. Maine was the first state to allow entry by out-of-state bank holding companies in 1975 and was followed by other states in the 1980s. Typically, acquisitions by out-of-state bank holding companies were limited to banks from same-region states and subject to reciprocity, that is, entry was only permitted if the acquiring banks’ home state allowed entry by banks from the target state, although some states were open to nationwide entry.18

Finally, interstate branching was permitted nationwide with the Reigle-Neal Interstate Banking and Branching Efficiency Act, which became effective June 1997, although states had the opportunity to opt in at an earlier date.19

Differences in states’ willingness to allow branch networks sustained the development of very differently structured bank systems across states. Where some states allowed only unit banking, other states permitted statewide branching which lead to more concentrated bank sectors when measured at the state level. At the same time, the limited ability to diversify portfolios geographically created a close interdependency between the state economy and the health of local banks. As regulations were gradually relaxed, deregulated bank sectors transformed. Changes in competitive pressures, geographic diversification and scale-economies on both the loan- and deposit-side affected loan losses and the cost of cap-

15The McFadden Act of 1927 essentially prohibited intrastate branching by subjecting the branching of national banks to state authority. The Douglas Amendment to the Bank Holding company Act of 1956 further restricted interstate expansion by barring bank holding companies from acquisitions in another state unless specifically authorized by that state.
16Kroszner and Strahan (1999) analyze the determinants of the timing of bank deregulation and find that states with more small bank-dependent firms tended to deregulate earlier. States with more unstable banks also tended to deregulate earlier.
17Arkansas, Colorado, Illinois, Minnesota, and New Mexico.
18Restrictions on de novo entry was typically only relaxed at a later point in time.
19Two states, Texas and Montana, opted out.
ital, and hence the loan interest rates charged. Jayaratne and Strahan (1998) find that relaxation of, in particular, intrastate branching restrictions were the source of large improvements in bank efficiency by allowing better-run banks to capture a larger share of local markets. Low-cost banks grew faster than under-performing banks following deregulation and state averages for loan losses and operating expenses fell. Jayaratne and Strahan show that much of these improvements were passed on to borrowers in the form of lower loan interest rates.20

Following deregulation, considerable consolidation occurred, predominantly through mergers and acquisitions. McLaughlin (1995) documents that the deregulation of intrastate branching restrictions caused changes in market structure faster than interstate banking restrictions. She shows that bank holding companies have responded promptly and in large numbers to deregulation of branching restrictions by merging previously separated subsidiaries, whereas responses to interstate deregulations were slower but picked up considerable speed in the late 1980s. In the latter case, bank holding companies tended to expand intra-regionally, rather than cross-regionally.

4 Measuring income insurance

We measure the degree to which personal income is insured between states of the United States. Our measure builds on the measure of risk sharing though capital markets developed in Asdrubali, Sørensen, and Yoshia (1996). The following set of assumptions have become standard in the risk sharing literature: a representative consumer of each region maximizes life-time expected utility from consumption. If utility functions are CRRA, and all regions have a common intertemporal discount factor, a perfect (Pareto efficient) risk sharing allocation satisfies $C_{it} = k_i C_t$ for all $t$ and all realizations of uncertainty, where $C_{it}$ and $C_t$ denotes regional and aggregate consumption, respectively. The constant $k_i$ is independent of time and state of the world. It reflects the “power” (including initial wealth) of state $i$ in the risk sharing arrangement.

Because our focus is the interconnection of small business owner’s personal finances with those of their firms, we focus on income insurance (smoothing). If full risk sharing is achieved via income smoothing, then $INC_{it} = k_i INC_t$ where $INC_{it}$ and $INC_t$ denotes state and aggregate personal income per capita, respectively. If income is fully insured, the income of different states may be at different levels but since the constant $k_i$ is independent of time, full income smoothing implies that all states have identical growth rates of income. This implication forms the basis of our empirical estimations.

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20They estimate that average loan rates fell by three-fifths of the reduction in loan losses and only find small, generally statistically insignificant, increases in bank profitability after deregulation.
When residents in one state hold claims to the output flow of productive assets in other states, the dividend, interest, and rental income derived from these holdings help smooth the income of all the states. Alternatively, residents of a state may interact with financial institutions, such as banks, and hold contingent claims indirectly through intermediaries. Relative to our setting, we may think about transactions with intermediaries as a potential substitute for direct cross-state asset holdings.

Let \( \text{PINC}_{it} \) and \( Y_{it} \) denote the *growth rates* of state personal income and state GDP, respectively. Under full income risk sharing all states have the same growth rate of income: \( \text{PINC}_{it} = \text{PINC}_{jt} \) for all states \( i \) and \( j \) for all time periods \( t \). Equivalently, \( \text{PINC}_{it} - \text{PINC}_{t} = 0 \) where \( \text{PINC}_{t} \) is the average across all states in period \( t \). The interpretation is that the average income growth cannot be insured through cross-state income diversification.\(^{21}\) \((Y_{it} - \bar{Y}_t)\) and \((\text{PINC}_{it} - \text{PINC}_t)\) then constitute state-specific output and personal income respectively.

Rather than testing if risk sharing is perfect, we develop a measure of income insurance. We want to define income insurance in state \( i \) in period \( t \) to be zero if income moves one-to-one with output, i.e., if \( \text{PINC}_{it} - \text{PINC}_t = Y_{it} - \bar{Y}_t \). We, therefore, define the amount of personal income insurance in state \( i \) at time \( t \) as

\[
\text{INS}_{it} = 1 - \frac{\text{PINC}_{it} - \text{PINC}_t}{Y_{it} - \bar{Y}_t}. \quad (1)
\]

This measure is defined year-by-year and state-by-state and it will be quite volatile. Occasionally, a state may have a growth rate similar to the average growth rate and, in order to not divide by zero, we substitute a value of 0.001 (preserving the sign) for values of \( Y_{it} - \bar{Y}_t \) less than 0.001 in absolute value.\(^{22}\) Alternatively, one might consider deleting observations with very small idiosyncratic output shocks. But since the observation contains some information about risk sharing, we prefer to truncate such observations rather than deleting them from the sample. Measurement error in the risk sharing variable is not a source of bias when it is used as a dependent variable in our regressions later on. Even with this adjustment a few values of \( \text{INS}_{it} \) are clearly outliers and we delete observations where the absolute value of \( \text{INS}_{it} \) is larger than 10 (29 observations).\(^{23}\)

The income insurance measure should be interpreted as follows: if state \( i \) in year \( t \) does not participate in risk sharing with other U.S. states, \( \text{PINC}_{it} - \text{PINC}_t = Y_{it} - \bar{Y}_t \) and \( \text{INS}_{it} \) will be zero. A value of \( \text{INS}_{it} > 0 \) implies income insurance. The more positive is \( \text{INS}_{it} \), the

\(^{21}\)We could subtract the aggregate rather than the average with very little effect on the results and no change in the interpretation.

\(^{22}\)In the extreme case where \( Y_{it} \) happens to equal \( \bar{Y}_t \) exactly, the measure is undefined and does not contain information about the amount of risk sharing—intuitively, this simply means that there is no idiosyncratic risk to share.

\(^{23}\)When we calculate this measure using the much more volatile series for proprietors’ income, rather than personal income, we delete observations where \( \text{INS}_{it} \) is larger than 150 in absolute value, resulting in the deletion of 8 observations.
less state-specific income follows state-specific output. Either state-specific income in that
year is “smoother” \((0 < \text{INS}_it < 1)\) or it is “counter-cyclical” \((\text{INS}_it > 1)\).\(^{24}\) Alternatively, 
\(\text{INS}_it < 0\) implies “dissmoothing”. The further below zero is \(\text{INS}_it\), the more procyclical 
state-specific income relative to output—shocks to output are amplified in personal income.

In order to examine if income insurance changes with banking deregulation we construct 
a dummy variable \(D_{it}\) that takes the value of 0 in state \(i\) in the years before banking 
deregulation and the value of 1 from the first year where both intrastate and interstate 
banking were permitted. We denote this variable “Full Banking Deregulation” to indicate 
that the state is fully open to integration. We refer the reader to Section 5 for exact variable 
definitions.

We then perform the regression

\[
\text{INS}_it = \alpha + \beta D_{it} + \epsilon_{it},
\]

(2)

where a positive value of \(\beta\) indicates that income insurance improved with banking deregulation. Alternatively one might use the date of intrastate deregulations only as a regressor. This variable does, however, not carry the same explanatory power as full openness in the regressions. Ideally, one would like to know the effect of both intra-state and full deregulation but there is not enough variation for us to use both variables simultaneously. We cannot use interstate deregulation dates as regressors as they exhibit very little variation across states.

However, we can construct a continuous measure which reflects the impact of any type 
of deregulation, namely the fraction of cumulative acquired bank assets in state \(i\) (scaled by 
total bank assets or state \(\text{GDP}\)) as the regressor. This variable is a more direct measure of 
the structural changes that occurred in bank markets following deregulations and captures 
changes in bank size, geographic diversification and integration into multistate banking 
organizations that were a result of mergers and acquisitions. Acquired assets is not a perfect 
measure of banking integration and it could potentially be endogenous. For example, banks 
in high risk regions being more likely to merge with out-of-state institution in order to pool 
risk. We do not think endogeneity concerns are important, but because we cannot rule 
them out we do not rely exclusively on this variable. We, therefore, perform regressions 
using both the deregulation dummy and cumulative acquired assets. We believe that results 
that are qualitatively robust to the choice of regressor are credible.

We use cumulative acquired assets by defining the variable \(\text{CASS} = \ln(1+\text{cumulative} \) 
(scaled) bank assets acquired) in the regressions. The log-transform is used because the

\(^{24}\)More precisely, state-specific personal income would be a smoother series than output if \(0 < \text{INS}_it < 1\) 
in every year.
series grow exponentially over time for most states, as can clearly we been from Figure 1 where we depict cumulative acquired bank assets for five arbitrarily chosen states. We perform regression of the form

$$\text{INS}_{it} = \alpha + \beta \text{CASS}_{it} + \epsilon_{it}. \quad (3)$$

The intercept in (2) and (3) has the interpretation as the average degree of income insurance, across states and time.\(^{25}\) A one-percentage point increase in the growth rate of state-specific output entails an increase in the growth of state-specific personal income of \(1 - \alpha\) percentage points. The coefficient \(\beta\) is the marginal effect of bank market integration on average income insurance.

Testing whether banking integration improved income insurance for small business owners, we construct a dummy variable, \(SB_i\), that equals one for states where the share of people employed in small businesses in 1977 was above or below the median value in our sample.\(^{26}\) We interact this dummy with the regressors in the baseline regressions to estimate if income insurance is larger on average in states with more small businesses. We define small businesses as those having less than 100 employees.\(^{27}\) As a robustness check we alternatively measure the importance of small businesses by the number of small firms in 1988 (the earliest available year). The results using this measure are very similar and we, therefore, do not tabulate them.

We perform the regression

$$\text{INS}_{it} = \alpha + \beta D_{it} + \zeta D_{it} SB_i + \epsilon_{it}. \quad (4)$$

The parameter of interest is \(\zeta\), which measures if the effect of deregulation is larger in states with more small businesses. We expect to find a positive estimate—that is, we expect the effect of deregulation to be stronger in states with many small businesses.

In the panel data regressions we transform the left-hand side in order to obtain a roughly bell-shaped distribution. We use the transformation \(\text{sign}(\text{INS}_{it}) \ln(1 + |\text{INS}_{it}|)\). A graph confirms that this transformation results in a roughly bell-shaped regressand.\(^{28}\)

From the construction of \(\text{INS}_{it}\) we expect regression errors to be inversely related to the size of the denominator \(Y_{it} - \bar{Y}_t\). A scatter plot reveals the squared errors from an initial

\(^{25}\)In the regressions, we demean all regressors, i.e., \((D_{it} - \bar{D}_t), (\text{CASS}_{it} - \bar{\text{CASS}_t})\), and similar for all other regressors used, so as to leave the estimated intercept unaffected by the average value of \(D_{it}\) and \(\text{CASS}_{it}\). This does not affect the interpretation of \(\beta\) as the marginal effect of bank integration.

\(^{26}\)We get similar results if we sort states according to average value.

\(^{27}\)The Small Business Administration defines small businesses as having less than 500 full-time equivalent employees. Businesses with less than 100 employees made up 58 percent of total employment on average in 1977.

\(^{28}\)When the \(\text{INS}_{it}\) measure is based on proprietors’ income, a number with much more variation, we use the transformation \(5\times\text{sign}(\text{INS}_{it}) \ln(1 + |\text{INS}_{it}|)/5\).
OLS-estimation to be proportional to $y_{it} - \bar{y}_t$ and, in order to obtain roughly homoskedastic errors we weight all observations by the square root of $y_{it} - \bar{y}_t$.

5 Data

We use a panel of variables for the 50 U.S. states minus Delaware, Alaska and Wyoming for the period 1970–2001.\textsuperscript{29} Below, we describe the main sources of data and the methodology used to construct the variables used in the analysis. As all our measures are in per capita terms, we often omit the term “per capita” for the sake of brevity. Growth rates of real per capita variables are calculated as first differences of natural log of per capita level values.\textsuperscript{30}

State Gross Domestic Product: We use the Bureau of Economic Analysis (BEA) data for gross state product which is defined as the “value added” of the industries of a state deflated by the consumer price index to obtain real per capital state gross domestic product (gross state product).

Personal Income: We use BEA state-level personal income deflated by consumer prices to obtain real per capita personal income by state.\textsuperscript{31} Measures of components of personal income; proprietors’ income, wages, and dividends, interest and rental income are also taken from the BEA.

Interstate and Intrastate Branching Restrictions: We measure the direct effect of deregulation as an indicator variable which equals one in years where both interstate and intrastate branching were permitted. We follow the practice of Jayaratne and Strahan (1996) and Kroszner and Strahan (1999) and define the date of intrastate deregulations as branching deregulation through mergers and acquisitions allowing multibank holding companies to convert subsidiaries into branches. Deregulation dates are from Krozner and Strahan.

Cumulative Bank Assets Acquired: As an alternative measure of bank integration, we consider the cumulated value of bank assets in state $i$ at time $j$ that were acquired by banks

\textsuperscript{29}We exclude Delaware from the sample due to laws that provide tax incentives for credit card banks to operate there. As a result, the banking industry in Delaware grew much faster than other states in the 1980s. Alaska and Wyoming are excluded because the expansion of the oil-related industry coincided with the timing of banking deregulation. As a large part of the oil-related business is owned by entities located outside the two states, the expansion entails considerable risk sharing. Inclusion of the two states therefore biases our results towards finding a positive effect of banking deregulation on income insurance. Indeed, this was confirmed by preliminary regression results based on a sample including AK and WY.

\textsuperscript{30}We deflate output using the consumer price deflator rather than the output deflator as we want to measure the purchasing power of output.

\textsuperscript{31}Interstate smoothing of earnings can occur through commuting across state borders. The BEA takes into account commuters’ income in the construction of personal income data. Therefore, our measure incorporates this kind of interstate income insurance. Similar holds for distributed profits, interest, and rent, which occurs when residents of one state hold securities of corporations and property in other states.
through mergers and acquisitions. The location of the target bank determines the state assignment. Hence, this measure captures both M&As within the state but also those acquisitions made by out-of-state banks. We scale this value by the value of total bank assets in the state in each year. Data is based on the U. S. Call Reports from the period 1960–1994 and are taken from Rhoades (1985, 1996) (the data cannot be interpreted on a state basis beyond 1994, hence all regressions involving acquired bank assets employ 1994 as the sample end-point).

We measure the degree of importance of small businesses in a state as the proportion of people employed in small businesses relative to total employment in 1977, the earliest date available. Data for the share of small businesses in the population of firms at the beginning of the sample period are not available prior to 1988, hence employment in 1977 is our preferred measure. We say that small businesses are relatively more “prevalent” or “important” in a state if this proportion is higher than the median value across all states.

**Small Business Employment:** By small we mean establishments with a number of employees less than 100. The data on small businesses for the years of 1977–1997 are available from Geospatial and Statistical Data Center, University of Virginia library.\(^{32}\) For the 1998–2001 period, the data is from the Economic Census.\(^{33}\) Employment is paid employment, which consists of full and part-time employees, including salaried officers and executives of corporations. Included are employees on sick leave, holidays, and vacations; not included are proprietors and partners of unincorporated businesses.

**Proprietor’s income:** This component of personal income is the current-production income (including income in kind) of sole proprietorships and partnerships and of tax-exempt cooperatives. Corporate directors’ fees and the imputed net rental income of owner-occupants of farm dwellings are included in proprietors’ income, but the imputed net rental income of owner-occupants of non-farm dwellings is included in rental income of persons. Proprietors’ income excludes dividends and monetary interest received by nonfinancial business and rental incomes received by persons not primarily engaged in the real estate business; these incomes are included in dividends, net interest, and rental income of persons, respectively. Data are available from the BEA.

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\(^{32}\)See http://fisher.lib.virginia.edu/collections/stats/cbp/state.html

\(^{33}\)See http://www.census.gov/csd/susb/susb.htm
6 Results and discussion

6.1 Level of income insurance and prevalence of small businesses

We begin by establishing the cross-sectional relationship between the level of personal income insurance and the prevalence of small businesses, by regressing our measure of income insurance $\text{INS}$ on a dummy which equals one if the prevalence of small businesses were above the median in state $i$, $\text{SB}_i$. We measure the prevalence of small businesses both according to number of employees in small firms (see description and definitions in sections 4 and 5). Table 1 establishes the stylized fact that the average level of income insurance is lower in states where small businesses are more important, which is consistent with our hypothesis that small business owners have difficulties insuring their income from output shocks due to the intertwining of their personal income with the success of their business.

6.2 Income insurance, bank market integration and small businesses

In Table 2, we present our estimates of income insurance obtained. We find, as reported in the first column, that the constant (interpreted as the average value of the dependent variable for our sample) period was 30, which translates into 35 percent income smoothing on average. The interpretation of the estimate is that a one percentage point decline in GDP-growth of a state (keeping aggregate GDP fixed) will result in a 0.35 percentage point decline in personal income growth. In Figure 2 we depict the growth-rates of state-specific GDP and personal income for five arbitrarily chosen states. We allow income insurance to differ before and after banking reform by including in the regression a dummy variable that takes the value of 1 after banking reform. We find, according to the point estimate, that the left-hand side variable on average increased by a coefficient of 12.4, which translates into 13.2 percentage points more income insurance, after banking reform. The estimate is clearly significant at the one percent level. This finding is consistent with banking reform leading to improved income insurance.

In columns 2 and 3, we employ the more direct measure of the structural changes in bank markets that occurred following deregulation; namely, the cumulated fraction of bank assets acquired in state $i$ through mergers and acquisitions in each year. We estimate an effect similar to the regression in column 1: the coefficient is positive and significant at the one percent level. To give an interpretation of the economic significance of the size of the coefficient, consider the average (across states) increase in the cumulative fraction of acquired assets between 1970 and 1994, which grew from 5.2 percent to 37.8 percent. That change in bank assets acquired translates (for column 2) into a 11 percentage point increase

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34 The dependent variable is $\ln(1 + \text{INS})$ (for positive values of $\text{INS}$), so 35 is found as $100 \times \exp(0.30) - 1$.
35 This number is of the same magnitude as that found by Asdrubali, Sørensen, and Yosha (1996).
in income insurance over the sample period. The result, in column 3, for cumulative assets normalized by state output are similar to those of column 2.

Table 3 reports the results where we add to our baseline regression an interaction terms that captures the importance of small businesses in state $i$ relative to the median. States where small businesses are more prevalent experience an additional positive effect of bank market integration. Considering the regressions using deregulation dates as regressor, the difference in coefficient estimates in states with more and few employees in small businesses of 7.2 in column 1 corresponds to 7.5 percentage points. Considering the regression with acquired bank assets, the additional effect in states where small businesses are more prevalent is 3.7 (column 1), corresponding to 3.8 percentage points more income insurance.

The results for the interaction term in Table 3 are consistent only at the 10 percent level. However, the impact is robustly estimated across the three columns and therefore quite credible.

In Table 4, we include a trend in the regressions. Inter-state income insurance in the U.S. has been systematically increasing over time (Asdrubali, Sørensen, and Yoshia (1996)) and we might find a positive effect of banking deregulation due to left-out variable bias if we do not allow for this trend in income insurance. We therefore run both of the above regressions including a time trend taking the value of $(t - 1969)$ in year $t$. Allowing for a trend, lowers the coefficient estimate for the average impact of banking reform. Using the deregulation dummy the estimated average effect is insignificant, while it is borderline significant at the 5 percent level cumulative acquired assets. The estimated trend is, as expected, positive. The trend is likely caused partly by bank deregulation and the regression is not able to clearly separate the impact of deregulation from the trend. However, the predicted differential impact on states with more or less small businesses is robust to the inclusion of a trend: the estimates in Table 4, for the interaction terms, are very similar to those estimated in Table 3 and those coefficients are still significant at the 5 percent level.

6.3 Income insurance and proprietors’ income

In Table 5 we show that state-level income insurance is significantly lower in states with a large fraction of proprietors. This result is qualitatively similar to the results of Agronin (2003), who used a somewhat different implementation.

As a further test of our hypothesis that banking deregulation affected the scope for income insurance through small business owners-managers’ financial situation, we consider

\footnote{Acquired asset are measured in percent, so the transformation is $100 \times [\exp(5.8 \times \ln(1 + 37.8) - \ln(1 + 5.2))] - 1 = 11.2$.}

\footnote{For small values, the log-transformation has a very small impact and we will ignore the approximation in the further discussion of results.}
how deregulation affected the reaction of by proprietors' income to output shocks. We want to consider the effect of deregulation on the sensitivity of proprietors’ income to output shocks as an alternative way of providing evidence of the small business channel. Hence, proprietors income proxies for the personal income of small business owners-managers. Part of small business owners’ income may be received in the form of dividends when the business is incorporated. That fraction of personal income is not captured in proprietors’ income, but enters the dividends, interest, and rental income component of personal income. We have, however, no means of separating this part out of the dividend series.\(^{38}\)

We construct a measure of the smoothing of proprietor’s income relative to state GDP similar to \(\text{INS}_{it}\) (substituting personal income with proprietor’s income).\(^{39}\)

Table 6 presents the regression results. The intercept is large in absolute value and negative, indicating that proprietors' income is a very pro-cyclical series (relative to state-specific output). The coefficient estimate of –53 means that, on average, a one percentage point decrease in state GDP (holding aggregate GDP constant) implies a 1.53 percentage point fall in proprietor’s income. In other words, proprietors’ income is more volatile than state GDP. In Figure 3, where we plot annual growth rates of state-specific GDP and proprietors’ income, it is obvious that proprietors’ income is a rather pro-cyclical series. The estimated positive coefficient on the deregulation dummy (column 1) and cumulative acquired assets (columns 2 and 3) suggests that banking reform diminished the volatility of proprietors' income dramatically. The coefficients on the deregulation measures are significant at the 1 percent level and very large in economic terms. The point estimate of the deregulation dummy indicates that after banking reform proprietors income moved in the same direction as output shocks but only half as much (quite similar to the estimated impact on overall personal income). This point estimate seems somewhat too large—the lower range of the 5 percent confidence interval seems more reasonable and this roughly agrees with the estimated economic impact measured from the cumulative acquired assets variables.

In Table 7, we show that the results in Table 6 are qualitatively unchanged (and statistical significance preserved) when a trend is allowed for—it seems that the sensitivity of proprietors income to state GDP is not a trending series, although it changes with banking deregulation.

In Table 8, we compare the “smoothing” of proprietors’ income with that of other income components reported by the BEA. Wages are smoothed similarly to personal income—that

\(^{38}\)Proprietors’ income; wages; and dividends, interest, and rental income constitute on average 8 percent, 57 percent, and 19 percent, respectively, of personal income during our sample period.

\(^{39}\)Strictly speaking, this is not a measure of the insurance of proprietors’ income, as we do not know proprietors’ share of state GDP. Rather, our estimate will capture the smoothness of the proprietors’ income series relative to state output. Otherwise, the interpretation is similar to that of Section 4.
is not surprising since wages are the main component of personal income. Interestingly, banking deregulation has no impact on the sensitivity of wages to aggregate output shocks. When using cumulative acquired assets, the point estimate is actually significantly negative, but combining our prior expectations with this lack of robustness of this result, we hesitate to stress this negative point estimate. Dividend, income, and rent is less sensitive to output movement than the other income components. This is to be expected, in fact dividends from nationwide investment is the primary example of how one can diversify income geographically. Banking reform does not change the sensitivity of this income component to output shocks. Table 9 shows that the results of Table 8 are robust to inclusion of a time trend in the regression.

Our regressions are imposing the constraint that average income insurance is identical for each state included in a regression. In Tables 10 and 11, we briefly examine if our results are robust to allowing for state-specific constants (fixed effects, in panel data jargon). The answer is a qualified yes.

Table 10 shows how the fraction of small business employment affects aggregate income insurance using running separate regressions for states with more or less than average small business employment (since the $SB_i$-variable does not vary over time, we prefer to run the regression with two subsamples). The results robustly finds that banking reform had no impact on income insurance in states with little employment in small businesses while there was a significant (at the 5 percent level when using cumulation acquired assets) impact on states with high small business employment. This reinforces the conclusions derived from Table 4.

In Table 11, we consider the sensitivity of components of personal income to output shocks, allowing for state fixed effects. Regarding, the overall impact of banking deregulation on personal income insurance the point estimates remain positive but statistically significant only when cumulative acquired assets are used. The impact on the sensitivity of output shocks on wages is estimated to be negative, in this case significant at the 5 percent level only when the deregulation dummy is used. Dividends, income, and rent react more to output shocks after deregulation according to these results (only with borderline significance at the 5 percent level when acquired bank assets-variable is used). However, the more important (for our interpretation) result that proprietors income become less sensitive to output shocks still holds with very high levels of significance. Hence, Table 11 reinforces the conclusions derives in Tables 8 and 9.
7 Conclusion

This paper provides evidence that U.S. banking deregulation, and the consequent changes in bank market structure, had significant real effects through the role played by banks as small business financiers and insurers of the personal income of small business owners.

We show that (personal) income insurance increased significantly in states which deregulated banking restrictions—indeently of whether we measure deregulation by the year of deregulation or by cumulated bank assets acquired. This results is, however, somewhat sensitive to whether a time trend is included in the regression.

Our hypothesis is that banking reform affects income insurance because of the intertwining of the personal finances of bank-dependent small business owners with the finances of their firms. We find two sets of results consistent with this hypothesis. First, we show that the positive effect of deregulation on income insurance is significantly stronger in states where small businesses are more important measured in terms of share of employment. Second, we show that proprietors’ income was dramatically less sensitive to output shocks following banking deregulation. These two sets of results seem very robustly estimated.

We conjecture that the changes in the U.S. banking industry that have lead to an improvement in income insurance are due to improved efficiency of interbank capital allocation and/or improved efficiency in lending to small businesses after deregulation. In particular, it may be that income insurance within bank organizations improves due to geographical diversification and higher participation of regional banks in nationwide financial markets.
References


Demsetz, Rebecca S., and Philip E. Strahan, 1997, Diversification, size, and risk at bank holding companies, *Journal of Money, Credit and Banking* 29, 300–313.


Houston, Joel F., and Christopher James, 1998, Do bank internal capital markets promote lending?, *Journal of Banking and Finance* 22, 899–918.


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Ostergaard, Charlotte, 2001, External financing costs and banks’ loan supply: Does the structure of the bank sector matter?, Manuscript, Norwegian School of Management.


Table 1:
Income Insurance and the Prevalence of Small Businesses.

<table>
<thead>
<tr>
<th>Employees in 1977</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
</tr>
<tr>
<td>(1.1)</td>
</tr>
<tr>
<td>Small Businesses</td>
</tr>
<tr>
<td>(2.1)</td>
</tr>
</tbody>
</table>

Note: Results from the following GLS regression:

\[ \text{INS}_{it} = \alpha + \beta \text{SB}_{it} + \epsilon_{it}. \]

\( \text{INS}_{it} \) measures (personal) income insurance, see definition in Section 4. \( \text{INS}_{it} = 1 - (\text{PINC}_{it} - \text{PINC}_{it})/(\text{Y}_{it} - \text{Y}_{it}) \). In the regressions, the dependent variable is \( \text{sign}(\text{INS}_{it}) \cdot \ln(1 + |\text{INS}_{it}|) \). \( \text{SB}_{it} \) is a dummy variable that equals one if state \( i \) belongs to the subsample of states where small businesses were more prevalent (above median) in 1977. Small Businesses are establishments with less than 100 employees. Sample is 1970–2001. States excluded are: AK, DE and WY. Standard errors are in parentheses. All coefficients and standard errors are multiplied by 100.
<table>
<thead>
<tr>
<th></th>
<th>Model A</th>
<th>Model B</th>
<th>Model C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>30.0</td>
<td>28.0</td>
<td>27.9</td>
</tr>
<tr>
<td></td>
<td>(1.1)</td>
<td>(1.2)</td>
<td>(1.2)</td>
</tr>
<tr>
<td>Full Banking Deregulation</td>
<td>12.8</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>(2.2)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Cumulative Acquired Bank Assets (scaled by total bank assets)</td>
<td>–</td>
<td>5.8</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>–</td>
<td>(1.0)</td>
<td>–</td>
</tr>
<tr>
<td>Cumulative Acquired Bank Assets (scaled by state GDP)</td>
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<td>–</td>
<td>6.4</td>
</tr>
<tr>
<td></td>
<td>–</td>
<td>–</td>
<td>(1.2)</td>
</tr>
</tbody>
</table>

**Table 2:**
The Effect of Banking Deregulation and Acquisitions of Bank Assets on Income Insurance.

Note: Results are from the following GLS regressions:

Model A: \( \text{INS}_{it} = \alpha + \beta D_{it} + \epsilon_{it} \).

Models B and C: \( \text{INS}_{it} = \alpha + \beta \text{CASS}_{it} + \epsilon_{it} \).

\( \text{INS}_{it} \) measures (personal) income insurance, see definition in Section 4. \( \text{INS}_{it} = 1 - (\text{PINC}_{it} - \text{PINC}_{it})/(Y_{it} - \text{V}_{it}) \). In the regressions, the dependent variable is \( \text{sign}(\text{INS}_{it}) \cdot \ln(1 + |\text{INS}_{it}|) \). \( D_{it} \) is an indicator variable that equals one if restrictions on interstate banking and intrastate branching were lifted in year \( t \) or earlier for the corresponding state and zero otherwise. \( \text{CASS}_{it} \) is cumulative bank assets acquired in state \( i \) through mergers and acquisitions. \( \text{CASS}_{it} \) equals one plus the log of the cumulative share of bank assets in state \( i \) that were acquired by banks at time \( t \). Sample is 1970–2001 for Model A, and 1970–1994 for Models B and C. States excluded are: AK, DE and WY. Standard errors are in parentheses. All coefficients and standard errors are multiplied by 100.
Table 3:
The Effect of Banking Deregulation and Acquisitions
of Bank Assets on Income Insurance
in States with Many and Few Small Businesses.

<table>
<thead>
<tr>
<th></th>
<th>Model A</th>
<th>Model B</th>
<th>Model C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>30.1</td>
<td>28.0</td>
<td>27.9</td>
</tr>
<tr>
<td></td>
<td>(1.1)</td>
<td>(1.2)</td>
<td>(1.2)</td>
</tr>
<tr>
<td>Full Banking Deregulation</td>
<td>12.2</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>(2.2)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(D_{it} \cdot SB_i)</td>
<td>7.2</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>(4.4)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Cumulative Acquired Bank Assets (scaled by total bank assets)</td>
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<td>5.8</td>
<td>–</td>
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<td>6.0</td>
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<td>CASS_{it} \cdot SB_i</td>
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<td>3.7</td>
<td>4.2</td>
</tr>
<tr>
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<td>–</td>
<td>(2.1)</td>
<td>(2.6)</td>
</tr>
</tbody>
</table>

Note: Results are from the following GLS regressions:
Model A: \(INS_{it} = \alpha + \beta D_{it} + \zeta D_{it} \cdot SB_i + \epsilon_{it}\).
Models B and C: \(INS_{it} = \alpha + \beta CASS_{it} + \zeta CASS_{it} \cdot SB_i + \epsilon_{it}\).
\(INS_{it}\) measures (personal) income insurance, see definition in Section 4. \(INS_{it} = 1 - (PINC_{it} - PINC_{it})/(\bar{Y}_{it} - \bar{Y}_{it})\). In the regressions, the dependent variable is \(\text{sign}(INS_{it}) \cdot \ln(1 + |INS_{it}|)\). \(D_{it}\) is an indicator variable that equals one if restrictions on interstate banking and intrastate branching were lifted in year \(t\) or earlier for the corresponding state and zero otherwise. \(SB_{it}\) is a dummy variable that equals one if state \(i\) belongs to the subsample of states where small businesses were more prevalent (above median) in 1977. \(Small Business\)s are establishments with less than 100 employees. \(CASS_{it}\) is cumulative bank assets acquired in state \(i\) through mergers and acquisitions. \(CASS_{it}\) equals one plus the log of the cumulative share of bank assets in state \(i\) that were acquired by banks at time \(t\). Sample is 1970–2001 for Model A, and 1970–1994 for Models B and C. States excluded are: AK, DE and WY. Standard errors are in parentheses. All coefficients and standard errors are multiplied by 100.
Table 4: The Effect of Banking Deregulation and Acquisitions of Bank Assets on Income Insurance in States with Many and Few Small Businesses, Allowing for Time Trend.

<table>
<thead>
<tr>
<th></th>
<th>Model A</th>
<th>Model B</th>
<th>Model C</th>
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<td>(1.2)</td>
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<tr>
<td>Full Banking Deregulation</td>
<td>–1.0</td>
<td>–</td>
<td>–</td>
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<tr>
<td></td>
<td>(3.4)</td>
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<td>–</td>
</tr>
<tr>
<td>$D_{it} \cdot SB_{i}$</td>
<td>9.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>(4.4)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Cumulative Acquired Bank Assets (scaled by total bank assets)</td>
<td>–</td>
<td>2.7</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>–</td>
<td>(1.3)</td>
<td>–</td>
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<tr>
<td>Cumulative Acquired Bank Assets (scaled by state GDP)</td>
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<td>–</td>
<td>2.3</td>
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<td></td>
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Note: Results are from the following GLS regressions:

Model A: $INS_{it} = \alpha + \beta D_{it} + \zeta D_{it} \cdot SB_{i} + \gamma (t - 1969) + \epsilon_{it}$.

Models B and C: $INS_{it} = \alpha + \beta CASS_{it} + \zeta CASS_{it} \cdot SB_{i} + \gamma (t - 1969) + \epsilon_{it}$.

$INS_{it}$ measures (personal) income insurance, see definition in Section 4. $INS_{it} = 1 - (PINC_{it} - \overline{PINC}/Y_{it} - \overline{Y})$. In the regressions, the dependent variable is $\text{sign}(INS_{it}) \cdot \ln(1 + |INS_{it}|)$. $D_{it}$ is an indicator variable that equals one if restrictions on interstate banking and intrastate branching were lifted in year $t$ or earlier for the corresponding state and zero otherwise. $SB_{it}$ is a dummy variable that equals one if state $i$ belongs to the subsample of states where small businesses were more prevalent (above median) in 1977. Small Businesses are establishments with less than 100 employees. $CASS_{it}$ is cumulative bank assets acquired in state $i$ through mergers and acquisitions. $CASS_{it}$ equals one plus the log of the cumulative share of bank assets in state $i$ that were acquired by banks at time $t$. Sample is 1970–2001 for Model A, and 1970–1994 for Models B and C. States excluded are: AK, DE and WY. Standard errors are in parentheses. All coefficients and standard errors are multiplied by 100.
Table 5: Income Insurance and the Prevalence of Proprietors.

<table>
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<tr>
<th></th>
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<tbody>
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<td>34.3</td>
</tr>
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<td>(1.5)</td>
<td>(1.5)</td>
</tr>
<tr>
<td>No. of proprietors per capita</td>
<td>–8.6</td>
<td>–9.6</td>
</tr>
<tr>
<td></td>
<td>(2.1)</td>
<td>(2.1)</td>
</tr>
</tbody>
</table>

Note: Results from the following GLS regression:
\[ \text{INS}_{it} = \alpha + \beta \text{PROP}_i + \epsilon_{it}. \]
\( \text{INS}_{it} \) measures (personal) income insurance, see definition in Section 4. \( \text{INS}_{it} = 1 - (\text{PINC}_{it} - \text{PINC}_{it})/(\gamma_{it} - \gamma_{it}) \). In the regressions, the dependent variable is \( \text{sign}(\text{INS}_{it}) \cdot \ln(1 + |\text{INS}_{it}|) \). \( \text{PROP}_i \) is a dummy variable that equals one if state \( i \) belongs to the subsample of states where the number of proprietors per capital were more prevalent (above median) in 1970 or on average over the sample period. Sample is 1970–2001. States excluded are: AK, DE and WY. Standard errors are in parentheses. All coefficients and standard errors are multiplied by 100.
Table 6:
The Effect of Banking Deregulation and Acquisitions of Bank Assets on the Sensitivity of Proprietors’ Income to Output Shocks.

<table>
<thead>
<tr>
<th></th>
<th>Model A</th>
<th>Model B</th>
<th>Model C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-53.2</td>
<td>-63.7</td>
<td>-64.4</td>
</tr>
<tr>
<td></td>
<td>(9.2)</td>
<td>(10.7)</td>
<td>(10.7)</td>
</tr>
<tr>
<td>Full Banking Deregulation</td>
<td>103.8</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>(19.0)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cumulative Acquired Bank Assets</td>
<td>-</td>
<td>53.9</td>
<td>-</td>
</tr>
<tr>
<td>(scaled by total bank assets)</td>
<td>-</td>
<td>(9.4)</td>
<td>-</td>
</tr>
<tr>
<td>Cumulative Acquired Bank Assets</td>
<td>-</td>
<td>-</td>
<td>62.8</td>
</tr>
<tr>
<td>(scaled by state GDP)</td>
<td>-</td>
<td>-</td>
<td>(11.4)</td>
</tr>
</tbody>
</table>

Note: Results are from the following GLS regressions:
Model A: $\text{INS}_{it} = \alpha + \beta D_{it} + \epsilon_{it}$.
Models B and C: $\text{INS}_{it} = \alpha + \beta \text{CASS}_{it} + \epsilon_{it}$.
$\text{INS}_{it}$ measures (personal) income insurance, see definition in Section 4. $\text{INS}_{it} = 1 - (\text{propinc}_{it} - \text{propinc}_{it})/(Y_{it} - \overline{Y}_{it})$. In the regressions, the dependent variable is $5 \cdot \text{sign}(\text{INS}_{it}) \cdot \ln(1 + |\text{INS}_{it}|/5)$. $D_{it}$ is an indicator variable that equals one if restrictions on interstate banking and intrastate branching were lifted in year $t$ or earlier for the corresponding state and zero otherwise. $\text{CASS}_{it}$ is cumulative bank assets acquired in state $i$ through mergers and acquisitions. $\text{CASS}_{it}$ equals one plus the log of the cumulative share of bank assets in state $i$ that were acquired by banks at time $t$. Sample is 1970–2001 for Model A, and 1970–1994 for Models B and C. States excluded are: AK, DE and WY. Standard errors are in parentheses. All coefficients and standard errors are multiplied by 100.
Table 7:
The Effect of Banking Deregulation and Acquisitions of Bank Assets on the Sensitivity of Proprietors’ Income to Output Shocks, Allowing for Time Trend

<table>
<thead>
<tr>
<th></th>
<th>Model A</th>
<th>Model B</th>
<th>Model C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-53.3</td>
<td>-63.1</td>
<td>-63.7</td>
</tr>
<tr>
<td></td>
<td>(9.2)</td>
<td>(10.7)</td>
<td>(10.7)</td>
</tr>
<tr>
<td>Full Banking Deregulation</td>
<td>114.6</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>(29.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cumulative Acquired Bank Assets (scaled by total bank assets)</td>
<td>-</td>
<td>63.1</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(11.3)</td>
<td></td>
</tr>
<tr>
<td>Cumulative Acquired Bank Assets (scaled by state GDP)</td>
<td>-</td>
<td>-</td>
<td>75.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(14.1)</td>
</tr>
<tr>
<td>Time trend</td>
<td>-0.8</td>
<td>-2.7</td>
<td>-2.9</td>
</tr>
<tr>
<td></td>
<td>(1.6)</td>
<td>(1.9)</td>
<td>(1.9)</td>
</tr>
</tbody>
</table>

Note: Results are from the following GLS regressions:
Model A: \( \text{INS}_{it} = \alpha + \beta D_{it} + \gamma (t - 1969) + \epsilon_{it} \).
Models B and C: \( \text{INS}_{it} = \alpha + \beta \text{CASS}_{it} + \gamma (t - 1969) + \epsilon_{it} \).
\( \text{INS}_{it} \) measures (personal) income insurance, see definition in Section 4. \( \text{INS}_{it} = 1 - \frac{(\text{propinc}_{it} - \text{propinc}_{it})}{(\text{Y}_{it} - \text{Y}_{it})} \). In the regressions, the dependent variable is \( 5 \cdot \text{sign}(\text{INS}_{it}) \cdot \ln(1 + |\text{INS}_{it}|/5) \). \( D_{it} \) is an indicator variable that equals one if restrictions on interstate banking and intrastate branching were lifted in year \( t \) or earlier for the corresponding state and zero otherwise. \( \text{CASS}_{it} \) is cumulative bank assets acquired in state \( i \) through mergers and acquisitions. \( \text{CASS}_{it} \) equals one plus the log of the cumulative share of bank assets in state \( i \) that were acquired by banks at time \( t \). Sample is 1970–2001 for Model A, and 1970–1994 for Models B and C. States excluded are: AK, DE and WY. Standard errors are in parentheses. All coefficients and standard errors are multiplied by 100.
Table 8:
The Effect of Banking Deregulation and Acquisitions of Bank Assets 
and the Sensitivity of Components of Personal Income to Output Shocks

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>30.0</td>
<td>−53.2</td>
<td>32.1</td>
<td>44.8</td>
</tr>
<tr>
<td></td>
<td>(1.1)</td>
<td>(9.2)</td>
<td>(1.2)</td>
<td>(1.7)</td>
</tr>
<tr>
<td>Full Banking Deregulation</td>
<td>12.8</td>
<td>103.8</td>
<td>−0.7</td>
<td>−3.0</td>
</tr>
<tr>
<td></td>
<td>(2.2)</td>
<td>(19.0)</td>
<td>(2.4)</td>
<td>(3.4)</td>
</tr>
<tr>
<td>Constant</td>
<td>28.0</td>
<td>−63.7</td>
<td>30.6</td>
<td>44.3</td>
</tr>
<tr>
<td></td>
<td>(1.2)</td>
<td>(10.7)</td>
<td>(1.3)</td>
<td>(1.8)</td>
</tr>
<tr>
<td>Cumulative Acquired Bank Assets (scaled by total bank assets)</td>
<td>5.8</td>
<td>53.9</td>
<td>−5.0</td>
<td>−1.4</td>
</tr>
<tr>
<td></td>
<td>(1.0)</td>
<td>(9.4)</td>
<td>(1.1)</td>
<td>(1.6)</td>
</tr>
<tr>
<td>Constant</td>
<td>27.9</td>
<td>−64.4</td>
<td>30.7</td>
<td>44.3</td>
</tr>
<tr>
<td></td>
<td>(1.1)</td>
<td>(10.7)</td>
<td>(1.3)</td>
<td>(1.8)</td>
</tr>
<tr>
<td>Cumulative Acquired Bank Assets (scaled by state GDP)</td>
<td>5.7</td>
<td>62.8</td>
<td>−5.6</td>
<td>−1.9</td>
</tr>
<tr>
<td></td>
<td>(2.1)</td>
<td>(11.4)</td>
<td>(1.4)</td>
<td>(2.0)</td>
</tr>
</tbody>
</table>

Note: Results are from the following GLS regressions:
Top panel: \( \text{INS}_{it} = \alpha + \beta D_{it} + \epsilon_{it} \).
Middle and bottom panels: \( \text{INS}_{it} = \alpha + \beta \text{CASS}_{it} + \epsilon_{it} \).
\( \text{INS}_{it} \) measures (personal) income insurance, see definition in Section 4. \( \text{INS}_{it} = 1 - (x_{it} - \bar{x}_{it})/(y_{it} - \bar{y}_{it}) \), where \( x_{it} \) represents components of personal income: personal income; proprietors’ income; wages; and interest, dividends, and rent, respectively. In the regressions, the dependent variable is \( \text{sign}(\text{INS}_{it}) \cdot \ln(1 + |\text{INS}_{it}|) \). Sample is 1970–2001 for top panel, and 1970–1994 for middle and bottom panels. States excluded are: AK, DE and WY. Standard errors are in parentheses. All coefficients and standard errors are multiplied by 100.
Table 9:
The Effect of Banking Deregulation and Acquisitions of Bank Assets and the Sensitivity of Components of Personal Income to Output Shocks, Allowing for Time Trend.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>30.1</td>
<td>-53.3</td>
<td>32.1</td>
<td>44.9</td>
</tr>
<tr>
<td></td>
<td>(1.0)</td>
<td>(9.2)</td>
<td>(1.2)</td>
<td>(1.7)</td>
</tr>
<tr>
<td>Full Banking Deregulation</td>
<td>0.2</td>
<td>114.6</td>
<td>3.1</td>
<td>-11.5</td>
</tr>
<tr>
<td></td>
<td>(3.4)</td>
<td>(29.7)</td>
<td>(3.7)</td>
<td>(5.3)</td>
</tr>
<tr>
<td>Time trend</td>
<td>0.9</td>
<td>-0.8</td>
<td>-0.3</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td>(0.2)</td>
<td>(1.6)</td>
<td>(0.2)</td>
<td>(0.3)</td>
</tr>
</tbody>
</table>

|                                | 27.8       | -63.1       | 30.6  | 44.3             |
|                                | (1.2)      | (10.7)      | (1.3) | (1.2)            |
| Cumulative Acquired Bank Assets | 3.5        | 63.1        | -4.9  | -2.2             |
| (scaled by total bank assets)  | (1.2)      | (11.3)      | (1.4) | (2.0)            |
| Time trend                     | 0.7        | -2.7        | 0.0   | 0.2              |
|                                | (0.2)      | (1.9)       | (0.2) | (0.3)            |

|                                | 27.7       | -63.7       | 30.7  | 44.2             |
|                                | (1.2)      | (10.7)      | (1.3) | (1.8)            |
| Cumulative Acquired Bank Assets | 3.1        | 75.7        | -5.4  | -3.0             |
| (scaled by state GDP)          | (1.5)      | (14.1)      | (1.7) | (2.4)            |
| Time trend                     | 0.8        | -2.9        | 0.0   | 0.3              |
|                                | (0.2)      | (1.9)       | (0.2) | (0.3)            |

Note: Results are from the following GLS regressions:
Top panel: \( \text{INS}_{it} = \alpha + \beta D_{it} + \gamma (t - 1969) + \epsilon_{it} \).
Middle and bottom panels: \( \text{INS}_{it} = \alpha + \beta \text{CASS}_{it} + \gamma (t - 1969) + \epsilon_{it} \).
\( \text{INS}_{it} \) measures the sensitivity of components of income to output shocks, see definition in Section 4.
\( \text{INS}_{it} = 1 - (x_{it} - \bar{x}_t)/(y_{it} - \bar{y}_t) \), where \( x_{it} \) represents components of personal income: personal income, proprietors’ income; wages; and interest, dividends, and rent, respectively. In the regressions, the dependent variable is sign(\( \text{INS}_{it} \))·ln(1 + |\( \text{INS}_{it} \)|). Sample is 1970–2001 for top panel, and 1970–1994 for middle and bottom panels. States excluded are: AK, DE and WY. Standard errors are in parentheses. All coefficients and standard errors are multiplied by 100.
Table 10:

<table>
<thead>
<tr>
<th></th>
<th>More Small Businesses</th>
<th>Fewer Small Businesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Banking Deregulation</td>
<td>9.1</td>
<td>-1.4</td>
</tr>
<tr>
<td>(scaled by total bank assets)</td>
<td>(6.4)</td>
<td>(6.1)</td>
</tr>
<tr>
<td>Cumulative Acquired Bank Assets</td>
<td>10.9</td>
<td>-0.7</td>
</tr>
<tr>
<td>(scaled by total bank assets)</td>
<td>(4.3)</td>
<td>(4.1)</td>
</tr>
<tr>
<td>Cumulative Acquired Bank Assets</td>
<td>11.9</td>
<td>-0.4</td>
</tr>
<tr>
<td>(scaled by state GDP)</td>
<td>(4.5)</td>
<td>(4.7)</td>
</tr>
</tbody>
</table>

Note: Results are from the following GLS regressions:
Row 1: \( \text{INS}_{it} = \alpha_i + \beta D_{it} + \epsilon_{it} \).
Rows 2 and 3: \( \text{INS}_{it} = \alpha_i + \beta CASS_{it} + \epsilon_{it} \).
\( \text{INS}_{it} \) measures (personal) income insurance, see definition in Section 4. \( \text{INS}_{it} = 1 - (\text{PINC}_{it} - \overline{\text{PINC}}_{it})/(Y_{it} - \overline{Y}_{it}) \). In the regressions, the dependent variable is \( \text{sign(INS}_{it}) \cdot \ln(1 + |\text{INS}|_{it}) \). A state is in the subgroup with More Small Businesses if small businesses were more prevalent (above median) in 1977. Small Businesses are establishments with less than 100 employees. Sample is 1970–2001 for top panel, and 1970–1994 for middle and bottom panels. States excluded are: AK, DE and WY. Standard errors are in parentheses. All coefficients and standard errors are multiplied by 100.
Table 11:

<table>
<thead>
<tr>
<th></th>
<th>Pers. Inc</th>
<th>Propr. Inc</th>
<th>Wages</th>
<th>Int., Div. &amp; Rent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Banking Deregulation</td>
<td>2.8</td>
<td>84.4</td>
<td>-6.8</td>
<td>-13.1</td>
</tr>
<tr>
<td>(scaled by total bank assets)</td>
<td>(2.8)</td>
<td>(18.9)</td>
<td>(3.1)</td>
<td>(4.4)</td>
</tr>
<tr>
<td>Cumulative Acquired Bank Assets</td>
<td>3.5</td>
<td>36.4</td>
<td>-3.2</td>
<td>-5.0</td>
</tr>
<tr>
<td>(scaled by total bank assets)</td>
<td>(1.8)</td>
<td>(12.6)</td>
<td>(2.0)</td>
<td>(2.8)</td>
</tr>
<tr>
<td>Cumulative Acquired Bank Assets</td>
<td>4.3</td>
<td>45.8</td>
<td>-4.4</td>
<td>-6.3</td>
</tr>
<tr>
<td>(scaled by state GDP)</td>
<td>(2.0)</td>
<td>(14.5)</td>
<td>(2.3)</td>
<td>(3.3)</td>
</tr>
</tbody>
</table>

Note: Results are from the following GLS regressions:
Row 1: \( \text{INS}_{it} = \alpha_i + \beta D_{it} + \epsilon_{it} \).
Rows 2 and 3: \( \text{INS}_{it} = \alpha_i + \beta \text{CASS}_{it} + \epsilon_{it} \).
\( \text{INS}_{it} \) measures the sensitivity of components of income to output shocks, see definition in Section 4. \( \text{INS}_{it} = 1 - \frac{(x_{it} - \bar{x}_{it})}{(y_{it} - \bar{y}_{it})} \), where \( x_{it} \) represents components of personal income: personal income, proprietors' income; wages; and interest, dividends, and rent, respectively. In the regressions, the dependent variable is \( \text{sign}(\text{INS}_{it}) \cdot \ln(1 + |\text{INS}_{it}|) \). Sample is 1970–2001 for top panel, and 1970–1994 for middle and bottom panels. States excluded are: AK, DE and WY. Standard errors are in parentheses. All coefficients and standard errors are multiplied by 100.
Figure 1: Cumulative Acquired Assets (scaled by total assets)

A. Aggregate U.S.

B. California (state 5)

C. Kansas (state 15)

D. Montana (state 25)

E. Oklahoma (state 35)

F. Virginia (state 45)
Figure 2: Average and State-Specific Growth Rates of GSP and Personal Income

A. Average growth rate

B. California (state 5)

C. Kansas (state 15)

D. Montana (state 25)

E. Oklahoma (state 35)

F. Virginia (state 45)
Figure 3: Average and State-Specific Growth Rates of GSP and Proprietors' Income