

# Financial crises and incomplete information

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## Abstract

This article presents a review of Giannetti's (2002a,b) models arguing that incomplete information may be more relevant than moral hazard in explaining banking crises and episodes of overlending. It argues that overlending problems are not necessarily due to investor moral hazard and guarantees on deposits. Instead, guarantees on deposits may even limit the losses accumulated by the banking system. In fact, if international investors have incomplete information on the average quality of the investment opportunities available in a country and firms are financed by a main bank, a soft budget constraint distortion arises, because of capital inflows. The model shows that in equilibrium international investors rationally do not require any risk premium until a substantial amount of losses has been accumulated, even if there are no guarantees on deposits. Bond market development, by increasing the number of lenders, can eliminate the soft budget constraint distortion and prevent banking crises.

## 1. Introduction

Financial crises are generally thought to be caused either by liquidity problems, due to coordination problems among depositors, or by moral hazard. According to a strand of the literature (Radelet and Sachs (1998)), banks would fund profitable but illiquid projects: if agents panic and withdraw their deposits before the projects are completed, banks default. In contrast, according to the theories based on moral hazard (McKinnon and Pill (1996), Krugman (1998), Corsetti et al (1999)), banks fund insolvent projects because of corruption, looting and connected lending. International investors, who generally channel their funds through the local banks, would not exert any discipline by not making deposits in insolvent banks, because they expect the value of their deposits to be guaranteed by the government.

Unfortunately, none of these explanations consider the specific nature of financial markets and bank-firm relationships in emerging economies. Moreover, a maintained assumption of both classes of models is that international investors have complete information on the growth prospects and the banking system of the economies where they invest. In particular, it is commonly assumed that they can observe the quality of the projects banks fund.

In fact, these assumptions are rarely satisfied. Investors are uncertain about the origins of growth of an economy that may grow because of excessive investment in low productivity projects as well as the availability of good investment opportunities. Since also for economists it is an arduous task to measure total factor productivity and the determinants of growth, it is sensible to assume that also international investors are imperfectly informed about the determinants of growth in a country and ultimately about the aggregate productivity of the projects funded by the banking system.

At the microeconomic level, the pervasive lack of transparency of financial systems based on close bank-firm relationships suggests that it is more realistic to assume that international investors who make deposits in domestic banks, and to a large extent also domestic depositors, are imperfectly informed about the solvency of individual banks in a country.

In a series of papers, Giannetti (2002a,b) has taken seriously the implications of investors' incomplete information to analyse the determinants and the dynamics of financial crises. In her models, capital

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inflows are demand-determined and international investors channel their funds through local banks and have incomplete information about the quality of projects funded by the bank where they have made deposits. They have prior beliefs about the probability that some banks are insolvent and renewing bad loans, instead of declaring default. In the model, this can happen because of a soft budget constraint or outright looting. However, investors attribute a positive probability to the fact that the growth in bank loans is due to the availability of profitable projects.

In this setting, investors update their beliefs on the probability that banks will be able to repay deposits at the end of each period. The risk of not being able to withdraw the deposits remains low as long as banks have an incentive to renew loans to non-profitable projects, because deposits can be withdrawn at any moment and there are other investors willing to provide the bank with funds if the interest rate is high enough.

It is possible to show that banks have an incentive not to renew loans and to declare default only if the risk premium required by international investors is sufficiently high. In equilibrium, this happens only if the expected level of the aggregate losses accumulated by the banking system is large enough.

In this context, if investors are not perfectly informed, it is possible to explain overlending without moral hazard. Moreover, it is straightforward to explain contagion. Since investors cannot distinguish across banks they can suddenly demand a high risk premium also from banks that are perfectly solvent, but illiquid. The increase in the interest rate burden may also drive illiquid banks into insolvency and cause widespread banking crises.

Some characteristics of the financial system are key for explaining the propensity to banking crises of emerging economies. Obviously, in this context, banking crises and problems of excessive lending would not arise if the banking system were transparent: investors would not make deposits in insolvent banks. Moreover, they could distinguish between insolvent and illiquid banks and this would make it possible to avoid contagion. On the other hand, the dearth of funds to intermediate, due to limited domestic saving before the liberalisation of capital inflows, puts a constraint on credit expansion and ensures a precarious financial stability. After the liberalisation of capital inflows, instead, international investors can provide any amount of funds the banking system demands, as long as they receive the same expected return they would have on similar international assets. Consequently banks have the possibility to fund and renew any amount of loans they wish.

Most importantly, it is possible to show that close bank-firm relationships, with a main bank providing the bulk of funds for a project, are at the origin of banks' incentives to renew loans to projects that are unprofitable. Therefore, banking crises are expected to be less likely in financial systems where firms have a multiplicity of lenders.

In what follows, I describe a few situations of financial crises in emerging markets that can be easily explained by the nature of bank-firm relationships and the lack of transparency. I refer the reader to Giannetti (2002a,b) for details on the models. The concluding section elaborates some policy implications based on the theoretical analysis mentioned above.

## **2. Stylised facts**

Several regularities observed in a number of banking crises suggest the importance of underdeveloped financial markets, incomplete information and the lack of a variety of lenders in explaining financial instability. In what follows, I analyse the experiences of Chile in 1982, the Nordic countries (Finland and Sweden) in 1991-92, and East Asian economies in 1997 to evidence these common features.

### **2.1 Main banks**

The absence of a variety of financial markets and the shortage of lenders are common features of emerging markets. Corporations are highly dependent on borrowing from financial institutions and, as is common in countries with bank-based financial systems, rely heavily on debt financing. This aspect is very important for the financial stability of the banking system, as the solvability of highly indebted lenders is easily undermined by changes in the cost of funds and a reversal in capital flows. Furthermore, there are close relationships between banks and firms and loan exposures are highly

concentrated. This in turn provides incentives also to renew loans to insolvent projects, if the availability of funds allows increasing credit. Although not efficient, the financial system appears stable before the liberalisation of capital movements. Most importantly, in banking systems based on close bank-firm relationships less information is generally available to outside investors.

The empirical evidence corroborates the assumptions of the model on bank-firm relationships.

For instance, in Chile before the 1982 crisis, the grupos (large financial and manufacturing conglomerates) were highly dependent on bank loans and very often the financing bank itself belonged to the conglomerates (Velasco (1991)). Dependence on bank loans was high in Nordic countries as well. In 1980, the debt/equity ratios were about 3 and 4 in Finland and Sweden, respectively, compared to less than 1/5 in the United Kingdom and 1/4 in the United States. Moreover, most commercial banks had highly concentrated loan exposures, mostly to connected non-financial corporations. Relationship banking was also dominant in East Asian economies. In South Korea, for instance, bank loans were the main source of credit and there was a particular form of bank-enterprise relationship that linked each large business group, the chaebol, to a main bank, the so-called principal transactions bank (Nam (1996)). Amazingly, just a few years ago, these relationship-based financial systems were extolled for allowing financiers to take a longer view on investment and they were credited with the remarkably good economic performance of the East Asian economies (Rajan and Zingales (1998)). Their weaknesses became clear in 1997.

## **2.2 Large availability of funds**

Banking crises follow the lifting of restrictions on capital movements, which allows banks to acquire funds abroad. These new funding opportunities, made possible by large capital inflows, permit greater credit expansion than domestic retail deposits. As a consequence, non-profitable projects are financed. As the first signs of banks' fragility become evident, capital inflows revert and the banking crisis begins. Although the financial systems of the economies that experience financial crises seemed relatively stable when capital inflows were restricted, the lifting of these restrictions coincides with the beginning of a lending boom, backed by an accumulation of foreign liabilities by domestic banks and apparently irrational lending policies. This is due to the fact that, when capital inflows are restricted, the amount of domestic savings imposes a cap on the amount of loans the banking system can extend. This dearth of funds gives banks an incentive to be more selective and a credible commitment not to provide working capital to insolvent projects, just to postpone the official recognition of the losses. The large availability of funds before the banking crisis is also a well-documented empirical fact. The 1982 Chilean crisis followed the financial liberalisation of the late 1970s and was preceded by massive capital inflows mainly in the form of short-term bank liabilities (see Table 1 for the data). The expansion of bank liabilities had as a counterpart an increase in bank loans that may have in fact acted as a pull factor for capital inflows. As Velasco (1991) notes in analysing the origins of the crisis:

“Perhaps, the single most important factor behind the growth of domestic indebtedness was the rolling over of credits and the capitalization of interest...Furthermore, the line between a performing and a nonperforming asset becomes fuzzy when rollovers and capitalization of interest are widely used to keep many problem loans on the books.”

By 1982, this provoked a massive increase in non-performing assets and loan defaults that required government interventions. Due to the rapid expansion of net domestic credit to rescue financial institutions, the fixed exchange rate collapsed in June 1982. The events surrounding the 1994 crisis in Mexico were very similar; the crisis was preceded by a credit boom and a large increase in non-performing loans, as noted by Edwards and Végh (1997).

The origin of the banking and balance of payments crises in the Nordic countries also seems to rely on the accumulation of losses by the banking system; here, the lifting of restrictions on capital movements in the 1980s allowed banks to obtain funds abroad to finance their rapid credit expansion. As a consequence, the ratio of bank loans to nominal GDP increased to 90% in 1990 from 55% in 1984 in Finland, while it increased to 58% from 41% in Sweden. Banks' difficulties became evident in 1991, when several banks were bailed out by the government and the central bank had to provide liquidity.

The balance of payments crisis hit these economies the following year in conjunction with the EMS crisis.<sup>2</sup>

The experiences of Korea, Thailand and Indonesia during the 1997 Asian turmoil are the most recent examples of crises driven by an accumulation of bank losses. Consider once again South Korea. In the years preceding the 1997 crisis but following the opening of the financial markets in the second half of the 1980s, South Korea also experienced a pronounced increase in external borrowing by domestic banks, which in turn lent these funds to the private sector. The data in Table 2 show large growth rates of lending to the private sector, which averaged almost 17% annually in the 1990s; this is well in excess of the average growth rate of per capita GDP, which was about 7% annually. As a result, at the end of 1996 the ratio of short-term external liabilities of BIS reporting banks to foreign reserves was 213%. The structural weaknesses of the Korean banking system became increasingly apparent during 1997. In particular, the large exposures of banks to the highly leveraged conglomerates and the huge amount of impaired loans became evident when six chaebols failed. Moreover, investors discovered that the average debt/equity ratio of the top 30 conglomerates was over 500% and that most of the loans were in effect without collateral, since group firms used cross-payment guarantees to facilitate borrowing. In order to increase the confidence of international financial markets, the government announced guarantees on the foreign liabilities of Korean financial institutions. The Bank of Korea provided liquidity and, in December, it was forced to allow the won to float freely. Investors and lenders panicked when they learned that the country's short-term external debt was approximately \$104 billion (rather than the \$66 billion originally reported) and that usable reserves were lower than expected. As a consequence, the Korean banks' short-term external liabilities fell dramatically, because of capital outflows, and the currency depreciated by 39%.

The sequences of events were similar in Thailand and Indonesia, which also experienced lending booms fuelled by capital inflows in the years preceding the crises, as is evident from Tables 2 and 3.

In all these episodes banks appear to have renewed their loans to insolvent firms. Why are there incentives for banks to overlend after the liberalisation of financial markets? Giannetti (2002a,b) argues that the lifting of restrictions on capital movements causes a soft budget constraint problem because a massive amount of capital becomes available at low cost in the early phase of the financial liberalisation. The Ponzi scheme only ends when the cost of funds rises because of the incipient crisis.

### **2.3 Incomplete information and contagion**

Financial systems dominated by banks are generally more illiquid and opaque. As a consequence, their solvency is easily undermined by variations in the cost of funds.

In fact, close bank-firm relationships are not necessarily bad: many banks may fund illiquid projects that are profitable and solve problems of temporary illiquidity for projects that other financiers would not fund because of imperfect information. However, because of the very nature of these bank-firm relationships, investors are not able to distinguish banks that are funding unprofitable projects from banks that are helping firms to solve liquidity problems. Therefore, when expectations on the losses accumulated by the banking system worsen, international investors demand a higher interest rate on their deposits with all the banks of a country: the increase in the interest rate burden may provoke a banking crisis, although many banks may have been only illiquid *ex ante*. Moreover, the increase in the cost of funds and the crisis may also involve countries that for some reason are considered "similar" by international investors, because, for instance, they belong to the same geographical area.

The experience of Malaysia in 1997 provides a striking example of this vulnerability of relationship banking to external variations in the cost of funds. In comparison to the other East Asian economies, the situation of Malaysia was different because its banking system was relatively strong in 1997, before the onset of the crisis (IMF (1998)). In fact, following the banking crisis of 1985-88, the asset quality of the Malaysian banking system had improved substantially. The ratio of non-performing loans to total lending fell from a peak of 35% in 1987 to 3.6% by mid-1997 (even though banks' total lending to the private sector had increased in Malaysia as well). However, at the onset of the crisis, investors did not appear to notice these differences: the cost of external funds increased, and banks and finance

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<sup>2</sup> The Nordic countries did not belong formally to the EMS, but had their currencies pegged to the ecu.

companies experienced a significant deterioration in asset quality. The main source of vulnerability was the high leverage of the economy: the ratio of banks' claims on the private sector to GDP was over 140% in 1996. The Malaysian authorities responded by injecting liquidity into the banking system in order to keep interest rates low regardless of the negative impact on the currency. The consequences of the crisis in Malaysia were almost indistinguishable from those in South Korea.

The experience of Malaysia suggests that an illiquid and highly leveraged banking system may be an important channel of contagion, even if the banking system is not insolvent.

A very similar mechanism may explain Argentina's experience during the Tequila crisis. On the eve of the introduction of the Convertibility Plan in 1991, financial intermediation in Argentina had reached its lowest point. With the advent of macroeconomic stabilisation, though, the banking industry registered significant productivity improvements and credit to the private sector rose. This process was interrupted by the devaluation of the Mexican peso in December 1994, which led to a sharp increase in the perceived risk of bank liabilities. As a consequence, the interest rate on commercial banks' 30-day deposits jumped and deposits fell (Edwards (1998)). Since Argentina had a currency board, which did not allow the central bank to provide liquidity or bail out the banking system, the increase in the interest rate on deposits may be attributed either to an increase in the perceived probability of bank defaults or to the currency board's imperfect credibility. In either case, the run on deposits and the increase in the cost of funds provoked widespread bankruptcies, bank failures and a deep recession.

Giannetti (2002b) shows formally the mechanism through which illiquid banks are driven into insolvency when the cost of funds rises because international investors have incomplete information on the quality of the banks' assets.

## **2.4 Summary**

A common element of the aforementioned episodes is the centrality of the banking system in the development of the crises. In a few cases, such as Chile and Korea, the crises seem to have been unavoidable outcomes of the banks' insolvency. On the other hand, Malaysia was probably driven into insolvency by an increase in the interest rate burden, which resulted from a loss of confidence in East Asian economies. However, the crisis was made possible by the high indebtedness of the economy and the illiquidity of its banking system.

Moreover, in all cases, financial liberalisation was followed by massive capital inflows and a rapid increase in bank lending. What is striking is that the financial systems appeared stable before the financial liberalisation. Why did capital inflows undermine financial stability? What is specific to the financial systems of these economies? I suggest that if there is shortage of lenders and the source of funds is one main bank, a soft budget constraint problem may arise when an economy is opened to capital inflows. Consequently, insolvent projects may be financed, driving an accumulation of losses by the banking system. Moreover, if international investors have incomplete information about the solvency of a country's banking system and if they attribute a positive probability to banks' default in countries that are only illiquid, then an increase in the interest rate burden may drive banks into insolvency, even if they would have been able to recover their loans in the long run.

## **3. Some policy implications**

The previous section has described how several recent episodes of banking crises can be associated with financial underdevelopment, close bank-firm relationships and a lack of transparency. Under these conditions, it is possible to show that excessive lending to non-profitable projects and sudden stops of capital inflows emerge in equilibrium. This section discusses different institutional arrangements that can improve financial stability.

The imposition of capital controls can, of course, reduce the incentives for banks to renew loans also to projects that are not profitable, since it provides a credible commitment not to expand credit. However, capital controls also impede banks' funding of new investment opportunities that may arise in an economy and, for this reason, may not be the most desirable solution.

Guarantees on deposits are totally irrelevant to improvement of financial instability, if problems of coordination among investors can be reduced through bankruptcy laws or by international institutions. In Giannetti's models, in which the existence of coordination problems among investors is ruled out for simplicity, financial crises may emerge both with and without guarantees on deposits. Guarantees on deposits can only affect the timing of the crisis.

In contrast, financial market development can reduce dramatically the propensity to financial crisis: of course, an improvement in transparency, such as better accounting practices and more stringent disclosure requirements, would eliminate the problems arising from incomplete information, which are supposedly at the origin of banking crises. However, this may be difficult to achieve as very fine information must be provided in order to enable investors to distinguish between illiquid and insolvent banks.

It may be relatively easier to influence the structure of bank-firm relationships: if a firm has a multiplicity of lenders, either banks or bondholders, the incentive to renew loans to projects that turn out to be insolvent disappears. Therefore, the possibility of excess lending and of sudden stops is eliminated if the banking system becomes more competitive and firms no longer have a main bank providing most of the credit. Most importantly, if bond markets become more important, firms acquire many more lenders, who have no incentive to continue to provide working capital if the firm cannot repay previous loans. This provides a theoretical foundation and illustrates a mechanism that supports an often advocated policy tenet: a country should have appropriate financial structures in place before removing capital controls.

## Tables

Table 1  
Chile, 1982

	1975	1976	1977	1978	1979	1980	1981	1982
Outstanding short-term liabilities (as a percentage of GDP)	12.1	9.2	10.1	13.5	16.4	21.9	30.3	48.9
Loans of banking system to private sector (as a percentage of GDP)	6.4	8.9	14.8	20.3	28.2	40.2	54.9	61.7

Source: Velasco (1991).

Table 2  
**Lending boom in East Asian economies**  
Rate of growth of bank lending to the private sector

	1991	1992	1993	1994	1995	1996
Korea	20.78	12.55	12.94	20.08	15.45	20.01
Indonesia	17.82	12.29	25.48	22.97	22.57	21.45
Thailand	20.45	20.52	24.03	30.26	23.76	14.63
Malaysia	20.58	10.79	10.80	16.04	30.65	20.24

Source: Corsetti et al (1998).

Table 3  
**Financial fragility of East Asian economies**  
Short-term liabilities towards BIS banks  
as a percentage of foreign reserves, end-1996

Korea	Indonesia	Thailand	Malaysia
213	181	169	47

Source: Corsetti et al (1998).

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