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Banking Policy and Macroeconomic Stability

An Exploration

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Abstract

Whether and when does banking serve to stabilize the economy? Caprio and Honohan view the banking system as a filter through which foreign and domestic shocks feed through to the domestic economy. The filter can dampen or amplify the shocks through various credit market channels, including credit growth, import of foreign capital, and possibly interest rates. The question is whether the prudential quality of banking, as proxied by measures of regulatory quality and openness to foreign banking, amplify or dampen these shocks.

The authors find that many of the regulatory characteristics that have been found to deepen a financial system and make it more robust to crises—notably those which empower the private sector—also appear to *reduce* the sector's ability to provide short-term insulation to the macroeconomy. It is as if prudent bankers are reluctant to absorb short-term risks that, if neglected, might cause solvency and growth problems in the longer run. Forbearance might dampen short-term volatility, but at the expense of the longer run health of the banking sector and the economy. One way to avoid this apparent tradeoff is evident: banking systems which have a higher share of foreign-owned banks, a feature already associated with financial deepening and lowered risk of crisis, also seem to score well in terms of short-term macroeconomic insulation.

This paper—a joint product of Finance, Development Research Group, and the Financial Sector Strategy and Policy Department—is part of a larger effort in the Bank to analyze bank regulation and supervision. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Agnes Yaptenco, room MC3-446, telephone 202-473-1823, fax 202-522-1155, email address ayaptenco@worldbank.org. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The authors may be contacted at gcaprio@worldbank.org or phonohan@worldbank.org. June 2002. (37 pages)

Banking policy and macroeconomic stability: an exploration

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I. Introduction

In view of the depressing record of the last two decades with banking crises around the world and, in particular, in emerging markets, and it is understandable that authorities are interested in whether (and when) banking serves to stabilize the economy. Evidently, a crisis of bank insolvency has the potential to push the economy into a slump, in what is the most extreme form of credit-driven macroeconomic cycle. This is an example of bad banking worsening macroeconomic performance, and episodes in which banks are alleged to contribute to booms or asset bubbles are not difficult to find as well. But could some forms of "good" banking also have a destabilizing role?

For example, worsening creditworthiness conditions as a slump gets under way can lead a cautiously managed bank to raise its credit quality thresholds and shift to safe assets such as government bonds; the ensuing credit crunch can exacerbate a downturn (Bernanke, 1983; Bernanke-Lown, 1991; Greenwald-Stiglitz, 1993). In an upturn the opposite can be the case, with increasing confidence triggering a relaxation of credit standards and a surge of credit driving the economy even higher - and amplifying credit cycles. Some authors have noted that the tightness of supervisory guidelines can act in the same pro-cyclical way (cf. Berger et al. 2001).

Unfortunately, in assessing the importance of each of these models in practice, the econometrician is faced with difficult problems. While banking crises can contribute to a subsequent output dip, it is equally true that adverse output shocks can trigger a banking crisis (IMF, 1998; Hoggarth et al. 2001). Disentangling cause and effect is very difficult in practice. Likewise, it is usually hard to determine whether a particular decline in credit can be attributed to demand or supply shocks. The relevant structural equations are

usually not well determined, as evidenced from the large literature on the East Asia crisis and the potential role of a credit crunch there (Agenor et al., 2000 ; Ding et al., 1998).

An alternative approach to addressing the question of good banking and macro stability is to look at some instruments for banking quality and examine the macro-performance of economies by reference to these instruments. The advantage of this approach is that it can provide guidance as to the type of banking system that government officials could expect to maximize stabilizing influences. Two distinct types of instrument on which some data are available are (i) the nature of bank regulation and (ii) presence of, or openness to, foreign bank ownership.[1]

Already there is a literature on the cross-country contribution of financial depth to macroeconomic stability (Easterly, Islam, Stiglitz, 2000; Beck, Lundberg, Majnoni, 2001). It concludes that deeper financial systems – at least up to a certain point – do seem to be able to insulate economies against certain types of shock. The question posed in this paper can be seen as addressing the same question but along different dimensions of banking sector quality.

While the presence of reputable foreign banks is usually held to contribute to the institutional strength of the banking system (cf. Levine, 1996), heavy reliance on foreign banks could be destabilizing if they introduce or transmit foreign shocks to a greater extent than they absorb shocks of domestic origin.

Schematically we can see the banking system as a filter through which foreign and domestic shocks feed through to the domestic economy. The filter can dampen or amplify the shocks, through various credit market channels including credit growth,

[1] The major source of most of this data is the World Bank's survey of regulation (Barth-Caprio-Levine, 2001a)

import of foreign capital and possibly interest rates. Our question is whether the prudential quality of banking, as proxied by measures of regulatory quality and of openness to foreign banking, amplify or dampen these shocks. Barth, Caprio, and Levine (2001b) found that some aspects of the regulatory environment can help stimulate increased financial depth as well as reduce the likelihood of financial crises, and here we look at whether the same or other features of the regulatory environment can dampen short-term macroeconomic volatility.

Although it is hard to identify a statistically clear role for different aspects of the regulatory environment among the many factors influencing overall macroeconomic volatility, when we look at the way in which banking system balance sheets evolve in response to shocks, we do find systematic patterns. In general, many of the regulatory characteristics that have been found to deepen a financial system and make it more robust to crises -- notably those which empower the private sector -- also appear to reduce the sector's ability to provide short-term insulation to the macroeconomy. It is as if prudent bankers are reluctant to absorb short-term risks that might cause solvency and growth problems in the longer run. But this apparent trade-off can be avoided: banking systems which have a higher share of foreign-owned banks, already a feature associated with financial deepening and lowered risk of crisis, also seem to score well in terms of short-term macroeconomic insulation.

In the next section, we review some of the earlier efforts to address these issues. Section 3 follows with new empirical work, and section 4 concludes with advice for policymakers.

II. Banking on stability: what do we know?

> ...no degree of regulatory wisdom could, or should, have made the 1920s a profitable time for banks in agricultural regions affected by drastic declines in prices and land values...What regulation could have done, but did not do, was make the system as a whole less susceptible to shocks and more resilient in its response to failures. Calomiris, 1989

There has been little disagreement that one of the important goals of banking and, more generally, finance is to help individuals and society cope with changing economic circumstances (Levine, 1997). One of the most basic functions of finance, namely the mobilization of savings, itself represents a way for individuals to protect themselves from economic downturns. And from the (small business) man on the street, looking for a loan, to the sophisticated consumer of derivative products, the function of transforming risk (reducing it through aggregation and enabling it to be carried by those better able to bear it) also is a key way to deal with economic volatility (World Bank, 2001).

But is banking a source of stability? Although they note that the distinction can be overdrawn, Allen and Gale (2000) suggest that markets tend to be destabilizing, whereas banks and other intermediaries, by virtue of being able to re-contract more seamlessly, help to stabilize economies. And at least theoretically, banks should be forward-looking in their decisions. They should hold a well diversified portfolio, taking provisions and holding capital in order to ensure their survival. Banking and the building of special relationships does not fit with the perfectly competitive model, and bank charters have a value, which bankers can capture by making sure that they survive. Failure in banking, as in other industries, can send valuable signals and should be permitted, but there is a reduction in information capital when banks shut down, so that society suffers some loss.

'Bad' banks are those that risk failure either deliberately or through myopic decisions on risk-taking, but at least in this theoretical approach, good banks will outweigh the bad.

Nevertheless, it is not without some irony that in many banking crises – as in the 1920s and 1930s, among other episodes – it has been noted that the banking sector itself appears to have acted to amplify risks rather than to help mitigate them. What could cause such amplification?

Some have argued that regulators are to blame: by tightening capital regulations or raising provisioning standards after a boom is already well underway, or indeed after one has begun collapsing, banks may be induced to vary their lending in a pro-cyclical fashion (cf. Berger et al., 2001). And some features of the 1988 Basle Accord, such as the lower risk weight for short-term credit, may individually be sensible for banks but collectively can induce an increased ratio of short-term to total debt and therefore greater financial fragility, meaning more economic volatility.

Others claim that the rating agencies are the culprits: by downgrading companies or countries after a slowdown has already begun, an application of existing capital standards in most countries would automatically lead to a tightening of credit conditions. Although the evidence suggests that rating agencies do a respectable job of anticipating companies' misfortunes, they appear to perform less well when it comes to country risk (cf. Ferri, Liu and Majnoni, 2001).

And still others argue that it is the bankers themselves exhibiting lemming-like behavior. This behavior could be entirely rational. Errors in judgment may be punished more severely, both by the market and by internal compensation schemes: when the bank or the analyst makes a mistake in isolation, adverse consequences may be more

significant than one made in good company. Alternatively, the manner in which bank executives are compensated could more actively lead to potential pro-cyclical lending: if compensation is based on the short-run performance of bank stock prices, the mercurial tendency of markets will be transmitted directly to banks (John, Saunders, and Senbet, 2001).

Volatility, regardless of its source, is a legitimate source of concern in a world of less than complete markets, because individuals cannot costlessly enter into contracts for all conceivable states of the world. This statement holds with particular force in emerging market countries where the variety of financial services available tends to be more limited than in more advanced countries. Moreover, real, nominal, and financial volatility all are greater in emerging markets due to their smaller size and typically greater economic concentration (Caprio-Honohan, 1999, and World Bank, 2001), so if volatility matters in high-income economies, it must have been an even greater source of concern for developing countries.

Bernanke and Gertler (1989) and Gertler and Rose (1994) note that shocks to net worth can translate into a greater real volatility in the presence of credit market imperfections. The more significant are information problems, the more bankers will rely on the collateralizable net worth of borrowers, changes in which can lead to simultaneous expansion or shrinkage of bank balance sheets, leading to greater volatility of real income and inflation, and thus affecting economic welfare. Kiyotaki and Moore (1997) also note that such imperfections can increase the effects of temporary shocks and contribute to their persistence. The assumption that these imperfections are more pronounced in developing countries, consistent with the well-known lack of financial development

there, makes it all the more likely than emerging markets will be particularly affected by greater volatility. Banking is also important because for most countries it is the primary channel to break the link between domestic investment and savings, thereby permitting a more efficient allocation of capital worldwide.

So how can countries achieve a banking sector – more 'good' banks and fewer bad ones -- that mitigates, rather than magnifies economic volatility? Here the answers are thought to be well-known: adopt international best practices for everything from accounting and corporate governance to bank regulation and supervision. In addition to suffering from some circularity (essentially telling developing countries that they would become richer if only they adopted the institutional framework that advanced countries evolved over many generations), these recommendations for best practices are based exclusively on 'armchair empiricism.'

One answer might be to become more developed financially: Beck, Lundberg, and Majnoni (2001) find that although real sector shocks are dampened as financial systems develop, monetary shocks are amplified: firms depend more on external resources with significant financial sector development, which exposes them more to monetary or financial shocks.[2] But this still begs the question of whether countries with deep financial systems are equally capable of dampening even some forms of volatility. Are some types of deep financial system more effective in this respect than others?

To fill this void, Barth-Caprio-Levine (2001b) collect data on regulatory and supervisory practices around the world and find that numerous regulatory features, such as regulatory barriers to bank entry, regulatory restrictions on bank activities, greater

[2] Easterly, Islam and Stiglitz, (2000) found that volatility decreased with financial sector development until very high levels of development are reached when volatility appears to grow.

supervisory power, and government ownership of banks are positively associated with government corruption except when political openness is pronounced; for most countries, greater supervisory powers go with greater corruption and worse outcomes for bank development and stability. More positively, they find that regulatory and supervisory strategies that focus on empowering the private sector (improving transparency and disclosure) and limiting the adverse incentive effects from generous deposit insurance work best to promote bank performance and stability. An additional feature of the regulatory environment that helps bank stability is found in their analysis to be the ability of foreign banks to enter the local market. In Barth-Caprio-Levine (2001b), the dimension in which stability is measured refers to banking crises. But even if no crisis occurs, banking can perform an insulating function, as is examined further below.

Most other approaches to this question focus on individual cases, and even individual features of the regulatory environment. Jordan, Peek, and Rosengren (2000) find that U.S. banks which disclose less information then encountered more severe market reaction on eventual announcement and that this reaction was potentially contagious. In other words, better disclosure was at least consistent with lower volatility in the stock market prices of these banks. An earlier effort by Peek and Rosengren (1995) found that banks holding low capital ratios were forced to cut back more on their real estate portfolio in bad times, suggesting that bad banking can indeed exacerbate real volatility through credit decisions.

Other research has examined the impact of foreign banks, either in their offshore activities or onshore in industrial and emerging markets. Goldberg (2001) uses bank-specific data on U.S. bank lending to foreign countries, and finds that, while in general

these are not sensitive to local output and interest rate conditions in emerging markets, the volume of U.S. bank claims on foreign countries is quite sensitive to changes in U.S. conditions. This finding echoes that of Peek and Rosengren (2000), who established how Japanese banks pulled back from U.S. lending in the 1990s and that the retrenchment had real economic effects in select U.S. real estate markets. This suggests that foreign banks may help mitigate the effect of domestic shocks but could amplify the impact of foreign shocks. Those results were strongly driven by cross-border banking activities; in contrast, local operations of foreign-owned banks may be less ambiguous in their contribution to stability. For example, Crystal, Dages, and Goldberg (2001) find that in Argentina, Chile, and Columbia, foreign-owned banks showed not only high but more stable loan growth and higher capital asset ratios. This important finding strongly suggests that foreign-owned banks provide stability and do so as a result of their greater financial strength, perhaps as well because they are better regulated (Berger et al., 2000) and/or are less myopic.[3]

To summarize then, the literature provides some hope that certain aspects of the banking environment can help reduce volatility in emerging markets. In the next section we look at data on bank lending behavior in a wide cross-section of countries to see what light it throws on this issue.

[3] Clarke, Cull, and Martinez-Peria (2001) also show that access to credit by small- and medium-scale enterprises is greater with a higher foreign banking presence. Since many countries have resorted to expensive directing credit programs to solve this access problem, this finding would also suggests that foreign bank entry improves long-term stability as well.

III Using Aggregate Balance Sheet Data to Assess the Insulating Potential of the Banking System

If a banking system acts to stabilize or destabilize macroeconomic aggregates, this should become evident in the way in which the size and composition of its balance sheet evolves in response to shocks. In this section we look at the short-term dynamics of banking-system balance sheets as they change from quarter-to-quarter. In contrast to previous work examining the probability of crises -- relatively rare events occurring perhaps one or twice in a quarter-century -- our goal is to examine the ability of banking systems to insulate high-frequency disturbances.

This goal requires linking two distinct sources of data, namely quarterly balance sheet aggregates and information on structural characteristics of the banking systems. For the latter, we use the database of Barth, Caprio and Levine (2001a), which defines the outer margins of our sample of countries. For the former, we turn to *International Financial Statistics* (IFS).

III.1 Simplified Banking System Balance Sheets

Drawn up on what is, in principle, a common set of definitions, IFS contains monetary survey data on well over a hundred countries, including almost all of the countries for which we have banking quality data. Our focus is on the component data for deposit-money banks, not including the monetary authorities. But the balance sheet classifications of the monetary survey are too numerous to allow for a cross-country study without considerable consolidation and rationalization. A total of 44 distinct balance sheet category codes are included in the monetary survey, though any given country only has entries against a subset of these, typically fewer than twenty. Even 20

classifications is much too detailed a breakdown for the purpose at hand, namely to understand the influences on the broad allocation of different sources of funds to different uses in the balance sheet.

Therefore we have simplified and consolidated the data into a simplified format, the same for all countries, distinguishing between just six broad categories with convenient notation as follows:

Assets	*Liabilities*
a loans and advances	*c* capital
b bills and other liquid investments (net)	*d* deposits and deposit-type instruments
	e net other liabilities
	f net foreign liabilities

Here *a* ("advances" - though we use the term interchangeably with loans) equals total domestic credit, including claims on central, state and local governments (these expressed net of deposits), public enterprises, nonmonetary financial institutions and the private sector. The remaining asset-side item *b* ("bills") includes bank reserves net of credit to banks from the monetary authorities. The item *c* "capital" is the entry under capital accounts in *IFS*; it does not in all cases correspond to regulatory capital under the Basel conventions. The major item under liabilities is *d* "deposits," which includes not only demand and time deposits (other than the public sector deposits already netted out of *a*) but also money market and other liquid liabilities. The residual item *e* also includes bonds issued by banks. Net foreign liabilities *f* is self-explanatory. Detailed definitions are included in the Annex: "Consolidating the monetary survey".

Over time, each of the elements of the balance sheet evolve, but at any given moment, the balance sheet identity is satisfied by the data for each country:

$$a + b = c + d + e + f.$$

This identity reflects not only the nature of banking *transactions* but also the fact that *valuation changes* (such as changes in loan-loss provisioning) give rise to offsetting changes in the net residual, capital.

In order to look at the evolution of the typical balance sheet structure in our data set, we express each element as a percentage of the sum of the two asset items $a + b$ (advances plus bills). In interpreting the resulting ratios, note that this denominator is not the same as the balance sheet total. For one thing, borrowing from the central bank is netted out of "bills". Also, foreign assets are netted from the liability figure "foreign liabilities". With this caveat, we see from Figure 1 that deposits dominate the liabilities and advances the assets side of the mean portfolio structure.[4] The other four elements are, on average, rather small. Nevertheless, when we look at the variation both between countries and over time (1990-2000), we discover that each of the six elements contributes approximately the same amount (Figures 2a and 2b). This confirms that none of the elements of the chosen grouping of balance sheet items can be ignored in understanding the portfolio dynamics.

Over time, there has been a trend towards declining relative importance of the two large items, advances and deposits, as shown in Figure 3a, which shows the value for the median country at each date. Each of deposits and advances has trended downwards at a rate of between 0.5 and 0.7 percent points per annum. The slack has been taken up by an increase in net liquidity on the asset side and mainly by capital items on the liability side Figure 3b). These trends presumably reflect increased regulatory emphasis on capital and liquidity, as well as to a shift away from the use of discount lending by central banks.

[4] The figure shows the mean over 71 countries for each country's mean on quarterly data during 1990Q1-2000Q4.

We also notice that fluctuations in the balance sheet aggregates are sizable: movements of several percentage points even for the median of over 70 countries: individual countries experienced much more volatility.

So what are the drivers of this volatility, and how do they vary as between different types of banking system?

Figure 1

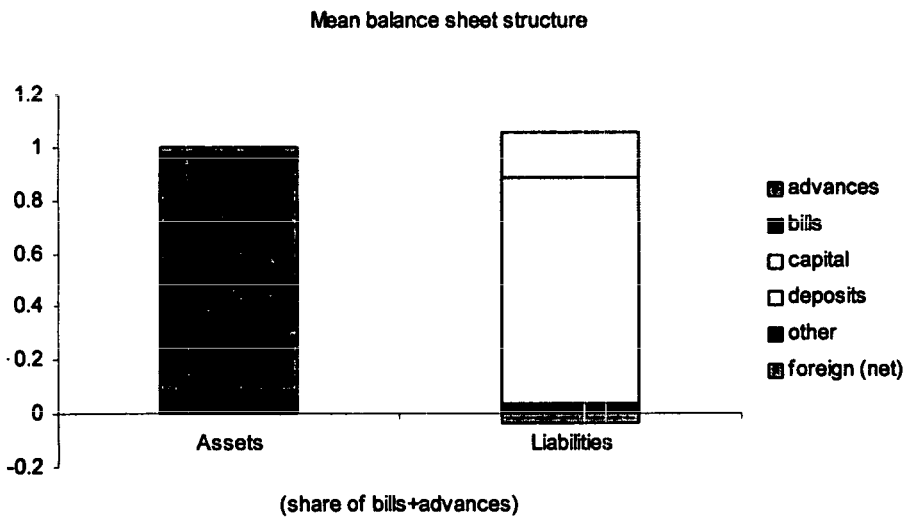


Figure 2a

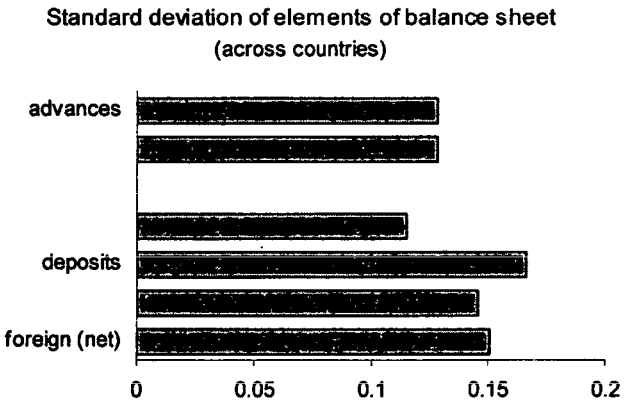


Figure 2b

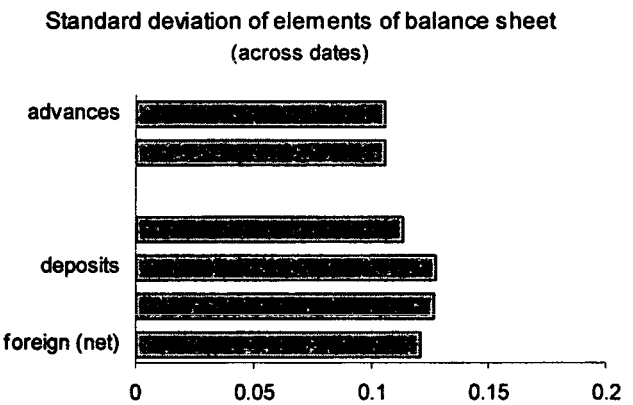


Figure 3a

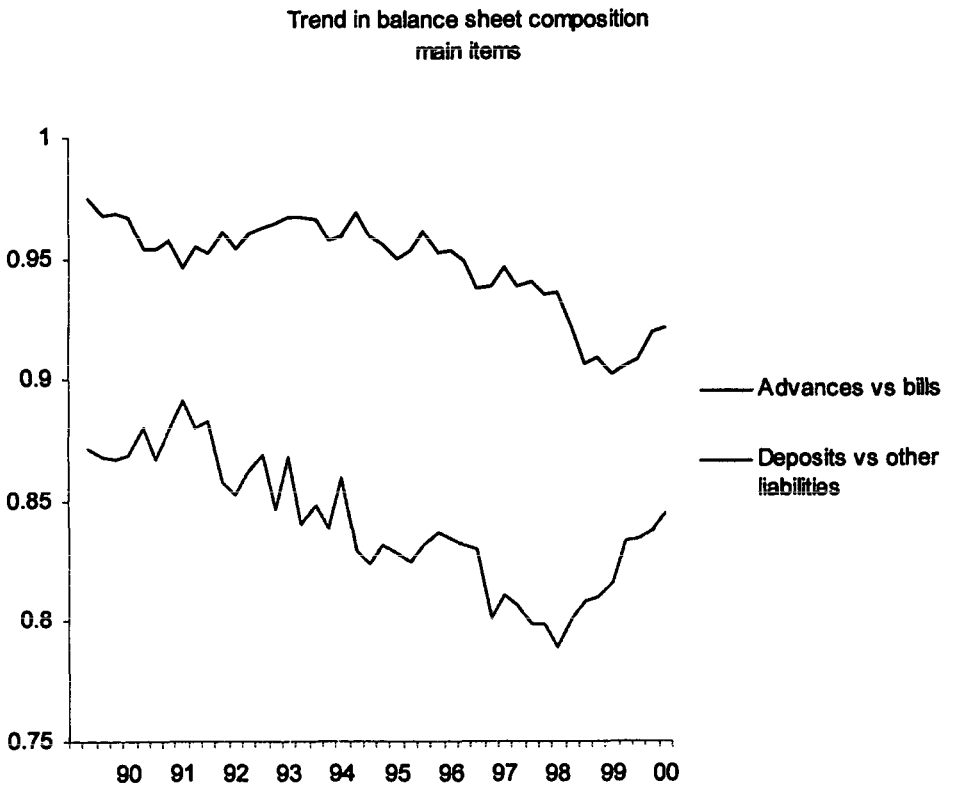
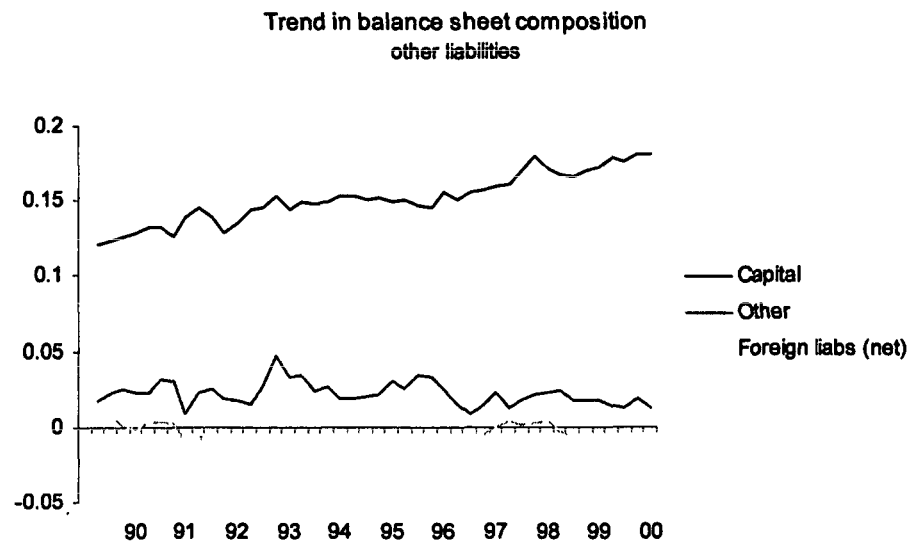


Figure 3b



III.2 Using the monetary survey data to assess the banking system's absorptive capacity.

Deposit shocks can be severe, as witness the dramatic experiences in Argentina in 1994-95 and again during 2001, when deposits fell by over 20 per cent and 10 per cent respectively, or in Turkey in 1994. The heightened depositor uncertainty which they typically imply can reflect heightened lender uncertainty also, but even if the bank lenders do not have a heightened sense of lending risk, they will have to find alternative sources of funding if they are not to shrink their loan portfolio in response to a withdrawal of deposits. Fluctuations in loans in turn can drive macroeconomic fluctuations. So we want to know whether the banking system does in fact act to insulate the volume of loans from exogenous shocks in deposits, with the presumption that such insulation is socially beneficial.

Even if deposits remain stable, disturbances in loan-loss experience can affect the banks' capitalization. This in turn will lead to other portfolio adjustments including fluctuations in lending impacting the macroeconomy. Here again we want to know if the banks are prone to cutting-back on new loans simply because of loan-losses (as distinct from cutting-back in a prudent response to heightened risk.) If they do so, this is likely to exacerbate an economic downturn and as such be socially undesirable.

In the case both of shocks to deposits and to capital, it is evident that simultaneity and feedback will be a crucial issue. For example, a poor harvest will tend to affect both credit demand and deposits, without there being any causality from the latter to the former. In what follows we use standard econometric techniques to correct for this problem.

Before attempting to capture the magnitude of these effects and how they may differ as between different types of country, it may be convenient to sketch the formal framework which could be underlie our generally intuitive approach to the econometric modeling.

A modeling framework

Let us denote the vector of balance sheet items as $x=(a,b,c,d,e,f)'$. In a competitive environment, each bank can be thought of as choosing a value x^* to optimize an expected profit function $\pi_i(x,r)$ in response to an exogenous expected vector of returns r (and subject to the adding-up condition $x'l=1$, where l is the unit vector). More generally, in a non-competitive environment, the banks may choose an optimal point (x^*, r^*) along a demand surface $\Delta_i(x,r)=0$. Finally, banks may be quantity-takers as well as price-takers for some of the elements of the balance sheet, in that they may, for example, be required to accept all deposits presented to them at a parametric rate of return. If so, the optimal portfolio will be conditional on the actual value of the deposits received. In practice, there may also be adjustment costs, so that the actual value of x may deviate from the optimized value, notably if there is some shock to the exogenous rates of return and/or the given flow of deposits.

If we only have data on the quantities and not on the rates of return, we cannot hope to estimate the profit function or the demand surfaces. But, with some further assumptions, we can draw some inferences as to the role of the banking system in contributing to macroeconomic stability.

For example, if banks are quantity-takers for deposits, then shocks to aggregate deposits *d* must be absorbed by some or all of the other elements of the balance sheet. (There may also be price adjustments). If the adjustment is through a change in the net foreign liability *f*, with no change in the level of advances *a* then the banking system is completely insulating the level of advances from shocks to the level of deposits.

According to the credit view of monetary transmission, it is through changes in loans and advances that the banking system has its biggest short-run[5] impact on the macroeconomy. If so, it is of interest to compare the degree to which deposit shocks are passed through to advances, or whether the banking system acts to insulate advances. In practice, of course, much of the dollar value of shifts in deposits typically passes through to advances, which are normally the largest element of the asset side of the balance sheet. Are there systematic variations in the extent of pass-through, and are these correlated with banking quality variables?

Response of loans and advances to fluctuations in deposits.

Naturally, being the largest balance sheet elements, deposit and loan fluctuations tend to be highly correlated over time and across countries. We regressed the quarterly logarithmic change in *a* on the contemporaneous change in *d* for our panel of 74 countries, 1990-2000. A simple OLS regression a coefficient of 0.78 with a standard error of little over 0.01 (Table 1a: Equation 1.1). Of course, simultaneity bias may be present and we look at this momentarily.

[5] And, according to the finance and growth literature, loans and advances are the key channel from finance to growth.

Taking this estimate at face value suggests that a fall in deposits of 10 per cent will pass through to advances to the extent of 7.8 per cent. This is the average over all countries. The next question is whether this pass-through is affected by the nature and quality of bank regulation and by the presence of foreign banks.

However, when we allow the coefficient on *d* to vary depending on the value of the banking quality variables by adding cross-product terms one-by-one to the equation, we find significant effects, many of them positive, suggesting that banking system quality does influence the pass-through and can actually tend to *destabilize* loans and advances in the short-run.[6] An exception is foreign ownership, which tends to insulate advances from deposit shocks.

In order to interpret these regressions, we take our cue from Barth, Caprio and Levine (2001b), though with a slightly different perspective given the different concerns at hand. Our conjecture is that banking systems that are subject to effective monitoring by market forces or by non-discretionary official bodies are more likely to adjust their lending in response to deposit fluctuations for fear of falling foul of the oversight. Although shareholders may have different views about increasing the leverage of their bank (which would occur if a fall in deposits were made-up at the expense of the quantity or quality of capital), those who are creditors to the bank will prefer to see the lending portfolio shrink because they otherwise would be more exposed to loss and enjoy no upside gain from increased risk.

In contrast, banking systems subject mainly to discretionary oversight by official regulators (even if this involves high capital requirements) will be more likely or better

[6] This finding relates to high-frequency fluctuations and does not contradict previous evidence that the odds of a banking crisis are lower in such systems.

able to smooth the impact of deposit fluctuations on loans in order to maintain the comfortable borrowing relationship and steady flow of profits albeit at the risk of violating regulatory norms.

Banking systems restricted from a wider range of lines of business may also be in a weaker position to insulate their borrowers from deposit fluctuations (e.g. by being unable to switching resources from the other lines). Finally, banking systems with foreign ownership may be better placed to intermediate or raise capital from abroad, thereby insulating the domestic borrowers from domestic deposit shocks.

This gives us predicted signs for each group of variables as shown in the first column of Table 1. The regression strategy for the equations reported in this table is a very simple one (and may need to be refined in future work). We simply include any or all of the structural variables as slope-shift (interaction) terms with the (logarithmic) change in deposits *d*. These structural explanatory variables are drawn from Barth, Caprio and Levine and are constant for each country.

In general the results are broadly consistent with the expected pattern. We note an especially large and statistically significant effect for the prompt corrective action variable: in regression 1.2 this amplifies the pass through effect by over one third, this suggests that such action may tend to induce a regulatory credit-crunch. The effect of foreign ownership - a kind of buffer which reduces the pass-through from deposits to loans again by more than a third, is also highly significant whether included with the other variables (regression 1.2) or on its own[7] (regression 1.10). Otherwise the only deviations from predicted signs are in respect of private monitoring (unexpected sign, but

anyway insignificant), the official regulatory powers variable which has the expected sign in the multivariate regression, but changes sign when included on its own (regression 1.5), and the line of business restrictions variable, insignificant in the multivariate specifications, but with an unexpected sign when included on its own.

These OLS results need to be subjected to robustness tests of various sorts. One essential is to correct for simultaneity bias, which we do by instrumenting for the change in deposits (the list of instruments are shown in the notes to Table 2). When only the instrumented change in deposits is included (regression 2.1) the coefficient is now higher, suggesting approximately 1 for 1 pass-through. Once again, when the other explanatory variables are added, the pattern of signs is broadly in line with expectations - in fact more so, inasmuch as the unexpected sign on official powers in regression 2.5 is now wholly insignificant. The line of business restrictions are now significant in the multivariate regressions with the expected sign. The index of private monitoring also now enters significantly with the expected sign.[8] The estimated effect of prompt corrective action remains significant, though smaller in sign. The impact of foreign ownership is also smaller and is now insignificant in the multivariate specification, though it remains significant on its own in regression 2.10.

Evidently, the econometric model is a very simple one, and the results obtained could be fragile to variations in specification, and in particular to omitted variables bias. Nevertheless, the results seems to confirm the fear of some authors that excessive caution in banking could result in a worsening of the capacity of the banking system to absorb

[7] By "on its own" we mean that the variable is included as the only slope-shift (interaction) term with the logarithmic change in deposits. A single constant term is included but not reported in all the regressions of Tables 1 and 2.

deposit shocks from passing through to loans and advances in the short-run. Thus, somewhat paradoxically, the type of regulation that has been shown to be relatively ineffective in protecting banking systems from failure and in helping to develop the banking system long-term could help provide some short-term stability.

Foreign ownership is an important exception. Found by others to be good for prudential considerations, it is also a stabilizer in the present context, likely because it brings a benefit, greater diversification, that adds to stability in the short and long term.

Capital shocks and loan growth

How is loan growth affected by shocks to banking confidence? The most obvious way in which our balance sheet data can be used to throw light on this question is by examining what happens to loans after a decline in bank capital. Do banks raise their credit standards, thereby slowing loan growth? Timing is important here. A revaluation of the loan portfolio following recognition of loan losses is a major source of variation in bank capital. This is a mechanical accounting effect, and not one which we wish to confuse with a behavioral response of lending to heightened portfolio risk and reduced capitalization. Therefore, in contrast to the deposit effect, which we allowed in the previous section to be simultaneous within the same quarter, we need to examine changes in a which follow changes in c. Capital can also change for other reasons, including new issues, retained earnings etc. So it is at best a very noisy indicator of confidence based on recent loan-loss experience (and one could do a lot better with more detailed income statement data) but it is the closest thing in the dataset we are using here.

[8] One of the components of this index captures the role of rating agencies, often thought to induce a pro-cyclical tendency.

Assuming that the confidence impact changes occur mainly in the year following a change in capital, we adopt the change in capital over the four previous quarters as our main explanatory variable. Various functional forms could be employed. In this preliminary effort, we have chosen to restrict the impact to be the same for each of the four quarters (relaxing the restriction risks increasing omitted variables bias in these lightly specified equations). Also, instead of the logarithmic rate of change, we express the change in capital c as a ratio of the contemporaneous loan stock a. Finally, we report regressions corrected for first-order autocorrelation.

The results are in Table 3. The patterns obtained confirm those of the previous section. Foreign ownership is again a stabilizing factor, perhaps in this case also reflecting a greater ability by foreign-owned banks to access capital. Also stabilizing (to a lesser extent) is reliance on official prudential regulation. In contrast, the measures of private prudential strength tend to be associated with a higher pass-through of capital changes to lending, as are restrictions on line of business.

Bank foreign borrowing and deposit shocks

One way of insulating a national banking system from shocks is to offset these shocks by trading in the international capital market. Deposit withdrawals can be replaced, by healthy banks, with funds drawn from the international money market. Likewise, a surplus of deposit funds can be placed in the international market. This is a potentially important form of insulation provided by a banking system that is well integrated with the world financial markets. Using our data, a small modification of the

method already applied throws light on the extent to which foreign borrowing has in practice been used in this way.

The regressions reported in Tables 4 and 5 explain changes in net foreign liabilities of the banking system (the change normalized, as in the figures above, as a share of the total of $a+b$) as a function of the logarithmic change in deposits. The same explanatory variables (slope-shifts) are used as before. A banking system that offsets deposit outflows with foreign borrowing will have a negative coefficient on the change in deposits (level effect). Slope-shift factors that increase the insulation will show up with negative coefficients.

Table 4 shows the OLS results. Once again the pattern is generally as expected from the framework discussed above. On average, additional foreign borrowing as a share of the balance sheet pseudo-total $a+b$ is about 11 per cent of the logarithmic change in deposits, implying that about 15 per cent of the deposit shock is insulated on average (regression 4.1). The multivariate regression 4.2 has the expected values for all of the coefficients, and displays a very strong insulating effect from foreign ownership.

However, turning to Table 5, a caveat is indicated, as the results do not come through as clearly for the 2SLS estimates. The signs are mostly the same, but size and significance have fallen. (The line-of-business restrictions variable is significant but with an unexpected sign). Also the R-squared values are low - some of them not even statistically significant using F-tests. This suggests that the instruments have not been strong enough to identify the actual effects reliably.

Nevertheless, the main conclusion that foreign ownership is a stabilizing force, while other regime features known to be good for long-term prudential and financial development goals, are not.

IV. Concluding Remarks

Previous work on prudential banking policy has rightly emphasized the importance of placing a great deal of reliance on the risk management capacity and incentive of informed market participants. That is the way to reduced risk of crisis and to long-term financial deepening.

At the same time, there remains a nagging concern that tightly-managed banking systems could under perform in terms of insulating the macroeconomy from short-term volatility. Our analysis of quarterly aggregate banking balance sheet data from over 70 countries suggests that these concerns are not altogether without foundation. The seeming paradox between the short-term and long-term effects of some features of the regulatory environment can be readily dispelled, as it likely is that by forcing greater adjustment to short-term changes, private monitoring may be better at preventing the build up of large losses. Unless either markets or officials become able to forecast accurately which shocks are permanent and which are transitory, a policy of quicker adjustment of loans to deposits appears to be the better way to ensure the medium-term stability of the economy and the banking system, admittedly at the expense of the short-term stability of the former.

Fortunately, there appears to be one tool that authorities can use to improve both short-term and long-term stability, and that is greater reliance on foreign ownership.

Greater foreign ownership appears to add diversification to all economies, large and small, but is especially important to the many small economies around the world. Although foreign entry is never popular with the current owners of the banking system, as noted in a recent report (World Bank, 2001), authorities need to recall that what matters for growth and development is access to good quality financial services, not who provides them.

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Table 1: *Sensitivity of lending to changes in deposits: OLS regressions*

Equation no:	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10
Level effect	0.78 (67.5)	0.69 (34.3)	0.66 (46.2)	0.76 (62.2)	0.76 (61.3)	0.79 (67.2)	0.78 (67.5)	0.66 (47.4)	0.78 (67.6)	0.83 (47.1)
Capital rules (-)		-0.02 (1.5)	-0.04 (2.8)	-0.09 (7.2)						
Official regulatory powers (-)		-0.04 (2.5)	-0.06 (3.9)		0.07 (6.6)					
Private monitoring (+)		-0.02 (1.4)	-0.01 (0.9)			-0.01 (0.7)				
Entry standards (+)		0.02 (1.8)	0.03 (2.2)				0.04 (4.5)			
Prompt corrective action (+)		0.25 (12.2)	0.24 (12.2)					0.22 (14.7)		
Line of business restrictions (+)		-0.01 (0.6)	-0.02 (1.2)						-0.04 (3.6)	
Foreign ownership (-)		-0.24 (3.6)								-0.25 (3.7)
R-squared / DW	0.616 2.10	0.660 2.02	0.647 2.01	0.623 2.08	0.622 2.09	0.616 2.10	0.619 2.09	0.643 2.04	0.618 2.08	0.62 2.12

Sample: *Pool74*: 74 Countries; Quarterly data 1990Q1-2000Q4; Method: Pooled Least Squares

The estimated equation is $\Delta\ln(a_t-a_{t-1})=\alpha+\beta\ \Delta\ln(d_t-d_{t-1})+\Sigma_j\gamma_j\ \Delta\ln(d_t-d_{t-1})*z_j$. The "level effect" is the coefficient α.

The explanatory variables z_j are *Capindexpc*, *Officialpc*, *Privtepc*, *Entrypc*, *Promptpc*, *Restrictpc* and *Foreignown*. Expected sign shown in parenthesis in first column.

Table 2: *Sensitivity of lending to changes in deposits: 2SLS regressions*

Equation no:	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	2.10
Level effect	1.04 (44.8)	0.95 (22.8)	0.91 (26.2)	0.98 (36.2)	1.03 (38.6)	1.00 (41.3)	1.02 (41.2)	0.96 (29.7)	1.02 (42.0)	1.09 (34.4)
Capital rules (-)		-0.03 (1.2)	-0.04 (1.5)	-0.08 (3.5)						
Official regulatory powers (-)		-0.08 (2.6)	-0.08 (3.0)		0.01 (0.3)					
Private monitoring (+)		0.10 (4.5)	0.09 (4.9)			0.08 (4.5)				
Entry standards (+)		0.04 (1.6)	0.03 (1.3)				0.02 (1.0)			
Prompt corrective action (+)		0.12 (2.9)	0.13 (3.5)					0.09 (3.0)		
Line of business restrictions (+)		0.07 (2.6)	0.08 (3.1)						0.03 (1.1)	
Foreign ownership (-)		-0.09 (0.7)								-0.23 (2.1)
R-squared / DW	0.455 2.06	0.496 2.05	0.466 2.05	0.438 2.10	0.435 2.12	0.440 2.13	0.435 2.12	0.437 2.09	0.436 2.12	0.463 2.12

Sample: *Pool71*: 71 Countries; Quarterly data 1990Q1-2000Q4; Method: Pooled Least Squares;
The estimated equation is as in Table 1, except that $\Delta\ln(d_t-d_{t-1})$ is replaced with its predicted value from a regression of $\Delta\ln(d_t-d_{t-1})$ on four lags of $\Delta\ln(a_t-a_{t-1})$; $\Delta\ln(d_t-d_{t-1})$ and $\Delta\ln(f_t-f_{t-1})$ and the values of *Capindex*, *Entrytest*, *Officindex*, *Privtindex*, *Restrict* and *Prompt*.
The explanatory variables z_j are *Capindexpc*, *Officialpc*, *Privtepc*, *Entrypc*, *Promptpc*, *Restrictpc* and *Foreignown*. Expected sign shown in parenthesis in first column.

Table 3: *Sensitivity of lending to previous changes in capital: OLS regressions*

Equation no:	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	3.10
Level effect	0.59 (24.0)	0.53 (12.2)	0.40 (15.0)	0.53 (21.1)	0.55 (22.1)	0.55 (23.0)	0.58 (23.4)	0.46 (17.4)	0.59 (23.8)	0.76 (21.6)
Capital rules (-)		-0.05 (1.7)	-0.08 (2.8)	-0.18 (6.4)						
Official regulatory powers (-)		-0.04 (1.1)	-0.09 (2.7)		0.12 (4.9)					
Private monitoring (+)		0.10 (4.2)	0.14 (6.5)			0.13 (6.1)				
Entry standards (+)		0.02 (0.8)	0.01 (0.3)				0.01 (0.6)			
Prompt corrective action (+)		0.28 (6.3)	0.31 (7.6)					0.29 (9.3)		
Line of business restrictions (+)		0.10 (3.3)	0.10 (3.9)						0.00 (0.0)	
Foreign ownership (-)		-0.47 (3.3)								-0.66 (5.8)
AR(1)	0.35 (17.5)	0.28 (12.8)	0.28 (13.3)	0.33 (16.7)	0.34 (17.3)	0.32 (15.8)	0.35 (17.5)	0.32 (16.1)	0.35 (17.5)	0.34 (16.0)
R-squared / DW	0.434 2.17	0.492 2.13	0.470 2.12	0.444 2.17	0.440 2.19	0.443 2.14	0.434 2.17	0.456 2.18	0.434 2.17	0.465 2.17

Sample: *Pool71*: 71 Countries; Quarterly data 1990Q1-2000Q4; Method: Autoregressive Pooled Least Squares (Eviews);
The estimated equation is $\Delta\ln(a_t-a_{t-1})=\alpha+\beta\,\Sigma_{k=1,4}\,\Delta\ln(c_{t-k}-c_{t-k-1})/\,a_{t-k}+\Sigma_j\gamma_j\,\{\Sigma_{k=1,4}\,\Delta\ln(c_{t-k}-c_{t-k-1})/\,a_{t-k}\}*z_j$. The "level effect" is the coefficient α.
The explanatory variables z_j are *Capindexpc*, *Officialpc*, *Privtepc*, *Entrypc*, *Promptpc*, *Restrictpc* and *Foreignown*. Expected sign shown in parenthesis in first column.

Table 4: *Response of bank foreign borrowing to deposit changes: OLS regressions*

Equation no:	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	4.10
Level effect	-0.11 (14.7)	-0.15 (11.7)	-0.03 (1.4)	-0.15 (19.6)	-0.13 (16.7)	-0.11 (15.3)	-0.11 (15.0)	-0.19 (20.4)	0.11 (14.8)	-0.05 (4.8)
Capital rules (-)		-0.07 (7.4)	-0.04 (2.8)	-0.12 (14.5)						
Official regulatory powers (-)		-0.02 (2.1)	-0.01 (0.8)		0.05 (7.9)					
Private monitoring (+)		0.03 (3.8)	0.04 (3.2)			0.04 (6.8)				
Entry standards (+)		0.04 (5.6)	-0.01 (0.5)				0.03 (5.1)			
Prompt corrective action (+)		0.10 (7.7)	0.03 (1.3)					0.13 (13.8)		
Line of business restrictions (+)		-0.04 (3.8)	-0.04 (2.8)						-0.06 (8.3)	
Foreign ownership (-)		-0.26 (5.5)								-0.33 (7.6)
R-squared / DW	0.073 1.87	0.21 1.90	0.022 2.08	0.138 1.90	0.093 1.88	0.088 1.92	0.081 1.88	0.132 1.87	0.095 1.85	0.097 1.90

Sample: *Pool71*: 71 Countries; Quarterly data 1990Q1-2000Q4; Method: Pooled Least Squares;
The estimated equation is $\Delta\ln(f_t-f_{t-1})/(a_t+b_t) = \alpha+\beta\ \Delta\ln(d_t-d_{t-1})+\Sigma_j \gamma_j\ \Delta\ln(d_t-d_{t-1})*z_j$. The "level effect" is the coefficient α.
The explanatory variables z_j are *Capindexpc*, *Officialpc*, *Privtepc*, *Entrypc*, *Promptpc*, *Restrictpc* and *Foreignown*. Expected sign shown in parenthesis in first column.

Table 5: *Response of bank foreign borrowing to deposit changes: 2SLS regressions*

Equation no:	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	5.10
Level effect	0.01 (0.7)	0.01 (0.3)	-0.03 (1.4)	-0.03 (1.9)	-0.06 (0.4)	-0.01 (0.6)	0.01 (1.0)	-0.03 (1.8)	0.02 (1.8)	0.01 (0.6)
Capital rules (-)		-0.03 (2.1)	-0.04 (2.8)	-0.07 (5.1)						
Official regulatory powers (-)		-0.00 (0.1)	-0.01 (0.8)		0.03 (2.2)					
Private monitoring (+)		0.03 (2.2)	0.04 (3.2)			0.05 (5.2)				
Entry standards (+)		-0.00 (0.2)	-0.01 (0.5)				-0.02 (1.2)			
Prompt corrective action (+)		0.03 (1.2)	0.03 (1.3)					0.06 (3.4)		
Line of business restrictions (+)		-0.04 (2.2)	-0.04 (2.8)						-0.07 (4.9)	
Foreign ownership (-)		-0.14 (1.8)								-0.01 (2.9)
R-squared / DW	0.000 2.02	0.02 2.09	0.022 2.08	0.011 2.04	0.002 2.08	0.011 2.04	0.001 2.02	0.005 2.03	0.010 2.05	0.004 2.03

Sample: *Pool71*: 71 Countries; Quarterly data 1990Q1-2000Q4; Method: Pooled Least Squares;
The estimated equation is as in Table 4, except that $\Delta\ln(d_t-d_{t-1})$ is replaced with its predicted value from a regression of $\Delta\ln(d_t-d_{t-1})$ on four lags of $\Delta\ln(a_t-a_{t-1})$; $\Delta\ln(d_t-d_{t-1})$ and $\Delta\ln(f_t-f_{t-1})$ and the values of *Capindex*, *Entrytest*, *Officindex*, *Privtindex*, *Restrict* and *Prompt*.

Data Annex:

A. Consolidating the IFS Monetary Survey

Here is a listing and grouping of the elements of the aggregate balance sheet of deposit money banks as reported in International Financial Statistics, together with their identifying codes

Bank assets

Reserves	
20+20c+20d+20n+20r	Reserves
Foreign assets	
21	Foreign Assets
Domestic credit:	
22a+22an	Claims on Central Govt
22b+22bx	Claims on State & Local Government
22c	Claims on Public Enterprises[9]
22d	Claims on Private Sector
22f	Claims on Nonmonetary FIs
22g	Claims on Other FIs

Bank liabilities

Deposits	
24+24x	Demand Deposits
25+25.a+25a+25aa+ 25b+25bb+ 25e+25l+26dg	Time Deposits etc.[10]
Money market liabilities	
26a+26aa+26m	Money market instruments
Bonds	
26b+26ab+26n	Bonds
Foreign liabilities	
26c+26cl	Foreign Liabilities
Government deposits	
26d+26e+26f	Government Deposits
Borrowing from monetary authority	
26g	Credit from Monetary Authority
Borrowing from OFIs	
26i+26j	Credit from Other Financial Institutions
Capital	
27a	Capital Accounts
Other items	
27r	Other Items (net)

[9] Also 22ca; 22cb; 22cg.

[10] But not 25b for Russia, because of double-counting.

The six aggregates used in the statistical analysis of Section III consolidate these items as follows (using the italicized headings of the above table:

a = *Domestic credit* less *government deposits* ("*A*dvances")
b = *Reserves* less *borrowing from monetary authority* ("*B*ills")
c = *Capital*
d = *Deposits* plus *money market liabilities* plus *borrowing from OFIs* ("*D*eposits")
e = *Other items* plus *bonds* ("Net Other Liabilities")
f = *Foreign liabilities* less *foreign assets* ("Net *F*oreign Liabilities")

Then the balance sheet identity is: $a+b=c+d+e+f$.

B. The Banking Quality Variables

These variables are drawn from Barth, Caprio and Levine (2001a). They are briefly summarized here:

Capital rules: this is the variable "Capital regulatory index" in BCL. It is the sum of two separate indices, one measuring whether there are explicit regulatory requirements regarding the amount of capital that a bank must have relative to various guidelines; the other measuring whether the source of funds counted as regulatory capital include assets other than cash or government securities and borrowed funds as well as whether the sources are verified by the regulatory or supervisory authorities.

Official regulatory powers: Whether the supervisory authorities have the authority to take specific actions to prevent and correct problems along 16 different dimensions.

Private monitoring: Sum of the responses to the following: is a certified audit of banks required; fraction of the top 10 banks that are rated by international rating agencies; is reliable accounting disclosure required and is there director liability for this; absence of explicit deposit insurance scheme.

Entry Standards: ("Entry into Banking Requirements"): whether there are specific legal submissions required to obtain a license to operate as a bank.

Prompt Corrective Action: whether a law establishes pre-determined levels of bank solvency deterioration which forces automatic enforcement actions such as intervention.

Line of business restrictions: Combines whether a bank may own shares in a nonfinancial firm; whether a bank can conduct securities, insurance or real estate.

Foreign ownership: the fraction of the banking system's assets that are 50% or more foreign owned.

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