

**FINANCIAL DATA NEEDS FOR MACROPRUDENTIAL
SURVEILLANCE – WHAT ARE THE KEY INDICATORS OF RISKS TO
DOMESTIC FINANCIAL STABILITY?¹**

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Abstract

'Macroprudential surveillance' - monitoring conjunctural and structural trends in financial markets so as to give warning of the approach of financial instability - is immensely important given that financial crises can have huge costs. In this context, this paper presents three complementary lectures, which set out in generic terms the financial data needed for monitoring risks of financial instability. To ensure a firm basis for the analysis, with a coherent and economical choice of data, we consider that it is important to build up to the full list of data in a series of steps. So, we start with a view of the nature of financial instability, and the types of turbulence, that might pose particular systemic dangers, and the implications they have for data needs. These together give building-blocks for the listing in the third lecture of the types of financial and macroeconomic data that are needed for macroprudential analysis, and a suggested approach to their interpretation. We also give a practical example, by looking at how theory and data respectively gave clues to the approach of the Asian crisis of 1997-8 and in this context, notes the data actually available in Thailand at the onset of the crisis in 1997.

Overall, it is suggested that the theory of financial instability and the experience of financial crises in the past provide sufficient material to enable meaningful use to be made of financial and macroeconomic data in macroprudential surveillance. Such data may include econometric forecasts, as well as current information. In using such data, judgement is crucial in assessing of risks to financial stability - macroprudential surveillance can never be mechanistic. At most, crises resemble each other in terms of broad-brush features that tend to accompany one another and follow recognisable temporal patterns. Nevertheless, we maintain that detailed knowledge of the sequence of events in past crises, both directly and as encapsulated in theory, is a *sine qua non* to interpreting the data. In addition, there is a need for development of broad information on what constitutes normal conditions in an economy, as well as the patterns that have often preceded financial crises in the past both domestically and internationally.

Given the shortcomings in the data available for many countries, especially in the emerging markets, considerable efforts to improve coverage and timeliness are warranted. Besides macroeconomic data, emerging-market countries may need to lay particular emphasis on better banking data, given the structure of their financial markets, which is typically bank-dominated. They may also need to improve market discipline by improved disclosure and transparency of the public and private sectors.

It is emphasised that although this paper is principally directed to public authorities, as background for the conduct of the supervisory policy and monetary policy, private sector agents also have a role to play in monitoring the risks they face as a consequence of the behaviour of the overall financial system. They are, therefore, encouraged to undertake their own analyses of risks at a macro level.

Introduction

This paper presents three complementary lectures, which set out in generic terms the financial data needed for monitoring risks of financial instability. We define financial instability (also referred to as ‘financial disorder’ or ‘systemic risk’) as a sequence of events entailing heightened risk of a financial crisis, where a financial crisis is seen in turn as ‘a major and contagious collapse of the financial system, entailing inability to provide payments services or to allocate funds for investment’.² Note that instability of institutions and markets tends to be a necessary but not sufficient condition for a financial crisis in this sense.

‘Macroprudential surveillance’ - monitoring of conjunctural and structural trends in financial markets so as to give warning of the approach of financial instability - is immensely important given that financial crises can have huge costs. For all estimates of the potential costs of financial crises suggest that they are huge and broadly distributed across the economy. The IMF (1998a) suggested that on average banking crises impose costs of 14-15% of GDP; this rises to 17-19% if they are combined with currency crises. Recovery typically takes 3-5 years. The cost of restructuring banking sectors alone was as much as 10% of GDP in Scandinavia, and more than 30% of GDP after crises in some emerging markets such as Argentina, Chile, Uruguay and Kuwait. It goes without saying that the crises also entailed widespread insolvencies in the financial sector and associated job losses up to the highest level in affected financial institutions. There is hence an immense premium on timely warnings regarding systemic risks as an input to policy decisions as well as to strategies and market behaviour of financial institutions.

To ensure a firm basis for the analysis, with a coherent and economical choice of data, we consider that it is important to build up to the full list of data in a series of steps. So, we start with a view of the nature of financial instability, and the types of turbulence, that might pose particular systemic dangers, and the implications they have for data needs. We then selectively combine these suggestions and make a list of data needs and methods to analyse such data. Accordingly, the first lecture provides an overview of the main theories of financial instability that have been proposed in the literature, and lists the financial and macroeconomic indicators that they highlight. The second lecture outlines the main types of systemic financial instability that have been observed, drawing mainly on experience of OECD countries, and the stylised indicators that they suggest to be important. We also assess some of the recent empirical work on banking crises and the data used to predict such events econometrically.

² An issue arises as to whether the definition should include the mispricing of financial assets. We suggest that though this may accompany a financial crisis, the failure of payments and of allocation of funds are the defining features. Arguably, mispricing of financial assets is quite common (eg in asset bubbles, exchange rate misalignments and mispricing of credit risk) without entailing a financial crisis, or even systemic risk, whereas failure of payments and of credit allocation are only seen in a crisis. Mispricing may nonetheless, we suggest later, be part of the overall pattern that builds towards a crisis.

These together give building-blocks for the listing in the third lecture of the types of financial and macroeconomic data that are needed for macroprudential analysis, and a suggested approach to their interpretation. The chosen data is basically a combination of the data highlighted by theory and experience in the first two lectures. The chosen data-set draws on the full range of data likely to be available in an advanced OECD economy, which other countries are urged also to provide. In the final section of this lecture we give a practical example, by looking at how theory and data respectively gave clues to the approach of the Asian crisis of 1997-8. In this context, using the example of Thailand, we note the subset of our "ideal data-set" likely to be currently available even for emerging market economies for the purposes of macroprudential surveillance.

Throughout, it is emphasised that judgment is crucial in assessing of risks to financial stability, and that macroprudential surveillance can never be mechanistic. At most, crises resemble each other in terms of broad-brush features that tend to accompany one another and follow recognisable temporal patterns. Nevertheless, we maintain that detailed knowledge of the sequence of events in past crises, both directly and as encapsulated in theory, is a *sine qua non* to interpreting the data. It is also emphasised that although this paper is principally directed to public authorities, as background for the conduct of the supervisory policy and monetary policy, private sector agents also have a role to play in monitoring the risks they face as a consequence of the behaviour of the overall financial system. They are, therefore, encouraged to undertake their own analyses of risks at a macro level.

LECTURE 1: THEORIES OF FINANCIAL INSTABILITY AND RELATED INDICATOR VARIABLES

1.1 Theories of financial instability

We start by outlining the various theories of financial instability that have been proposed in the economic literature, before considering what data they highlight. A detailed comparative summary of the theories is provided in Davis (1995a). We emphasise at the outset that we consider that all of the strands of theory presented here have a contribution to make to our understanding of financial crises, but that the explanations are in most cases partial. In our view, it is best to adopt a selective synthesis of the theories, drawing also on the evidence of actual crises set out in the second lecture. We maintain this approach in our listing of data in Lecture Three, which draws on both theory and experience.

Theories emphasising debt and financial fragility (commonly associated with Fisher (1933), Kindleberger (1978) and Minsky (1977)) consider financial crises to be a key feature of the turning-point of many business cycles, a response to previous "excesses" of borrowing that can occur in a variety of financial markets. Their work is based largely on observations of periods of financial instability up to and including the Great Depression. These theories first pinpoint the concept of a so-called displacement - an exogenous event leading to improved opportunities for profitable investment - which triggers the cyclical upturn. Second, they highlight financial innovations (eg new forms of bank liability) ,which boost the supply of credit and/or the velocity of circulation of money, and enable supply and demand for finance to remain in balance during the fixed investment boom that follows the displacement. However, sharp increases in demand for credit mean that interest rates eventually rise, which leads to "financial fragility".

Features of fragility include an increase in debt finance, a shift from long to short-term debt; a shift from borrowing that cash flow adequately covers to borrowing that it does not covered at all; a heightening of speculative activity in asset markets; and a reduction in margins of safety for financial institutions. Further rises in interest rates, perhaps due to policy tightening, can lead to systemic risk and financial crises, with contagious bank runs and resulting inability to provide payments or allocate credit. The fact that financial crises are seen as a common feature of the business cycle may be seen as indicating *ex-ante* mispricing of risk in relation to normal – and broadly predictable - cyclical developments. This is a controversial feature of this strand of theory. In addition, some advocates of this approach adopt a perhaps excessively broad definition of financial crises, including sharp changes in asset prices with no adverse systemic consequences.

The monetarist approach (linked to Friedman and Schwarz (1963)) emphasises contagious banking panics, which may cause monetary contraction. Banking panics arise from a public loss of confidence in banks' abilities to convert deposits into currency. This may be caused by failure of an important institution, which

may in turn stem from failure of the authorities to pursue a steady and predictable monetary policy (for example accommodating inflation then tightening policy sharply; or abandoning a currency peg). “Regime-shift” policy changes are held to be inherently unpredictable, and so a crisis is consistent with accurate *ex-ante* risk pricing. On the other hand, adherents of this approach often adopt an excessively narrow view of a financial crisis, limiting it to the systemic consequences of a fall in the money supply only.

Bank runs themselves (Diamond and Dybvig (1983)), which are important in both the financial-fragility and monetarist paradigms, may be seen in terms of the “liquidity insurance” banks provide to depositors by pooling risk; banks' assets are mainly long-term and illiquid, and so banks engage in maturity transformation. This feature gives an incentive for panic runs on banks even if solvent, because of imperfect information regarding the bank's assets, inability of the bank to sell or cash illiquid assets (ie loans) at par, and the “first come first served” process by which claims are met. According to the original model, the risk that others depositors may withdraw can cause a panic regardless of the underlying financial position of the bank, and may effect both other banks (via contagion) and borrowers without access to other sources of funds. However, Gorton (1988) provides data suggesting that systemic panics are not random events, but are linked to changing perceptions of the riskiness of banks by depositors at the onset of recessions. Runs and panics may of course be counteracted by lender of last resort or deposit insurance,³ at a cost in terms of moral hazard (see Section 1.2). The theory also applies to liquidity failure in securities markets, where “one-way” selling due to pervasive uncertainty, or asymmetric information between market makers and investors, may lead market liquidity to collapse (Davis 1994, 1999).

Parallel to the assumptions of the monetarist approach about shifts in policy regime, other theories of crisis focus on uncertainty (Shafer (1986)). Following Knight (1921), uncertainty is defined as pertaining to future developments that cannot be reduced to objective probabilities (eg financial crises), and also providing opportunities for profit in competitive markets. It thus contrasts with risk, which refers to events for which in principle probability analysis can be employed. Behaviour of markets for new financial instruments, which have not yet been present in adverse market conditions, may be particularly subject to uncertainty in this sense. Responses to uncertainty, for example by lending officers in banks, may be to apply subjective probabilities to uncertain events – (such as the occurrence of a policy regime shift or financial crisis) - and add a risk premium. But agents often tend to judge such probabilities by the actions of others (‘herding’⁴), which can collectively lead to systemic financial instability. (One feature of herding is that individually low-risk strategies may collectively raise system fragility.) In the presence of uncertainty, adverse surprises may trigger shifts in confidence, affecting markets more than seems warranted by their intrinsic significance; and so lead to a crisis. Confidence and uncertainty effects may

³ Note that the lender of last resort is intended to deal with liquidity problems at solvent institutions, whereas deposit insurance can deal with insolvency issues.

⁴ ‘Herding’ may be defined as willingness of financial institutions to imitate each others’ portfolios and pricing strategies, even if this is contrary to long-run profit maximisation.

also trigger falls in consumption and investment relative to income that broaden the effects of the crisis on the macroeconomy.⁵

Paradigms of credit rationing (Guttentag and Herring (1984)) suggest that financial crises are characterised by abrupt increases in credit rationing. Extending the theories stressing uncertainty outlined above, a further distinction is made between systematic market risks, such as recession and financial crises, - which are subject to much greater uncertainty, as outlined above. In the case of recession, it is suggested that *ex ante* risk-pricing is generally accurate as such events occur frequently and are generally well understood. But for financial crises and other uncertain events, there is no such presumption; competition may drive prudent creditors from the market, as they are undercut by those disregarding the likelihood of financial crisis, because of ignorance or hope of competitive advantage.

In addition to competition, various psychological factors underlying this pattern of 'disaster myopia'⁶ may be identified, notably a tendency to calculate probabilities by how easily past occurrences are brought to mind, which declines with time, as well as institutional factors such as short periods over which loan officers are assessed, and asymmetry of outcomes for managers and shareholders. These tendencies, which imply declining expectations of financial crises during periods of calm, may lead to declining capital positions, loosening of "equilibrium" price and quantity rationing of credit, and hence increased vulnerability of creditors to shocks, since the actual probability distribution of shocks has not changed. Expectations and reality may thus drift apart during a period of calm, until a financial shock leads to an abrupt increase in credit rationing, as lenders become aware of their imprudence triggering a crisis.

Asymmetric information and agency cost theory (Mishkin (1991)) suggests that the well-known problems of the debt contract, namely moral hazard and adverse selection arising from information asymmetry between borrower and lender, and absence of complete contracts, can also account for sharp contractions of credit and financial instability. For example, if interest rates rise, there may be a sharp increase in adverse selection (only the worse-quality borrowers are still willing to borrow), thus leading to a decline in the supply of credit. Higher uncertainty (so that screening of borrowers by lenders is more difficult) increases adverse selection, and may also reduce the supply of credit. Collateral values may be reduced, which again would tend to increase adverse selection. And borrowers with low net worth (due to an asset price collapse) offer greater moral hazard to lenders, as they have less to lose by default. High-risk borrowers typically suffer in a "flight to quality". Finally, if there are bank runs, a sound bank can protect itself by increasing liquidity at the expense of loans, again leading to a contraction of credit. Asymmetric information also gives a view of the spillover effects of financial crises on the real economy. Developing from the financial-fragility paradigm, Bernanke (1983) suggests that bank failures eg in the Great

⁵ See Davis (1995b)

⁶ 'Disaster myopia' may be defined as a tendency to disregard uncertain, low-probability, high-risk hazards.

Depression destroyed private information on borrowers, raising real costs of intermediation, inducing credit rationing and widespread insolvencies.

We suggest that an industrial analysis based on the effects of changes in entry conditions in financial markets (Davis (1995a)) can provide a supplementary set of underlying factors and transmission mechanisms. Easing of entry barriers may be caused by deregulation, technical progress or market developments reducing the comparative advantage of incumbents over new entrants. Note that such a framework does not require actual new entry – rather, the key is that the sunk (irrecoverable) costs of market entry should decline. This may be reflected in more competitive behaviour by incumbents, in order to protect themselves from the threat of entry. It is commonly observed that such changes in entry barriers do not merely entail reductions in profits and/or smooth elimination of excess capacity, but rather that reductions in spreads and increases in quantities of credit go beyond the equilibrium level, (ie the level at which lenders can make normal profits on their lending business on average over the cycle), leaving the institutions involved vulnerable to financial instability. Drawing on the theories outlined above and applying the logic of market competition, it is argued that the following mechanisms *inter alia*, may play a role:

- To the extent that new entrants to financial markets can induce borrowers to switch away from established credit relationships or offer extra credit (by offering lower prices), information-based linkages will be weakened and existing information devalued⁷.
- Uncertainty may be increased by new entry. Incumbents may be unable accurately to predict the responses of new entrants to changing conditions, and their existing knowledge of market dynamics will be rendered less useful. Entrants, inexperienced in the market, will face even greater uncertainty. Unaware of the dynamics of supply and demand in the market, they may be prone to herd-like behaviour, for example all lending to the same type of client. When the market itself is new, (or after liberalisation, where interest rate controls prevented lending to risky borrowers), all institutions will face uncertainty.
- Competition may cause firms to make inadequate provision for uncertain events such as financial crisis, because firms that make adequate provision are undercut by those disregarding such possibilities for reasons of ignorance or competitive advantage (cf. the “credit rationing” paradigm noted above). New entrants may be particularly prone to such undercutting.
- Sufficiently short time-horizons may even make firms disregard systematic risks such as the economic cycle in their risk appraisals, and so again, via the process of competition, help to reduce the prudential standards for the whole market. Hit-and-run entry as predicted by the theory of contestable markets must by its nature have a short-time horizon.⁸

⁷ Conceptually, new lenders may be seen as “cannibalising” existing market information and structure, to the detriment of existing firms. Despite this, however, new lenders are still likely to lend on the basis of inadequate or asymmetric information during the initial stages. Thus for both types of lender, entry may lead to a lowering of credit standards.

⁸ Besides the features outlined above, which are of particular importance in financial markets, there are several more general features of competitive processes may cause overshooting of competitive equilibrium. Firms earning normal profits on their

- Competition for market share, as stressed by managerial theories of the firm - an approach frequently adopted by entrants, or in new and developing markets - may lead to cumulative reductions in market prices until it is checked by losses for participants, and withdrawal or retrenchment. Such competition may persist if participants can cross subsidise their operations from others making excess profits (ie there is a market failure elsewhere) and they are relatively immune to take-overs, as is the case for banks in most countries. Evaluation of loan officers over a short period on the basis of current lending performance is typical of market-share oriented banks.

Fitting in to the context of this industrial analysis (Keeley (1990)⁹ highlights the incentives for risk-taking provided by banks operating at low equity values. He shows that deregulation may lead directly to incentives for risk-taking by financial institutions, even abstracting from the safety net (see below). In a regulated market, where banks have a degree of market power in making loans, the bank's charter is a capital asset, and banks have incentives not to risk failure by reducing capital or increasing asset risk, even in the presence of a safety net. Deregulation that facilitates new entry, or that liberalises rate-setting on bank liabilities, reduces the value of the charter, especially for banks in protected local markets that rely on non-price competition to attract funds. Risk-taking becomes more attractive, as the potential loss from bankruptcy is lower, and hence a higher mean and variance of profits may be sought. Such incentives will of course be increased by mispriced safety net protection.

As noted, in our view these theories are best seen as not mutually exclusive, but rather as identifying relevant, though partial, features of financial instability. This becomes apparent when considering features of actual periods of financial instability (as in Lecture Two). Hence, there is a need to select key features from the full range of these theories to develop data needs for macroprudential surveillance. We now go on to add two additional points on the theory side, before considering what data needs the various theories highlight.

1.2 Additional considerations - the safety net and international aspects

Besides the main theories of "domestic financial instability", it is relevant briefly to consider the importance of regulation and of international aspects.

existing products may all be simultaneously attracted to situations offering potential for growth, but individual firms are unable to predict in advance whether rivals will follow. Such tendencies will be particularly marked if there is no clear ordering of firms in terms of likelihood of success. Once investments are sunk, entry decisions may be difficult to reverse. Moreover, if there are sunk costs, firms may find it optimal to stay in the market for some time even if they make losses, as they will lose sunk costs of reputation etc. if they leave. During this period, they may be vulnerable to adverse conditions in financial markets.

⁹ See also Marcus (1984), which introduced the concept of charter value, Demsetz *et al* (1996) which provides micro evidence, and the recent contribution by Milne and Whalley (1998)

Regulation is clearly an appropriate response to potential systemic risks in financial markets. But it must first be noted that inadequacies in regulation may heighten tendencies to take excessive risks. For example, if it is considered that all banks getting into difficulties will be saved, increases in competition (in particular on the part of new entrants) may lead to incentives to take excessive risks, ignoring the externalities imposed on other intermediaries (who also help finance the lender of last resort) and on the lender of last resort itself. Moreover, lenders in the interbank market may not have the correct incentives to discriminate between banks (by price or quantity rationing) and discourage risk-takers.¹⁰

Although this lecture series is about domestic financial crises, it can be argued that international elements should not be disregarded.¹¹ Indeed, one factor missing from the above “closed-economy” theories is consideration of the role of international capital flows. Traditionally, the focus of the literature on exchange rate crises (Krugman (1991)) has been on the possible gains from speculation against a depreciation of a fixed parity, given the size of the nation’s foreign exchange reserves and various fundamental factors, notably the net external asset position and the balance of payments. Some models suggest that such a process is akin to bank runs described above.

The contribution of international capital flows to recent crises and their international transmission (see Table 2B) introduce a number of additional elements. In particular there is the issue of exchange rate pressure, resisted by the authorities via interest rate increases, which may triggering or aggravate financial instability. Second, one may instance the complications introduced by the financing of the public or private sector in foreign currency, which makes balance-sheet positions sensitive to exchange rates, and leads to a potential link from depreciation in the context of a currency crisis to more general financial instability. This danger will be especially acute if foreign exchange reserves are too low to cover the debts in foreign currency, – or are already exhausted by the preceding currency crisis. In this context, note that financial liberalisation was often linked to removal of controls on capital movements, allowing newly liberalised financial intermediaries to take on yet more risk by borrowing in foreign currency.¹²

Third, there is the increasing role of institutional investors as a conduit for capital flows. As they are under severe pressure to perform in line with peers, they are particularly likely to “herd” into rising markets and to seek rapid withdrawal from falling markets, destabilising domestic financial markets and exchange rates (Davis 1995c). Fourth, there is a possible link of contagion where there are cross-country similarities in trade patterns (Glick and Rose (1998)). More generally, the features noted in the ‘domestic’ theories may generalise to an international level, such as new entry to international lending of institutions that may lack adequate information on their customers; the role of confidence (eg in currency pegs); banking panics and

¹⁰ In the case of excessive regulatory protection, “excessive competition” can arise despite knowledge by lenders of the true probabilities of cyclical shocks and even the distribution of disastrous outcomes. Institutions may as a consequence hold inadequate capital on a risk adjusted basis.

¹¹ Nevertheless, we acknowledge that a fuller treatment of international aspects would require a paper in itself.

¹² Kaminsky and Reinhart (1996) show that currency crises are often preceded or accompanied by banking crises.

contagion at an international level; credit rationing (manifested eg in tiering of interest rates for banks from a given country); and moral hazard.

1.3 Financial data requirements for analysing risks to financial stability, derived from theory

What are the main indicator variables indicated by the theories, and which may be used as "building blocks" in the more detailed selection of data in Lecture Three?

The theory of debt and financial fragility tends to emphasise the importance of rising corporate or household debt accumulation relative to assets as indicating vulnerability to financial instability. This may accompany fixed-investment booms, especially in real property, or (more generally) long-term and rapid overall economic growth. Asset-price increases typically accompany such patterns. Again, a move to short-term debt, a rise in income gearing and a shift of the corporate or household sector into deficit may give warnings of imminent heightened fragility. Consequently, there is a need to focus on prices, quantities and maturities in credit (loan or bond) markets, overall macroeconomic and investment trends, sector-balances and asset prices.

The monetarist approach clearly emphasises the growth of monetary aggregates as a factor preceding financial instability. A classic pattern is accommodation of excessive monetary growth, accompanying rising inflation, followed by a sharp and unexpected rise in official interest rates to combat such inflation, and flat or declining monetary aggregates accompanying a banking panic. But this is only one possible pattern of monetary developments that might precede instability. Another is pressure on a fixed exchange rate due to a loss of competitiveness, in the context of inflation leading to abandonment of a currency peg and resulting solvency problems for those borrowing in foreign currency. Overall, the implication is that besides a focus on monetary data and actual and expected inflation *per se*, we need to consider scenarios of abandonment of the authorities' central approach to monetary policy and its consequences for the burden of indebtedness in the economy. A critical assessment of monetary policy is needed in this context, eg in the light of trends in real exchange rates in the case of a currency peg.

The means of assessing the risks of bank runs¹³ may include the range of indicators of banks' conditions that micro (ie individual bank) data on balance sheets and profit and loss can provide. These include capital adequacy, overall interest rate margins, returns on assets or equity, the nature of banks' assets and loan concentration to sectors or borrowers.¹⁴ As wholesale depositors are often seen as readier to "run" than

¹³ We do not subscribe to the view that banking crises are "sunspots" or random events, but do acknowledge that crises may have a self-fulfilling element (which may be linked to uncertainty), such that the scale of crises may be out of line with gravity of the initial shock.

¹⁴ In particular, sectors whose returns are subject to sharp variability, such as property companies.

retail,¹⁵ the balance between types of funding is also important. Meanwhile, interbank claims may give evidence on the counterparty risk arising from direct exposures; and the structure and similarity of banks' balance sheets may offer information as to whether contagion could operate via this route. These suggestions imply use of micro data on the banks' balance sheets and profit and loss, and a focus on the mean and distribution of balance-sheet structures in the banking sector. Detection of major individual banks that may be "outliers" is also important, although this raises the issue of identifying 'core' banks (eg by criteria such as size, payments system activity or international scope). Price data such as spreads between interbank claims and risk-free assets such as treasury bills (or on a longer-term basis, between bank bonds and government bonds) give an indication of the markets' overall risk perceptions for the banking sector. Bank share prices are a complementary indicator, although they are less accurate indicators of changing credit risk. Finally, there may be important qualitative information about how likely it is that insolvency will become contagious. These include the details, timeliness and frequency of disclosure to regulators or shareholders, whether the interbank market is collateralised, whether the payments system is net or gross, regulation of over-the-counter positions, and perceptions of the credibility of the central banks and regulatory authority.

Vulnerability of markets to liquidity failure has historically tended to coincide with small numbers of market makers with low levels of capitalisation, often in markets that have grown rapidly, and/or failure of investors who had held a large proportion of market assets. Extreme forms of herding and adoption of similar strategies by borrowers or investors has also tended to be a feature. Adverse consequences depend on the degree of dependence on market financing of key agents in the financial or non-financial sectors.

Uncertainty, credit-rationing and asymmetric-information theories in a way summarise the previous types of theory, and highlight many of the same variables. They highlight in particular the pattern of loan spreads over time (with a marked deviation from long-term averages, first in excessive compression and then on the upside reflecting adverse selection and credit rationing), and the incidence of competition and herding, (eg into new markets) by financial institutions. Rapid growth of markets, in particular those for new financial instruments, typically require vigilance owing to the heightened uncertainty and the likely incidence of "disaster myopia". Uncertainty itself may be suitably proxied by volatility of options prices or parameter estimates derived from GARCH models. Credit-rationing cycles may be predicted by falling bank capital ratios and new access to credit by sectors that were previously rationed. Theories stressing asymmetric information focus in particular on the importance of net worth of borrowers as an indicator of potential moral hazard and adverse selection. This may be proxied by equity and property prices, or debt/equity ratios. It may be noted that a fall in inflation can also reduce net worth in real terms by increasing the real value and burden of fixed-rate debt.

¹⁵ First, such depositors have better information than their retail counterparts; second, they tend not to be covered by deposit insurance.

The industrial analysis introduces some additional potential elements to financial surveillance. In particular, it would tend to stress the need for careful attention to changes in market structure and behaviour. New entry is an obvious indicator, but as emphasised by the theory of contestable markets, even potential competition is enough to generate changes in behaviour that may have systemic consequences via uncertainty, disaster myopia etc. A strand of the empirical literature on banking has developed indicators of contestability derived from the properties of bank revenue functions (see De Bandt and Davis (1998)).¹⁶ In addition, a number of the features discussed above again come to the fore, such as patterns of herding into new and rapidly growing markets, market-share competition, and narrowing margins as competition increases. Deregulation is seen as a common trigger for overlending, which may be accompanied by objective measures of the presence of excess capacity in the banking sector (such as low profitability and high branch-to-population ratios). As is well known, the generosity and degree of mispricing of the safety net in combination with low charter values may also enhance risk-taking. The history of “rescues” in terms of deposit insurance in addition to bank equity values, non-performing loans and capital adequacy may come to the fore in this context.¹⁷

International elements to add to the above include resistance to exchange rate pressure by the authorities (by intervention, or interest rate rises), the scope of foreign-currency borrowing (also relative to foreign exchange reserves), and the nature of capital inflows generally. The current preferences of the institutional investor community, and whether all are adopting similar investment strategies, may help one to predict unsustainable levels of capital inflows. It is also relevant to know how far the economy in question is vulnerable to shocks e.g. affecting commodity prices.

Hence, the theory give a rich menu of suggested data for macroprudential surveillance. However, we emphasise that complementary analysis of actual experience is needed before coming to any definitive views on data selection. Judgment is also needed as to what existing data is best used to illustrate the effects that the theories highlight. In Lecture Two, we turn to actual experience.

¹⁶ The intuition is that if revenues rise in line with costs, the industry is behaving in a contestable manner, whereas if they are unrelated, there is a form of monopoly.

¹⁷ Non-performing loans may be of particular relevance, as they give an indication of risks to capital adequacy from future write-offs

LECTURE 2: DERIVING INDICATOR VARIABLES FROM EXPERIENCE OF FINANCIAL INSTABILITY

2.1 Types of financial instability

The variety of theories outlined in Lecture One might suggest that financial crises themselves come in many different forms. In fact, historical experience suggests that financial instability manifests itself in three main ways, although within these broad groups there are many sub-categories and further distinctions to be made (see Table 1). It is suggested that study of these types of instability, in the context of the specific features of particular crises and in the light of theory, can help in pinpointing data needs.

One generic type of crisis is bank failures following loan or trading losses. This may link to the full range of behaviour outlined in the theories. Examples (see Table 1) include the LDC debt crisis, the banking crises in Japan, the Nordic countries and Australia, the US thrifts crisis and the Asian crisis. Many developing countries have suffered such crises in recent decades. Within those banking crises, one may distinguish those that were confined to the domestic financial system as from those that are also linked to cross-border bank lending and indebtedness in foreign currencies (LDC debt, Asia).¹⁸

A second type involves extreme market price-volatility after a shift in expectations. Such crises are distinctive in that they tend to involve institutional investors as principals, and are focused mainly on the consequences for financial institutions of sharp price changes which result from institutional “herding” as groups of such institutions imitate one another’s strategies. Whereas violent price movements may in themselves not have systemic implications,¹⁹ these may emerge when such movements threaten eg institutions that have taken leveraged positions on the current levels of asset prices. Examples are the stock-market crash of 1987, the ERM crisis, the 1994 bond market reversal and the Mexican crisis. There were also elements of this in the Asian crisis.

A third type, which is linked to the second, involves protracted²⁰ collapse of market liquidity and issuance. Also often involving institutional herding, the distinction from the second type is often largely one of whether markets are sufficiently resilient, and whether market-maker structures are suitably robust. In addition, such crises tend to occur in debt rather than equity or foreign exchange markets. The risks are acute not only for those holding positions in the market, but also for those relying on the market for debt finance or liquidity, which increasingly include banks. Examples in the past have tended typically to be rather specific and idiosyncratic markets, which by nature relied on a narrow investor base, market-maker structure and/or issuer base (junk bonds, floating-rate notes, Swedish commercial paper, Ecu bonds).

¹⁸ Note that both types of crisis were at times linked to international economic developments hitting the macroeconomy.

¹⁹ They may, however, lead to resource misallocation.

²⁰ It is not denied that all sharp price changes will tend to affect market liquidity to a greater or lesser degree.

However, the events in 1998 following the Russian default and the rescue of the hedge fund LTCM were much more serious, as liquidity failure was threatened in markets such as the US securities repurchase (repo), swaps, commercial paper (CP), corporate and Treasury bond market (see IMF (1998), Davis (1999)). The main historical precedent was the Penn Central Bankruptcy and its effect on the US commercial paper market. In these cases, liquidity was threatened in core markets, thus leading the US authorities to take decisive action.

A cross-cutting set of distinctions may be made in terms of the broad causes of financial instability. Here, one may highlight that a number of crisis situations began with financial deregulation (such as the Scandinavian and Japanese banking crises), with the behaviour of financial institutions in the wake of this “displacement” leading to a build-up of corporate and personal debt to unsustainable levels, and then to financial fragility. More generally, deregulated financial systems may be more subject to instability in the longer term (see Demirguc-Kunt and Detragiache (1998b) and Section 2.3). Second, there are crises characterised by disintermediation and reintermediation of financial flows from banks to non-banks (such as the UK secondary banking crisis (1973) and the initial US thrifts crisis (1980)), which has proven a cause of difficulty for the institutions facing adverse flows of funds. A third sub-category is financial instability caused by the failure of a single large institution whose position at the core of the financial system has potential consequences out of proportion to its size (such as Continental Illinois). Commodities (LDC debt) and property-related lending and speculation (secondary banking, Scandinavia, Japan) have been a significant source of instability in the past, owing to their heavy demands for capital, and uncertain returns due to cyclical instability of prices.

One can also distinguish those crises linked to international debt, where the additional complication of foreign-currency liabilities enters the picture (Asia, LDC debt). Finally, there are crises with an equity-market linkage, whose systemic aspect may reflect the presence of leveraged institutions recycling money back into the market, “illusions of liquidity” due to innovative trading techniques, or equity held as an asset on banks’ books (eg the stock market crash of 1987, and the recent banking difficulties in Japan).

Finally, experience suggests that there are some institutional preconditions for financial stability. Durable stability is unlikely if monetary policy is capricious and unpredictable, or where there is no provision for a safety net or regulation of capital adequacy. More generally, volatile inflation has often been a precursor to instability (see Caprio and Klingebiel (1996)).

2.2 Data requirements for analysing risks to financial stability, derived from stylised patterns of instability

Tables 2A and 2B summarise the features of selected individual financial crises from 1933-98. The tables highlight a restricted set of key features drawn from the overall listing suggested by the theory. We

consider these to be the most basic data-set that is suggested by actual experience as being common to crises in the past. They complement the broader set of variables highlighted by theory and presented in Section 1.3, and suggest possible ways of streamlining the required dataset.

Notably, in advance of crises, the stress is laid on:

- Unanticipated regime shifts towards *laxity* on the part of monetary, fiscal or regulatory authorities
- Debt accumulation (economy-wide, by individual sectors or in individual markets)
- Asset price booms (in either property or equity prices)
- Concentration of risk on the part of financial institutions (implying excessive optimism in respect of potential “correlations”)
- New entry of intermediaries to the relevant market
- Financial innovation (and rapid growth of the markets concerned)
- Declining capital adequacy of financial institutions
- And finally, monetary tightening or unanticipated regime shifts towards *rigour* on the part of monetary, fiscal and regulatory authorities.

Of course, many of these features have occurred separately without entailing a crisis, and indeed are part of the normal functioning of a market economy. It is their combination and acuteness that is crucial. There are conceptual distinctions between these features: monetary or other forms of policy tightening is a *triggering mechanism* that may indeed be warranted by the other elements, whereas most of the other elements are *propagation mechanisms* arising from an *initial shock* (such as a regime shift towards laxity, changes in regulation or technology in the real economy or financial markets, see Section 3.3). Moreover, not all of these features were present in all cases. Nevertheless, we suggest that they constitute a useful checklist derived from actual experience – and that the experiences themselves warrant considerable attention.

The impact of the crises can be judged by the last six elements in the table, namely credit rationing, market liquidity failure and/or bank runs; contagion between markets or institutions; international transmission; action by the authorities; a severe macroeconomic impact;²¹ and in some cases dysfunction of financial system and economic collapse. Although the last item is fortunately rare, its potential incidence as well as that of severe macroeconomic consequences reminds of the importance of detecting incipient financial crises well in advance.

²¹ The macroeconomic impact may be direct (eg via shifts in private or public sector financial balances) or indirect, as effects of a crisis on GDP or imports of a country in difficulties affects other countries’ exports and GDP, possibly inducing further financial stability. The latter may be seen as a form of “real contagion”.

2.3 A cross-check from econometric studies

Continuing to assess the lessons of experience, we now evaluate a number of recent econometric studies of the incidence of banking crises, which have sought to assess which financial and macroeconomic developments are closely linked to the emergence of such systemic crises. We consider that such studies provide a useful cross-check on the data needs for macroprudential surveillance, and their results may be a useful back-up to more judgmental analyses of financial crises. However, there are in our view considerable risks to strong reliance on such tools, as they omit the crucial element of judgement required, as well as failing to allow for the changing nature of financial markets, and the risks that may arise in the context of securities market intermediation. There may be important non-linearities, for example in the switch by banks from risk-averse to risk-loving behaviour as charter values decline, which linear econometric estimates may miss (although the logit function may give a helpful approximation to such behaviour). Furthermore, they may not detect the build-up to crises – which may take several years, - by focusing on the period when a crisis occurs, or that immediately preceding it.

A typical study is that of Demirguc-Kunt and Detragiache (1998a), who estimated a multivariate logit model, using data from a sample of 53 developing and developed countries over 1980-94. Banking crises were defined to occur in the context of at least one of the following: non-performing assets/total assets ratio of more than 10%, cost of a rescue of more 2% of GDP, large-scale nationalisation of banks, bank runs, and emergency measures such as deposit freezes/bank holidays/generalised deposit insurance policies. They pinpointed low economic growth and high inflation as key macroeconomic indicators of the probability of financial crises. High real short-term interest rates – often implemented in the context of a need to bring inflation under control - were also associated with systemic banking problems, as well as vulnerability to balance of payments problems (proxied by an adverse terms-of-trade shock) and to sharp capital outflows (ratio of M2 to foreign exchange reserves). Explicit deposit insurance schemes made crises more likely, pointing to a link to moral hazard in the context of the safety net. Interestingly, bank liquidity (bank cash and reserves as a proportion of bank assets), exposure to the private sector (ratio of loans to the private sector to total loans) and lagged credit growth were not significant at conventional levels (two years lagged credit growth was significant at 10%). Fiscal deficits and exchange rate depreciations were also insignificant.

Another paper by Hardy and Pazarbasioglu (1998) criticised this exercise for including contemporaneous variables, thus risking mixing causes and consequences of a banking crisis. They sought to identify only leading indicators by looking only at lagged variables in their logit estimates and also seeing the pre-crisis year as a separate event from the crisis. Nevertheless, they came up with a comparable set of indicators, focusing on data from 38 countries from 1980-97. They found that banking distress is associated with a sharp fall in GDP growth; boom-bust cycles of inflation, credit expansion and capital inflows; rising real

interest rates and an increasing incremental capital output ratio; declining bank deposits; a sharp fall in the real exchange rate, declining imports and an adverse terms-of trade-shock. They noted that there are regional differences in indicators, with the Asian difficulties (see Section 3.4) being preceded by credit growth and rising foreign liabilities, which proxied the vulnerability of the banking and corporate sectors.

Third, Kaminsky and Reinhart (1996) examined 20 developed and developing countries from 1970-95, to assess macroeconomic variables whose behaviour is systematically different in the period prior to banking and currency crises. Banking crises were preceded by recession, declines in the terms of trade, stockmarket crashes, real exchange rate appreciation, lending booms, increases in the money multiplier, and increases in real interest rates. Meanwhile, Gonzalez-Hermosillo *et al* (1997) found using Mexican data that bank-specific indicators and banking-sector variables (proxying contagion) indicate the *likelihood* of bank failure, whereas macroeconomic variables help to predict the *timing* of it.

In further work, Demirguc-Kunt and Detragiache (1998b) looked at the effect of financial liberalisation, using a dummy variable for the deregulation of bank interest rates as the defining event. They found that banking crises were more likely to occur in liberalised financial systems, controlling for the variables set out above. Crises tended to occur a few years after liberalisation, and were linked to a decline in bank franchise value, possibly because monopoly power is eroded. (Bank franchise value was proxied by returns on equity.) This is consistent with the “industrial approach” to financial instability set out in Lecture 1. The crises were rendered more severe if the overall institutional environment of a country was underdeveloped, eg with low GDP per capita, and poor rule-of-law, quality of bureaucracy and contract enforcement.

In sum, the econometric estimates provide a complementary list of variables for macroprudential surveillance, although the caveats surrounding the practical use of such studies should be borne in mind.

LECTURE 3 : SUGGESTED DATA NEEDS AND A PRACTICAL APPLICATION

3.1 Overall considerations in selecting data

With the suggestions put forward in Lectures One and Two as background, in this final lecture we seek to define a detailed data-set of indicators of financial instability, and offer suggestions as to their use. We also provide an illustration of application in the Asian crisis, including an examination of warning signs readily available in the case of Thailand in June 1997. Note that the approach here is to combine on a selective basis the data suggestions set out in Sections 1.3 and 2.2, but to add value by defining the actual data items as precisely as possible.

In deriving data needs for financial surveillance from the theory and the stylised patterns outlined in the first lecture, an important consideration is economy in terms of the number of indicators employed. Failure in this regard may lead to including virtually all financial and economic data in macroprudential surveillance, and thus risking to fail to distinguish key warning patterns. A second is to derive data needs directly from theory and experience as outlined above. A central issue is then to assess what combinations of variables can offer consistent warning signs for potential turbulence, and its potential severity. What, in other words, can help us to give advance warning of a crisis? Third, the data needs will have to be sufficiently qualitative and general to cater for the fact that crises in the future are likely to differ from those in the past,²² whether in terms of markets affected, incidence or nature of resulting contagion. Fourth, and more generally, there will be an important qualitative aspect which extends beyond data per se to the inferences and assessments that central banks, supervisory authorities and market players may draw in the course of their normal operational activities. We consider this and other qualitative aspects to be crucial inputs to macroprudential surveillance.

Often it will be important to assess what the benchmark is for assessing risks to financial stability, a norm against which a current situation may be judged. For example average spreads over a long period provide a benchmark for the price of credit although judgement is needed in the light of changes in the credit quality of borrowers, as well as the occurrence of financial liberalisation. A more sophisticated approach would be to estimate equations for spreads (which could make credit quality and liberalisation exogenous variables) and assess deviations from predicted values out of sample. Cross- country benchmarks may in this context be helpful, although “normal levels” in terms of prices or quantities may also depend on the nature of financial relations and broad elements of financial structure within an economy. For example, traditionally relationship-banking countries have been able to sustain higher levels of corporate debt relative to equity or GDP than is prudent in those characterised by transactions banking (and, correspondingly, financial-asset price volatility is seen as less damaging to the macroeconomy). Even these patterns are not

²² Indeed, there is a clear danger of “fighting the last war” in seeking excessively precise and detailed data, rather than seeking broad patterns in the data.

fixed, however, and a decline in the scope of banking relations may warrant, for example, a lower debt-equity ratio than would otherwise be the case.²³

Another set of norms based in quantity data may be in terms of the abnormal growth of a certain financial market, which may indicate that risk-taking is high or increasing, and/or less experienced players are becoming involved. (However, indicators of pricing are needed to confirm adverse shifts in risk-taking.)

In the light of these considerations, we now assess overall data needs. It will be borne in mind that in going through the various theories in Lecture One, it was evident that there are considerable overlaps both in the explanations and the data needs. Equally, the stylised patterns of instability set out in Lecture Two tend to emphasise several of the theories, again suggesting a need for synthesis.

3.2 Types of financial data required for macroprudential surveillance

As mentioned, our broad generic data-set selectively combines these indicators suggested from theory and experience in Sections 1.3 and 2.3, while seeking as far as possible to offer variables that may actually be found in current datasets. We look at the variety of data highlighted in terms of types of data, (see in Table 3). The types of data are: flow-of-funds data, financial prices, monetary data, detailed data on banks, qualitative data, external data and macroeconomic data. Drawing on Lectures One and Two, we also show the sign of change in variable that typically indicates heightened risks to financial stability. Note that in some cases variables have two signs, showing the pattern during the longer-term build-up to a crisis and when it is about to occur.

We should emphasise at the outset that this ideal set of data will not always be available in emerging-market economies. Section 3.4 on the Asian crisis highlights some of the narrower data-set that may be usable and available for such countries. Nevertheless, we see such analysis as an imperfect substitute, and encourage the necessary deepening of the statistical infrastructure.

First, there is a need for flow-of-funds data (in the form of flow and stock data).²⁴ This is required crucially in order to track overall patterns of corporate and household sector gross indebtedness, relative to income (sectoral income or GDP) or gross financial or total assets. Also relevant are corporate sector gross debt/equity ratios; related shifts by households or companies into financial deficit (defined relative to GDP); rises in income gearing (interest payments as a proportion of income); shifts in the pattern of intermediation towards or away from the banking sector (as shown by the total assets of banks relative to non-bank financial institutions); and rapid growth of lending in *any* individual market, to a given sector or

²³ Such a shift is widely predicted in the context of EMU, see Davis (1998).

²⁴ Note that many countries lack such a dataset, and the OECD has ceased to publish comparative data on corporate balance sheets.

region. In the flow-of-funds context, information on investment patterns of institutional investors, the balance between sources of corporate debt finance in banking and bond markets (to assess vulnerability to crises in different institutions or markets) and maturity of debt (where short-term debt implies heightened risks) may also be helpful. Flow-of-funds data should also provide broad measures of the developments in banking (eg balance-sheet expansion and capital adequacy), although data on income and expenditure and micro data (discussed below) must supplement this. Some proxies can be suggested if there are no flow-of-funds data; in particular, the private sector deficit may be tracked by identity using the the public sector and external sector financial positions (since the three together add up to zero). Private sector debt may be proxied by the stock of bank lending to the non-bank private sector as a proportion of GDP.

Second, various financial prices may give a valuable direct indicator of the degree of risk perceived by markets, notably in respect of spreads on bank liabilities ie money-market and bond yield spreads over government/risk-free rates, and spreads on corresponding company liabilities (notably spreads on corporate bonds and bank loans to companies over government bonds (for fixed rate) and interbank rates (for floating). As noted, a benchmark is also needed, ie an indicator of what a "normal difference" is. A comparison of bank and corporate spreads should enable a view to be taken of whether underpricing (prior to a crisis) and risk-aversion (after the crisis) are localised in the corporate sector or also extend to the banking sector. Meanwhile, asset prices such as share price indices²⁵ and, particularly, property prices, may offer an indication of the degree of collateral available to lenders. Rapid rises in property prices have often foreshadowed equally precipitate falls, with loans going into default. Where property prices are unavailable, share prices of property companies can give a proxy. Judgment as to the deviation of asset prices from fundamentals will again be crucial in this regard. Finally, bank share prices give a view of the equity value of banks, and hence the risk of insolvency.

Third, monetary data together with inflation and nominal GDP projections are needed in order to assess whether growth in a broad monetary aggregate such as M2 or M3 is dangerously rapid (requiring future tightening of policy) or low or negative (threatening the financial sector with systemic risks). Velocity (the ratio of nominal GDP to money) offers useful supplementary information, although it will also be influenced by financial innovation and liberalisation. Correspondingly, the real short-term interest rate (ie the risk-free or interbank rate less the current rate of inflation) may give a view as to whether the monetary stance is unduly loose or tight. The credit counterpart of money (credit to the non-bank sectors) may give a rough indicator of incipient debt problems, in the absence of more detailed flow-of-funds data. Breakdowns of monetary data to show lending by sub-sectors of banking and to various industrial sectors and regions will be helpful in pinpointing potential risks that may be obscured by aggregate data.

Fourth, there is a need for more detailed data on banks and if possible other financial institutions with maturity mismatch which are thus subject to the risk of runs (eg investment banks). Such data would need

²⁵ In countries such as Japan, share prices also enter the calculation of banks' capital.

to be as timely as possible to be useful. Ideally, there should be micro data on individual institutions' balance sheets and profit and loss, which allow identification of averages across the sector, distributions within the sector and large individual outliers. These should include data on capital adequacy, liquidity (such as the maturity mismatch or currency mismatch), margins (ie net interest income as a proportion of assets), non-performing loans relative to capital, and overall returns on assets or equity. In a time-series form, such data should allow a view to be taken of the evolving competitive situation in the banking sector, new entry and the risks of excess capacity. A specific estimation of so called "H-statistics" for the banking sector (see De Bandt and Davis (1998)) year-by-year may give a direct indication of contestability of banking markets - the variables needed in addition to those noted above include measures of individual banks' costs and revenues.

Fifth, various types of qualitative data are required. These include recent easing of financial regulation that could provoke high-risk behaviour, and technological changes, which may affect entry barriers to financial markets. A proxy for liberalisation, suggested by the IMF (1998a), is the ratio of broad money to narrow money. Macroeconomic policy items in respect of the monetary regime, as well as the nature of the safety net as perceived by market participants, also fall into this category. In addition, there is a need for qualitative data on the scope of financial innovation and the potential for correlations between market prices. Data on aspects of financial infrastructure will give a view of the likelihood of financial instability becoming contagious (such as whether the interbank market is collateralised, whether the payments system is net or gross, regulation of over-the-counter positions and perceptions of the credibility of the central banks and regulatory authority).

Finally, as noted, there are important qualitative insights available from operational activities of central banks, supervisors and market participants which are likely to be available in advance of any disclosure, published and numerical data as well as helping the interpretation of such data. We should highlight in particular information on the strategies of banks and whether they indicate eg a particular focus on lending to a certain sector, as well as intelligence gathered from market contacts about buildups of positions and regarding the risks being undertaken by key players. Such intelligence will be of particular importance when the risk of financial instability is acute. The challenge is to systemise and organise use made of such intelligence in the light of theory and past experience of crises.

External data needed, besides the current account as a proportion of GDP and the real exchange rate, include the range of international banking data provided by the BIS for non-OECD countries, or, correspondingly, capital account data for OECD countries. These should enable one to pinpoint the scope of international foreign-currency lending, its maturity and sectoral distribution, and the difference between short-term liabilities of a country in foreign currency and short-term assets (i.e. largely, foreign exchange reserves). Similarity of trade patterns across countries in terms of products and markets served may give evidence of the risk of contagion across countries.

Finally, complementing the financial data, overall macroeconomic data are required in order to assess the current state of the cycle, notably the state of real business fixed investment (both overall and in real-estate). Real GDP data should show whether the cycle is sufficiently long-standing that a downturn may be expected or forecast²⁶ soon, and aid a judgment as to whether prices and quantities in credit markets are consistent with such a prospect. The information should ideally be regional as well as national (although most systemic crises have been at a national rather than regional level). Inflation gives additional evidence on the ease and tightness of monetary policy. Forecasts and expectations of GDP and inflation may give valuable further evidence on likely outturns, and on previous outturns on the basis of which financial decisions are being made. Any discrepancy may in itself offer a cause for concern that errors are under way.

3.3 How should data be examined?

The essential point is to seek to detect emerging patterns of financial instability in advance and gauge their gravity when they occur by observing the *overall pattern* of economic and financial developments in a *judgmental manner, informed by the events of the past that have entailed systemic risks, and with a broad conceptual framework derived from theory to identify appropriate danger signals*. These patterns may include econometric forecasts of the relevant variables as well as actual data. The overall judgement should of course allow for the fact that some features, notably fixed-investment booms, have occurred in the past without leading to overshooting. Again, asset price falls are, as argued in the Introduction, not alone sufficient for a financial crisis. In other words, the key issue is the nature of the combination of the different features that are highlighted here.

Equally, as financial market participants may learn from past errors, crises in the future will rarely resemble in quantitative terms those in the past. This underlines the need for judgement, rather than solely data collection. We also suggest that econometric calculations regarding the *overall risk* of financial instability could be constructed and maintained as part of the information set of those involved in surveillance but not relied upon as a major source of information. It is emphasised that on their own real economy, or financial data are not sufficient to allow an overall view of risks to financial stability. Also, there is a need to combine qualitative and quantitative aspects.

A useful distinction that may be made in detecting patterns of financial instability in advance is that between primary shocks or “displacements”, which act as propagation mechanisms to a cycle of vulnerability to financial instability, and secondary shocks, which may trigger the episode of financial instability itself. In general, in macroprudential surveillance employing leading indicators of crises, we focus

²⁶ Macroeconomic data are arguably more suitable for forecasting than the bulk of financial data, although some successful attempts at modelling and forecasting financial data have been undertaken.

on the propagation mechanisms. It is suggested that these are the elements of financial instability that are most common across individual episodes, which may follow a wide variety of initial shocks or “displacements”. Meanwhile, the secondary shocks or triggers for financial instability will be detected too late to be leading indicators. They may in a sense be the culmination of the propagation mechanism, a rational response of the authorities to macroeconomic pressures, or an “accident waiting to happen” in a vulnerable financial system (eg in an institution, or in its infrastructure).

Digressing for a moment on primary shocks or “displacements” that trigger a cycle of financial expansion and fragility, they may, for example, include financial liberalisation, technical progress or innovation in financial markets, changes in monetary or fiscal policies and policy regimes, economic liberalisation, technical progress in the real sector in which a country may have a comparative advantage (such as developments in information technology), reconstruction after a war, discovery of a new natural resource, increased demand or changing relative prices for an existing natural resource. A combination of these may be important in some cases. We stress that such primary shocks are not unimportant. They should give important clues as to where to look for evidence of financial fragility, e.g. in lending to the sector concerned or in the markets most affected by financial liberalisation or innovation. On the other hand, experience also suggests that “credit cycles” that typically precede financial instability may at times take on a life of their own, that is at most tenuously linked to the initial cause.

3.4 An application to the Asian crisis

We conclude the series of lectures by looking at events that preceded the 1997 crisis in Asia, as well as the triggers for it from the point of view of theory, past experience and data (see also Stiglitz 1998, IMF 1998a). It is suggested that the Asian financial crisis shows a number of elements that have been seen many times in episodes of financial instability in the past, and which *are in line with the suggestion of theory*. This suggests that although Asia had some distinctive features, warning signs were nonetheless available, **using data available at the time**. Of course, this point should not be overstressed in the ‘wisdom of hindsight’.

Moreover, an important point is that the data available from the Asian countries fell considerably short of that which would ideally be available from a financial-surveillance point of view and some way short of best practice in OECD countries. Notably, sectoral balance sheets and flows-of-funds data; timely, detailed and accurate balance sheets of companies and banks; and data on property prices were often unavailable. Nevertheless, the data available in Asia were, we maintain, sufficient to give warning signs, and could equally be used in most other emerging-market economies. Table 4 shows the quite comprehensive but not always timely data that were readily available for Thailand in June 1997 to an international observer. These would of course be much less detailed than those at the disposal of domestic authorities.

One element was *historically strong economic growth, giving rise to investment opportunities*. **Macroeconomic data** showed that a characteristic of Asia for many years was not just rapid and sustained growth but also high investment, which although initially highly-profitable, began to show lower marginal returns in the last years before the crisis. Whereas declining returns were partly due to the natural effects of “catch-up” with advanced countries, they were also linked to misallocation of resources (to “prestige” projects, “cronies” and increasingly to excessive real-estate development). *A rapid build-up of debt* (detectable in terms of **bank lending to the non-financial sector**) was a consequence of the most recent spurt in investment. *Rising leverage (commonly in foreign currency, entailing capital inflows in the form of bank loans and securities as shown by the BIS banking data)* resulted. This reflected sources of funds internal to firms proving insufficient, equity markets being underdeveloped, domestic interest rates exceeding foreign ones and overall domestic saving, although high by western standards, being insufficient to finance investment in domestic currency. **Qualitative information, equity prices, balance of payments and capital-flow data** would highlight these points. Borrowers were happy to leverage themselves on the basis of buoyant expectations of economic growth as well as *rising asset prices* (which, apart from **equity prices**, would again be derived qualitatively).

The *regime shift* from a **closed economy to an open economy**, like financial liberalisation in advanced countries, may have caused domestic banks and their clients to overestimate the ability to pay back loans, because closed-economy regimes have often been accompanied by segmented financial systems, subject to quantitative regulation of balance sheets. These would be characterised by low lending rates and strict credit rationing, which in themselves historically prevented over-indebtedness and credit losses.

Inadequate credit assessment, and deteriorating overall balance sheet conditions seem to have been a characteristic both of domestic banks, for structural reasons (eg inadequate supervision and “crony capitalism”) and of international portfolio investors and banks. International portfolio investors (whose inflows were apparent from **national balance of payments data**) may have been lulled by the idea that they could always withdraw funds in an emergency without any loss, as liquidity would be maintained, and capital controls not imposed, as well as by seeing risks in emerging markets generally as rather low. Reflecting investor interest, emerging market eurobond spreads declined between 1995 - 1997 from 1.5% to 0.35%, while maturities rose from four years in 1991 to eight years in 1996. **(This could be seen from issuance data in international capital markets, which is also summarised by the BIS)**. Banks seem to have *sought market entry on uneconomic terms*, according to the **data on international bank lending provided by the BIS**. Even though it is premature to draw final conclusions, **provisions made in 1997-8** by banks that were active in the region earlier, such as UK banks, have been smaller than provision made by other European banks, which were active later. Hence, riskiness of new loans is shown to have increased over time. There may have been perceptions of *implicit safety-net guarantees* from governments to domestic banks that reduced concern over credit risk. The well-known *link of new entry*

of foreign banks, which may be relatively uninformed, to adverse selection, appears to have asserted itself.

One may judge that overall, the agents in the situation *developed a form of disaster myopia*, disregarding warning signs present in the **data such as current account deficits and loss of real competitiveness**, as well as **anecdotal evidence of misallocation of capital** in the context of rising leverage and **foreign currency borrowing**. Notably, the fact that any change in the exchange rate and rise in interest rates would expose borrowers to unbearable balance-sheet strains was seemingly ignored, on the assumption that dollar parities would always be held (or at least till rollover time), even though the interest rate differential (present in **official interest rates**) should have raised some questions about the sustainability of exchange-rate parities²⁷. Strong fiscal positions and historically stable exchange rates may have helped to create this impression. *Concentration of risk* in the domestic market, where there were relatively **few large borrowers**, was also a factor for the local banks in particular, which proved vulnerable to the effects on their clients of a falling exchange rate and tight monetary policy. *Reliance on asset values in lending* is, of course, an inherent characteristic of real-estate lending and, as noted, such lending became more prevalent prior to the crisis, as real-estate **and equity prices** themselves soared.

There is also evidence of underestimation of “*correlations*” between asset prices within one country, as well as within the region as a whole. This issue links credit risk assessment to interest-rate and exchange-rate risks, as well as to asset valuation. The potential positive correlation between all these arguably a **lesson from earlier debt crises** such as the Latin American crisis of 1982 had probably not been taken into account when lending and investing to Asian countries. So the overall risk, for example, in lending to one region, can be heavily underestimated, if all different risks are simply summed in a building-block manner, and low correlations between them are assumed (Both financial contagion and “real contagion” operating via effects on export demand may be at the root of such heightened correlations).

Following such a build-up, the triggers for the crisis appear to have included the beginnings of a *cyclical weakening*; declining share prices, reflecting this; pressure on the exchange rate in the international financial markets (as speculators perceived vulnerability of the pegs); an *unexpected policy regime shift* (in the currency peg); and *monetary tightening* (to limit depreciation) – all **apparent in the data**. These together provoked a further sharp fall in asset prices (bursting of the bubble), leading borrowers and consequently lenders into acute financial difficulties. International banking flows reversed themselves sharply. *Contagion between markets and internationally followed*, with markets picking on countries that seemed to have **similar characteristics** (eg. in terms of losses of **real competitiveness**), and/or which had **similar exposures in terms of trade patterns by commodity or main export markets**.

²⁷ There could even be a bias in a general perception of commitments by governments to peg currencies. There may be an inclination to “trust” such commitments, as the failure of the government to peg can be blamed for any later losses if the policy is not maintained.

Speculators assumed that given corporate debt exposure, and weak financial systems, high interest rates to defend currencies could not be maintained. It was noteworthy that all emerging-market countries' currencies were affected to a greater or lesser degree, as were stockmarkets globally after the Hong Kong collapse. The link to bank-run contagion is evident. *Credit rationing to the borrowers concerned intensified*, thus enhancing financial difficulties, and *bank runs took place* both in the areas most directly affected and also in Japan. *Declines in liquidity of securities markets*, arguably the equivalent of a bank run, also were apparent. *Systemic risk threatened*; the IMF intervened for fear of major financial crisis (defined here as a major collapse of the financial system, entailing inability to provide payments systems and to allocate capital - a realisation of systemic risk). *Broader macroeconomic consequences* included a **sharp rise in net saving by the private sector**, with devastating consequences for economic growth, as well as potentially aggravating financial instability.

Conclusion

This article has suggested that the theory of financial instability and the experience of financial crises in the past provide sufficient material to enable meaningful use to be made of financial and macroeconomic data in macroprudential surveillance. Such data may include econometric forecasts, as well as current information. These data may be employed in a judgmental manner to provide grounds for vigilance on the part of central bankers and supervisors, and as a basis for analysis by market participants.

However, it should also be pointed out that the indicators are in no way precise, and may all occur separately without financial instability being present or even threatened. Rather, there is a need for development of broad information on what constitutes normal conditions in an economy, as well as the patterns that have often preceded financial crises in the past. Though account should be taken of individual countries' special features, eg in respect of sustainable corporate indebtedness, analysis of experience both at home and abroad is essential; many mistakes have been made when assuming that countries are in some way unique and hence these patterns of financial instability are unlikely to arise or that circumstances are now different and the lessons of history no longer apply. The globalisation of the world financial system also makes a narrow focus on individual countries less and less valid, with a necessity arising in particular of considering international linkages and broad currency areas such as that of the euro. Meanwhile, we suggest that econometric estimates of overall fragility (as opposed to individual data items) may at best supplement, but not replace, a judgmental approach to surveillance.

Given the shortcomings in the data available for many countries, especially in the emerging markets, considerable efforts to improve coverage and timeliness are warranted. Besides macroeconomic data, emerging-market countries may need to lay particular emphasis on better banking data, given the structure of their financial markets, which is typically bank-dominated, while also providing detailed information on the public sector position. They may also need to improve market discipline by encouraging wide transparency and disclosure on the part of the private sector.

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Table 1: Selected episodes of financial instability 1970-95

Date	Event	Main feature
1970	US Penn Central Bankruptcy	Collapse of market liquidity and issuance
1973	UK secondary banking	Bank failures following loan losses
1974	Herstatt (Germany)	Bank failure following trading losses
1982	Ldc debt crisis	Bank failures following loan losses
1984	Continental Illinois (US)	Bank failure following loan losses
1985	Canadian Regional Banks	Bank failures following loan losses
1986	FRN market	Collapse of market liquidity and issuance
1986	US thrifts	Bank failures following loan losses
1987	Stock market crash	Price volatility after shift in expectations
1989	Collapse of US junk bonds	Collapse of market liquidity and issuance
1989	Australian banking problems	Bank failures following loan losses
1990	Swedish commercial paper	Collapse of market liquidity and issuance
1990-1	Norwegian banking crisis	Bank failures following loan losses
1991-2	Finnish banking crisis	Bank failures following loan losses
1991-2	Swedish banking crisis	Bank failures following loan losses
1992-6	Japanese banking crisis	Bank failures following loan losses
1992	ECU bond market collapse	Collapse of market liquidity and issuance
1992-3	ERM crisis	Price volatility after shift in expectations
1994	Bond market reversal	Price volatility after shift in expectations
1995	Mexican crisis	Price volatility after shift in expectations
1997	Asian crisis	Price volatility following shift in expectations and bank failures following loan losses.
1998	Russian default and LTCM	Collapse of market liquidity and issuance

For detailed accounts see Davis (1994, 1995b, 1995c, 1999)

Table 2A: Features of selected episodes of financial instability (1933-89)

	USA Great Depres-sion (1933)	USA Penn Central (1970)	UK secondary banks (1973)	Germany Herstatt (1974)	LDC debt crisis (1982)	USA Contl Illinois (1984)	Canada regional banks (1985)	FRN market collapse (1986)	USA thrift crisis (mid 1980s)	Stock market crash (1987)	USA junk bond market (1989)
Debt accumulation	●	●	●	●	●	●	●	●	●	●	●
Asset price boom	●		●					●	●	●	●
Concentration of risk	●		●	●	●	●	●		●	●	
Regime shift	●		●	●	●			●	●	●	
New entry of intermediaries	●		●	●	●			●	●	●	●
Innovation	●	●	●					●		●	●
Monetary tightening	●	●	●	●	●					●	
Declining capital adequacy of financial institutions	●		●	●	●	●	●		●		●
Credit rationing/liquidity failure/bank runs	●	●	●	●	●	●	●			●	●
Contagion between markets	●			●	●			●		●	
International transmission	●			●	●					●	
Action by the authorities		●	●	●	●	●	●		●	●	
Severe macroeconomic impact	●				●						
Dysfunction of financial system/economic collapse	●										

Source: Davis (1995a)

Table 2B: Features of selected episodes of financial instability (1989-98)

	Australian banking problems (1989)	Swedish CP crisis (1990)	Norwegian banking crisis (1990)	Finnish banking crisis (1991)	Swedish banking crisis (1991)	Japanese banking crisis (1992)	ECU bond market collapse (1992)	ERM crisis (1992)	Bond market reversal (1994)	Mexican crisis (1994)	Asian crisis (1997)	Russia and LTCM (1998)
Debt accumulation	●	●	●	●	●	●	●		●	●	●	●
Asset price boom	●	●	●	●	●	●			●		●	●
Concentration of risk	●	●	●	●	●	●			●		●	●
Regime shift			●	●	●	●	●	●	●	●	●	●
New entry of intermediaries	●	●	●	●	●	●	●				●	●
Innovation		●					●	●	●			●
Monetary tightening	●		●	●	●	●		●	●	●	●	
Declining capital adequacy of financial institutions			●	●	●	●					●	●
Credit rationing/liquidity failure/bank runs	●	●	●	●	●	●	●				●	●
Contagion between markets									●		●	●
International transmission							●	●	●	●	●	●
Action by the authorities	●		●	●	●	●				●	●	●
Severe macroeconomic impact	●	●	●	●	●	●		●	●	●	●	
Dysfunction of financial system/economic collapse						?					?	

Source: Davis (1995a)

Table 3: Data needs by type and the sign of the leading indicator effect

Flow-of-funds data	Financial prices	Monetary data	Banking/Financial structure	Qualitative information	External financial data	Memo: macroeconomic data
Corporate and household deficits +- Corporate debt levels + Bank versus market financing of companies Corporate debt-equity ratios + Household debt levels + Measures of income gearing + Unusual growth of financial claims in a particular market + Investment patterns of institutional investors, notably cross-border + Banking indicators derived from flow-of funds (e.g. overall capital adequacy -, balance sheet expansion +).	Equity prices (overall and for financial institutions) + Commercial and residential property prices (at national and regional level) + Corporate bond spreads (for domestic and eurobonds) -+ Corporate loan spreads - + Bank bond spreads + 3-month CD spreads -+ 3-month CP spreads -+ Maturity of debt +- Evidence of potential “bubbles” in equity, bond, or foreign exchange markets in terms of deviations from past averages +	Broad money growth +- Total credit to the non-financial sector + Velocity of money and credit + Official interest rates +- Growth in bank assets (total and by subsector of banks) + Sectoral or regional loan concentration + Real short and long term interest rates -+	Individual bank data showing averages, distributions and time series of capital adequacy -, margins -, liquidity -, wholesale + and retail - funding, profitability -, returns on equity -, non-performing loans for banks +. Where possible, corresponding data for investment banks and hedge funds. Change in number of banks + Change in number of foreign banks + New entry to markets + Market maker structure - Estimation of revenue functions to assess contestability +	Easing of financial regulation + Recent financial innovations + Current monetary regime and its sustainability -. Developments reducing entry barriers to markets (notably technological change) + Coverage of the safety net + (especially deposit insurance or other implicit or explicit guarantees) Potential correlation of risks + Structural and regulatory features limiting potential contagion - Information gathered from operational activities regarding potential for “herding” and other risks.	Current account deficit + Foreign currency bank lending + Real exchange rate/terms of trade + Foreign exchange reserves - Capital account flows in banking or portfolio form + Short term debt in foreign currency relative to total domestic debt and to short term assets in foreign currency + Direction of trade data – correlation with other countries at risk +	Economic growth at national and regional level +- Investment +- Inflation + Forecasts of the above variables

Note: the signs indicate the typical direction of change of the variable in advance of financial instability. Where two signs are given, these indicate long and short-term effects, eg real interest rates are often low during a boom and bubble, but increase when monetary policy is tightened before or during the crisis.

Table 4: Data availability for Thailand in June 1997**Sources: IMF (1997), BIS (1997a and b)**

Flow of funds data	Financial prices	Monetary data	Banking/Financial structure	Qualitative information	External financial data	Memo: macroeconomic data
Maturity of (international banking) debt (end 1996) Unusual growth of financial claims in a particular market (foreign currency and domestic bank lending) (end 1996)	Equity prices (overall and for financial institutions) (Mid 1997) Eurobond spreads and maturities (end-1996) Corporate loan spreads (end 1994) 3-month CD spreads (September 1996) Evidence of potential “bubbles” in equity, bond, or foreign exchange markets in terms of deviations from past averages (mid-1997)	Broad money (end 1996) Total credit to the non-financial sector (end 1996) Velocity of money and credit (end 1996) Official interest rates (June 1997) Growth in bank assets (total and by subsector of banks) (end 1996)	New entry to markets	Easing of financial regulation Recent financial innovations Current monetary regime and its sustainability. Developments reducing entry barriers to markets (notably technological change) Coverage of the safety net (especially deposit insurance or other implicit or explicit guarantees) Potential correlation of risks Structural and regulatory features limiting potential contagion	Current account (end 1995) Foreign currency bank lending (end-1996) Real exchange rate/terms of trade (end-1996) Foreign exchange reserves (Jan 1997) Capital account flows in banking or portfolio form (end 1995) Short term debt in foreign currency relative to total domestic debt and to short term assets in foreign currency (end 1996) Direction of trade data – correlation with other countries at risk (end-1996)	Economic growth at national level (end 1995) Investment (end 1995) Inflation (end 1996)