A RESEARCH REPORT FROM STOCKHOLM INSTITUTE FOR FINANCIAL RESEARCH

Bank Integration and State Business Cycles

DONALD MORGAN
BERTRAND RIME
PHILIP E. STRAHAN

NO 30 — SEPTEMBER 2004

Stockholm Institute
for Financial Research

Stockholm Institute for Financial Research (SIFR) is a private and independent non-profit organization established at the initiative of members of the financial industry and actors from the academic arena. SIFR was launched in January 2001 and is situated in the center of Stockholm. Magnus Dahlquist serves as director of the Institute. The mission of SIFR is to:

- Conduct and stimulate high quality research on issues in financial economics, where there are promising prospects for practical applications,
- Disseminate research results through publications, seminars, conferences, and other meetings, and
- Establish a natural channel of communication about research issues in finance between the academic world and the financial sector.

The activities of SIFR are supported by a foundation based on donations from Swedish financial institutions. Major contributions have been made by: AFA, Alecta, Alfred Berg, AMF Pension, Brummer & Partners, Carnegie, Handelsbanken, Kapitalmarknadsgruppen, Länsförsäkringar, Nordea, Svenska Fondhandlareföreningen, and Östgöta Enskilda Bank.

Sveriges Riksbank funds a position as visiting professor at SIFR.

SIFR also gratefully acknowledges research grants received from Bankforskningsinstitutet, Föreningsbankens Forskningsstiftelse, Jan Wallanders och Tom Hedelius Stiftelse, Riksbankens Jubileumsfond, and Torsten och Ragnar Söderbergs stiftelser.

Stockholm Institute for Financial Research, Saltmätargatan 19A 11, SE-113 59 Stockholm, Sweden
Phone: +46-8-728 51 20, Fax: +46-8-728 51 30, E-mail: info@sifr.org, Web: www.sifr.org

Bank Integration and State Business Cycles

Donald Morgan, Bertrand Rime, and Philip E. Strahan

Stockholm Institute
for Financial Research

BANK INTEGRATION AND STATE BUSINESS CYCLES*

Donald Morgan
Bertrand Rime
Philip E. Strahan

Abstract

We investigate how integration of bank ownership across states has affected economic volatility within states. In theory, bank integration could cause higher or lower volatility, depending on whether credit supply or credit demand shocks predominate. In fact, year-to-year fluctuations in a state's economic growth fall as its banks become more integrated (via holding companies) with banks in other states. As the bank linkages between any pair of states increases, fluctuations in those two states tend to converge. We conclude that interstate banking has made state business cycles smaller, but more alike.

* The authors' views do not necessarily reflect those of the Federal Reserve or the Swiss National Bank. We thank Lawrence Katz, Edward Glaeser, Jean Tirole and anonymous referees for their comments.

I. Introduction

The United States banking system was once anything *but* united. Until 1978, every state in the union barred banks from other states, so instead of one national banking system we had more like 50 little banking systems, one per state.[1] Once states opened their borders to out-of-state banks, bank holding companies marched in and bought up (or merged with) banks all over the country. In 1975, just ten percent of the bank assets in the typical state were owned by a multi-state bank holding company. By 1994, this interstate bank asset ratio had risen to 60 percent (Figure I). Our paper investigates how the advent of interstate banking integration in the United States has affected economic volatility within states.

With the United States' balkanized banking system, the fate of a state and its banks were closely tied; as went the state, so went the banks. The farm price deflation in the early 1980s bankrupted many farmers and many farm banks. Falling oil prices in the mid-80s wiped out a lot of Texans and a lot of Texas banks. Shocks to commodity prices probably caused these contractions, but frictions in the banking sector may have aggravated them. By allowing a freer flow of bank capital and lending among states, we maintain that interstate banking will reduce the drag that banking frictions can have on economic contractions.

Precisely *how* bank integration affects volatility—by what mechanism—is far from obvious. The literature on international capital (stock and bond) market integration focuses on the risk sharing and consumption smoothing provided by cross-country asset

[1] Most states also prohibited branching into other cities *within* the state, so we really had countless little banking systems, one per city.

holdings.[2] On the question of volatility, however, the real business cycle models popular in that literature suggest that capital market integration may *increase* output (versus consumption) volatility within countries as capital can flow from slumping economies toward booming ones.

Williamson [1989] studies an early form of bank integration in his comparison of the experiences of the Unites States and Canada during the Depression. Canadian banks were highly integrated across provinces during the 1930s, and virtually all survived the Depression. U.S. banks were highly fragmented across states, and thousands failed during the Depression. Despite the stark differences in bank structure and performance, the economic contraction in Canada was as severe as it was in the United States. Bank integration may stabilize the banking system, he concludes, but not necessarily output.

Our interstate version of the banking model in Holmstrom and Tirole [1997] produces a similar sort of ambiguity about the relationship between integration and volatility. The increased mobility of bank capital under interstate banking tends to dampen the adverse effect of bank capital/loan supply shocks on state lending and spending, we argue, while amplifying the impact of firm collateral/loan demand shocks. Whether the net effect is more or less volatility ultimately depends on which shocks matter most.

In this paper, we estimate reduced form regressions with measures of state-level fluctuations in economic growth on the one side and measures of interstate bank linkages on the other. We test whether interstate integration is associated with smaller or larger

---

[2] We do not consider the possible risk-sharing and consumption smoothing benefits of interstate banking. Even when the U.S. was fragmented, savers could share risk *via* stock and (municipal) bond markets. In fact, Asdrubali et al. [1996] find that U.S. capital markets play a more vital role in income and consumption smoothing across states than do credit markets.

fluctuations within states. Using a panel of state-year data over 1976-1994, we find that growth fluctuations within a state subside significantly as that state's banks become more closely linked to banks in other states. The declines in volatility are especially pronounced in "oil" states. We also find that as banks in any two particular states become more linked, business cycles in those states tend to converge. Additional evidence suggests that this stabilization and convergence do not reflect endogenous integration or mere coincidence, hence our conclusion: Interstate banking has made state business cycles smaller, and more alike.[3]

Our findings should inform other research. Interstate banking should be considered as still another explanation for the downward trend in *aggregate* U.S. economic volatility documented by McConnell and Perez-Quiros [2000] and Blanchard and Simon [2001]. Reduced volatility of inventory investment has been advanced as one explanation of that trend; better finance via interstate banking may explain smoother inventory investment. Increased mobility of bank capital may also reduce the surprisingly large labor flows whereby state economies adjust to shocks [Blanchard and Katz, 1992]. The stabilizing benefits of interstate banking in the United States are also relevant to the bank integration in Europe, and financial "globalization" generally.

---

[3] In more speculative analysis, Morgan, Rime and Strahan [2003] investigate the possible mechanisms linking banking integration to economic fluctuations. We computed the correlation between collateral values (based on housing prices) and economic growth, and between bank capital (based on book values, from Call Reports) and economic growth. Consistent with theory, the collateral-growth correlation *increases* significantly with banking integration, whereas the bank capital-growth correlation *weakens* with integration. Integration therefore seems to stabilize by reducing a state's vulnerability to downturns in its local banking system. This stabilizing force outweighs a state's greater sensitivity to changes in the value of collateral. Because we are not able to isolate exogenous shocks to collateral and bank capital, this analysis is difficult to interpret structurally.

II. Banking Geography: A Brief History

By geography, we mean the myriad state and federal laws that have limited where banks operate. The history can be confusing because banks can expand within states or between them, and they can expand by several means. Branching is the simplest and cheapest way to grow because branches do not require separate charters, capital, management teams or boards of directors. When branching is forbidden, a bank can grow by buying other banks, or by opening new (de novo) ones. Four cases are possible (hence the potential confusion): interstate banking, interstate branching, intrastate banking, and intrastate branching.[4]

The Douglas Amendment to the 1956 Bank Holding Company (HC) Act gave states the prerogative to exclude out-of-state banks or holding companies from buying or building a bank or branch in their state. All states exercised this option, effectively barring interstate banking. In 1978 Maine passed a law allowing entry by bank holding companies from any state that allowed entry by Maine banks. Alaska, Massachusetts, and New York passed similar laws in 1982. By 1992, all states but Hawaii had passed reciprocal entry laws of some sort.

The transition to interstate banking was completed with passage of the Reigle-Neal Interstate Banking and Branching Efficiency Act of 1994. Reigle-Neal made interstate banking a bank right, not a state right; banks or holding companies could now enter another state without permission.

One more piece of legislation bears mention. In 1982, federal legislators amended the Bank Holding Company Act to permit the acquisition of *failed* thrifts and

[4] Adding to the confusion is the bank vs. bank holding company distinction: a bank holding company (BHC) is just a corporate entity comprising one or more separately chartered banks.

banks by out-of-state banks or holding companies. Banks and thrifts failed by the hundreds in some states in the early 1980s after the recessions of 1980 and 1981-82 and the "third world debt" crises. Surviving institutions in hard-hit states were often not fit to re-capitalize the failed ones, so Congress acted to let in healthy banks from out-of-state. Note that the interstate banking boom following this act coincided with severe downturns in certain states. We bring this up again later.

States were also relaxing restrictions on intrastate branching in the 1970s and 1980s. Table I lists states by the year they entered an interstate banking compact and the year they permitted intrastate branching. States deregulated in waves, or cohorts, rather than all at once, which we exploit in identifying how interstate banking affects fluctuations in economic growth within states.

III. Interstate Banking Does Not Necessarily Reduce Volatility

Our interstate version of Holmstrom and Tiroles' [HT 1997] banking model suggests that bank integration could cause higher *or* lower volatility. Bankers in the HT model can prevent moral hazard by monitoring firms, but they can also commit moral hazard by neglecting to monitor. These frictions make the flow of credit and investment spending dependent on the stock of firm collateral and bank capital; contractions in either cause contractions in aggregate investment spending.

Our interstate version of the model includes a second physical place ("state") where bank capital can flow (Appendix). We compare the impact of collateral and bank capital shocks under an *interstate* banking regime, where capital can flow freely across states, versus an *intra*state regime where capital flows across states is restricted.

Collateral and capital shocks are still contractionary under interstate banking, but the magnitudes change: bank capital shocks have a smaller impact on investment under interstate banking, while the impact of firm collateral shocks gets amplified by interstate banking. The intuition is simple: a holding company operating banks in two states will import capital to state *A* if the returns to lending the banks' capital are still good, but a collateral shock in state *A* will lead the holding company to export capital and lending away from that state.

If we identify bank capital and firm collateral with loan supply and demand curves, we can illustrate these ideas graphically (Figure II). With a segregated banking system, a reduction in bank loan supply in state *A* increased bank returns in *A*, but has no affect on credit markets in state *B*; borrowers in state *A* bear the full brunt of the shock in the form of higher loan interest rates (β_A in Figure II) and smaller loan quantities (L_A in Figure II). Under *inter*state banking, by contrast, the higher return on bank capital in state *A* attracts credit from state *B*. The inflow from *B* partially offsets the initial impact on loans supplied in state *A*. When loan demand is weak in state *A*, due to declines in borrower wealth or collateral, integration amplifies the decline in investment by facilitating the flow of banking resources out of state *A* and into *B* (Panel B). The main point we take from this model is that integration could be positively or negatively related to volatility, depending on whether loan supply or demand shocks are the larger source of volatility. In the next section we test whether integration following banking deregulation was followed by more or less economic volatility.

IV. Regression Strategy and Data

To test if state volatility has changed with banking integration, we estimate regressions with the following structure:

(1) $Fluctuation_{it} = a_i + a_t + \beta x Integration\ measure_{it} + \varepsilon_{it}$.

$Fluctuation_{it}$ equals the absolute deviation from conditional mean growth in either gross state product, employment, or personal income, where the conditional means are estimated by regressing growth rates in each state-year on dummy variables indicating year, state, and indicator variables for whether the state permitted interstate banking and intrastate branching (discussed below). In particular:

(2) $Growth_{it} = c_i + c_t + \gamma\ x\ Deregulation\ Indicators_{it} + v_{it}$,

and

(3) $Fluctuation_{it} = \left| v_{it} \right|$.

Roughly speaking, the fluctuation in economic growth for a given state-year equals the size of the deviation from average growth for that state (over 1976-94) and from average growth for all states in that year.[5]

Banking integration is measured by two variables. Both measures use interstate banking affiliations *via* bank holding companies. Holding company affiliations are really the only way to measure interstate bank integration (interstate credit flows are not available), but it is the right conceptual measure for our purposes. Houston, James and Marcus [1997] show that loan growth of a subsidiary bank depends more on cash flow

---

[5] We prefer to model absolute rather than squared deviations for two reasons. First, absolute deviations maintain the same units as growth, so the coefficients are easily interpreted. Second, the squared deviations exhibited very large outliers for several small states (e.g. Alaska, North Dakota and Wyoming). When these states are dropped, the results are similar using squared deviations to those reported below in terms of economic and statistical significance. When these three states are included, the coefficients on banking

and capital of the holding company than on the subsidiary's own cash flow and capital. They conclude that holding companies represent internal capital markets through which scarce funds get allocated among subsidiary banks in different locations. These internal capital market flows are precisely the flows that will transmit economic shocks across states.[6]

The first measure of integration, the *interstate asset ratio*, equals the fraction of bank assets in state *i* that are owned by a holding company that owns bank assets in one or more other states. Suppose bank assets are distributed across states *A* and *B* like this:

A	*B*
1	10
2	20,

where each number represents a bank and the amount of its assets. If A*1* and *B10* are jointly owned (by a holding company) but *A2* and *B20* are unaffiliated, *interstate asset ratio* equals 1/3 for both states.

The second measure, o*ther state asset ratio*, equals total out-of-state assets held by holding companies operating in the state, divided by total assets in that state. O*ther state asset ratio* equals 10/3 for state *A* in the example above and 1/30 for state *B*. The o*ther state asset ratio* captures differences in state or banking system size that the *interstate asset ratio* misses entirely. In the example above, capital flows from state *B* to state *A* may matter a lot to A, but flows the other way may hardly matter to state *B*.[7] The

---

integration lose significance for deviations in both income and gross state product growth but remain about the same for employment growth (which does not have the outlier problem).

[6] Ashcraft [forthcoming] finds federal funds rate shocks have a smaller impact on bank lending in states where banks are better linked (via holding companies) with banks in other states.

[7] *Interstate asset ratio,* by contrast, captures changes that are missed by o*ther state asset ratio*. *Interstate asset ratio* for state A would increase from 1/3 to 1 if, in the example above, B10 acquired A2,

correlation between *interstate asset ratio* and *other state asset* ratio over 1976-94 was 0.34, so they do measure different dimensions of integration.

We take o*ther state asset ratio* as given because it depends mostly on a state's (relative) size and location, factors that are largely exogenous with respect to the size of a fluctuation in a given state-year. Nevada has a high *other state asset ratio* because it happens to be near California.[8] *Interstate asset ratio*, by contrast, might be correlated with contemporaneous fluctuations in a state. Economic contractions, especially if accompanied by banking crises, may attract bargain-hunting banks from other states (or drive local banks to look outward for lending opportunities). A positive correlation between fluctuations in a given state-year and the *interstate asset ratio* in that state-year would bias the OLS estimates upwards.

To address that potential bias, we report instrumental variable (IV) regressions using three deregulation indicators as instruments for *interstate asset ratio (*as well as *other state asset ratio* and labor shares, as discussed below). The first indicator, a*fter interstate deregulation,* switches on (from zero to one) the year a state permits entry by out-of-state banks and stays on thereafter. *Five years after interstate deregulation* switches on five years after deregulation and stays on thereafter.[9] *After intrastate branching,* the third indicator variable, switches on the year a state permitted its own banks to branch within the state.[10]

---

but *other state asset ratio* would not change. The change in *interstate asset ratio* would capture the potential for credit from B10 to flow throughout state A.

[8] Hawaii never passed an interstate banking agreement (before Congress did), presumably because it is so distant from every other state.

[9] Lagging allows for delays between deregulation and the actual mergers and acquisitions that increase interstate bank affiliations.

[10] Using *intrastate* branching to instrument for *interstate* banking is odd, but we wanted a complete measure of states' stance toward geographic expansion, whether inward or outward. None of our

The first stage regressing of *interstate asset ratio* on these indicators (reported below) measures the change in that ratio within a state after deregulation, and the difference in that ratio between deregulated states and still regulated states. As long as state deregulation is *not* driven by contemporaneous fluctuations in a state (evidence on that later), changes in *interstate asset ratio* after deregulation can be taken as exogenous with respect to current fluctuations in a given state.[11]

Over time, a contemporaneous correlation might show up as a *constant* difference in the relationship between fluctuations and *interstate asset ratio*. States that are prone to big cycles (because of different resource endowments, say) and banking crises may wind up more integrated if the banking crises are followed by waves of buyouts from banks in other states. We deal with this possibility by including fixed state effects that eliminate any constant differences (across states) in fluctuations. We also report regressions that include labor force composition as well; big mining (oil, gas, or mineral) states may be subject to bigger fluctuations than big government states, for example. We also include the sum of squared labor shares as a measure of labor force concentration. All else equal, we would expect states with less diversified economies to be more volatile.

Table II summarizes our data, definitions, etc. All data (except gross state product) start in 1976, just before Maine passed the first interstate banking law (GSP data start in 1978). All data end in 1994, the year Congress passed the Riegle-Neal Interstate Banking Act. Apart from its symbolic importance, certain bookkeeping consolidations

---

conclusions depend on this variable. Conceivably, states that permit branching may attract more interstate linkages from holding companies that seek a presence all over a state.

[11] If deregulation *does* depend on the contemporaneous fluctuations in a state, then our instruments are endogenous too.

enabled by Reigle-Neal make it impossible to distinguish holding company assets in different states.[12]

A few summary statistics in Table II warrant note. *Other state asset ratio* is roughly ten times larger than *interstate asset ratio (*because of the different numerator in each ratio). The three measures of state economic activity—employment, income, and gross product—grew 2.0 - 2.3 percent per year over the relevant sample period. Our measure of *fluctuations* in growth averaged 1.1 percent for employment, 1.5 percent for personal income, and 2.3 percent for gross product. Our *conditional* measure of fluctuation in each series is only half as large as the corresponding standard deviation, but the rankings are identical: employment fluctuates least, gross product most (income in the middle).[13] Note that mining employment is highly variable (relative to its mean share of employment). The high standard deviation of mining employment reflects both the ups and downs in this sector within states, and the larger variation in the mining share across states.

Figure III plots *interstate asset ratio* by state cohorts, grouped by when the state first permitted interstate banking.[14] The surge in several states in the mid-1980s reflects the buying of *failed* banks and thrifts enabled by Congress in 1982.

Figure IV plots the change (difference-in-differences) in employment growth fluctuations before and after deregulation. We computed the change in the mean

---

[12] Reigle-Neal enables a holding company to consolidate businesses across states into its headquarter bank. For example, when NationsBank consolidated into its headquarters in North Carolina (NationsBank NC N.A.), its "North Carolina assets" more than doubled between 1994 and 1995.

[13] Gross product growth fluctuates more than personal income growth because personal income also includes residents' income earned in other states (stock market wealth, etc.). Income from other states may diversify residents against changes in income from their own state.

[14] Positive levels of *interstate asset ratio* before deregulation represent assets of multi-state bank holding companies that predated the Douglas Amendment (that were grandfathered under that act).

employment growth volatility after interstate banking reform, relative to the change in volatility over the same years in states that were still regulated. Though a bit crude (because the "control group" composition changes as more states deregulate), this calculation reveals whether most states experienced more or less volatility after deregulation. In fact, all but four states experienced lower employment growth fluctuations after deregulation.[15] Some of the largest declines were in "oil states" [Blanchard and Katz, 1992]: Wyoming (WY), Montana (MT), Oklahoma (OK), Texas (TX), North Dakota (ND), and Louisiana (LA).[16]

V. Results

V.1. Main Findings

Table III reports coefficients from a set of preliminary regressions. The standard errors are clustered by states to allow for correlation across states [Bertrand et al., 2004].[17] Also reported [in square brackets] are 95 percent confidence intervals generated by repeated sampling over state-clusters. Sampling over states reveals whether results depend on particular states (oil states, for example).

The first regression shows that *interstate asset ratio* increased significantly—by 14 to 17 percentage points—after deregulation. *Five years after deregulation* is also significant, suggesting a long-run increase in the *interstate asset ratio* of 21 to 25 percentage points. The "within" R^2 is 71 percent with labor shares, 66 percent without.

---

[15] Using a similar analysis, we find declines in personal income growth volatility in 39 of 48 states, and we find declines in gross state product volatility in 37 of 48 states.

[16] Blanchard and Katz [1992, p. 10] define oil and mineral states as states where two percent or more of total state earnings are derived from oil and mineral earnings (in 1980). Their list comprises the five states listed in the text, plus Alaska (AL), Colorado (CO), New Mexico (NM), and West Virginia (WV).

This first regression is also the first-stage for the IV regressions we report later. The significance of both deregulation indicators and the decent R^2 suggest that our instrument set is reasonable.[18]

The other regressions in Table III show that fluctuations in all three growth measures—gross product, income, and employment—tend to subside after interstate deregulation. These regressions can be interpreted as reduced form models linking changes in regulations directly to economic volatility. The decline after reform is significant for every measure when the regressions include the labor shares. Without the labor shares, the decline in employment and gross state product fluctuations is significant, but the decline in personal income is not.[19] The results also suggest (weakly) that the effects of deregulation on volatility build over time -- the coefficients on *five years after interstate deregulation* are always negative (although not significantly so). This result is consistent with the changes in banking integration, which also increase gradually after a state deregulates restrictions on interstate banking.

Table IV reports OLS (fixed effect) regressions of fluctuations on our banking integration measures. *Other state asset ratio*—the exogenous measure—enters negatively in every regression. Its coefficient is significant between the five percent and ten percent level. The ninety-five percent confidence interval is centered in the negative range, but it reaches into the positive range.

---

[17] Our adjustment follows Bertrand et al. [2004], who study this problem in the context of difference-in-differences estimators and recommend clustering observations by state.

[18] The insignificance of *intrastate branching deregulation* means that permitting branching within a state is not associated with increased affiliation across states.

[19] Income can come from out of state, so it makes sense that income fluctuations are less sensitive to bank integration.

Interstate asset ratio—the endogenous measure—enters negatively in five of six regressions, but the coefficient is never statistically significant. The associated confidence interval is centered in the negative range, but the intervals are wide. When the labor shares are included, the coefficient on *interstate asset ratio* is two-to-six times more negative. This interaction reinforces the possibility (raised above) that *interstate asset ratio* might be *higher* in states that are inherently more volatile (because of their resource endowment) because such states are more prone to banking crises and buyouts by banks in other states (if permitted). Controlling for labor shares—a reasonable proxy for endowments—this apparent bias in the OLS estimates is diminished.[20]

Table V reports instrumental variable (IV) regressions, where the instruments for *interstate asset ratio* are *other state asset ratio,* the labor shares, and the deregulation indicators. The IV estimates of *interstate asset ratio* are significant in all but one regression, and in every regression that includes labor shares. The IV estimates imply a substantial stabilizing effect of interstate bank affiliations, especially given labor shares. A state with *interstate asset ratio* 0.28 above average (one standard deviation) would have fluctuations in personal income growth 0.9 percentage points (0.28x0.032x100) lower than a state where interstate asset ratio was average. The typical fluctuation in personal income growth was 1.6 percent, so 0.9 is sizable.[21]

V.2. Endogenous deregulation does not explain reduced volatility

---

[20] The coefficient on *other state asset share,* by contrast, is not nearly as sensitive to inclusion of the labor shares. The insensitivity of the *other state asset coefficient* to labor mix reinforces our treatment of that measure as largely accidental, or exogenous measure reflecting state size and location (near big or large states) and not fluctuations within the state.

[21] We found similar results when we allowed a full set of interactions between the year effects and the state-level industry employment share variables (in case the impact of the aggregate shock depends on a state's industry mix). In an earlier draft, we found a more pronounced stabilizing effect of integration in small states.

Our deregulation instruments *might* be correlated with contemporaneous fluctuations in a state. Economic fluctuations, especially contractions, may pressure legislators to allow entry by out-of-state banks or exit by local banks seeking greener pastures. If so, smaller fluctuations after deregulation might just reflect increased volatility before deregulation and reversion to average fluctuations after. Not so. In Table VI we re-estimate the regulatory reduced form models from Table III with an additional indicator variable equal to one during the five-year period preceding regulatory change. This indicator never enters significantly positive; nor does its inclusion in the model change the main results. All three fluctuation measures subside *after* deregulation (significantly so for employment and gross state product), but none were unusually high in the five years prior to deregulation.[22]

V.3. Convergence in state cycles

Banking integration also affects the spillover of credit shocks from one state to others. Whether integration causes state cycles to become more or less alike, however, depends on whether supply or demand shocks are the predominant source of disruptions to credit markets. Recall Figure II. If bank capital/loan supply contracts in state *A,* a holding company in *A* will import bank capital from some healthier state where it also holds banks, say *B.* The capital import from *B* contracts loan supply there and expands loan supply in *A*, thus narrowing the divergence in lending (and spending) between *A* and *B* (compared to an *intra*state banking structure with immobile capital).[23] A contraction in loan *demand* in *A (*and the resulting decline in bank capital returns) motivates interstate

---

[22] The *five years prior to interstate deregulation* dummy in the Table VI regressions effectively "dummies out" those years.

holding companies to shift capital from *A* to *B*. The capital exported from *A* contracts loan supply there (further reducing the quantity of lending in *A*), and expands loan supply in *B*, thus widening the divergence between *A* and *B* (compared to *intra*state banking). The net effect is ambiguous; whether differences between state fluctuations widen or narrow with interstate banking depends on which shock—loan supply or loan demand—predominates. Given our finding that fluctuations fall after interstate banking deregulation, we can infer that loan supply/capital shocks predominate (else we would have found the opposite). Hence, we expect interstate banking will narrow differences between state business cycles.

We test this "integration *cum* convergence" hypothesis here using pair-wise comparisons across states. For every pair of states over 1976-94 (state-pair-year), we computed the value of bank assets in the two states (say *A* and *B*) that are jointly owned (by a holding company), divided by the sum of bank assets in *A* and *B*. The higher that ratio, the more integrated the two states banking systems. As a discrete alternative, we also constructed an indicator that switches on (from zero to one) if *A* and *B* have *any* bank assets that are jointly owned. The dependent variable equals the absolute difference in the growth residual between state pairs in a given year, where the growth residual (v_{it}) is computed as before (see Equation (2) above). To be precise:

(4) $\quad \textit{Absolute Difference in Growth}_{i,j,t} = \left| \; v_{it} - v_{jt} \; \right|.$

We expected a smaller difference between growth in *A* and *B* as their banks become more integrated (and compared to other, less integrated, state-pairs). To construct standard errors, we cluster the data for each state-year.

---

[23] Peek and Rosengren [2000] find that the capital contractions of Japanese banks in the 1990s caused them to reduce their lending in the U.S. (California in particular).

In fact, states' cycles do converge along with their banking systems (Table VII). Absolute differences between growth in all three measures—employment, personal income, and gross product—decline significantly as the share of commonly owned bank assets increases. The indicator of any jointly owned assets is also significant in every regression. The absolute difference in employment growth is 0.4 percentage points lower for states with some jointly owned assets than for states whose banking sectors are completely segregated (column 2). The mean absolute difference in employment growth is 1.6 percent. Note that business cycles differences *increase* with differences between states' industry mix, as we would expect, but interstate bank linkages narrow business cycle differences even after controlling for differences in labor force composition.[24]

V.4. Interstate trade does not explain our results

The negative correlation between bank integration and state business fluctuations is almost certainly *not* an artifact of increased trade ("*real"* integration) among the states. It is not obvious that trade is stabilizing; trade permits specialization, and specialization is the opposite of diversification. Recall from Tables III and IV that fluctuations in state income and output growth increase with the sum of squared labor shares (a measure of concentration). If anything, increased trade (if it begets specialization) might cause larger fluctuations. We also examined the data available on interstate shipping (as a proxy for trade), and found no correlation between the change in interstate shipping between 1977 and 1993 for each state and the corresponding change in *interstate asset ratios.*[25]

---

[24] The difference between two states' industry mix is measured by the square root of the sum of squared differences between the two states' employment shares in the eight one-digit SIC sectors listed in Table 1. The regressions in Table VII also include state-pair fixed effects to absorb permanent similarities between states (such as proximity) and annual fixed effects to remove trends.

[25] Out-of-state shipping ratios are available periodically from the *Commodity Flow Surveys* conducted by the Department of Transportation and the Department of Commerce. The closest surveys to our (1976-

VI. Conclusion

The Unites States once had 50 little banking systems, one in every state. Now we have a much more integrated banking system, with holding companies operating banks across many states. Interstate banking appears to have helped stabilize growth fluctuations within states, and to reduce divergence between states. State business cycles have become smaller, in other words, but more alike.

This conclusion has implications in several dimensions. Banks in Europe are still relatively *dis*integrated across nations [Berger 2003]. As integration accelerates, along with unification generally, our findings suggest that business cycles in European nations will also diminish and converge. Interstate bank integration may also help explain the decline in *aggregate* U.S. economic volatility over the past twenty years documented in McConnell and Perez-Quiros [2000] and Blanchard and Simon [2001]. Researchers have already ventured several explanations for this trend; better finance *via* bank integration may be yet another.[26] Our findings also relate to "regional evolutions" studied by Blanchard and Katz [1992]. They find that labor migration played a surprisingly large role in the adjustment of state economies to shocks. By increasing the ease with which financial capital can flow into states, banking integration could potentially reduce the incentive for people to leave states during downturns. It would be interesting to test

---

94) sample were in 1977 and 1993. We plot the data in Morgan et al [2003] but omit that plot here for brevity. The correlation of 0.103 was not significantly different from zero (p value = .49).

[26] Better inventory management [Kahn, McConnell and Perez-Quiros, 2002], reduced volatility of sales with non-convexities in the production process [Ramey and Vine, 2001], better monetary policy [Blanchard and Simon, 2001], and better luck [Stock and Watson, 2001]. Better finance fits best with the inventory-management hypothesis. According to this view, firms began smoothing production better in the post-1984 period by building up inventories during periods of low sales growth, and vice versa during period of high sales growth [Kahn, et al, 2002]. These counter-cyclical movements in inventories are only possible if banks are able to provide counter-cyclical credit; interstate banking may contribute in that direction.

whether increased mobility of bank capital, via interstate banking, has altered the role of labor mobility in the adjustment to shocks.

Appendix: Interstate Banking in the Holmström and Tirole (HT) model.[27]

The basic model comprises firms, banks, and investors. All are risk neutral. Firms choose between a good project and either of two bad projects. The "good" project succeeds with probability p_H; both "bad" projects succeed with probability p_L. A key parameter in the model is the good and bad projects' relative likelihood of success: $\Delta p = p_H - p_L > 0$. All of the projects return R (per-unit invested) if they succeed and 0 if not. The two bad projects also produce differing amounts of *private* benefits to the firm: type *b* bad projects produce a small private benefit (*b);* type *B* bad projects produce a larger private benefit ($B > b$). Banks can prevent *B* investments by monitoring, but not *b* investment. Monitoring costs *c* per unit of investment. Banks must invest enough of their own capital in the project to be credible monitors.

Contracts. Firms borrow from both the bank (*informed capital*) and investors (*uninformed capital*). If the project succeeds, the firm, bank monitor, and uninformed investors receive *Rf*, *Rm* and *Ru*. *Rf* must be large enough to induce the firm to choose the good project ($Rf \geq bI / \Delta p$). *Rm* must be large enough to induce the bank to monitor ($Rm \geq cI / \Delta p$). At equilibrium, the two incentives constraints and the firm's budget constraint will bind. The *maximum pledgeable income,* defined by HT as the maximum expected income per unit of investment that can be promised to uninformed investors without destroying incentives, is then equal to $p_H (R - (b + c) / \Delta p)$.

Intrastate Banking

---

[27] Morgan et al. (2003) elaborate on this interstate version of the HT model.

By *intra*state banking, we mean informed capital is completely immobile across states. That immobility means the equilibrium in each state is the same as in the HT's one state model. Let γ and β denote the rates of return required by uninformed investors and by banks, respectively. Let Kf_1 be the aggregate amount of firm capital in state 1, Km_1 the aggregate amount of informed capital in state 1, and Ku_1 the aggregate supply of uninformed capital in state 1. The first two are fixed, while the third is determined so that the demand for uninformed capital (the sum of the pledgeable expected returns of individual firms, discounted by γ) equals the supply of uninformed capital. Equilibrium in the uninformed capital market in state 1 requires

$$\frac{p_H (Kf_1 + Km_1 + Ku_1)\big(R - (b+c)/\Delta p\big)}{\gamma} = Ku_1 .$$

The equilibrium quantity of uninformed capital in state 1 is determined by

$$Ku_1 = \frac{p_H (-b - c + R \cdot \Delta p)(Kf_1 + Km_1)}{p_H (b + c - R \cdot \Delta p) + \Delta p \cdot \gamma} .$$

The equilibrium rates of return in informed capital markets is defined by

$$\beta_1 = p_H \cdot c(Kf_1 + Km_1 + Ku_1)/(Km_1 \cdot \Delta p) .$$

I*nterstate banking*. Under *inter*state banking, we assume that informed capital *can* move freely to equalize β across states. Define π_1 as the share of aggregate informed capital (Km_1+Km_2) invested in state 1. Let Ku_1^i and Ku_2^i be the quantities of uninformed capital attracted by firms in each state (note the superscript i for interstate banking). Equilibrium with interstate banking is determined by these three equations:

$$\frac{p_H\left(Kf_1+\pi_1(Km_1+Km_2)+Ku_1^i\right)\left(R-(b+c)/\Delta p\right)}{\gamma}=Ku_1^i$$

$$\frac{p_H\left(Kf_2+(1-\pi_1)(Km_1+Km_2)+Ku_2^i\right)\left(R-(b+c)/\Delta p\right)}{\gamma}=Ku_2^i$$

$$\beta=\frac{p_H\cdot c\left(Kf_1+\pi_1(Km_1+Km_2)+Ku_1^i\right)}{\Delta p\cdot\pi_1(Km_1+Km_2)}=\frac{p_H\cdot c\left(Kf_2+(1-\pi_1)(Km_1+Km_2)+Ku_2^i\right)}{\Delta p(1-\pi_1)(Km_1+Km_2)}.$$

The equilibrium quantities attracted by firms in each state and the share of informed capital invested in state 1 are

$$Ku_1^i=\frac{p_H(-b-c+R\cdot\Delta p)(Kf_1+Kf_2+Km_1+Km_2)Kf_1}{\left(p_H(b+c-R\cdot\Delta p)+\Delta p\cdot\gamma\right)(Kf_1+Kf_2)}$$

$$Ku_2^i=\frac{p_H(-b-c+R\cdot\Delta p)(Kf_1+Kf_2+Km_1+Km_2)Kf_2}{\left(p_H(b+c-R\cdot\Delta p)+\Delta p\cdot\gamma\right)(Kf_1+Kf_2)}$$

$$\pi_1=\frac{Kf_1}{Kf_1+Kf_2}$$

Comparative statics

The negative impact of a bank capital crunch in state 1 (a decrease in Km_1) on the amount of *informed* and of *uninformed capital* invested in state 1 is smaller under *inter*state banking. Intuitively, the increase in β caused by the bank capital crunch attracts bank capital from state 2. This capital inflow mitigates the impact of the bank capital crunch on the availability of external finance in two ways. First, the bank capital inflow leads to a lower decrease in the amount lent by banks to firms in state 1 (this effect is shown in Figure I, Panel A). Second, because the amount lent by banks to firms in state 1 decreases less, we also have a smaller reduction in the pledgeable income that can be promised to uninformed investors by firms in state 1. As a result, we have a smaller

reduction in the amount of uninformed capital that firms in state 1 can attract. With unit banking, these mitigating effects do not take place, since bank capital cannot move across states. Formally, proposition 1 implies $\partial \pi_1(Km_1 + Km_2)/\partial Km_1 < \partial Km_1/\partial Km_1$ and $\partial Ku_1^i/\partial Km_1 < \partial Ku_1/\partial Km_1$. The proofs, available from the authors, are straightforward under the *symmetry* conditions $Kf_1 = Kf_2$ and $Km_1 = Km_2$ at initial values.

The negative impact of a collateral squeeze in state 1 (a decrease in Kf_1) on the amount of *uninformed* and *informed capital* invested in state 1 s larger under *inter*state banking. With interstate banking, the decrease in β after the collateral squeeze drives bank capital from state 1 to state 2. Here again, two effects must be distinguished. First, the bank capital flight leads to a decrease in the amount lent by banks to firms in state 1 (this effect is shown in Figure I, Panel B). Second, because of this reduction of the amount lent by banks to state 1 firms, we also have a decrease in the pledgeable income that can be promised to uninformed investors. As a result, firms in state 1 can attract less uninformed capital. With unit banking, these amplifying effects do not take place, since bank capital cannot move across states.

Federal Reserve Bank of New York

Swiss National Bank

Boston College, Wharton Financial Institutions Center, and National Bureau of Economic Research

REFERENCES

Ashcraft, Adam, "New Evidence on the Lending Channel," *Journal of Money, Credit, and Banking,* forthcoming.

Asdrubali, Pierfederico, Bent Sorenson and Oved Yosha, "Channels of Interstate Risk Sharing: United States 1963-90," *Quarterly Journal of Economics,* CXI (1996), 1081-1110.

Berger, Allen N, "Global Integration in the Banking Industry," *Federal Reserve Bulletin,* LXXXIX (2003), 451-460.

Bertrand, Marianne, Esther Duflo and Sendhil Mullinaithan, "How Much Should We Trust Difference-in-Differences Estimators?" Q*uarterly Journal of Economics, CXIX* (2004), 249-276.

Blanchard, Olivier and Lawrence F. Katz, 1992, "Regional Evolutions," *Brooking Papers on Economic Activity,* 1992:1.

Blanchard, Olivier and John Simon, "The Long and Large Decline in U.S. Output Volatility," *Brooking Papers on Economic Activity,* No. 1 (2001), 135-74.

Holmstrom, Bengt, and Jean Tirole, "Financial Intermediation, Loanable Funds, and the Real Sector," *Quarterly Journal of Economics*, CXII (1997), 663-691.

Houston, Joel, Christopher James, and David Marcus, "Capital Market Frictions and the Role of Internal Capital Markets in Banking," *Journal of Financial Economics,* XLVI (1997), 135-164.

Jayaratne, Jith and Philip E. Strahan, "The Finance-Growth Nexus: Evidence from Bank Branch Deregulation," *Quarterly Journal of Economics*, CXI (1996), 639-670.

Jayaratne, Jith and Philip E. Strahan, "Entry Restrictions, Industry Evolution, and Dynamic Efficiency: Evidence from Commercial Banking, *The Journal of Law and Economics*, XL1 (1998), 239-273.

Kahn, James A., Margaret McConnell and Gabriel Perez-Quiros, "On the Causes of the Increased Stability of the U.S. Economy," Federal Reserve Bank of New York, *Economic Policy Review*, VIII (2002), 183-202.

Kane, Edward, "De Jure Interstate Banking: Why Only Now?," *Journal of Money, Credit, and Banking*, XXVIII (1996), 141-161.

Kroszner, Randall S. and Philip E. Strahan, "What Drives Deregulation: Economics and Politics of the Relaxation of Bank Branching Restrictions," *Quarterly Journal of Economics*, CXIV (1999), 1437-67.

McConnell, Margaret and Gabriel Perez-Quiros, 2000, "Output Fluctuations in the United States: What Changed Since the Early 1980s?" *American Economic Review* XC (2000), 1464-76.

Morgan, Donald, Bertrand Rime, and Phillip Strahan, "Bank Integration and State Business Cycles," NBER Working Paper No. 9704 (2003).

Peek, Joseph and Eric Rosengren, "Collateral Damage: Effects of the Japanese Bank Crisis on the United States," *American Economic Review* XC (2000), 30-45.

Stock, James and Mark W. Watson, "Has the Business Cycle Changed and Why?" mimeo, August 2002.

Stockman, Alan, and Linda Tesar, "Tastes and Technology in a Two-Country Model of the Business Cycle: Explaining International Comovements," *American Economic Review*, LXXXV (1995), 168-185.

Williamson, Stephen, "Restrictions on Financial Intermediaries and Implications for Aggregate Fluctuations: Canada and the United States 1870-1913," in *NBER Macroeconomics Annual: 1989*, O. Blanchard and S. Fischer, eds. (Cambridge, Mass. And London: MIT Press, 1989).

TABLE I

States (acronym), By the Year Out-of-State Bank Entry and Intrastate Branching Permitted

	Interstate banking:	Intrastate branching:
Maine (ME)	1978	1975
Alaska (AK)	1982	*
New York (NY)	1982	1976
Connecticut (CT)	1983	1980
Massachusetts (MA)	1983	1984
Kentucky (KY)	1984	1990
Rhode Island (RI)	1984	*
Utah (UT)	1984	1981
Washington, DC (DC)	1985	*
Florida (FL)	1985	1988
Georgia (GA)	1985	1983
Idaho (ID)	1985	*
Maryland (MD)	1985	*
Nevada (NV)	1985	*
North Carolina (NC)	1985	*
Ohio (OH)	1985	1979
Tennessee (TN)	1985	1985
Virginia (VA)	1985	1978
Arizona (AZ)	1986	*
Illinois (IL)	1986	1988
Indiana (IN)	1986	1989
Michigan (MI)	1986	1987
Minnesota (MN)	1986	1993
Missouri (MO)	1986	1990
New Jersey (NJ)	1986	1977
Oregon (OR)	1986	1985
Pennsylvania (PA)	1986	1982
South Carolina (SC)	1986	*
Alabama (AL)	1987	1981
California (CA)	1987	*
Louisiana (LA)	1987	1988
New Hampshire (NH)	1987	1987
Oklahoma (OK)	1987	1988
Texas (TX)	1987	1988
Washington (WA)	1987	1985
Wisconsin (WI)	1987	1990
Wyoming (WY)	1987	1988
Colorado (CO)	1988	1991
Delaware (DE)	1988	*
Mississippi (MS)	1988	1986
South Dakota (SD)	1988	*
Vermont (VT)	1988	1970
West Virginia (WV)	1988	1987
Arkansas (AR)	1989	1994
New Mexico (NM)	1989	1991
Nebraska (NE)	1990	1985
Iowa (IA)	1991	*
North Dakota (ND)	1991	1987
Kansas (KS)	1992	1987
Montana (MT)	1993	1990
Hawaii (HI)	Not permitted (as of 1994)	1986

Branching date reflects when states permitted branching via merger & acquisition (usually before de novo branching permitted). Dates from Amel [1993] and Kroszner and Strahan [1999].

* pre-1970.

TABLE II

Variable Names, Definitions, Summary Statistics, and Sources

Interstate Banking Ratios:	**Mean**	**St.Dev.**	**Source**
Interstate asset ratio = bank assets in state *i* affiliated with out-of-state bank holding company / total bank assets in state *i*	0.34	0.28	Bank reports of income and condition data. Authors' calculations.
Other state asset ratio = bank assets in state *j* affiliated (via holding company) with banks in state *i* / total bank assets in state *i*.	3.31	5.62	
Deregulation Indicators (0/1):			
After interstate banking deregulation (switches on after deregulation)	0.40	0.49	Dates in Table 1. Authors' calculations
Five years after interstate deregulation (switches on five years after deregulation)	0.20	0.40	
Intrastate branching deregulation (switches on after intrastate branching permitted)	0.55	0.50	
Economic growth (annual %):			
Employment	2.0	2.2	Dept. of Commerce, Bureau of Economic Analysis data. Authors' calculations.
Personal income (real)	2.3	3.0	
Gross state product (real)	2.1	4.5	
Growth fluctuations(absolute deviation from state-year average growth rate x 100):*			
Employment	1.1	1.0	Dept. of Commerce, Bureau of Economic Analysis data. Authors' calculations.
Personal income (real)	1.5	1.6	
Gross state product (real)	2.3	2.7	
Labor shares (state employment in each sectorx100 /total, non-farm state employment):			Dept. of Commerce, Bureau of Economic Analysis data. Authors' calculations.
Mining	1.4	2.2	
Construction	5.5	1.3	
Manufacturing	5.4	6.7	
Transportation	5.1	1.0	
Trade	21.7	2.5	
Finance	7.4	1.4	
Services	25.5	4.8	
Government	18.1	5.2	
Sum of squared labor shares	19.1	2.3	

Statistics (except for gross state product) calculated over 931 state-years: 49 states (South Dakota and Delaware omitted; D.C. included) over 1976-94. Statistics for gross state product calculated over 833 state-years: 49 states x 1978-94 (1976-77 unavailable).

* State-year average is calculated by regressing annual growth in each variable on indicators for state, year, after interstate banking deregulation, and after intrastate branching deregulation. Fluctuations equal the absolute value of the residual from this regression.

TABLE III

Integration Rises and State Fluctuations Fall with Interstate Deregulation

OLS Regression Coefficients (standard errors-clustered by state) [95% confidence intervals-bootstrapped from sampling over states]

	Dependent Variable							
	(1)		**(2)**		**(3)**		**(4)**	
	Interstate Asset Ratio		**Employment Growth Fluctuations**		**Personal Income Growth Fluctuations**		**Gross State Product Growth Fluctuations**	
Other state asset ratio***	0.17	-0.17	-0.04*	-0.03*	-0.06**	-0.03**	-0.13**	-0.12**
	(0.42)	(0.42)	(0.02)	(0.01)	(0.03)	(0.02)	(0.06)	(0.06)
	[-0.2/1.1]	[-0.6 /1.0]	[-0.07/0.03]	[-0.05/ 0.04]	[-0.11/ 0.02]	[-0.06/0.03]	[-0.19/0.02]	[-0.21/0.02]
After interstate deregulation***	17.0**	14.0**	-0.3**	-0.4**	-0.02	-0.5**	-0.6**	-0.7**
	(4.0)	(3.0)	(0.1)	(0.1)	(0.2)	(0.2)	(0.2)	(0.3)
	[10.0/24.0]	[9.0/18.0]	[-0.5/ -0.2]	[-0.6/ -0.1]	[-0.6/ 0.3]	[-1.0/-0.1]	[-0.98/-.23]	[-1.1/-0.3]
Five years after interstate deregulation ***	8.0**	7.0**	-0.1	-0.3	-0.3	-0.2	-0.1	-0.2
	(3.0)	(3.0)	(0.1)	(0.2)	(0.2)	(0.2)	(0.3)	(0.2)
	[4.0/15.0]	[2.0/11.0]	[-0.4/0.2]	[-0.6/0.1]	[-0.18/0.7]	[-0.5/0.4]	[-0.7/0.4]	[-0.8/0.3]
After intrastate branching deregulation***	1.0	1.0	-0.3**	-0.2	0.2	-0.1	-0.2	0.1
	(3.0)	(3.0)	(0.1)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)
	[-5.0/7.0]	[-6.0/5.0]	[-0.5/ -0.04]	[-0.4/0.1]	[-0.5/ 0.08]	[-0.4/0.2]	[-0.5/0.2]	[-0.3/0.4]
F-test for joint significance of all four explanatory variables reported above	8.03**	6.89**	3.04**	3.76**	1.62	2.02	3.08**	4.60**
Labor shares Included?	No	Yes	No	Yes	No	Yes	No	Yes
Within-state R^2 (%)	65.8	71.3	11.2	14.5	7.5	15.1	18.7	22.2

Regressions (1) - (3) estimated over 931 state-years: 49 states (D.C. included, SD and Delaware excluded) x 1976-94. Regressions (4) estimated over 833 state years: 49x1978-94 (1976-77 not available). Variables are defined in Table II. All regressions include state and year effects.

*significant at 10 percent

**significant at 5 percent

***coefficient multiplied by 100.

TABLE IV

State Fluctuations Fall with Banking Integration

OLS Regression Coefficients (standard errors-clustered by state) [95% confidence intervals-bootstrapped from sampling over states]

	Dependent Variables					
	(1)		**(2)**		**(3)**	
	Employment Growth Fluctuations		**Personal Income Growth Fluctuations**		**Gross Product Growth Fluctuations**	
Interstate asset ratio***	-0.1	-0.3	0.2	-0.4	-0.1	-0.6
	(0.3)	(0.3)	(0.5)	(0.4)	(0.5)	(0.4)
	[-0.6/ 0.4]	[-1.3/ 0.17]	[-0.8/1.3]	[-1.2/0.03]	[-1.2 /0.47]	[-1.5/ 0.16]
Other state asset ratio***	-0.04*	-0.03**	-0.06**	-0.04**	-0.13**	-0.12**
	(0.02)	(0.01)	(0.03)	(0.02)	(0.05)	(0.06)
	[-0.06/0.03]	[-0.04/0.02]	[-0.09/0.03]	[-0.06 /0.02]	[-0.19/0.04]	[-0.2/ 0.01]
Labor share coefficients (government omitted):						
Mining	-	0.22*	-	0.29**	-	0.78**
		(0.11)		(0.14)		(0.22)
Construction	-	0.17**	-	0.37**	-	0.36
		(0.06)		(0.09)		(0.29)
Manufacturing	-	0.05	-	-0.01	-	0.22*
		(0.06)		(0.08)		(0.13)
Transportation	-	-0.04	-	-0.12	-	-0.10
		(0.17)		(0.31)		(0.38)
Trade	-	0.05	-	0.40*	-	0.51**
		(0.10)		(0.22)		(0.20)
Finance	-	0.17	-	0.45**	-	0.60**
		(0.11)		(0.14)		(0.25)
Services	-	0.06	-	0.02	-	0.01
		(0.07)		(0.09)		(0.14)
Sum of squared labor shares	-	0.08	-	0.54**	-	0.74**
		(0.10)		(0.17)		(0.20)
Within state R^2 (%)	9.98	13.4	6.9	14.4	18.2	21.7

Regressions (1)-(2) estimated over 931 state-years: 49 states (D.C. included, SD and Delaware excluded) x 1976-94. Regressions (3) estimated over 833 state-years: 49 x 1978-94 (1976-77 not available). All regressions include state and year effects. Variables are defined in Table II.

*significant at 10 percent

**significant at 5 percent

***coefficient multiplied by 100.

TABLE V

State Fluctuations Fall with Banking Integration

IV Regression Coefficients (standard errors-clustered by state) [95% confidence intervals-bootstrapped from sampling over states] ***

	Dependent variables					
	(1)		**(2)**		**(3)**	
	Employment Growth Fluctuations		**Personal Income Growth Fluctuations**		**Gross State Product Growth Fluctuations**	
Interstate asset ratio****	-1.7**	-2.9**	-0.8	-3.2**	-3.2**	-4.5**
	(0.6)	(0.8)	(1.5)	(1.3)	(1.6)	(1.9)
	[-2.9/0.05]	[-5.5/-1.3]	[-2.4/2.2]	[-6.4 /1.3]	[-6.7/0.12]	[-9.1/0.15]
Other state asset ratio****	-0.03	-0.03	-0. 06*	-0.04	-0.12*	-0.12*
	(0.03)	(0.02)	(0.03)	(0.02)	(0.07)	(0.07)
	[-0.07/ 0.05]	[-0.06/0.04]	[-0.10/0.03]	[-0.08/0.07]	[-0.20/0.08]	[-0.21/0.06]
Labor share coefficient (government omitted)						
Mining	-	0.29*	-	0.36**	-	0.92**
		(0.13)		(0.15)		(0.22)
Construction	-	0.28**	-	0.49**	-	0.51
		(0.09)		(0.11)		(0.31)
Manufacturing	-	0.12	-	0.07	-	0.36**
		(0.08)		(0.10)		(0.15)
Transportation	-	-0.03	-	-0.11	-	0.03
		(0.22)		(0.33)		(0.53)
Trade	-	0.30**	-	0.68**	-	1.00**
		(0.15)		(0.24)		(0.27)
Finance	-	0.23	-	0.51**	-	0.76**
		(0.14)		(0.15)		(0.26)
Services	-	0.22**	-	0.20*	-	0.23
		(0.08)		(0.12)		(0.18)
Sum of squared labor shares	-	-0.01	-	0.44*	-	0.67**
		(0.14)		(0.24)		(0.26)
Within state R^2	4.6	10.1	5.7	11.8	14.8	19.6

Regressions (1) – (2) estimated over 931 state-years: 49 states (D.C. included, SD and Delaware excluded) x 1976-94. Regression (3) estimated over 833 state years: 49 x 1978-94 (1976-77 not available). Variables are defined in Table II. All regressions include state and year effect.

*significant at 10 percent

**significant at 5 percent

***instruments for i*nterstate asset ratio*: other state asset ratio, deregulation indicators (Tables I & II), and labor shares

****coefficient multiplied by 100.

TABLE VI

Fluctuations Fall *After D*eregulation (Not Before)

OLS Regression Coefficients (standard errors-clustered by state) [95% confidence intervals-bootstrapped from sampling over states]

	(1) **Employment Growth Fluctuations**		**(2)** **Personal Income Growth Fluctuations**		**(3)** **Gross State Product Growth Fluctuations**	
	(1)	(2)	(3)	(4)	(5)	(6)
Other state asset ratio***	-0.04**	-0.03*	-0.06**	-0.03*	-0.14**	-0.12**
	(0.02)	(0.01)	(0.03)	(0.02)	(0.06)	(0.06)
	[-0.06/0.03]	[-0.06/0.01]	[-0.1/0.02]	[-0.05/0.04]	[-0.2/0.03]	[-0.2/0.03]
After interstate deregulation***	-0.5**	-0.4*	-0.09	-0.1	-1.5*	-1.3**
	(0.2)	(0.2)	(0.4)	(0.3)	(0.6)	(0.6)
	[-0.9/-0.2]	[-0.8/-0.03]	[-0.8/0.6]	[-0.7/0.6]	[-3.3/-0.1]	[-2.1/-0.6]
Five years after interstate deregulation***	-0.2	-0.3	0.2	-0.1	-0.2	-0.3
	(0.2)	(0.2)	(0.3)	(0.2)	(0.2)	(0.2)
	[-0.5/0.1]	[-0.6/0.1]	[-0.2/0.9]	[-0.5/0.3]	[-0.8/0.1]	[-0.7/0.1]
Five years *prior* to interstate deregulation***	-0.2	-0.1	0.1	-0.1	-0.7*	-0.5
	(0.2)	(0.2)	(0.2)	(0.2)	(0.4)	(0.4)
	[-0.5/0.5]	[-0.3/0.2]	[-0.3/0.5]	[-0.03/0.8]	[-2.0/0.2]	[-1.2/0.01]
After intrastate branching deregulation***	-0.3*	-0.2	-0.3	0.3	-0.2	0.1
	(0.1)	(0.1)	(0.2)	(0.2)	(0.2)	(0.2)
	[-0.5/-0.1]	[-0.5/-0.02]	[-0.5/0.1]	[-0.5/0.2]	[-0.7/0.2]	[-0.1/0.5]
Labor Shares Included?	No	Yes	No	Yes	No	Yes
Within R^2	11.4	14.3	7.6	15.3	19.2	22.4

Regressions (1) – (2) estimated over 931 state-years: 49 states (D.C. included, SD and Delaware excluded) x 1976-94. Regressions (3) estimated over 833 state years: 49 x 1978-94 (1976-77 not available). Variables are defined in Table II. All regressions include state and year effects.

*significant at 10 percent

**significant at 5 percent

***coefficient multiplied by 100.

TABLE VII

State Business Fluctuations Converge with Bank Integration
OLS Regression coefficients (standard errors-clustered by state-year)
[95% confidence intervals-bootstrapped from sampling over state-years]

	Absolute difference between state-pair fluctuations in:					
	(1)		**(2)**		**(3)**	
	Employment Growth		**Personal Income Growth**		**Gross State Product Growth**	
Share of jointly owned bank assets in any state-pair	-0.010**	-	-0.004*	-	-0.012**	-
	(0.002)		(0.002)		(0.004)	
	[-0.014/-0.007]		[-0.008/0.001]		[-0.016/-0.005]	
Indicator = 1 if state-pair has any commonly owned banks	-	-0.004**	-	-0.003**	-	-0.004**
		(0.0004)		(0.0005)		(0.0009)
		[-0.0043/-0.003]		[-0.004/-0.002]		[-0.006/-0.003]
Difference between employment shares	0.050**	0.049**	0.123**	0.123**	0.288**	0.287**
	(0.002)	(0.003)	(0.017)	(0.017)	(0.033)	(0.033)
	[0.032/0.072]	[0.028/0.073]	[0.082/0.142]	[0.094/0.164]	[0.226/0.341]	[0.200/0.356]
Dependent Variable Mean	0.016		0.023		0.033	
Number of Clusters	931		931		833	
Within R^2	9.3	9.5	7.0	7.1	14.6	19.6

Regressions estimated using state-pair-year observations from 1976 to 1994. The dependent variable equals the absolute value of the difference in the growth residual for a pair of states. Standard errors calculated using just one observation per state-year by clustering all observations for a given state-year. The difference (Euclidean "distance") between employment shares equals the square root of the sum of squared differences between the two states' employment shares in the eight one-digit SIC sectors listed in Table I. All regressions include dummies indicating year and state-pair (i.e. a fixed effect for each unique pair of states).

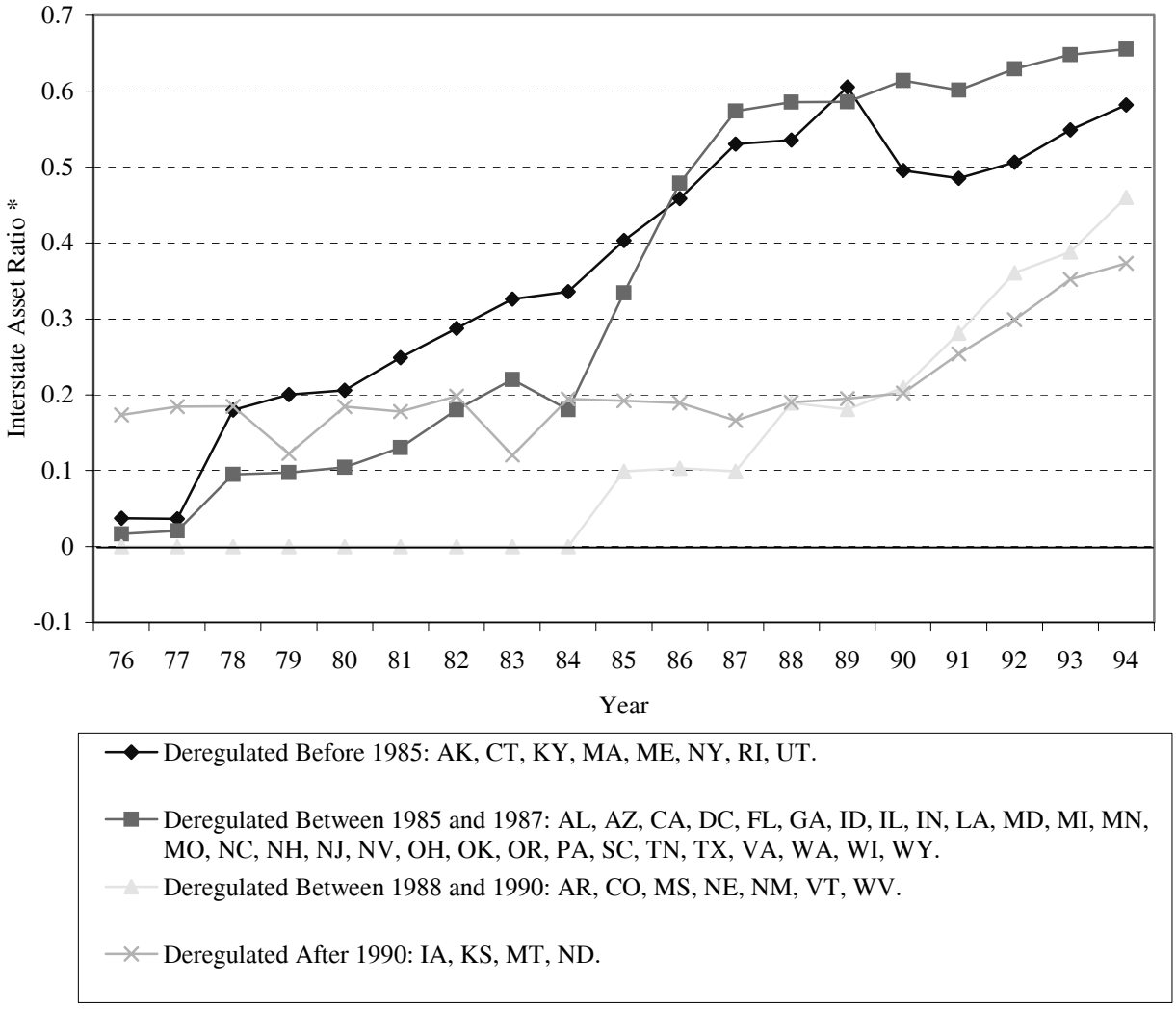
*significant at 10 percent

**significant at 5 percent.

Figure I
Interstate Asset Ratios by State: 1976 and 1994

*Percent of bank assets in a state held by out-of-state bank holding companies (including foreign BHCs).

Figure III
Interstate Asset Ratio by State Deregulation



Interstate asset ratio = percent of bank assets in a state held by out-of-state bank holding companies (including foreign BHCs)

Figure IV
Employment Growth Fluctuations Fall After States Permitted Interstate Banking

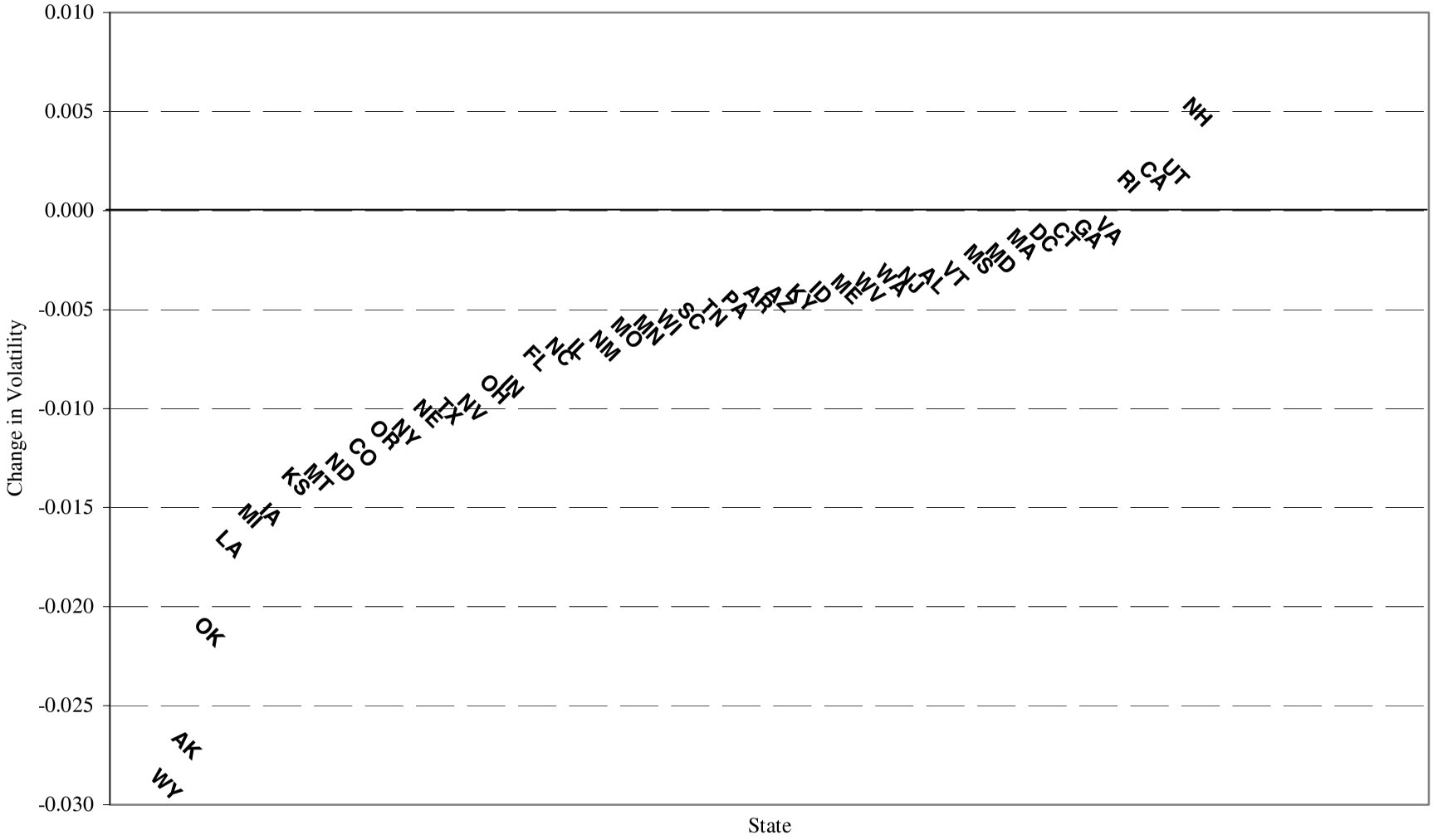


Figure plots the change in employment growth fluctuations before and after deregulation. We compute the change in the mean employment growth volatility after interstate banking reform, minus the average change in volatility over the same years for states that were still regulated (as a control for volatility trends).

SIFR Research Report Series

All reports can be downloaded from our website www.sifr.org, under the heading Research. Reports no. 1-15 are also available in print. In order to obtain copies of printed reports, please send your request to info@sifr.org with detailed ordering information.

1. **Foreigners' Trading and Price Effects Across Firms**
   Magnus Dahlquist and Göran Robertsson, December 2001
2. **Hedging Housing Risk**
   Peter Englund, Min Hwang, and John M. Quigley, December 2001
3. **Winner's Curse in Discriminatory Price Auctions: Evidence from the Norwegian Treasury Bill Auctions**
   Geir Høidal Bjønnes, December 2001
4. **U.S. Exchange Rates and Currency Flows**
   Dagfinn Rime, December 2001
5. **Reputation and Interdealer Trading. A Microstructure Analysis of the Treasury Bond Market**
   Massimo Massa and Andrei Simonov, December 2001
6. **Term Structures in the Office Rental Market in Stockholm**
   Åke Gunnelin and Bo Söderberg, April 2002
7. **What Factors Determine International Real Estate Security Returns?**
   Foort Hamelink and Martin Hoesli, September 2002
8. **Expropriation Risk and Return in Global Equity Markets**
   Ravi Bansal and Magnus Dahlquist, November 2002
9. **The Euro Is Good After All: Corporate Evidence**
   Arturo Bris, Yrjö Koskinen, and Mattias Nilsson, November 2002
10. **Which Investors Fear Expropriation? Evidence from Investors' Stock Picking**
    Mariassunta Giannetti and Andrei Simonov, November 2002
11. **Corporate Governance and the Home Bias**
    Magnus Dahlquist, Lee Pinkowitz, René M. Stulz, and Rohan Williamson, November 2002
12. **Implicit Forward Rents as Predictors of Future Rents**
    Peter Englund, Åke Gunnelin, Martin Hoesli, and Bo Söderberg, November 2002
13. **Accounting Anomalies and Information Uncertainty**
    Jennifer Francis, Ryan LaFond, Per Olsson, and Katherine Schipper, June 2003
14. **Characteristics, Contracts and Actions: Evidence From Venture Capitalist Analyses**
    Steven N. Kaplan and Per Strömberg, June 2003

15. **Valuing Corporate Liabilities**
    Jan Ericsson and Joel Reneby, June 2003

16. **Rental Expectations and the Term Structure of Lease Rates**
    Eric Clapham and Åke Gunnelin, October 2003

17. **Dealer Behavior and Trading Systems in Foreign Exchange Markets**
    Geir Høidal Bjønnes and Dagfinn Rime, December 2003

18. **C-CAPM and the Cross-Section of Sharpe Ratios**
    Paul Söderlind, December 2003

19. **Is there Evidence of Pessimism and Doubt in Subjective Distributions? A Comment on Abel**
    Paolo Giordani and Paul Söderlind, December 2003

20. **One for the Gain, Three for the Loss**
    Anders E. S. Anderson, May 2004

21. **Hedging, Familiarity and Portfolio Choice**
    Massimo Massa and Andrei Simonov, May 2004

22. **The Market Pricing of Accruals Quality**
    Jennifer Francis, Ryan LaFond, Per Olsson, and Katherine Schipper, May 2004

23. **Privatization and Stock Market Liquidity**
    Bernardo Bortolotti, Frank de Jong, Giovanna Nicodano, and Ibolya Schindele, June 2004

24. **Pseudo Market Timing: Fact or Fiction?**
    Magnus Dahlquist and Frank de Jong, June 2004

25. **All Guts, No Glory: Trading and Diversification among Online Investors**
    Anders E. S. Anderson, June 2004

26. **The Evolution of Security Designs**
    Thomas H. Noe, Michael J. Rebello, and Jun Wang, September 2004

27. **The Credit Cycle and the Business Cycle: New Findings Using the Loan Officer Opinion Survey**
    Cara Lown and Donald P. Morgan, September 2004

28. **How Do Legal Differences and Learning Affect Financial Contracts?**
    Steven N. Kaplan, Frederic Martel, and Per Strömberg, September 2004

29. **Advice and Monitoring: Venture Financing with Multiple Tasks**
    Ibolya Schindele, September 2004

30. **Bank Integration and State Business Cycles**
    Donald Morgan, Bertrand Rime, and Philip E. Strahan, September 2004

Stockholm Institute
for Financial Research