

Financial Structure and Financial Crisis

FRANKLIN ALLEN

Wharton School, University of Pennsylvania

I. INTRODUCTION

For many years the economies of South East Asia were regarded as models for economic development. The four tigers, Hong Kong, South Korea, Singapore and Taiwan, grew from low levels of income per head to among the highest in the world in a few decades. The newly industrializing economies of Indonesia, Malaysia and Thailand had also started to grow at an extremely rapid rate. The Philippines had performed better in recent years. The success of these economies was documented in a 1993 World Bank report entitled *The East Asian Miracle*.

Unfortunately, in the latter half of 1997, with the exception of Taiwan, financial crises struck these economies. Asset prices and exchange rates tumbled and the banking sectors were put under severe strain. The financial crises spilled over into the real economies and severe recessions occurred.

This experience raises two obvious questions.

- Why did the crises occur?
- What can be done to prevent them in future?

The conventional analysis of these issues focuses on the particular features of the countries in South East Asia (see, for example, McKinnon and Pill 1997, 1999; Corsetti *et al.* 1998a, b; Krugman 1998; Agénor *et al.* 1999). Factors that are often cited as being important causes are the following.

- Explicit and implicit government and International Monetary Fund guarantees of banks.
- Ineffective regulation of the banking system.
- Corruption and nepotism in the banking industry.
- A monopolistic market structure such as the *chaebols* in Korea.

The implication of this analysis is that to prevent future crises these factors should be reversed. In short, the financial structure of these economies should be made to resemble the financial structure of the US economy. This would involve the following.

- Effective regulation and improved transparency of the banking system.
- Development of financial markets so that the reliance on the banking system is reduced.

It will be argued below that the financial crises suffered by South East Asia were not due to the country-specific factors that are stressed in the conventional analysis. Section II points out that they are essentially similar to crises that have occurred, both historically and recently, in many other countries with very different financial structures. This suggests that the problem of financial crises is a more general one.

Section III develops a theory of financial crises. This has two important features: (a) creation of an asset price *bubble* through the interaction of an agency problem and a lax and uncertain monetary policy; (b) a *debt overhang* that causes a recession after the bubble has burst. This analysis leads to a different conclusion compared to the conventional one on the relationship between financial structure and financial crisis. The implications are developed in Section IV. It is argued that it is not the financial structure of the economy that is important but the avoidance of a lax and uncertain monetary policy so that asset price bubbles are avoided. Once a bubble has occurred and has burst then what is required is a recapitalization of the banking system to eliminate the debt overhang problem.

Section V considers the relationship between financial structure and growth. One of the most costly aspects of the financial crises in South East Asia has been the reduction in growth. It is argued that financial structure does matter for growth. For countries trying to develop an economy based on manufacturing in traditional industries a bank-based system has some advantages. For economies where the main industries are knowledge-based, equity and debt markets may have some advantages. Given the conclusion in the previous section that financial structure is not that important for preventing financial crises the aim of long-run growth does not need to be compromised.

Finally, Section VI contains concluding remarks.

II. A COMPARISON OF SOUTH EAST ASIAN AND OTHER CRISES

Contrary to conventional financial theory, financial systems that are subject to market forces seem prone to periodic financial crises. In determining whether crises are idiosyncratic events or systemic, it is helpful to start by considering their history. Financial crises like those in South East Asia often follow what appear to be bubbles in asset prices. Historic examples of this type of crisis are the Dutch Tulipmania in the seventeenth century, the South Sea bubble in England and the Mississippi bubble in France at the start of the eighteenth century and the Great Crash of 1929 in the United States.

Similar events occurred in Norway, Finland and Sweden in the 1980s (see Heiskanen 1993; Drees and Pazarbasioglu 1995). In Norway the ratio of bank loans to nominal GDP went from 40% in 1984 to 68% in 1988. Asset prices soared, while investment and consumption also increased significantly. The collapse in oil prices helped to burst the bubble and caused the most severe banking crisis and recession since the war. In Finland an expansionary budget in 1987 resulted in massive credit expansion. The ratio of bank loans to nominal

GDP increased from 55% in 1984 to 90% in 1990. Housing prices rose by a total of 68% in 1987 and 1988. In 1989 the central bank increased interest rates and imposed reserve requirements to moderate credit expansion. In 1990 and 1991 the economic situation was exacerbated by a fall in trade with the Soviet Union. Asset prices collapsed, banks had to be supported by the government and GDP shrank by 7%. In Sweden a steady credit expansion through the late 1980s led to a property boom. In the autumn of 1990 credit was tightened and interest rates rose. In 1991 a number of banks had severe difficulties because of lending based on inflated asset values. The government had to intervene and a severe recession followed. In addition to a banking crisis there was a currency crisis.

Most other OECD countries experienced similar episodes although they were less extreme than in Scandinavia. Higgins and Osler (1997) consider 18 OECD countries and document a significant rise in real estate and stock prices during the period 1984–9. These prices subsequently fell during the period 1989–93. Regression results indicate that a 10% increase in real residential real estate prices above the OECD average in 1984–9 is associated with an 8% steeper fall than average in 1989–93. Similarly, for equities a 10% increase above the average in the earlier period is associated with a 5% steeper fall in the later period. Higgins and Osler interpret this as suggestive of the existence of bubbles. Investment and real activity were also sharply curtailed during the latter period.

Mexico provides a dramatic illustration of an emerging economy affected by this type of problem. In the early 1990s the banks were privatized and a financial liberalization occurred. Perhaps most significantly, reserve requirements were eliminated. Mishkin (1997) documents how bank credit to private non-financial enterprises went from a level of around 10% of GDP in the late 1980s to 40% of GDP in 1994. The stock market rose significantly during the early 1990s. In 1994 the Colosio assassination and the uprising in Chiapas triggered the collapse of the bubble. The prices of stocks and other assets fell and banking and foreign exchange crises occurred. These were followed by a severe recession.

Kaminsky and Reinhart (1996, 1999) study a wide range of crises in 20 countries, including five industrial and 15 emerging ones. A common precursor to most of the crises considered was financial liberalization and significant credit expansion. These were followed by an average rise in the price of stocks of about 40% per year above that occurring in normal times. The prices of real estate and other assets also increased significantly. At some point the bubble bursts and the stock and real estate markets collapse. In many cases banks and other intermediaries were overexposed to the equity and real estate markets and about a year later on average a banking crisis ensues. This is often accompanied by an exchange rate crisis as governments choose between lowering interest rates to ease the banking crisis or raising interest rates to defend the currency. Finally, a significant fall in output occurs and the recession lasts for an average of about a year and a half.

In a study of the relationship between financial liberalization and financial fragility, Demirguc-Kunt and Detragiache (1998) study 53 countries during the period 1980–95. They find that financial liberalization increases the probability

Table 1 Percentage Growth in Bank Lending to the Private Sector

Country	1991	1992	1993	1994	1995	1996	1997
Hong Kong	N/A	10	20	20	11	16	20
Indonesia	18	12	25	23	23	21	46
Malaysia	21	11	11	16	31	26	30
Philippines	7	25	41	26	45	49	29
Singapore	12	10	15	15	20	16	13
South Korea	21	13	13	20	15	20	22
Thailand	20	21	24	30	24	15	20

N/A: not available.

Based on Table 18 of Corsetti *et al.* (1998a).

of a banking crisis. However, a stronger institutional environment, in the sense of factors such as respect for the rule of law, a low level of corruption and good contract enforcement, reduces this effect. They also found that domestic credit growth precedes financial crises.

The economies in South East Asia underwent a similar experience to those recounted above. Table 1 shows the percentage increase in banking lending to the private sector in each country that experienced a crisis. It can be seen that the increase in lending was significant in all countries. The effect on stock market and property prices is shown in Tables 2 and 3, respectively. Stock prices or property prices or both rose significantly and then collapsed in 1997.

The evidence presented in this section shows that similar financial crises to those in South East Asia have occurred repeatedly in a wide range of different circumstances. Many occur in the absence of government guarantees, when banking regulation was not lax, when corruption and nepotism were absent and when there was a competitive industrial market structure. For example, the USA in the late 1920s and early 1930s witnessed a dramatic rise in asset prices and a subsequent banking crisis when no government guarantees to banks existed; similarly for many crises in the USA in the late nineteenth century. The financial systems of Norway, Finland and Sweden are significantly different from those of the South East Asian countries. Corruption and nepotism are not a problem; nor

Table 2 Stock Market Price Indexes

Country	1991	1992	1993	1994	1995	1996	1997
Hong Kong	4,297	5,512	11,888	8,191	10,073	13,451	10,722
Indonesia	247	274	588	469	513	637	401
Malaysia	556	643	1,275	971	995	1,237	594
Philippines	1,151	1,256	3,196	2,785	2,594	3,170	1,869
Singapore	1,490	1,524	2,425	2,239	2,266	2,216	1,529
South Korea	610	678	866	1,027	882	651	376
Thailand	711	893	1,682	1,360	1,280	831	372

Based on Table 10 of Corsetti *et al.* (1998a).

Table 3 Property Market Price Indexes

Country	1991	1992	1993	1994	1995	1996	1997
Hong Kong	453	554	1,392	862	1,070	1,682	941
Indonesia	119	66	214	140	112	143	40
Malaysia	113	126	369	240	199	294	64
Philippines	34	39	81	80	87	119	59
Singapore	280	250	541	548	614	648	357
South Korea	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Thailand	82	168	367	232	192	99	7

N/A: not available.

Based on Table 11 of Corsetti *et al.* (1998a).

is lax banking regulation. All this suggests that the financial crises in South East Asia were caused by a market failure arising from an agency problem rather than particular features of their economies.

III. A THEORY OF CRISES

The financial crises described in the previous section typically have three distinct phases. The first phase starts with financial liberalization, or with a conscious decision by the central bank to increase lending, or with some other similar event. The resulting expansion in credit is accompanied by an increase in the prices of assets such as real estate and publicly traded stocks. This rise in prices continues for some time, possibly several years, as the bubble inflates. During the second phase the bubble bursts and asset prices collapse, often in a short period of time, such as a few days or months, but sometimes over a longer period. The third phase is characterized by the default of many firms and other agents that have borrowed to buy assets at inflated prices. Banking and/or foreign exchange crises may follow this wave of defaults. The difficulties associated with the defaults and banking and foreign exchange crises often cause problems in the real sector of the economy which can last for a number of years.

How can this sequence of events be understood? Standard theories of asset pricing assume that investors purchase assets with their own wealth. In most financial systems, this is not the whole story. Intermediation is important. Many of the agents actually making the decision to buy real estate, stocks and other assets do so with other people's money. The purchase of real estate is usually financed by a bank loan or in some other similar way. If the investment is successful, the borrower repays the loan and retains the difference between the value of the asset and the principal and interest. If the investment is unsuccessful, the borrower has limited liability and the lender bears the shortfall.

It is important to note that agency problems are not restricted to bank-based economies. Market-based financial systems also suffer from the same problem. In the USA and UK a large proportion of stocks are held by mutual funds, pension

funds and insurance companies. Money managers also have incentives to take risk. If their investment strategy is successful, they may be rewarded by a share of the returns, but most importantly they will attract new investors in the future. Because they receive management fees in proportion to the assets under their control, they will be significantly better off as a result of their good performance. If the investment strategy is unsuccessful, there is a limit to the downside risk that the manager bears. In the worst case, he will be fired but in any case his liability is limited. Thus, when intermediaries make investment decisions, the incentive scheme they face has convex payoffs (see Allen and Gorton 1993).

The agency problem of excessive risk taking associated with limited liability is crucial for the analysis presented below. In the corporate finance literature it has been widely assumed since Jensen and Meckling (1976) that the incentives for risk taking arising from debt finance are significant. As an example of this type of problem in the context of intermediation, there is considerable evidence that risk shifting was a significant factor in the US S&L crisis (see, for example, Benston et al. 1986).

Allen and Gale (2000a) develop a model containing this kind of agency problem. The Appendix contains a numerical example to illustrate the phenomenon. For simplicity, investments are assumed to be debt financed. The borrower chooses the type of investments (safe or risky) and the lender is unable to observe how the funds are invested. As in Jensen and Meckling (1976) and Stiglitz and Weiss (1981), these assumptions imply there is a risk shifting problem. By buying risky assets, the borrower can shift downside risk on to the lender, but retains the right to any upside returns. The more risky the asset, the more attractive risk shifting becomes. When a significant proportion of investors in the market have these incentives, the equilibrium asset price will be high relative to the 'fundamental' value of the asset, which is defined as the price that somebody would be willing to pay if she was investing her own wealth. The difference between the equilibrium price and the fundamental value is the 'bubble'. Two factors are particularly important in determining the size of the bubble. One is the amount of credit that is available to finance speculative investment. The other is the degree of uncertainty in the market. The greater is either of these factors, the greater is the bubble.

The relationship between credit and asset prices is relatively straightforward to see in real estate markets. An expansion of credit reduces the interest rate at which investors can borrow and this in turn increases the prices they are willing to pay. In stock markets, the relationship is more subtle. Margin restrictions imply that only a proportion of the total investment can be financed with borrowed funds. However, if credit expands, investors may be willing to borrow a greater amount against the houses, cars and other assets they buy and put more money into intermediaries such as mutual funds. As explained above, the incentives that money managers face are similar to those that would be created if the money were directly borrowed and, again, asset prices will be bid up as a result.

The relationship between credit and asset prices becomes even more complex in a dynamic context. In deciding how much he should pay for an asset today, an

investor will consider the future price of the asset and the possibility of capital gains. The future price will depend in part on the level of credit that is anticipated in future periods. If an expansion of credit is anticipated, asset prices are likely to rise and this expectation will feed back into current prices. Thus, it is not only current credit expansion but anticipated future expansion that feeds the bubble in asset prices.

There is another aspect of future credit expansion that has a direct impact on current asset prices. It is unlikely that the future level of credit can be perfectly anticipated. There may in fact be a great deal of uncertainty about future credit expansion. The central bank has limited ability to control the amount of credit. In addition, there may be changes of policy preferences, changes of administration and changes in the external environment, all of which may alter the amount of credit that will be created. The more uncertainty is associated with future credit, the more uncertain future asset prices will be. Because of the risk shifting problem, uncertainty makes risky assets more attractive to the debt-financed investor, and this results in a higher asset price and a larger bubble.

The theory thus predicts that bubbles will tend to occur when the current credit levels are high, when future credit levels are expected to be higher and when future credit levels are expected to be uncertain. This is consistent with the fact that many asset bubbles associated with recent crises were preceded by financial liberalization. In the Scandinavian countries, there was a move away from restricted financial systems towards market-oriented ones. This led to an expansion in credit and also considerable uncertainty about the future level of credit. A similar sequence of events occurred in the South East Asian economies.

This account of the genesis and evolution of bubbles contrasts with McKinnon and Pill (1997, 1999) and Krugman (1998), where the bubble is created by government guarantees to the banking system or the prospect of an IMF bailout. While these factors will exacerbate the situation, it can be argued they are not the primary causes of asset bubbles. In particular, they do not explain why bubbles have occurred so often in the absence of such guarantees or why they are so often associated with financial liberalization.

The second phase of the financial crisis involves the bursting of the bubble and a collapse in asset prices. In some of the episodes recounted in Section II, it appears that the collapse was precipitated by a real shock. An example is the collapse in oil prices that triggered the bursting of the bubble in Norway. In other cases, the crisis appears to have been triggered by an event in the financial sector. A good example is Sweden's tightening of credit in 1990, which precipitated the collapse in asset prices.

The effect of a real shock is easy to understand. Anything that affects the health of the businesses that make up the economy will clearly have a direct impact on asset prices. Furthermore, uncertainty about these factors will lead to uncertainty about stock prices. The effect of a financial shock is more complex.

The model in Allen and Gale (2000a) suggests that a critical determinant of asset prices is the expected amount and the volatility of credit expansion. In many cases financial liberalization leads to an expansion of credit, which feeds a

bubble in asset prices. These higher prices are in turn supported by the anticipation of further increases in credit and asset prices. Any faltering of this cumulative process may cause the bubble to burst and lead to a crisis. What is critical is the relationship between actual and expected credit expansion. Since anticipated expansion has been built into current asset prices, continued expansion is required to allow speculators to repay their debts. In fact, a positive level of credit expansion may be required to prevent the bubble from bursting. Allen and Gale (2000a) call a credit regime *robust* if there is no financial crisis as long as the level of credit does not contract. A *fragile* regime is one in which credit is actually required to expand at a positive rate in order to prevent a financial crisis. It is fairly easy to construct examples of fragile regimes. In fact, examples can be constructed where an arbitrarily high rate of credit expansion is necessary to prevent a crisis. In this case, the probability of a crisis is close to one.

The third phase of the crisis occurs after asset prices have collapsed. At this stage there will be widespread default and the banking system will come under severe strain. If the fall in asset prices is not too large, the banking system may be able to survive intact. However, in more extreme cases either many banks will fail and be liquidated or the government will be forced to step in and rescue the banks. For small countries there may also be a currency crisis as the government is forced to choose between lowering interest rates to save the banking system or raising them to protect the exchange rate. Even if rates are raised there may still be an exodus of capital. A moderate increase in interest rates may not be sufficient to prevent capital flight because of the weakened state of the banking system and the uncertainty that often accompanies financial turbulence.

Perhaps the most important aspect of the third phase is the spillover of the financial crisis into the real economy. In practice, financial crises are often associated with a significant fall in output or at least a reduction in the rate of growth. Output fell dramatically in the South East Asian economies that were subject to crises. This was also the case in the Scandinavian countries.

Allen and Gale (2000a) do not analyse the relationship between financial and real sectors. However, Bernanke (1983), Bernanke and Gertler (1989) and Holmstrom and Tirole (1997) among others have analysed the spillover from the financial sector to the real sector. Holmstrom and Tirole (1997), for example, develop an incentive model of financial intermediation in which intermediaries and firms are credit-constrained. The predictions of the model are broadly consistent with the interaction between the real and financial sectors in the Scandinavian crises.

There are a number of other mechanisms that may lead to close ties between the health of the banking sector and the level of economic activity. The Basle Accord set requirements for minimum levels of capital in a wide range of countries. In addition there are domestic capital requirements in many countries. If banks suffer a wave of loan defaults, bank capital will necessarily be depleted. They can respond to this in a number of ways. One is to issue more equity or other securities that count towards the capital base. A second is to reduce the volume of new loans they make.

Raising new capital is problematic when a bank is beset with difficulties. The bank is effectively suffering from a *debt overhang* (Myers 1977). Suppliers of capital will know that in the event of default their money will go to the depositors and other creditors and so will be unwilling to supply it. Alternatively, the bank could sell off the loans, pay off its creditors and remove the debt overhang. The problem with this course of action is that there is an option value of continuing the bank as a going concern. The value of this option is held by the current shareholders. They will be reluctant to shut down the bank and forgo the option value. In addition, there may be a considerable problem in liquidating the loans at fair prices because markets for loans are thin. As Shleifer and Vishny (1992) have pointed out, the firms that will place the highest value on assets are likely to be those in the same industry. The liquidation value of assets is likely to be low when others in the same industry are also suffering from liquidity problems. A related argument is found in Allen and Gale (1994, 1998), who show that asset market prices depend on the amount of 'cash in the market'. When many banks are trying to liquidate loans simultaneously, the price will be low because the amount of liquidity in the market is limited. For all these reasons, the debt overhang is hard to eliminate.

As a result, the bank may have no alternative but to cut back the volume of new loans. If banks do this simultaneously there can be a significant effect on output. This in turn can lead to more defaults and a further reduction in loans in a downward spiral.

Although it is easy to blame the Basle Accord and other capital adequacy regulations for causing a credit crunch, the same thing might happen under a *laissez-faire* regime. There are several reasons why banks might wish to hold a 'buffer' of equity capital. By analogy with the standard theory of the firm, it could be argued that a higher level of capitalization reduces moral hazard problems and reduces the probability of bankruptcy, where bankruptcy is assumed to involve deadweight costs. Even in the absence of capital adequacy regulations, banks might well react to financial crises by trying to rebuild capital ratios by reducing the volume of new lending.

To the extent that capital adequacy requirements do restrict the amount of loans that banks are willing to extend, a relaxation in reserve requirements may help to ease the situation. Such reductions can be temporary or permanent. This strategy has been tried in Venezuela, Spain, Argentina and Hungary (see Dziobek and Pazarbasioglu 1997).

The third phase of the financial crisis can involve considerable costs in terms of reduced growth and lost output. It is for this reason that understanding financial crises is so important. In the next section, we turn to the policy issues raised by this analysis.

IV. POLICY ISSUES

The theory of crises outlined in the previous section raises two important policy issues. The first is how bubbles in asset prices can be prevented. The second is how

to deal with the banking system and minimize the loss of output after an asset bubble has occurred and precipitated a banking crisis. Each of these is discussed in turn.

Although it has long been recognized that there is a link between monetary policy, inflation and asset prices (see, for example, Fama 1981), there has only recently been an active debate concerning the extent to which central banks should target asset prices. The standard analysis of the link between stock prices and inflation suggests that when the money supply is increased, prices and wages will in the long run increase in line with the standard quantity theory of money. Depending on the relative speeds of adjustment of prices in the output and input markets, profits and hence stock prices can be increased or decreased by inflation. The empirical evidence suggests that a rise in inflation (realized, expected or unexpected) reduces stock prices. This type of theory does not provide much guidance to central banks in how to target asset prices beyond suggesting that if inflation is controlled asset prices will be determined by fundamentals.

The theory outlined in Section III provides a rather different perspective on the relationship between monetary policy and asset prices. It emphasizes the importance of the level and volatility of credit for asset price determination and thus suggests an important role for monetary policy and the reserve requirements of banks in preventing the development of bubbles in asset prices. Governments and central banks should try to avoid unnecessary expansion of credit, as well as unnecessary uncertainty about the path of credit expansion. This suggests that financial liberalization is a particularly risky exercise, as experience confirms. In a liberalization regime, credit tends to increase dramatically and, because there is no experience with the new regime, uncertainty also increases significantly. If financial liberalization is to be undertaken, it should be done slowly and carefully. To the extent possible, the central bank should make clear how the volume of credit will evolve over time.

The second policy issue concerns how the government should intervene to deal with problems caused by a banking crisis and minimize the spillovers into the real economy. As outlined in Section III, the collapse of a bubble can cause a significant debt overhang. The value of the option to continue, together with the difficulty of liquidating loans for their fair value, means that banks will try to remain in business as long as possible. In order to maintain levels of capital consistent with regulation, banks will reduce the volume of new loans and this will lead to a credit crunch. The reduction in output and the further negative impact this will have on the creditworthiness of other borrowers can lead to a significant reduction in output. To offset these negative effects, the government can try to recapitalize the banking system. This can involve direct infusions of funds or outright nationalization of the banking system. Norway provides an interesting example of the effectiveness of swift government intervention.

As recounted in Section II, lending increased dramatically in Norway in 1985 and 1986 as the financial system was liberalized and asset prices increased significantly. The bubble burst when oil prices collapsed in 1986. This led to a

sharp increase in corporate bankruptcies and non-performing loans. According to Brown et al. (1998), most financial institutions incurred operating losses in 1987 and 1988 but it was thought that with the exception of a few finance companies and savings banks there would not be severe problems. In 1988 there was an officially supported merger of two large savings banks. In 1989 further support was provided to the merged savings bank, five other savings institutions and two small commercial banks. By late 1989 most commercial banks were again becoming profitable and it appeared as though the crisis was at an end. However, from 1990 to 1993 the largest commercial banks were hit by a wave of loan losses. Guarantee funds were quickly exhausted and the government and central bank developed new channels for transmitting funds to the banking sector. The level of bank-financed guarantee funds dispersed initially was about 0.9% of GDP. Once these were exhausted the government injected funds equivalent to a further 2.2% of GDP and the central bank another 1% of GDP. As a result of these interventions the government came to own an 87.5% stake in the largest commercial bank (Den Norske Bank) and became the sole owner of the second and sixth largest commercial banks (Christiana Bank & Kreditkassen and Fokus Bank). The original shareholders of these banks had their holding written off.

The objective of official support during this period was to restore capital ratios to at least 8% and to restore the profitability of the banks. There was considerable success in achieving these aims. Profitability was restored to roughly pre-crisis levels and operating expenses were reduced by about a third. During 1995–6 Fokus Bank was reprivatized and the government stakes in the two largest commercial banks were reduced to just over 50%.

The government's prompt action in restoring the banking system meant that it was quickly able to revert to performing its normal economic function. The recession in Norway was relatively short-lived and the economy started growing again fairly quickly. The return to robust economic growth in turn reinforced the recovery in the banking system.

As discussed in Section II, Sweden and Finland also underwent severe banking crises and suffered from sharp recessions in the late 1980s and early 1990s. Their governments also intervened quickly and extensively. Although the details differed from Norway the effect was the same in the sense that the macroeconomic impacts of the banking collapses were short-lived and the economies resumed growing again quite quickly (see Drees and Pazarbasioglu 1995; Englund 1999).

A possible alternative way of reducing the effects of debt overhang is the development of a corporate bond market. Such a market will allow the firms to borrow even when banks are unwilling to do so. The problem here is that there may be a debt overhang in firms which prevents borrowing in a similar way to the debt overhang in banks. For this reason recapitalization of the banking system is likely to be a more effective means of minimizing the negative effects of a collapse in asset prices.

In summary, it has been argued that the most important policy objective should be the avoidance of bubbles in asset prices. This can best be achieved by

the government and central bank increasing credit in a responsible way and minimizing the uncertainty associated with future credit and monetary policy. Financial liberalization should be undertaken slowly and with the minimum uncertainty possible regarding future developments. Financial structure is not an important factor here because bubbles can occur in both bank-based and market-based financial systems. If a bubble in asset prices does occur and bursts then the best way of minimizing the debt overhang problem is for the government to recapitalize the banking system.

V. FINANCIAL STRUCTURE AND GROWTH

One of the most important effects of the financial crises in South East Asia was that the countries' previously high growth was eliminated. In designing policies to prevent financial crises it would be unfortunate if growth was also reduced. The conventional prescription of altering the financial structure and moving towards a market-based system may not be compatible with this goal. The high growth that occurred took place with bank-based systems.

There is considerable evidence that the level of financial development of a country affects growth. Levine (1997) provides an excellent survey of the literature and concludes that countries with larger banks and more active stock markets grow faster in subsequent decades. In general this literature does not distinguish between the effects of bank-based and market-based systems. Exceptions are Allen and Gale (1999, 2000b). They develop a model that suggests that bank-based systems are effective at financing industries where the technology and business strategies are well known. Market-based systems, on the other hand, are desirable when the technology is new or constantly evolving and as a result there is *diversity of opinion* and people agree to disagree.

Market finance is identified with situations in which investors become informed and then decide individually whether to contribute to the funding of the project. Examples of market finance include IPOs, the private equity market and venture capital firms. Venture capital firms have some of the features of markets and intermediaries, but they are included in market finance because of their size. The number of investors in a single firm is relatively small and there is a large number of firms to choose from, so there is likely to be homogeneity of beliefs among the investors in a single firm. Intermediated finance is identified with large institutions, such as banks, where there is likely to be heterogeneity of beliefs.

When a new industry starts up there are several types of uncertainty. In addition to uncertainty about the effectiveness of the technology, there is uncertainty about the best management strategies to follow and the consequences of each strategy. Markets have considerable advantages in such situations. A large number of people participate directly in the investment decision. This is costly because each investor has to acquire the information to make the decision; but it has the great advantage that each investor makes his

own decision based on his own information and his own prior. This ability to agree to disagree allows innovative projects to be financed.

The nature of intermediated finance is different. The decision to invest in a project is delegated to a manager. Funds may be allocated to a project even if some of the investors providing the funds think the project is a bad one. The advantage of the intermediary is that it economizes on the acquisition of information, because only the manager needs to become informed (see Diamond 1984). This is fine when investors have homogeneous beliefs. The problem arises when there is diversity of opinion. Even if the manager does his best to choose projects he honestly believes are profitable (i.e. there is no principal-agent problem) diversity of opinion implies that some providers of finance would disagree with those decisions even if they had the same information as the manager. If the probability of disagreement is sufficiently high, the investors may be unwilling to provide funds in the first place. Thus, intermediated finance may result in under-funding of innovative projects.

The analysis suggests that diversity of opinion and the degree of risk are crucial in determining the relative performance of markets and intermediaries. Markets will be especially effective at financing industries which are new and where relatively few data are generated; that is, industries in which information is sparse and diversity of opinion persists.

Biotechnology is a good example of a new industry in which very little information was initially available. The lack of information did not only relate to the technology. Given the lack of similar industries, it was also unclear which business strategies should be pursued. All this led to great diversity of opinion. Nevertheless, this industry has been very successfully funded through the stock market.

Diversity of opinion can also arise in established industries. When there is only limited experience with a new technology, there is usually a wide range of views on the value of the technology and the best way to proceed. A good example of this is provided by the computer industry. IBM was clearly dominant during the 1950s, 1960s and 1970s when mainframe machines were the primary technology. In the 1980s the development of the personal computer dramatically changed the industry. Initially, it was not at all clear how this change would affect the industry and what strategies the company should adopt. Indeed, IBM lost its almost unchallenged dominance of the industry because it did not initially realize that personal computers represented a long-term competitive threat to mainframes.

The actual development of new industries and new technologies is, of course, extremely complex and the provision of finance is only one part of this process. Establishing the historical importance of market-based versus bank-based finance empirically would be a lengthy and difficult exercise. However, as Allen (1993) notes, it is of some interest that many new industries were developed in the UK or USA, which are the countries that have historically had the most highly developed financial markets. For example, railways were first developed in the UK and to a large extent both the UK's and other countries' railways were financed

through the London Stock Exchange in the nineteenth century. Even though the automobile was invented in Germany, it was in the USA that automobiles were first produced on a large scale. The aircraft, consumer durable, computer and biotechnology industries have been largely developed in the USA. It is not uniformly the case that all new industries were first developed in the UK or USA. For example, the chemical industry was initially developed on a large scale in Germany. Nevertheless, casual empiricism suggests that a surprising proportion of new industries have been developed in the UK and USA.

Given that most of the economies in South East Asia are engaged in traditional industries rather than new industries, Allen and Gale's theory suggests that keeping bank-based financial systems is desirable in terms of promoting growth. The implication is that changing financial structure to promote financial markets may lead to a reduction in growth for emerging economies.

VI. CONCLUDING REMARKS

This paper has described a model of bubbles and ensuing financial crises which is consistent with events observed in South East Asia, Scandinavia and many other countries. It has been argued that a financial system, whether bank-based or market-based, can lead to risk shifting and bubbles in asset prices. If the bubble bursts and asset prices collapse a banking crisis can follow. This may spill over into the real economy and lead to a fall in output. Policy should be directed at ensuring an asset price bubble does not occur by keeping credit growth at an appropriate level and avoiding uncertainty about future financial policy. However, if a bubble does occur and the inevitable collapse in asset prices leads to a banking crisis, swift intervention to eliminate the debt overhang problem is desirable.

Contrary to the conventional analysis, the arguments presented above suggest that financial structure is not that important for whether financial crises occur. They happen in both bank-based and market-based systems. What is important in preventing financial crises is that central banks and governments avoid a rapid expansion of credit and the introduction of uncertainty about future levels of credit.

This is not to say that financial structure is unimportant. Bank-based systems may be helpful in promoting growth in economies where most of the major industries are concerned with conventional manufacturing and the technology and business strategies are well known. Moving towards market-based systems would not be helpful in this respect.

REFERENCES

Agénor, P.-R., M. Miller, D. Vines and A. Weber (1999), *The Asian Financial Crisis: Causes, Contagion and Consequences*. Cambridge: Cambridge University Press.

- Allen, F. (1993), 'Stock Markets and Resource Allocation', in C. Mayer and X. Vives (eds), *Capital Markets and Financial Intermediation*. Cambridge: Cambridge University Press.
- Allen, F., and D. Gale (1994), 'Limited Market Participation and Volatility of Asset Prices', *American Economic Review*, 84, 933–955.
- Allen, F., and D. Gale (1998), 'Optimal Financial Crises', *Journal of Finance*, 53, 1245–1284.
- Allen, F., and D. Gale (1999), 'Diversity of Opinion and Financing of New Technologies', *Journal of Financial Intermediation*, 8, 68–89.
- Allen, F., and D. Gale (2000a), 'Bubbles and Crises', *Economic Journal*, 110, 236–255.
- Allen, F., and D. Gale (2000b), *Comparing Financial Systems*. Cambridge, MA: MIT Press.
- Allen, F., and G. Gorton (1993), 'Churning Bubbles', *Review of Economic Studies*, 60, 813–836.
- Allen, F., S. Morris and A. Postlewaite (1993), 'Finite Bubbles with Short Sale Constraints and Asymmetric Information', *Journal of Economic Theory*, 61, 206–229.
- Benston, G., R. Eisenbeis, P. Horvitz, E. Kane and G. Kaufman (1986), *Perspectives on Safe and Sound Banking: Past, Present, and Future*. Cambridge, MA: MIT Press.
- Bernanke, B. (1983), 'Non-monetary Effects of the Financial Crisis in the Propagation of the Great Depression', *American Economic Review*, 73, 257–276.
- Bernanke, B., and M. Gertler (1989), 'Agency Costs, Collateral, and Business Fluctuations', *American Economic Review*, 79, 14–31.
- Brown, S., N. Koliadina, H. Samiei and A. Thomas (1998), *Norway Country Report*. Washington, DC: International Monetary Fund.
- Corsetti, G., P. Pesenti and N. Roubini (1998a), 'What Caused the Asian Currency and Financial Crisis? Part I: A Macroeconomic Overview', NBER Working Paper 6833.
- Corsetti, G., P. Pesenti and N. Roubini (1998b), 'What Caused the Asian Currency and Financial Crisis? Part II: The Policy Debate', NBER Working Paper 6834.
- Demirguc-Kunt, A., and E. Detragiache (1998), 'Financial Liberalization and Financial Fragility', Working Paper 98/83. Washington, DC: International Monetary Fund.
- Diamond, D. (1984), 'Financial Intermediation and Delegated Monitoring', *Review of Economic Studies*, 51, 393–414.
- Drees, B., and C. Pazarbasioglu (1995), 'The Nordic Banking Crises: Pitfalls in Financial Liberalization?', Working Paper 95/61. Washington, DC: International Monetary Fund.
- Dziobek, C., and C. Pazarbasioglu (1997), 'Lessons from Systemic Bank Restructuring: A Survey of 24 Countries', Working Paper 97/161. Washington, DC: International Monetary Fund.
- Englund, P. (1999), 'The Swedish Banking Crisis Roots and Consequences', *Oxford Review of Economic Policy*, 15, 80–97.
- Fama, E. (1981), 'Stock Returns, Real Activity, Inflation, and Money', *American Economic Review*, 71, 545–565.
- Heiskanen, R. (1993), 'The Banking Crisis in the Nordic Countries', *Kansallis Economic Review*, 2, 13–19.
- Higgins, M., and C. Osler (1997), 'Asset Market Hangovers and Economic Growth: The OECD During 1984–93', *Oxford Review of Economic Policy*, 13, 110–134.
- Holmstrom, B., and J. Tirole (1997), 'Financial Intermediation, Loanable Funds, and the Real Sector', *Quarterly Journal of Economics*, 112, 663–691.
- Jensen, M., and W. Meckling (1976), 'Theory of the Firm: Managerial Behavior, Agency Cost and Ownership Structure', *Journal of Financial Economics*, 3, 305–360.
- Kaminsky, G., and C. Reinhart (1996), 'Banking and Balance-of-payments Crises: Models and Evidence', Working paper. Washington, DC: Board of Governors of the Federal Reserve.
- Kaminsky, G., and C. Reinhart (1999), 'The Twin Crises: The Causes of Banking and Balance-of-payments Problems', *American Economic Review*, 89, 473–500.

- Krugman, P. (1998), 'Bubble, Boom, Crash: Theoretical Notes on Asia's Crisis', Working paper. Cambridge, MA: MIT.
- Levine, R. (1997), 'Financial Development and Economic Growth: Views and Agenda', *Journal of Economic Literature*, 35, 688–726.
- McKinnon, R., and H. Pill (1997), 'Credible Economic Liberalizations and Overborrowing', *American Economic Review*, 87, 189–203.
- McKinnon, R., and H. Pill (1999), 'Exchange-rate Regimes for Emerging Markets: Moral Hazard and International Overborrowing', *Oxford Review of Economic Policy*, 15, 19–38.
- Mishkin, F. (1997), 'Understanding Financial Crises: A Developing Country Perspective', in *Annual World Bank Conference on Development Economics 1996*. Washington, DC: The International Bank for Reconstruction and Development, pp. 29–61.
- Myers, S. (1977), 'Determinants of Corporate Borrowing', *Journal of Financial Economics*, 5, 147–75.
- Shleifer, A., and R. Vishny (1992), 'Liquidation Values and Debt Capacity: A Market Equilibrium Approach', *Journal of Finance*, 47, 1343–1366.
- Stiglitz, J. and A. Weiss (1981), 'Credit Rationing in Markets with Imperfect Information', *American Economic Review*, 71, 393–410.
- World Bank (1993), *The East Asian Miracle*. Washington, DC: The International Bank for Reconstruction and Development.

APPENDIX

This appendix presents a simple example to illustrate the model in Allen and Gale (2000a) and show how asset price bubbles can arise. For ease of exposition the example is slightly different from the model presented there. The theory is based on rational behavior. Standard models of asset pricing assume people invest with their own money. The price of an asset in this benchmark case is identified as the 'fundamental'. A bubble is said to occur when the price of an asset rises above this benchmark (see Allen *et al.* 1993). If the people making investment decisions borrow money then because of default they are only interested in the upper part of the distribution of returns of the risky asset. As a result there is a risk shifting problem and the price of the risky asset is bid up above the benchmark, so there is a bubble.

In the example the people who make investment decisions do so with borrowed money. If they default there is limited liability. Lenders cannot observe the riskiness of the projects invested in so there is an agency problem. As explained in Section III, a similar problem can arise when institutional investors make the investment decisions.

Initially there are two dates, $t = 1, 2$. There are two assets in the example. The first is a safe asset in variable supply. For each 1 unit invested in this asset at date 1 the output is 1.5 at date 2. The second is a risky asset in fixed supply that can be thought of as real estate or stocks. There is 1 unit of this risky asset. For each unit purchased at price P at date 1 the output is 6 with probability 0.25 and 1 with probability 0.75 at date 2, so the expected payoff is 2.25. The details of the two assets are given below.

Financial Structure and Financial Crisis

<i>Asset</i>	<i>Supply</i>	<i>Investment at date 1</i>	<i>Payoff at date 2</i>
Safe	Variable	1	1.5
Risky	1	P	R = 6 with prob. 0.25 = 1 with prob. 0.75 ER = 2.25

All agents in the model are assumed to be risk neutral.

The fundamental

Suppose each investor has wealth 1 initially and invests her own wealth directly. Since everyone is risk neutral the marginal returns on the two assets must be equated.

$$\frac{2.25}{P_F} = \frac{1.5}{1}$$

or

$$P_F = \frac{2.25}{1.5} = 1.5$$

The value of the asset is simply the discounted present value of the payoff where the discount rate is the opportunity cost of the investor. This is the classic definition of the fundamental. The benchmark value of the asset is thus 1.5 and any price above this is termed a bubble.

Intermediated case

Suppose next that investors have no wealth of their own. They can borrow to buy assets at a rate of $33\frac{1}{3}\%$. The most they can borrow is 1. If they borrow 1 they repay 1.33 if they are able to. If they are unable to pay this much the lender can claim whatever they have. As explained above, lenders cannot observe how loans are invested and this leads to an agency problem.

The first issue is: can $P = 1.5$ be the equilibrium price?

Consider what happens if an investor borrows 1 and invests in the safe asset.

$$\text{Marginal return safe asset} = 1.5 - 1.33 = 0.17$$

Suppose instead she borrows 1 and invests in the risky asset. She purchases $1/1.5$ units of the asset. When the payoff is 6 she repays the loan and interest of 1.33 and keeps what remains. When it is 1 she defaults and the entire payoff goes to the lender, so she receives 0.

$$\text{Marginal return risky asset} = 0.25 \left(\frac{1}{1.5} \times 6 - 1.33 \right) + 0.75 \times 0 = 0.67$$

The risky asset is clearly preferred when $P = 1.5$ since $0.67 > 0.17$. This is the risk shifting problem. The expected payoff on the two investments in 1 unit of the safe asset and $1/1.5$ units of the risky asset is the same at 1.5. The risky asset is more attractive to the borrower though. With the safe asset the borrower obtains 0.17 and the lender obtains 1.33. With the risky asset the borrower obtains 0.67 while the lender obtains $0.25[1.33] + 0.75[1 \times (1/1.5)] = 1.5 - 0.67 = 0.83$. The risk of default allows 0.5 in expected value to be shifted from the lender to the borrower. If the lender could prevent the borrower from investing in the risky asset he would do so, but he cannot since this is unobservable.

What is the equilibrium price of the risky asset given this agency problem?

In an equilibrium where the safe asset is used, the price of the risky asset, P , will be bid up since it is in fixed supply, until the expected profit of borrowers is the same for both the risky and the safe asset:

$$0.25 \left(\frac{1}{P} \times 6 - 1.33 \right) + 0.75 \times 0 = 1.5 - 1.33$$

so

$$P = 3.$$

There is a bubble with the price of the risky asset above the benchmark of 1.5.

The idea that there is a risk shifting problem when the lender is unable to observe how the borrower invests the funds is not new (see, for example, Jensen and Meckling 1976; Stiglitz and Weiss 1981). However, it has not been widely applied in the asset pricing literature. Instead of the standard result in corporate finance textbooks that debt-financed firms are willing to accept negative net present value investments, the manifestation of the agency problem here is that the debt-financed investors are willing to invest in and bid up assets priced above their fundamental.

The amount of risk that is shifted depends on how risky the asset is. The greater the risk the greater the potential to shift risk and hence the higher the price will be. To illustrate this, consider the previous example but suppose the return on the risky assets is a mean-preserving spread of the original returns.

<i>Asset</i>	<i>Supply</i>	<i>Investment at date 1</i>	<i>Payoff at date 2</i>
Safe	Variable	1	1.5
Risky	1	P	$R = 9$ with prob. 0.25 $= 0$ with prob. 0.75 ER = 2.25

Now the price of the risky asset is given by

$$0.25 \left(\frac{1}{P} \times 9 - 1.33 \right) + 0.75 \times 0 = 1.5 - 1.33$$

so

$$P = 4.5.$$

More risk is shifted and as a result the price of the risky asset is bid up to an even higher level.

In the equilibria considered above the investors are indifferent between investing in the safe and risky asset. Suppose for the sake of illustration that when indifferent half choose to invest in the risky asset and half choose to invest in the safe asset.

$$\text{Bank's payoff} = 0.5[0.25 \times 1.33 + 0.75 \times 1] + 0.5[1.33] = 1.21.$$

If the banking sector is competitive this payoff will be paid out to depositors. In this case it is the depositors who bear the cost of the agency problem. In order for this allocation to be feasible markets must be *segmented*. The depositors and the banks must not have access to the assets that the investors who borrow invest in. Clearly if they did they would be better off just to invest in the safe asset rather than put their money in the bank or lend to the investors.