

BUBBLES, CRISES, AND POLICY

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In many recent cases financial liberalization has led to a bubble in asset prices. The bursting of the bubble results in a banking crisis and recession. It is suggested such bubbles are caused by an interaction of the risk-shifting problem arising from agency relationships in intermediaries and uncertainty concerning the expansion of credit. Two important policy objectives are identified. The first is the prevention of bubbles in asset prices. The second is minimizing the impact of spillovers on to the real economy during post-bubble banking crises. The different policy approaches taken in Norway and Japan are compared.

I. INTRODUCTION

What happened in South-east Asia in 1997? After years of growth, some of the world's most successful economies had severe crises in which stock markets and currencies plummeted. These events were followed by recessions with significant drops in output. How can these crises be understood? Did they occur because the economies of these countries have fundamental problems? In the popular press, country-specific explanations for crises are often given. For example, Indonesia, Malaysia, and Thailand are said to have been plagued by nepotism, corruption, and ineffective banking regulation. South

Korea had a rigid industrial structure dominated by the *chaebols*. However, all of these factors were in place during the many years of success that these economies enjoyed. The alternative hypothesis explored in this paper is that each of these crises can be explained by a common market failure.

Contrary to conventional financial theory, market-oriented financial systems are 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

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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 40 per cent in 1984 to 68 per cent in 1988. Asset prices soared, while investment and consumption also increased significantly. The collapse in oil prices helped 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 per cent in 1984 to 90 per cent in 1990. Housing prices rose by a total of 68 per cent 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 per cent. In Sweden a steady credit expansion through the late 1980s led to a property boom. In the fall 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.

Perhaps the best known example of this type of phenomenon is the dramatic rise in real estate and stock prices that occurred in Japan in the late 1980s and their subsequent collapse in 1990. Financial liberalization throughout the 1980s and the desire to support the United States dollar in the latter part of the decade led to an expansion in credit. During most of the 1980s asset prices rose steadily, eventually reaching very high levels. For example, the Nikkei 225 index was around 10,000 in 1985. On 19 December 1989 it reached a peak of 38,916. A new Governor of the Bank of Japan, less concerned with supporting the US dollar and more concerned with fighting inflation, tightened monetary policy and this led to a sharp increase in interest rates in early 1990 (see Frankel, 1993; Tschoegl, 1993). The bubble burst. The Nikkei 225 fell sharply during the first

part of the year and by 1 October 1990 it had sunk to 20,222. Real estate prices followed a similar pattern. The next few years were marked by defaults and retrenchment in the financial system. The real economy was adversely affected by the aftermath of the bubble and growth rates during the 1990s have mostly been slightly positive or negative, in contrast to most of the post-war period when they were much higher. It is interesting to note that the financial supervision of banks in Japan was not lax by international standards during this period (Corbett, 1999).

Most other OECD countries experienced similar episodes although they were less extreme than in Japan and 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 a 10 per cent increase in real residential real estate prices above the OECD average in 1984–9 was associated with an 8 per cent steeper fall than average in 1989–93. Similarly, for equities a 10 per cent increase above the average in the earlier period is associated with a 5 per cent 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 per cent of GDP in the late 1980s to 40 per cent 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 cent 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, Demirgüç-Kunt and Detragiache (1998) study 53 countries during the period 1980–95. They find that financial liberalization increases the probability 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.

Financial crises have thus occurred repeatedly for many centuries in a wide range of different circumstances. For example, the financial systems of Norway, Finland, and Sweden are clearly significantly different from those of Malaysia, Indonesia, Thailand, and South Korea. Nepotism and corruption are not a problem in Scandinavia, nor is lax banking regulation. All this suggests that these crises were caused by a common market failure rather than idiosyncratic causes.

Allen and Gale (1998*a*) provide a theory of bubbles and ensuing crises based on the existence of an agency problem. Many investors in real estate and stock markets obtain their investment funds from external sources. If the ultimate providers of funds are unable to observe the characteristics of the investment, there is a classic risk-shifting problem. Risk-shifting increases the return to investment in the assets and causes investors to bid up the asset

price above its fundamental value. A crucial determinant of asset prices is the amount of credit that is provided for speculative investment. Financial liberalization, by expanding the volume of credit for speculative investments, can interact with the agency problem and lead to a bubble in asset prices.

An alternative theory of financial crises has been suggested by McKinnon and Pill (1996, 1997, and their article in this issue) and Krugman (1998). They suggest that government guarantees are the fundamental cause of crises. Because deposits are guaranteed by the government, banks are not subject to the usual discipline of the market. This allows banks to engage in speculative investment, which bids up asset prices and creates a bubble that eventually bursts. We would argue that while government guarantees can certainly exacerbate the situation, they are neither necessary nor sufficient for the occurrence of a crisis. Many crises occurred when there was no prospect of a government guarantee for banks. The USA in the late 1920s and early 1930s witnessed a dramatic rise in asset prices and a subsequent crisis when no government guarantees existed. The USA in the 1950s and 1960s provides an example where government guarantees of the banking system existed but no crisis occurred.

Section II outlines a theory of crises. The policy issues raised by crises and the differing responses of Norway and Japan to their crises are discussed in section III. Norway's strategy was successful on many dimensions, while Japan has been much less successful. Section IV contains concluding remarks.

II. A THEORY OF CRISES

The financial crises described in the Introduction typically have three distinct phases. The first phase starts with financial liberalization, 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 buying real estate, stocks, and other assets do so with other people's money. The purchase of real estate is usually debt financed. 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. Similarly, 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, she will be fired, but in any case her liability is limited. Thus, when intermediaries make investment decisions, the incentive scheme they face has convex pay-offs.

The agency problem of excessive risk-taking associated with limited liability is crucial for the analysis presented below. If the penalties for default on debt or for being fired from an intermediary are sufficiently high, then there will not be an incentive to take risks. Indeed, the opposite problem may occur and agents may be excessively cautious. For example, prior to the reform of bankruptcy laws in the nineteenth century, default in England could lead to debtors' prison or the 'hell of the English' as it was known (see Welch, 1995). Since the abolition of such extreme penalties the effects of defaulting

have usually been restricted to reputational damage. 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 despite such reputational considerations. 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 crisis of the US savings and loans institutions (see, for example, Benston *et al.*, 1986).

Allen and Gale (1998a) develop a model containing this kind of agency problem. 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 it 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 would obtain in the standard asset pricing model, where everybody is investing his 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 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 or she 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 also 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 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 immediate expansion in credit and also considerable uncertainty about the future level of credit. In Japan, the government continually eased regulation on banks and the financial markets throughout the 1980s. Similar deregulation occurred in many emerging economies, such as Mexico and the South-east Asian economies.

This account of the genesis and evolution of bubbles contrasts with McKinnon and Pill (1996, 1997, and in this issue) and Krugman (1998), where the bubble is created by government guarantees to the banking system or the prospect of an IMF bail-out. While these factors will exacerbate the situation, we believe they are not the primary causes of asset bubbles. In particular, they do not explain why bubbles 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 the Introduction, 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 Japan'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 (1998a) suggests that a critical determinant of asset prices is the expected value 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 (1998a) 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. However, the Scandinavian countries quickly rebounded. In Japan, although the initial effect of the 1990 crash was relatively mild, growth has been depressed for a long period of time and the situation has continued to deteriorate.

Allen and Gale (1998a) 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 which 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 depreciated. They can respond to this in a number of ways. One is to issue more equity or other securities which 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, 1998b), 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, we could argue 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 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 lost output. It is for this reason that understanding asset bubbles and subsequent financial crises is so important. In the next section, we turn to the public-policy issues raised by this analysis.

III. POLICY ISSUES

The theory of crises outlined in the previous section raises two important public-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. We discuss each of these 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 II provides a rather different perspective on the relationship between monetary policy and asset prices. The theory emphasizes the importance of the level and volatility of credit for asset-price determination and thus provides 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 II, 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. A comparison of Norway and Japan provides an interesting contrast between the effective-

ness of swift intervention and the non-interventionist attitude of the Japanese government.

(i) Norway

As recounted in the Introduction, 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 per cent of GDP. Once these were exhausted the government injected funds equivalent to a further 2.2 per cent of GDP and the central bank another 1 per cent of GDP. As a result of these interventions the government came to own an 87.5 per cent 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 per cent 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 re-privatized and the government stakes in the two largest commercial banks were reduced to just over 50 per cent.

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 the Introduction, 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's case, 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) and Englund's article in this issue.

(ii) Japan

According to Bayoumi *et al.* (1998), an increase in credit associated with financial liberalization starting in the mid-1980s led to a dramatic increase in stock prices and the price of commercial real estate in Japan. The change in policy precipitated by the new Governor of the Bank of Japan caused a sharp rise in interest rates which burst the asset price bubble. Stock prices fell sharply in 1990–1 and real estate prices have continued to fall since then. Perhaps because in a number of dimensions other than asset prices, such as bank profitability, the severity of the crisis was not that great (see Corbett, 1998), the reaction of the Japanese government was initially in stark contrast to what happened in Norway. With the exception of modest financial assistance in 1995 to deal with the problem of housing companies affiliated to banks (the *jusen*), the government did not provide funds. This meant that banks slowly had to make provisions for bad loans from operating income and unrealized profits on stock holdings. The government policy of providing very little support was predicated on the assumption that the resumption of economic growth would reduce the quantity of non-performing loans and help restore the profitability of banks. By the late 1990s, as the economy stagnated, it became clear that this policy was not working.

The collapse of several financial institutions in 1997 and 1998, including the Hokkaido Takushoku Bank, Sanyo Securities, Yamaichi Securities, and then the Nippon Credit Bank and Long Term Credit Bank, and a shrinking economy led to a reconsideration of these policies. The government now proposes to inject substantial public funds into the banking system in an attempt to eliminate the debt overhang and restore the financial system to health.

A comparison of the policies followed in Norway and Japan underlines the importance of this aspect of government intervention. In Norway, a prompt recapitalization of the banks allowed them to resume lending, the recession soon ended, and economic growth returned. In Japan, the presumption was that economic growth would return and this would solve the banking problem. With the benefit of hindsight, it appears that the direction of causality is the opposite of that assumed in Japan. A solution to the banking problem is necessary to restore economic growth.

IV. CONCLUDING REMARKS

This paper has described a model of bubbles and ensuing financial crises which is consistent with events observed in Japan, Scandinavia, South-east Asia, and other emerging countries. It has been argued that an intermediated financial system 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. Public policy should be directed at ensuring an asset price bubble does not occur. However, if it does occur and the inevitable collapse in asset prices leads to a banking crisis, swift intervention to eliminate the debt-overhang problem is desirable.

We have focused on one model of the genesis of a financial crisis, in which financial liberalization leads to an asset-price bubble which then collapses and causes a banking crisis. There are other causes of financial crises and these have been studied elsewhere. For example, financial crises may result from real shocks to asset returns that occur as an integral part of the business cycle. Allen and Gale (1998*b*) analyse this type of crisis and show that, under certain circumstances, the allocation of risk bearing under a *laissez-faire* policy can be optimal. There are also circumstances in which monetary intervention by the central bank is optimal. The general conclusion is that the central bank should provide enough liquidity to prevent costly liquidation of real assets, but should not try to prevent the banks from passing on to depositors the costs of the underlying real shocks to the economy. Allen and Gale (1999) discuss the phenomenon of *contagion*, in which a small shock to one sector of the financial system can spread throughout the whole system and cause a widespread crisis.

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