Foreign Bank Entry and Business Volatility: Evidence from U.S. States and Other Countries

Donald P. Morgan
Federal Reserve Bank of New York

Philip E. Strahan
Boston College, Wharton Financial Institutions Center and National Bureau of Economic Research

"Foreign banker" once had a nasty ring to it, like "carpetbagger" or "loan shark."[1] In the harshest terms, foreign banks were seen as parasites that were out to drain financial capital from their hosts. In nationalization campaigns, banks were often the first targets, especially when foreign owned. Even after a decade of privatization, governments still own a surprisingly large share of bank assets (La Porta, López-de-Silanes, and Shleifer, 2002). Bank privatization has been held up, in part, by fear of foreign bankers who, in many cases, are the only, or most likely, buyers.

In the United States, banks from other states were long viewed as foreign, and most states strictly forbade entry by banks from other states until the mid-1970s. Even banks from other cities *within* a state were often blocked from opening branches in other cities in the state. Loosely speaking, the hometown bank was local, and banks from anywhere else were foreign.

We thank our discussant, Norman Loayza, for very helpful comments. The opinions expressed in this paper represent the authors' views and do not necessarily reflect the official position of the Federal Reserve Bank of New York or the Federal Reserve Board.

1. Carpetbagger was a pejorative term for northerners who flocked to the south after the Civil War in search of opportunity, financial or otherwise.

Banking Market Structure and Monetary Policy, edited by Luis Antonio Ahumada and J. Rodrigo Fuentes, Santiago, Chile.

Times have changed. In the United States, barriers to entry by out-of-state banks were gradually lowered across the states starting in the late 1970s. The biggest U.S. banks now operate more or less nationally, with banks or branches in many states. Nations around the world have also lowered barriers to foreign bank ownership, and foreign banks have entered aggressively. Foreign bank ownership in Latin America increased dramatically in the second half of the 1990s, with aggressive acquisitions by Spanish banks, in particular. In Chile, the foreign bank share of Chilean bank assets increased from less than 20 percent in 1994 to more than 50 percent in 1999 (Clarke and others, 2001).

Generally speaking, the first-order effects of relaxed bank entry restrictions have been favorable. Relaxed branching restrictions within states in the United States have been associated with increased credit availability, enhanced bank efficiency, and faster economic growth within states (Jayaratne and Strahan, 1996 and 1998). Internationally, the benefits of foreign entry seem to depend on the level of development of the host country. For developing nations, at least, foreign entrants tend to be more efficient than incumbent banks, and the stiffer competition seems to improve overall bank efficiency (Claessens, Demirgüç-Kunt, and Huizinga, 2001). Geert, Harvey, and Lundblad (2002) find that broader financial liberalization—that is, opening equity markets to foreign investors—is associated with faster economic growth.

Interest lately has turned to the second-order, or stability, effects of foreign bank entry, especially in developing nations where recent crises have raised general concern about financial sector stability and specific concern about bank stability. In contrast to the first-order effects—where one might expect mostly benefits from entry—the stability implications of increased entry are less obvious. Several vague concerns have surfaced. Maybe, for instance, fickle foreign banks will cut and run at the first hint of trouble, whereas local banks with long-term ties (or no place to run) will remain stalwart. Foreign bankers may also expedite capital flight in the event of a crisis. During the Asian crises, depositors did shift funds from finance companies and small banks toward large banks, especially foreign ones. What if foreign banks cherry-pick the best borrowers, leaving the local banks with the "lemons" and a risky overall portfolio? Evidence thus far suggests that these concerns are unfounded. Goldberg, Dages, and Kinney (2000) find that lending by foreign banks in Argentina and Mexico during the 1994–95 crises grew faster than did lending by

domestic banks, contrary to the cut and run hypothesis. Looking across a wider sample of countries, Levine (1999) finds that the foreign share of bank assets is *negatively* correlated with the probability of crisis.

Our paper investigates whether foreign bank entry is associated with more or less economic volatility, as measured by year-to-year fluctuations in real GDP and investment. Financial crises are the higher profile event, but business cycle fluctuations are much more frequent and may be an important underlying determinant of financial instability. Our empirical strategy employs panel data, allowing us to absorb unobserved heterogeneity across countries with fixed effects. We approach the topic with a mix of theory and evidence from both the U.S. states and countries. Our theory is based on the macroeconomic banking model in Holmstrom and Tirole (1997). Morgan, Rime, and Strahan (2003) use an extended (two-state) version of that model to consider the effect of interstate banking within the United States on business volatility within states. The main result is that integration (entry by out-of-state banks) is a two-edged sword for economic volatility: integration tends to dampen the effect of bank capital shocks on firm investment in a state, but it amplifies the impact of firm collateral shocks. The net effect of integration on business volatility is therefore ambiguous. The empirical effect, however, has been stabilizing in the United States. Morgan, Rime, and Strahan find that volatility within states falls substantially as integration with out-of-state banks increases.

Given the useful parallels between bank integration in the United States in the late 1970s and 1980s, we first review the theory behind Morgan, Rime, and Strahan. We then review and extend their empirical findings for the U.S. states, showing that banking integration across states reduced volatility by weakening the link between the health of local banks and the economy. As we describe in Section 2, the history of U.S. banking deregulation sets up an almost ideal empirical laboratory for testing how banking integration affects the economy, because we can separate out the exogenous changes in bank ownership using regulatory instruments. Section 3 applies a similar set of tests to a panel of about 100 countries during the 1990s, but in the cross-country context regulatory changes are not sufficiently common to allow us to identify the exogenous component of banking integration. Instead, we address the endogeneity problem by constructing instruments that reflect characteristics of groups of countries in the same region, with a common language, or with a similar legal system. The resulting instrumental variables (IV) estimates allow us to

avoid the problem that foreign bank entry may reflect, rather than drive, changes in economic performance. In contrast to the results for U.S. states, however, we find no evidence that foreign entry has been stabilizing. If anything, the evidence points tentatively in the other direction.

In our final set of tests, we show that the link between changes in the value of a country's traded equity—a proxy for the value of potential collateral—and its economy becomes stronger with banking integration. Foreign bank entry may make economies more unstable by amplifying the effects of wealth changes; this amplification does not appear to be outweighed by more stable banking. This result contrasts with the U.S. experience, where the dampening of bank capital shocks made integration stabilizing, and suggests that the specific environment in which banking integration occurs may determine its effects.

1. Foreign Banking and Economic Volatility

How are foreign banking and economic volatility related in theory? Ambiguously, we think, at least if the insights from the interstate banking model in Morgan, Rime, and Strahan (2003) apply internationally. Morgan, Rime, and Strahan extend Holmstrom and Tirole's (1997) macroeconomic banking model by adding another (physical) state and then investigating how the impact of various shocks differs under unit banking regime, where bank entry is forbidden, and interstate banking, where bank capital can flow freely between states. The impact of bank capital shocks (on firm investment) is diminished under interstate banking, but the impact of firm capital shocks is amplified. The net effect, in theory, is ambiguous. Because the insights from that model can help in the international context, we review the basic Holmstrom-Tirole model and the Morgan, Rime, and Strahan extension below. At the end of the section, we discuss the applicability of the model to the topic of international bank integration.

The marginal effects arising from integration have to do with how the supply of uninformed capital responds to changes in the supply of informed (that is, bank) capital. The intuition is pretty simple. A banking firm operating in two states (denominated A and B) can import capital from state A to state B if another of its banks in state B has good lending opportunities but no capital. The infusion of informed bank capital also draws extra uninformed capital. That capital shifting

immunizes firms in state B from bank capital shocks to some extent. Firms are more exposed to collateral shocks, however. An interstate banking firm will shift lending to state A if firms in state B suffer collateral damage. The loss of informed bank capital also causes capital flight by uninformed lenders, more so than in a unit banking arrangement. Hence, collateral shocks get amplified.

1.1 The Holmstrom-Tirole Model

The Holmstrom-Tirole model is an elegant synthesis of various strands of the macroeconomic and intermediation literature. Banks, or intermediaries generally, matter because their monitoring of firms' activities reduces moral hazard—such as shirking and perquisite consumption—by firm owners. Knowing that intermediaries are monitoring the firms also increases access to capital from uninformed savers. Bankers are prone to moral hazard as well; they will shirk monitoring unless they have sufficient stake in the firm's outcome to justify the monitoring costs. In the end, the level of firm investment spending on projects with given fundamentals depends on the level of bank and firm capital. Negative shocks to either kind of capital are contractionary, naturally, but the contractions are amplified through their effects on the supply of uninformed capital. The reduction in capital that can be invested in the firm by the bank and by the entrepreneur reduce the maximum amount of future income that the firm can pledge to uninformed investors (without distorting the firms' incentives). The decrease in the pledgeable income reduces the supply of uninformed capital available to the firm.

1.2 Interstate Banking

Morgan, Rime, and Strahan extend the Holmstrom-Tirole model by adding another (physical) state. We assume that bank capital is completely mobile across states under interstate banking and completely immobile across states under unit banking. Foreign entry, in other words, is completely prohibited. Even if we relax this restriction, the results remain similar as long as informed capital is relatively less mobile under unit banking. The return on uninformed capital is exogenous and equal across states in either regime. That makes sense in the United States, where savers have access to a national securities market even under unit banking. That assumption is arguable in the international context, but we stick with it for

now. The key results from that extended model are stated and discussed below.

Proposition 1: The negative impact of a bank capital crunch in state A on the amount of uninformed and informed capital invested in state A is smaller with interstate banking than with unit banking. A capital crunch in state A, for instance, will attract bank capital from state B, so firm investment in state A falls less than it would under unit banking. Because firm investment falls less, the maximum income they can pledge to informed investors falls by less than under unit banking; hence there is a smaller reduction in the amount of uninformed capital that firms in state A can attract.

Proposition 2: The negative impact of a collateral squeeze on the amount of uninformed and informed capital invested is larger under interstate banking than under unit banking. With interstate banking, for example, the decreased return on bank capital following a collateral squeeze causes bank capital to migrate from state A (where the initial downturn occurred) to state B (which is integrated with state A). The bank capital flight from state A reduces investment by firms in that state, which in turn reduces the maximum pledgeable income firms can credibly promise to uninformed investors. The supply of uninformed capital to firms in state A falls as a result. These amplifying effects are absent under unit banking because bank capital is immobile across states under that regime.

In sum, cross-state banking amplifies the effects of local shocks to entrepreneurial wealth because bank capital chases the highest return. Capital flows in when collateral is high and out when it is low. Integration dampens the impact of variation in bank capital supply. This source of instability becomes less important because entrepreneurs are less dependent on local sources of funding in an integrated market since bank capital can be imported from other states.

1.3 Applying the Holmstrom-Tirole Model Internationally

The intuition from the interstate banking model in Morgan, Rime, and Strahan (2003) is helpful in thinking about how international banking should affect volatility within nations. In fact, the model may fit better internationally. The distinction between informed and uninformed capital seems more germane with the distances involved in international lending than with interstate lending in the United States. The flights of uninformed capital in the model may describe

international capital flows in the 1980s and 1990s better than interstate capital flow in the United States in the 1970s.

Eichengreen and Bordo (2002), in their historical study of financial globalization, offer anecdotal evidence consistent with the role of informed capital (bank capital) in allowing leverage using uninformed capital. "That overseas investors appreciated... [this] monitoring is evident in the willingness of Scottish savers to make deposit with British branches of Australian banks, and in the willingness of British investors... to place deposits with Argentine banks" (p. 9). They also note the strict appetite for more monitorable, collateralizable claims by foreign investors. Railways were a favorite, for example, because investors (or their monitors) could easily verify how much track had been laid, and the track was staked down once it was laid.

2. Bank Integration and Business Volatility in U.S. States

The United States once had essentially fifty little banking systems, one per state. The U.S. banking system is now much more national, however, twenty-five years after states began permitting entry by out-of-state banks. Entry by out-of-state banks is not exactly the same as foreign bank entry, but they are not completely different, either. The parallels are close enough to revisit what Morgan, Rime, and Strahan find in their U.S. study before we turn to the international data. To maintain the parallels, the U.S. regressions reported in this section are specified as closely as possible to those estimated with international data. For the United States, we still find a negative correlation between out-of-state bank share and within-state business volatility. Consistent with that result and also with the model, we find that as bank integration increases, the (positive) link between bank capital growth and business gets weaker. We conclude that bank integration, and the resulting immunization from bank capital shocks, has had a stabilizing effect on state business volatility in the United States.

2.1 A Brief History of Interstate Banking in the United States

The Bank Holding Company Act of 1956 essentially gave states the right to block entry by out-of-state banks or bank holding companies.

States also had the right to allow entry, but none did until Maine passed a law in 1978 inviting entry or acquisitions by bank holding companies from other states so long as Maine banks were welcomed into the other states. No states reciprocated until 1982, when Alaska, Massachusetts, and New York passed similar laws.[2] Other states followed suit, and by 1992, all but one state (Hawaii) allowed reciprocal entry.[3] This state-level deregulation was codified at the national level in 1994, with the Reigle-Neal Interstate Banking and Branching Efficiency Act. That act made interstate banking mandatory (that is, states could no longer block entry) and made interstate branching optional (according to state wishes).[4]

Because states did not deregulate all at once, and because the resulting entry proceeded at different rates, integration happened in "waves" across states. The differences across states and across time provide the cross-sectional and temporal variation that we need to identify the effects of integration within states. The deregulatory events make useful instruments for identifying the exogenous component of integration (since actual entry may be endogenous with respect to volatility).[5]

2.2 U.S. Data and Empirical Strategy

Our bank integration measure equals the share of total bank assets in a state that are owned by out-of-state bank holding companies (that is, bank holding companies that also own bank assets in other states or countries). To take a simple example, if a state had one stand-alone bank and one affiliated bank of equal size, bank integration for that state would equal one-half. We compute our integration

2. As part of the Garn-St Germain Depository Institutions Act of 1982, federal legislators amended the Bank Holding Company Act to allow failed banks and thrifts to be acquired by any bank holding company, regardless of state laws (see, for example, Kane, 1996; Kroszner and Strahan, 1999).

3. State-level deregulation of restrictions on branching also occurred widely during the second half of the 1970s and throughout the 1980s.

4. The Reigle-Neal Act permitted states to opt out of interstate branching, but only Texas and Montana chose to do so. Other states, however, protected their banks by forcing entrants to buy their way into the market.

5. While we focus here on interstate banking, Jayaratne and Strahan (1996) report that state-level growth accelerated following branching deregulation; Jayaratne and Strahan (1998) show that branching deregulation led to improved efficiency in banking.

variables using the Reports of Income and Condition (or Call Reports) filed by U.S. banks. Our sample starts in 1976 and ends in 1994.[6]

We measure business volatility using the year-to-year deviations in state *i* employment growth around the expected growth for state *i* (over the 1976–94 period) in year *t*. To estimate expected growth, we first regress employment growth on a set of time fixed effects, a set of state fixed effects, an indicator equal to 1 after interstate deregulation, and our measure of state-level banking concentration (defined below).[7] The residual from this first-stage regression is our measure of the deviation from expected growth for each state and year. We take the square or absolute value of this deviation as our volatility measure.

The mean of our integration measure over all state-years was 0.34, rising from under 0.1 in 1976 to about 0.6 by 1994 (table 1). Employment grew 2.3 percent per year, on average, over the sample of state-years. The squared deviation of employment growth from its mean averaged 0.03 percent. The absolute value of deviations in employment growth averaged 1.3 percent.

Table 1. Summary Statistics for U.S. State-Level Panel Data, 1976 to 1994

Summary statistic	*N*	*Mean*	*Standard deviation*
Share of state bank assets owned by multi-state bank holding companies (banking integration)	931	0.34	0.28
Employment growth	931	0.023	0.023
Squared deviation of employment growth from expected employment growth	931	0.0003	0.0006
Absolute deviation of employment growth from expected employment growth	931	0.013	0.012
Share of state bank assets held by three largest banks (banking concentration)	931	0.376	0.210

6. The Riegle-Neal Interstate Banking and Branching Efficiency Act, passed that year, makes our integration measure incalculable by allowing banks to consolidate their operations within a single bank. We thus lose the ability to keep track of bank assets by state and year after 1994.

7. Business investment would be preferable (in terms of the model), but state-level investment data are not available for the U.S. states (although we do have such data for the international analysis). Our employment series is the best proxy for overall state economic activity, however.

2.3 Other Controls and Instruments

We also use banking sector concentration in our regressions, although it is not an element of the model. Bank-level studies for the United States find that bank risk taking tends to increase as concentration (and the associated rents, or bank charter value) falls.[8] Safer banks may translate into safer—that is, less volatile—economies (albeit slower growing ones; see Jayaratne and Strahan, 1996). Bank concentration will also likely affect the political game determining the barriers to out-of-state (or foreign) banking. The rents and inefficiencies associated with concentration will attract new entrants, but of course, the rents provide incumbents with the incentives and funds to defend barriers.[9] For the United States, Kroszner and Strahan (1999) find that states with more concentrated banking sectors were faster to lower barriers to in-state banks that simply wanted to branch into other cities. Since concentration may matter directly for volatility, as well as indirectly through its effect on deregulation, we use it both as an instrument and as a control (in some cases). Concentration is measured by the share of assets held by the largest three banks (table 1).

The rate of integration could depend, in part, on volatility. For example, banks may be more likely to enter a state after a sharp downturn (when volatility is high) to buy up bank assets cheaply. To exclude this endogenous element of integration, we use two instruments based on regulatory changes: an indicator variable for whether a state has passed an interstate banking agreement with other states; and a continuous variable equal to zero before interstate banking and equal to the log of the number of years that have elapsed since a state entered an interstate banking arrangement with other states. Our third (potential) instrument is banking concentration in each state, although we use that variable selectively (as identified in the table notes).[10] All the specifications include year dummy variables and state dummies.

8. On the relationship between charter value and risk, see Keeley (1990); Demsetz, Saidenberg, and Strahan (1996); Hellman, Murdock, and Stiglitz (2000); and Bergstresser (2001).

9. This may explain why interstate deregulation began in a reciprocal manner: state A would open its borders to state B only if state B reciprocated.

10. Both regulatory instruments have very strong explanatory power in the first-stage models. These regressions are available on request.

2.4 Results

All the coefficients on integration are negative and statistically significant (see table 2). The IV coefficient estimates are much larger than the ordinary least squares (OLS) estimates, implying that the stabilizing influence of integration is larger (if less precisely estimated) when we parcel out the endogenous component of integration.[11] The magnitudes are economically important. For example, the average share of a state's assets held by multi-state bank holding companies rose by about 0.5 between 1976 and 1994. According to our regression coefficients in the OLS model, the 0.5 increase in integration across states was associated with 0.4 percentage point decline in business volatility (table 2, column 5). The exogenous component of the increase in integration—that is, the increase stemming from deregulation—was about 0.25 over the sample.[12] Even with this smaller measure, we would still conclude that integration led to a 0.5 percentage point decline in volatility, a large drop relative to the unconditional mean for business volatility of 1.3 percent.

Our model suggests that the stabilizing effects of integration arise because of better diversification against bank capital shocks. If capital falls in state A, affiliated banks in state B will be happy to supply more to take advantage of good investment opportunities. The link between bank capital growth and business growth within a state should thus weaken as integration increases, which it does (table 3). Bank capital and state employment growth are positively correlated, but the correlation weakens as integration increases. If we take the case of the level of integration at the beginning of our sample (0.1), the coefficients suggest that a one standard deviation increase in bank capital growth (0.084) would be associated with an increase in employment growth of 1.3 percent. In contrast, based on the mean level

11. One might object that interstate banking deregulation itself may be partially determined by the volatility of a state's business cycle. For example, political pressure for opening a state's banking system to out-of-state competition may intensify during economic downturns (when volatility is high). To rule out the possibility that endogenous deregulation drives our IV results, we have also estimated the model after dropping the three years just prior to deregulation as well as the year of deregulation itself. In these specifications, the coefficient increases in magnitude (that is, becomes more negative), and its statistical significance increases across all three measures of volatility.

12. We report a Hausman specification test in table 2 comparing the OLS and IV models. This test fails to reject the hypothesis that the two models differ, although the test has low power given the large number of fixed effects.

Table 2. Panel Regression Relating Volatility of U.S. State-level Employment Growth to Banking Integration, 1976 to 1994[a]

	Dependent variable							
	Squared deviation of growth from expected growth				*Absolute deviation of growth from expected growth*			
Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Banking integration	–0.0003*	–0.0013*	–0.0011*	–0.0011*	–0.008*	–0.022*	–0.021*	–0.021*
	(0.0002)	(0.0004)	(0.0004)	(0.0004)	(0.0003)	(0.007)	(0.007)	(0.007)
Banking concentration				0.0004				–0.003
				(0.0004)				
Summary statistic								
Within R^2	0.05	0.01	0.01	0.01	0.07	0.03	0.04	0.04
No. observations	931	931	931	931	931	931	931	931
No. states	49	49	49	49	49	49	49	49
Hausman χ^2 test[b]		8.14	2.05			5.08	0.33	
Estimation technique	OLS	IV	IV*	IV	OLS	IV	IV*	IV*

a. All regressions contain both year and state fixed effects. Banking integration equals the share of a state's bank assets that are owned by multi-state bank holding companies. In the IV models, the instrumental variables are an indicator equal to 1 after a state allows out-of-state bank holding companies to purchase their banks, the log of the number of years that have elapsed since this regulatory change, and the market share of the largest three banks in the state (banking concentration). In the IV* model, we drop concentration from the list of instruments. The sample includes the District of Columbia but not South Dakota or Delaware; the latter two states are dropped because their banking systems are dominated by national credit card banks. Standard errors are in parentheses.

b. The Hausman test compares the model with the one preceding it. For example, the test in column 3 compares the coefficients in column 3 with the coefficients in column 2.

* Statistically significant at the 10 percent level.

of integration at the end of our sample (0.6), a one standard deviation increase in capital would be associated with an increase in employment of just 0.4 percent.[13]

2.5 Thinking Globally

Our analysis of U.S. data suggests quite strongly that bank integration across states had a stabilizing influence on economic activity within states. The regulatory history of state-level deregulation over a relatively long period offers an almost ideal way to explore integration's effects on business cycles, because we can sort out integration stemming from endogenous forces—such as banks' appetite to enter new states when the incumbent banks are weak—from integration

Table 3. Response of U.S. State Employment Growth to Local Bank Capital Shocks, 1976 to 1994[a]

	Dependent variable	
	Employment growth	
Explanatory variable	*(1)*	*(2)*
Growth in state bank capital	0.0578*	0.1718*
	(0.0066)	(0.0141)
Banking integration		–0.0001
		(0.0101)
Growth in state bank capital * banking integration		–0.2127*
		(0.0236)
Summary statistic		
Within R^2	0.5001	0.5435
No. observations	931	931
No. states	49	49
Estimation technique	OLS	IV

a. All regressions contain both year and state fixed effects. Banking integration equals the share of a state's bank assets that are owned by multi-state bank holding companies. In the IV models, the instrumental variables are an indicator equal to 1 after a state allows out-of-state bank holding companies to purchase their banks, and the log of the number of years that have elapsed since this regulatory change. The sample includes the District of Columbia but not South Dakota or Delaware; the latter two states are dropped because their banking systems are dominated by national credit card banks. Standard errors are in parentheses.
* Statistically significant at the 10 percent level.

13. Peek and Rosengren (2000) find that when Japanese banks faced financial difficulties in the 1990s, they reduced their lending in California, leading to a decline in credit availability there. This finding is consistent with our results, although it emphasizes the downside of integration. While integration insulates an economy from shocks to its own banks, it simultaneously exposes an economy to banking shocks from the outside.

stemming from policy changes. We also have accurate and consistent measures of both state-level economic activity and banking integration over a long span of time. This long, balanced panel lets us absorb all sorts of confounding variables by including year and state fixed effects. Even without these fixed effects, of course, confounding omitted variables are much less of a problem when comparing New York and New Mexico than when comparing Chile and China. Cross-country studies also suffer from measurement problems for observable variables, particularly the measure of integration (described below).

But how general are the state-level results? Do the good experiences of U.S. states translate naturally into good experiences when emerging economies open their markets to foreign banks? Clearly, the environments differ substantially. For example, the United States has a well-developed financial market and a legal system that makes contract writing and enforcement relatively easy. In emerging economies, explicit contracting is more difficult. Collateral shocks may therefore matter more outside the United States, where weaker contract enforcement makes lenders insist on higher collateral requirements or, more generally, greater levels of entrepreneurial equity holding per dollar lent (Eichengreen and Bordo, 2002).

The country experience with foreign bank entry also offers some data advantages over the state-level experience. For instance, we can measure both GDP growth and investment growth at the country level, rather than having to rely on employment growth. We are also better able to sort out the effects of different shocks. As the Morgan, Rime, and Strahan (2003) model shows, the effects of banking integration depend on the relative importance of different kinds of financial shocks. In the U.S. states, we showed that the impact of changes in local bank capital declined as states integrated with the rest of the country, but we could not control for shocks to collateral because measures of these shocks are not available at the state level. This omission is potentially serious given that the model predicts that integration will amplify, rather than dampen, the effects of collateral shocks. When looking across countries, however, we can sort out these two kinds of shocks by observing changes in the market value of all traded equity in the stock market (a proxy for changes in the value of collateral or entrepreneurial wealth) and, at the same time, measuring change in the health (capital) of the country's banking system.

3. International Evidence

We now consider how banking integration affects business cycles using countries rather than states. We use a similar empirical specification, although we do exploit data advantages where they exist. The challenges with international data involve cross-country heterogeneity, the accurate measurement of integration, and potential endogeneity between business volatility and foreign bank entry.

3.1 Cross-country Heterogeneity

Our panel data allow us to eliminate much of the cross-country heterogeneity with country-level fixed effects. That is a distinct advantage of our approach over recent papers relating predetermined measures of financial structure and regulation to subsequent economic growth and stability (Demirgüç-Kunt and Levine, 2002; Levine, 1999; Claessens, Demirgüç-Kunt and Huizinga, 2001). We were able to construct a wide, though unbalanced, panel for nearly a hundred countries, albeit within a rather short time period from 1990 to 1997 (see table 4). Many foreign countries began opening their markets to foreign banks during this period, however, so we do have enough time series variation within countries to include country fixed effects.

3.2 Measuring Banking Integration and Volatility

We measure a country's level of integration by the share of bank assets held by banks with at least 50 percent foreign-bank ownership. The series was constructed by Beck, Demirgüç-Kunt, and Levine (2000) using the Fitch IBCA Bankscope database. In contrast to our state measure of integration, foreign-bank ownership share does not fully capture the integration process because it does not include the effects of a country's banks reaching out into new markets. Our measure of state-level integration did incorporate all ownership ties between banks. This was possible with the U.S. data because all banks during our sample operated within a single state, and for each bank we could observe the identity of the banking company controlling it. We were thus able to compute the share of banks in a state controlled by a bank holding company with assets outside the state. In contrast, the best measure of foreign integration—foreign ownership of a country's banks—does not incorporate integration in which banks headquartered in one country own substantial bank assets outside

Table 4. List of Countries by Region

Africa	*Asia*	*Eastern Europe*	*Industrial countries*	*Middle East*	*Western Hemisphere*
Algeria	Bangladesh	Belarus	Australia	Bahrain	Argentina
Benin	Hong Kong	Bulgaria	Austria	Egypt	Bahamas
Botswana	India	Croatia	Belgium	Israel	Bolivia
Cameroon	Indonesia	Cyprus	Canada	Kuwait	Brazil
Congo	Malaysia	Czech Republic	Denmark	Lebanon	Chile
Ivory Coast	Nepal	Estonia	France	Saudi Arabia	Colombia
Kenya	Pakistan	Hungary	Germany	United Arab Emirates	Costa Rica
Lesotho	Papua New Guinea	Kazakhstan	Greece		Dominican Rep.
Madagascar	Philippines	Latvia	Ireland		Ecuador
Mali	Singapore	Lithuania	Italy		El Salvador
Mauritius	Taiwan (China)	Poland	Japan		Guatemala
Morocco	Thailand	Romania	Luxembourg		Guyana
Namibia	Vietnam	Russia	Netherlands		Honduras
Nigeria		Slovak Republic	Norway		Mexico
Rwanda		Slovenia	Portugal		Neth. Antilles
Senegal		Turkey	Spain		Nicaragua
Sierra Leone		Ukraine	Sweden		Panama
South Africa			Switzerland		Paraguay
Swaziland			United Kingdom		Peru
Tanzania			United States		Uruguay
Tunisia					Venezuela
Uganda					
Zambia					
Zimbabwe					

that country. So, for example, a country like Spain, with its largest banks holding significant assets in Latin America, does not appear to be well integrated with the rest of the world. Despite this limitation, foreign ownership is the best measure we have, and it probably represents the bulk of integration for smaller, less developed countries that do not have banks large enough to expand internationally.[14]

Table 5 reports the foreign share data by year and region. The data suggest large increases in banking integration in Asia, Eastern Europe, and the nonindustrialized portion of the Western Hemisphere. In contrast, Africa and Middle Eastern countries experienced little trend in integration during the 1990s.

14. To partially account for this measurement issue, we also estimated our models without the industrial countries listed in table 4. We find similar results to those reported in table 7.

Table 5. Trends in Median Foreign-bank Market Share, by Region, 1990 to 1997[a]

Percent

Year	*Africa*	*Asia*	*Eastern Europe*	*Industrial countries*	*Middle East*	*Western Hemisphere*
1990	18.2	12.4	3.6	3.2	5.5	11.7
1991	11.8	13.4	9.1	4.9	4.8	14.5
1992	23.1	15.0	2.8	4.1	4.9	21.7
1993	28.2	15.6	4.4	3.7	5.5	19.9
1994	23.6	18.4	6.9	3.8	5.6	17.9
1995	29.0	21.2	8.8	3.6	6.2	20.0
1996	22.3	24.1	10.4	3.6	6.3	21.1
1997	20.7	32.9	9.8	2.9	9.1	23.0

a. Medians are based on the percentage of each country's banking assets held by banks controlled by a foreign company, where control means that the foreign company owns at least 50% of the bank's equity.

We measure country volatility on a yearly basis the same as for the U.S. states, except that we consider both overall volatility in real GDP growth and the volatility in growth of real investment spending. For each series, we first construct a measure of unexpected growth by regressing GDP growth (investment growth) on a set of time fixed effects, a set of country fixed effects, our measure of banking integration, and the other control variables (described below). As before, volatility equals the square or absolute value of the residuals from this first-stage growth regression for each country and year. By controlling for banking integration in the first-stage regression, we implicitly allow the growth rate to increase (or decrease) as a country opens itself up to foreign bank entry. This eliminates the possibility of confusing an accelerated growth rate following banking integration with an increase in GDP volatility.[15]

Table 6 reports the summary statistics for our integration and volatility measures across countries and time. For banking integration, the average share of bank assets controlled by foreign banks

15. The models in Aghion, Banerjee, and Picketty (1999) and Caballero and Krishnamurthy (2001) suggest that the severe credit constraints in emerging market countries may slow growth and increase volatility. Their models suggest that foreign bank entry might reduce volatility via an efficiency channel, whereby the increased competition resulting from foreign bank entry relaxes those constraints and thereby causes growth to accelerate and volatility to decline. Our assumption of perfect competition even without foreign entry essentially rules out a reduction in volatility via increased efficiency (Norman Loayza gets credit for this point).

equals 0.192. Real GDP growth averages 2.85 percent per year, with an average squared deviation from the conditional mean growth of 0.43 percent and an average absolute deviation of 4.39 percent. These measures of average volatility are about three-and-a-half times as large as volatility in the U.S. states. Real investment has both a higher mean growth rate and greater volatility than overall GDP growth. Average investment grew by 7.68 percent per year, with volatility of 4.77 percent (squared deviations) and 16.07 percent (absolute deviations).

As in the state-level regressions, we include banking concentration both as an instrument and as a regressor in our model, although we vary the specifications because of the potential endogeneity of concentration. As noted above, an advantage of the country-level analysis over the state-level analysis is that we now can control for real integration (as opposed to financial integration), equal to the trade share of each country, (imports + exports) / GDP. Because the country-level data introduces considerable heterogeneity, we control for the effects of exchange rate volatility by adding the absolute value of

Table 6. Summary Statistics for Cross-country Panel Data, 1990 to 1997[a]

Summary statistic	*N*	*Mean*	*Standard deviation*
Share of a country's bank assets controlled by a foreign bank (banking integration)	498	0.192	0.222
Real GDP growth	498	0.0285	0.0634
Real growth in investment	516	0.0768	0.1877
Squared deviation of GDP growth from expected GDP growth	498	0.0043	0.0141
Absolute deviation of GDP growth from expected GDP growth	498	0.0439	0.0494
Squared deviation of growth in investment from its expected value	516	0.0477	0.0972
Absolute deviation of investment from its expected value	516	0.1607	0.1480
Share of a country's bank assets controlled by largest three bank (banking concentration)	498	0.639	0.216
Total liquid liabilities divided by GDP (financial development)	498	0.525	0.344
Absolute value of percent change in real exchange rate (terms of trade shock)	498	0.070	0.081
Imports + exports divided by GDP (real integration)	498	0.388	0.267

a. Expected growth rates are computed as the predicted value from a regression of GDP growth (capital growth) on a time effect and a country effect.

the change in the real exchange rate for a given country relative to the dollar. We also add a measure of the level of financial development in a country and year (the ratio of total liquid liabilities to GDP), following Levine (2003).[16]

As in the state-level approach, all regressions include both fixed country effects and fixed year effects. The country effects are especially important in the cross-country models because they eliminate many of the unobservable differences in economic conditions, institutions, regulations, taxation, law, corruption, culture, and other factors that may simultaneously affect volatility and foreign entry.

3.3 Potential Endogeneity: Constructing Instruments for Integration

It is perhaps even harder to argue that foreign bank entry is exogenous to economic conditions in a country than it is in the state-level context, so instrumenting becomes even more important than before. Our set of instrumental variables exploits linguistic, institutional, and geographic differences across countries. The idea is simple: a Spanish bank will be more likely to enter countries where Spanish is the primary language; an American bank will be more likely to enter countries in the Western Hemisphere; a British bank will be more likely to enter countries with similar legal and regulatory institutions. Therefore, if American banks are well positioned to enter new markets abroad because, for example, they are well capitalized, then English-speaking countries experience more (exogenous) entry than, say, French-speaking countries.

Accordingly, we first grouped countries along three dimensions: primary language (Arabic, English, French, German, Spanish/Portuguese, and other), legal origin (English, French, German, Scandinavian, and Socialist), and region (see table 4). For each country, we then compute the average of a series of characteristics related to the likelihood that foreign banks enter a country in the group. We exclude the characteristics of the country itself to ensure that these group means are exogenous. The group characteristics include the following: the ratio of bank assets to GDP (a measure of financial depth), the average bank capital-asset ratio (a measure of bank financial strength), and the average share of foreign ownership (a measure

16. Denizer, Iyigun, and Owen (2002) find that GDP volatility and financial development are negatively related.

of how much entry has already occurred within the group). We also include the size of the country's banking system relative to total banking assets held by all countries in the group.

The results from the first-stage regressions of foreign bank share on these group characteristics indicate that we are able to build a good instrument for estimating the effects of integration in an IV model, even controlling for country and time effects. For example, the *p* value testing the joint significance of the set of instruments excluded from the model in the first-stage regressions is less than 0.01. The regional averages turn out to be more powerful predictors of entry than either language or law. Countries in a region where banks are well capitalized, on average, experience significantly more foreign entry than countries in regions where banks are poorly capitalized, on average. Entry is also higher in countries located in regions with large banking systems (relative to GDP) and in countries whose banking system is small relative to the entire region.

3.4 Results

Tables 7 and 8 contain the results for volatility of real GDP growth for all countries and for nonindustrial countries in the Western Hemisphere, respectively, while tables 9 and 10 present the results based on volatility of real investment growth for the same country groups. We report eight specifications in each table, four using the squared deviations of growth to measure volatility and four using the absolute deviations of growth. These four specifications include the fixed-effects OLS and three IV models, one which includes the full set of instruments, one that deletes banking concentration from the instrument set as a possibly endogenous variable, and one that includes concentration as a right-hand-side variable in the model.

In contrast to the U.S. experience, these results are consistent with a zero or positive link between foreign banking (that is, banking integration) and economic volatility. We do not estimate a single negative coefficient on the foreign bank share variable that is significant at the 10 percent level or better in any of thirty-two specifications. In contrast, we find a positive and significant coefficient on foreign banking in fifteen of thirty-two specifications. This positive effect is most evident in table 10, which examines volatility of investment among the nonindustrial Western Hemisphere countries. In all eight of these specifications, the results suggest that greater banking integration is associated with more, not less, volatility.

Table 7. Panel Regressions Relating Volatility of Country Real GDP Growth to Banking Integration, All Countries, 1990 to 1997[a]

	Dependent variable							
	Squared deviation of growth from expected growth				*Absolute deviation of growth from expected growth*			
Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Banking integration	0.0083	0.0413	0.0381	0.0388	0.0477*	0.2633*	0.2031*	0.2038*
	(0.0077)	(0.0289)	(0.0323)	(0.0343)	(0.0271)	(0.1063)	(0.1154)	(0.1229)
Real integration	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001	0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0004)	(0.0004)	(0.0004)	(0.0004)
Financial development	0.017	0.017	0.017	0.018	0.061	0.066	0.065	0.070*
	(0.011)	(0.011)	(0.011)	(0.011)	(0.039)	(0.042)	(0.040)	(0.041)
Terms-of-trade shock	0.024*	0.024*	0.024*	0.024*	0.103*	0.100*	0.101*	0.098*
	(0.007)	(0.007)	(0.007)	(0.007)	(0.024)	(0.026)	(0.025)	(0.025)
Banking concentration				0.0012				(0.0212)
				(0.0073)				(0.0262)
Summary statistic								
Within R^2	0.0747	0.0326	0.0404	0.0404	0.0964	0.0200	0.0222	0.0237
No. observations	498	498	498	498	498	498	498	498
No. countries	87	87	87	87	87	87	87	87
Hausman χ^2 test[b]		1.40	0.05	0.05		4.39	1.00	
Estimation technique	OLS	IV	IV*	IV	OLS	IV	IV*	IV

a. All regressions contain both year and state fixed effects. Banking integration equals the share of a country's bank assets that are owned by foreign banks, where the foreign bank must own at least 50% of the local bank. Real integration equals the ratio of total imports plus exports to GDP. Banking concentration equals the market share of the country's three largest banks. In the IV models, the instrumental variables include the following: banking concentration, the average ratio of bank assets to GDP in countries in the same group (groups defined below), the average bank capital-asset ratio for all countries in the same group, the average share of foreign ownership for all countries in the same group, and the size of the countries banking system relative to the group. For each of these instruments, we construct group averages, where countries are grouped along three dimensions: primary language (Arabic, English, French, German, Spanish/Portuguese, and other), legal origin (English, French, German, Scandinavian, and Socialist), and region (defined in table 4). For each of the averages we do not include the value for the country itself, but rather use only the other countries within the group. In the IV* model, we drop concentration from the list of instruments. Standard errors are in parentheses.

b. The Hausman test compares the model with the one preceding it. For example, the test in column 3 compares the coefficients in column 3 with the coefficients in column 2. The models in columns 3 and 4 (7 and 8) are not nested, so the test is not available.

* Statistically significant at the 10 percent level.

Table 8. Panel Regressions Relating Volatility of Country Real-GDP Growth to Banking Integration, Nonindustrial Western Hemisphere Countries, 1990 to 1997[a]

	Dependent variable							
	Squared deviation of growth from expected growth				*Absolute deviation of growth from expected growth*			
Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Banking integration	–0.0213	–0.0279	–0.0286	–0.0253	–0.0013	–0.0226	–0.0195	–0.0309
	(0.0232)	(0.0235)	(0.0235)	(0.0241)	(0.0699)	(0.0706)	(0.0706)	(0.0727)
Real integration	0.0007*	0.0007*	0.0007	0.0006	0.0008	0.0008	0.0008	0.0010
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0012)	(0.0012)	(0.0012)	(0.0013)
Financial development	–0.027	–0.031	–0.032	–0.039	–0.0053	–0.0181	–0.0162	–0.0016
	(0.036)	(0.036)	(0.036)	(0.038)	(0.1093)	(0.1096)	(0.1096)	(0.1145)
Terms-of-trade shock	0.018	0.017	0.017	0.020	0.106	0.104	0.104	0.097
	(0.029)	(0.029)	(0.029)	(0.030)	(0.088)	(0.088)	(0.088)	(0.089)
Banking concentration				–0.0011				0.0266
				(0.0169)				(0.0509)
Summary statistic								
Within R^2	0.1428	0.1420	0.1419	0.1472	0.0999	0.0989	0.0992	0.1011
No. observations	112	112	112	112	112	112	112	112
No. countries	18	18	18	18	18	18	18	18
Hausman χ^2 test[b]		3.78	0.37			4.27	1.73	
Estimation technique	OLS	IV	IV*	IV	OLS	IV	IV*	IV

a. All regressions contain both year and state fixed effects. Banking integration equals the share of a country's bank assets that are owned by foreign banks, where the foreign bank must own at least 50% of the local bank. Real integration equals the ratio of total imports plus exports to GDP. Banking concentration equals the market share of the country's three largest banks. In the IV models, the instrumental variables include the following: banking concentration, the average ratio of bank assets to GDP in countries in the same language group, the average bank capital-asset ratio for all countries in the same language group, the average share of foreign ownership for all countries in the same language group, and the size of the countries banking system relative to the group. We do not construct instruments grouped along either regional or legal origin lines because all countries in these regressions are in the same region, and almost all of the countries in this region have a legal system originating from the French system. In the IV* model, we drop concentration from the list of instruments. Standard errors are in parentheses.

b. The Hausman test compares the model with the one preceding it. For example, the test in column 3 compares the coefficients in column 3 with the coefficients in column 2. The models in columns 3 and 4 (7 and 8) are not nested, so the test is not available.

* Statistically significant at the 10 percent level.

Table 9. Panel Regressions Relating Volatility of Country Real Growth in Investment to Banking Integration, All Countries, 1990 to 1997[a]

	Dependent variable							
	Squared deviation of growth from expected growth				*Absolute deviation of growth from expected growth*			
Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Banking integration	0.1795*	0.2428	0.1802	0.1560	0.2548*	0.4812*	0.3039	0.2809
	(0.0505)	(0.1807)	(0.2074)	(0.2178)	(0.0805)	(0.2909)	(0.3310)	(0.3462)
Real integration	0.0004	0.0003	0.0004	0.0005	0.0006	0.0004	0.0005	0.0007
	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0010)	(0.0012)	(0.0009)	(0.0013)
Financial development	0.028	0.031	0.028	0.032	0.076	0.085	0.078	0.090
	(0.071)	(0.071)	(0.072)	(0.072)	(0.113)	(0.115)	(0.114)	(0.114)
Terms-of-trade shock	0.1488*	0.1483*	0.1488*	0.1448*	0.2380*	0.2360*	0.2376*	0.2270*
	(0.0446)	(0.0448)	(0.0447)	(0.0450)	(0.0712)	(0.0720)	(0.0713)	(0.0717)
Banking concentration				0.0328				0.0843
				(0.0475)				(0.0756)
Summary statistic								
Within R^2	0.1086	0.1053	0.1086	0.1097	0.1242	0.1075	0.1234	0.1278
No. observations	516	516	516	516	516	516	516	516
No. countries	92	92	92	92	92	92	92	92
Hausman χ^2 test[b]		0.13	0.38			0.66	1.26	
Estimation technique	OLS	IV	IV*	IV	OLS	IV	IV*	IV

a. All regressions contain both year and state fixed effects. Banking integration equals the share of a country's bank assets that are owned by foreign banks, where the foreign bank must own at least 50% of the local bank. Real integration equals the ratio of total imports plus exports to GDP. Banking concentration equals the market share of the country's three largest banks. In the IV models, the instrumental variables include the following: banking concentration, the average ratio of bank assets to GDP in countries in the same group (groups are defined below), the average bank capital-asset ratio for all countries in the same group, the average share of foreign ownership for all countries in the same group, and the size of the countries banking system relative to the group. For each of these instruments, we construct group averages, where countries are grouped along three dimensions: primary language (Arabic, English, French, German, Spanish/Portuguese, and other), legal origin (English, French, German, Scandinavian, and Socialist), and region (defined in table 4). For each of the averages we do not include the value for the country itself, but rather use only the other countries within the group. In the IV* model, we drop concentration from the list of instruments. Standard errors are in parentheses.

b. The Hausman test compares the model with the one preceding it. For example, the test in column 3 compares the coefficients in column 3 with the coefficients in column 2. The models in columns 3 and 4 (7 and 8) are not nested, so the test is not available.

* Statistically significant at the 10 percent level.

Table 10. Panel Regressions Relating Volatility of Country Real Growth in Investment to Banking Integration, Nonindustrial Western Hemisphere Countries, 1990 to 1997[a]

	Dependent variable							
	Squared deviation of growth from expected growth				*Absolute deviation of growth from expected growth*			
Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Banking integration	0.2820*	0.2841*	0.2827*	0.2670*	0.4398*	0.4364*	0.4389*	0.4107*
	(0.0869)	(0.0877)	(0.0878)	(0.0901)	(0.1674)	(0.1691)	(0.1692)	(0.1738)
Real integration	0.0012	0.0013	0.0013	0.0016	0.0034	0.0034	0.0034	0.0041
	(0.0016)	(0.0016)	(0.0016)	(0.0016)	(0.0030)	(0.0030)	(0.0030)	(0.0031)
Financial development	0.118	0.119	0.118	0.148	0.0010	–0.0010	0.0005	0.0504
	(0.136)	(0.136)	(0.136)	(0.142)	(0.2620)	(0.2624)	(0.2625)	(0.2739)
Terms-of-trade shock	0.374*	0.374*	0.374*	0.361*	0.6055*	0.6051*	0.6054*	0.5842*
	(0.109)	(0.109)	(0.109)	(0.111)	(0.2107)	(0.2108)	(0.2108)	(0.2136)
Banking concentration				0.0489				0.828
				(0.631)				(0.1217)
Summary statistic								
Within R^2	0.3130	0.3129	0.3130	0.3179	0.2817	0.2817	0.2200	0.2856
No. observations	112	112	112	112	112	112	112	112
No. countries	18	18	18	18	18	18	18	18
Hausman χ^2 test[b]		0.03	0.13			0.02	0.15	
Estimation technique	OLS	IV	IV*	IV	OLS	IV	IV*	IV

a. All regressions contain both year and state fixed effects. Banking integration equals the share of a country's bank assets that are owned by foreign banks, where the foreign bank must own at least 50% of the local bank. Real integration equals the ratio of total imports plus exports to GDP. Banking concentration equals the market share of the country's three largest banks. In the IV models, the instrumental variables include the following: banking concentration, the average ratio of bank assets to GDP in countries in the same language group, the average bank capital-asset ratio for all countries in the same language group, the average share of foreign ownership for all countries in the same language group, and the size of the countries banking system relative to the group. We do not construct instruments grouped along either regional or legal origin lines because all countries in these regressions are in the same region, and almost all of the countries in this region have a legal system originating from the French system. In the IV* model, we drop concentration from the list of instruments. Standard errors are in parentheses.

a. The Hausman test compares the model with the one preceding it. For example, the test in column 3 compares the coefficients in column 3 with the coefficients in column 2. The models in columns 3 and 4 (7 and 8) are not nested, so the test is not available.

* Statistically significant at the 10 percent level.

Tables 7 through 10 report the Hausman specification test that compares coefficients of consistent (but not necessarily efficient) IV models with the more efficient (but not necessarily consistent) OLS model. The test never rejects the consistency of the OLS models. Although the magnitude of the effects of integration do change with the estimation technique, we never observe a change of sign in the coefficient on banking integration in comparing OLS with IV. If we look only at these eight OLS specifications, the coefficient on banking integration is positive in six of eight specifications, with statistical significance at the 10 percent level for five of these cases.

Why are country results so different from the U.S. results? Our model suggests that integration heightens the impact of firm collateral shocks on spending. Perhaps foreign banks respond more elastically to collateral shocks than domestic banks because they are better able to reinvest funds outside the country. To investigate, we regress the real growth of GDP and investment on proxies for shocks to entrepreneurial collateral (the return on the stock market in the country during the preceding year) and shocks to the banking system (the growth rate of bank capital in the country). We then interact these two capital variables with the foreign bank share.

The results (table 11, columns 1 and 4) confirm that the two capital variables are positively correlated with GDP and investment spending growth, as one would expect. More interesting is the positive coefficient on the interaction between collateral and foreign bank share: that positive sign suggests that the impact of firm capital shocks is indeed amplified by the presence of foreign banks. The amplification is much more pronounced in the investment regressions than the overall GDP growth regressions, which seems sensible since lower collateral value has a direct impact of firms' ability to borrow.

4. Conclusions

The theory behind this paper suggests that bank integration is a two-edged sword in terms of business cycle variability. Integration can magnify the impact of firm collateral shocks because integrated banks have the opportunity to shift their capital elsewhere during downturns. Shocks to the banking system itself, however, become less important in an integrated world because the integrated banks can import banking resources from abroad to fund good, local projects.

Table 11. Response of Real GDP Growth and Real Capital Formation Growth to Banking and Collateral Shocks, 1990-1997[a]

	Dependent variable					
	Real GDP growth			*Real growth in investment*		
Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Growth in real bank capital	0.0301*	0.0254	0.0363	0.0698	0.0460	0.0592
	(0.0167)	(0.0216)	(0.0257)	(0.0519)	(0.0804)	(0.0962)
Real return on stock market	0.0242*	0.0124	–0.0112	0.1565*	0.0440	–0.0607
	(0.0118)	(0.0146)	(0.0201)	(0.0366)	(0.0542)	(0.0754)
Banking integration		–0.1272	0.0130		0.0857	–1.6607
		(0.1845)	(0.2479)		(0.6865)	(0.9281)
Growth in bank capital*banking integration		0.06607	–0.0372		–0.2342	–0.0157
		(0.1036)	(0.1066)		(0.3853)	(0.3995)
Return on stock market*banking integration		0.1712*	0.3290*		0.9394*	1.4923*
		(0.0895)	(0.1262)		(0.3331)	(0.4730)
Summary statistic						
Within R^2	0.1513	0.2330	0.2472	0.4125	0.4544	0.4739
No. observations	188	175	181	189	176	182
No. countries	30	30	30	31	31	31
Estimation technique	OLS	IV	IV*	OLS	IV	IV*

a. All regressions contain both year and state fixed effects. Banking integration equals the share of a country's bank assets that are owned by foreign banks, where the foreign bank must own at least 50% of the local bank. In the IV models, the instrumental variables include the following: banking concentration, the average ratio of bank assets to GDP in countries in the same group (groups are defined below), the average bank capital-asset ratio for all countries in the same group, the average share of foreign ownership for all countries in the same group, and the size of the countries banking system relative to the group. For each of these instruments, we construct group averages, where countries are grouped along three dimensions: primary language (Arabic, English, French, German, Spanish/Portuguese, and other), legal origin (English, French, German, Scandinavian, and Socialist), and region (defined in table 4). For each of the averages we do not include the value for the country itself, only the other countries within the group are used. In the IV* model, we drop concentration from the list of instruments. Standard errors are in parentheses.
* Statistically significant at the 10 percent level.

Our data suggest that the cutting edge of the sword depends on where one looks. Bank integration across U.S. states over the late 1970s and 1980 appears to have dampened economic volatility within states. That dampening suggests that the benefit of integration in the U.S. has been to diminish the impact of bank capital shocks, and indeed, we find that employment growth and bank capital growth became less correlated with shocks to the local banking sector with integration. Internationally, we find that foreign bank integration is either unrelated to volatility of firm investment spending or positively related. That suggests that the amplifying effect of integration on firm capital shocks dominate, and we do, in fact, find that GDP

growth and investment growth became more sensitive to changes in stock market wealth, whereas the effect of shocks to the banking sector did not change significantly.

Even though our model admits conflicting effects from integration, and even though our ancillary regressions (in which we interact integration with bank capital or firm collateral) are consistent with those conflicting effects, we are less confident about our international results than we are about our U.S. analysis. The international data are noisier, for one, and we have less of it (eight years versus eighteen for the United States). Another concern is that our window on the world—the 1990 to 1997 period—is partly obscured by sweeping transitions and episodic financial crises, especially in emerging economies, that may confound the effects of integration, or may even motivate it. Fixed effects and instruments help with those problems to some degree, but not completely.

With those qualifiers, policymakers and central bankers should be aware of the possibility that business spending may become more volatile as they open their banking sectors to foreign entry. The first-order (growth and efficiency) effects of foreign bank entry are almost certainly positive, but the second-order (volatility) effects are less clear.

REFERENCES

Aghion, P., A. Banerjee, and T. Picketty. 1999. "Dualism and Macroeconomic Volatility." *Quarterly Journal of Economics* 114(4): 1359–97.

Beck, T., A. Demirgüç-Kunt, and R. Levine. 2000. "A New Database on Financial Development and Structure." *World Bank Economic Review* (September): 597–605.

Bergstresser, D. 2001. "Market Concentration and Loan Portfolios in Commercial Banks." Harvard Business School. Mimeographed.

Caballero, R. and A. Krishnamurthy. 2001. "International and Domestic Collateral Constraints in a Model of Emerging Market Crises." *Journal of Monetary Economics* 48(3): 513–48.

Claessens, S., A. Demirgüç-Kunt, and H. Huizinga. 2001. "How Does Foreign Entry Affect Domestic Banking Markets?" *Journal of Banking and Finance* 25(5): 891–911.

Clarke, G., R. Cull, M.S. Martínez Pería, and S.M. Sánchez. 2001. "Foreign Bank Entry: Experience, Implications for Developing Countries, and Agenda for Further Research." Washington: World Bank. Mimeographed.

Demirgüç-Kunt, A. and R. Levine. 2002. *Financial Structure and Economic Growth: A Cross-country Comparison of Banks, Markets, and Development*. Cambridge, Mass.: MIT Press.

Demsetz, R.S., M.R. Saidenberg, and P.E. Strahan. 1996. "Banks with Something to Lose: The Disciplinary Role of Franchise Value." *Federal Reserve Bank of New York Economic Policy Review* 2(2): 1–14.

Denizer, C.A., M.F. Iyigun, and A. Owen. 2002. "Finance and Macroeconomic Volatility." *Contributions to Macroeconomics* 2(1): article 7.

Eichengreen, B. and M.D. Bordo. 2002. "Crises Now and Then: What Lessons from the Last Era of Financial Globalization?" Working paper 8716. Cambridge, Mass.: National Bureau of Economic Research.

Geert, B., C.R. Harvey, and C. Lundblad. 2002. "Growth Volatility and Equity Market Liberalization." Duke University, Fuqua School of Business. Mimeographed.

Goldberg, L., G. Dages, and D. Kinney. 2000. "Foreign and Domestic Bank Participation in Emerging Markets: Lessons from Mexico and Argentina." *Federal Reserve Bank of New York Economic Policy Review* 6(3): 17–36.

Hellman, T., K. Murdock, and J. Stiglitz. 2000. "Liberalization, Moral Hazard in Banking, and Prudential Regulation: Are Capital Requirements Enough?" *American Economic Review* 90(1): 147–65.

Holmstrom, B. and J. Tirole. 1997. "Financial Intermediation, Loanable Funds, and the Real Sector." *Quarterly Journal of Economics* 112(3): 663–91.

Jayaratne, J. and P.E. Strahan. 1996. "The Finance-Growth Nexus: Evidence from Bank Branch Deregulation." *Quarterly Journal of Economics* 111(3): 639–70.

————. 1998. "Entry Restrictions, Industry Evolution, and Dynamic Efficiency: Evidence from Commercial Banking." *The Journal of Law and Economics* 41(1): 239–73.

Kane, E.J. 1996. "De Jure Interstate Banking: Why Only Now?" *Journal of Money, Credit and Banking* 28(2): 141–61.

Keeley, M.C. 1990. "Deposit Insurance, Risk, and Market Power in Banking." *American Economic Review* 80(5): 1183–200.

Kroszner, R.S. and P.E. Strahan. 1999. "What Drives Deregulation: Economics and Politics of the Relaxation of Bank Branching Restrictions." *Quarterly Journal of Economics* 114(4): 1437–67.

La Porta, R., F. López-de-Silanes, and A. Shleifer. 2002. "Government Ownership of Banks." *Journal of Finance* 57(1): 265–302.

Levine, R. 1999. "Law, Finance, and Economic Growth." *Journal of Financial Intermediation* 8(1–2): 8–35.

————. 2003. "More on Finance and Growth: More Finance, More Growth?" *Federal Reserve Bank of St. Louis Review* 85(4): 31-46.

Morgan, D.P., B. Rime, and P.E. Strahan, 2003, "Bank Integration and State Business Cycles." Working paper 9704. Cambridge, Mass.: National Bureau of Economic Research.

Peek, J. and E. Rosengren. 2000. "Collateral Damage: Effects of the Japanese Bank Crisis on the United States." *American Economic Review* 90(1): 30–45.