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# TOWARDS A TYPOLOGY FOR SYSTEMIC FINANCIAL INSTABILITY

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**Abstract:** This article seeks to provide a categorisation of events of systemic financial instability that have been experienced in recent decades, seeking to draw out common elements from these seemingly-diverse events. We maintain that despite the apparent diversity of events of financial instability, a useful summary categorisation is between bank, market-price and market-liquidity based crises. There are important subcategories of each type, such as domestic versus international, currency crisis linked, single-institution based, equity-related, property, commodities, deregulation and disintermediation linked crises. Such financial crises are usefully examined in the light of the theories of financial instability, not least to illuminate common generic patterns that can be helpful in macroprudential surveillance. We derive a framework for analysing the evolution of such crises, highlighting that it is vulnerability of a financial system that is the key common element to a crisis, besides the nature of propagation of a crisis to the wider economy. Besides having general applicability, notably to OECD countries, the typology and generic features have some relevant implications for euro area countries. Development of securities markets, the likelihood of regional crises and the likely impact of ageing are among aspects that warrant vigilance by policy makers in the euro zone.

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## Introduction

This article seeks to provide an overview of the various types of systemic financial instability that have been experienced in recent decades, while also seeking to draw out common elements from these seemingly-diverse events. We focus particularly, but not exclusively, on events in advanced industrial countries where securities markets as well as banks are, or are becoming, important to the financial system and financial intermediation. The article is structured as follows: first we provide a theoretical framework that helps us to understand financial instability. Then we outline three main types of financial turbulence, before going on to consider some of the subcategories of financial disorder that can be distinguished. We provide detailed examples of each of the three main types of instability<sup>2</sup>, and then we use this material to evaluate the theories and develop a set of generic features which history suggests are common to periods of financial instability, despite their differing nature. These in turn can help to provide a framework for assessing financial instability that can be helpful in assessing vulnerability of financial systems.

Before commencing, it is important to define financial instability. We prefer to define systemic risk, financial instability or disorder as entailing heightened risk of a financial crisis - “a major collapse of the financial system, entailing inability to provide payments services or to allocate credit to productive investment opportunities”. Such a crisis in turn would have a major effect on general economic activity. Note that the definition excludes asset price volatility and misalignment as independent aspects of instability<sup>3</sup>. Systemic risk tends to be ultimately related to concerns about solvency of financial institutions, although failure of market liquidity and breakdown of market infrastructure may also be important. In most OECD countries, which are our principal focus in this article, systemic risk has generally been countered by the authorities, thus preventing a crisis per se. In emerging market economies, on the other hand, a large number of full-blown financial crises have taken place in recent decades (Mishkin 2001).

### 1 Understanding financial crises

A theoretical framework for analysing and seeking to predict periods of financial instability is set out in detail in Davis (1999a) and summarised here. We suggest that many of the strands of the theory of financial instability have a contribution to make to our understanding of financial crises, but that the explanations are in most cases partial. A selective synthesis drawing on the evidence of actual crises is

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<sup>2</sup> The descriptions draw on Davis (1995a), the publishing rights in which are held by Oxford University Press.

<sup>3</sup> The correct definitions of financial stability and instability are a topic of controversy, which is by no means resolved. See the discussion in [groups.yahoo.com/group/financial\\_stability](http://groups.yahoo.com/group/financial_stability) during June 2001.

the correct approach to adopt. We shall review this matter after presenting some case studies of the three main types of instability in Section 4.

The basic theories include those of:

- *"debt and financial fragility"*, which suggests that financial crises follow a credit cycle with an initial positive shock (displacement) provoking rising debt, mispricing of risk by lenders and an asset bubble, which is punctured by a negative shock, leading to a banking crisis. These patterns are seen as a normal feature of the business cycle (Fisher (1933), Kindelberger (1978), Minsky (1977));
- *"monetarist"* that bank failures impact on the economy via a reduction in the supply of money. Crises tend to be frequently the consequence of policy errors by monetary authorities generating "regime shifts" that unlike the business cycle, are impossible to allow for in advance in risk-pricing (Friedman and Schwartz 1963);
- *"uncertainty"* as opposed to risk (in the sense of Knight 1921) as a key feature of financial instability, in that unlike the cycle, one cannot apply probability analysis to rare and uncertain events such as financial crises and policy regime shifts and hence price risk of them correctly. Financial innovations are subject to similar problems when their behaviour in a downturn is not yet experienced. Uncertainty is linked closely to confidence, and helps to explain the frequently disproportionate responses of financial markets in times of stress (Shafer 1986);
- *"disaster myopia"* that competitive, incentive-based and psychological mechanisms in the presence of uncertainty lead financial institutions and regulators to underestimate the risk of financial instability, accepting concentrated risks at low capital ratios. The pattern leads to sharp increases in credit rationing when a shock occurs (Guttentag and Herring (1984), Herring and Wachter (1999), Herring (1999)); and
- *"asymmetric information and agency costs"* that these aspects of the debt contract, which generate market failures of moral hazard and adverse selection, help to explain the nature of financial instability e.g. credit tightening as interest rates rise and asset prices fall (Mishkin 1991, 1997), or the tendency of lenders to make high risk loans owing to the shifting of risk linked to agency problems (Allen and Gale 1999, 2000);

Complementing these, we must highlight:

- *"bank runs"* that the basic ingredient of crises is panic runs on leveraged institutions such as banks which undertake maturity transformation, generating liquidity crises (Diamond and Dybvig 1983); such theory can also be applied to failures of securities market liquidity, as all market participants seek to sell simultaneously (Davis 1994, 1999b);
- *"herding"* that institutions copy each other in strategies regardless of underlying fundamentals; among banks there may be herding to lend at excessively low interest rates owing to inadequate incentives for loan officers to assess credit risk; and among institutional investors herding is a potential cause for price volatility in asset markets, driven e.g. by peer-group performance

comparisons, that may affect banks and other leveraged institutions (Scharfstein and Stein 1990, Davis and Steil 2001);

- *"industrial"* that effects of changes in entry conditions in financial markets can both encompass and provide a supplementary set of underlying factors and transmission mechanism to those noted above (Davis 1995a), as for example entry of new intermediaries leads to deterioration of information for existing players and heightened uncertainty about market dynamics.

*Inadequacies in regulation* may heighten tendencies to take excessive risks. Mispriced "safety net" assistance generates moral hazard<sup>4</sup>, which if not offset by enhanced prudential regulation may lead to heightened risk taking (McKinnon and Pill 1996). This pattern may be particularly threatening as developments such as deregulation and increased competition reduce franchise values of financial institutions (Keeley 1990). Moreover, lenders in the interbank market – notably cross-border - may not have the correct incentives to discriminate between banks (by price or quantity rationing) and discourage risk-takers (Bernard and Bisignano 2000).

Note that underlying a number of the theories of crisis are the *incentives* faced by financial institutions, regulators and the non financial sector that may aggravate vulnerability (Chai and Johnstone 2000). Examples include incentives to exploit the safety net, to copy other asset managers in herding behaviour and to underplay risks in a competitive market facing uncertainty.

There is also a need for 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. The process is akin to a bank run. The contribution of international capital flows to recent crises and their international transmission introduce a number of additional elements:

- *exchange rate pressure*, resisted by the authorities via interest rate increases, which may trigger or aggravate financial instability;
- 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 credit as well as market risk, leading to more general financial instability;
- *the increasing role of institutional investors* as a conduit for capital flows, "herding" into rising markets and to seek rapid withdrawal from falling markets, destabilising domestic financial markets and exchange rates (Davis and Steil 2001);
- a possible link of contagion where there are cross-country *similarities in trade patterns* (Glick and Rose 1998).

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<sup>4</sup> Risks can arise from agency problems independently of the safety net (Allen and Gale 1999).

## 2 Three principal types of financial instability

A list of recent episodes of systemic risk is given in Table 1. At first glance these events, and indeed episodes of financial instability that have been seen throughout history (Kindleberger 1978), seem to be highly diverse in genesis and manifestation. Certainly, financial crises never recur in an identical manner, both because institutional structures vary across countries and over time, and because individuals learn to some limited extent from such problems. But we would maintain, in the light of the theoretical aspects shown above, that there are three generic types of instability that have most commonly been observed.

One generic type of instability is centred on bank failures, typically following loan or trading losses (Davis 1995a, 2001a). Examples include the Texas banking crisis and the US thrifts crisis as well as the LDC debt crisis, the banking crises in Japan, the Nordic countries and Australia and the Asian crisis. Many developing countries have suffered such crises in recent decades (Caprio and Klingebiel 1996). Bank failures are likely in turn to lead to contraction of credit to the non-financial sector, entailing wider economic disruption. This may be the case even where debt securities markets are developed, if banks and borrowers share private information on their creditworthiness which is not available to bond investors, implying substitution is difficult (Bernanke (1983), Davis and Ioannidis (2003)). Within these banking crises, one may distinguish those that were confined to the domestic financial system (such as those in the Japan) as opposed to those that are also linked to cross border bank lending and indebtedness in foreign currencies (LDC debt, Asia). The distinction is not solely one between crises in OECD and emerging market economies, since the Swedish banking problems were also aggravated by foreign currency exposures (Englund 1999).

A second type of financial disorder involves extreme market price volatility after a shift in expectations (see Davis 1995b). Such crises are distinctive in that they often tend to involve institutional investors as principals, and are focused mainly on the consequences for other financial institutions of sharp price changes which result from institutional “herding” as groups of institutions imitate one another’s strategies. Whereas violent price movements may in themselves not have systemic implications<sup>5</sup>, these may emerge when such movements threaten 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 pattern in the Asian crisis where violent exchange rate movements helped trigger banking crises owing to foreign currency exposures of banks and non banks.

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<sup>5</sup> They may, however, lead to resource misallocation and an increased cost of capital, with deflationary macroeconomic implications.

A third type of turbulence, which is linked to the second, involves protracted<sup>6</sup> collapses of market liquidity and issuance (see Davis 1994). Again often involving institutional herding, the distinction with the second type is often largely one of whether markets are sufficiently resilient, and whether market maker structures are suitably robust. Also, such crises tend to characterise debt and derivatives markets rather than equity or foreign exchange. 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 (US junk bonds, international floating rate notes, Swedish commercial paper, ECU bonds). However, the events following the Russian default and the rescue of the hedge fund LTCM were much more serious (see Section 4), 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 (1999b)). 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.

### 3 Subcategories of financial turbulence

Beyond the three main types, a cross-cutting set of distinctions may be made in terms of the broad causes of financial vulnerability. Here, one may highlight that a number of crisis situations began with *financial deregulation* (such as the Scandinavian and Japanese banking crises). The behaviour of inexperienced financial institutions (overseen by equally inexperienced regulators) in the wake of this “displacement” led to a build-up of corporate and personal debt to unsustainable levels, and then to financial fragility (Englund 1999). Or, as in the case of the US thrifts, deregulation was seen as a means of recapitalisation, while regulators forbore to intervene despite low or zero capital ratios. More generally, deregulated financial systems may be more subject to instability in the longer term (see Demirguc-Kunt and Detragiache (1998b)). Whereas liberalisation remains desirable to ensure credit is available at the lowest price to credit worthy borrowers, it does imply a need for vigilance by risk managers and regulators in its wake.

Second, there are crises characterised by *disintermediation and reintermediation* of financial flows from banks to non-banks or markets, which has proven a cause of difficulty for the institutions facing adverse flows of funds. Examples include the UK secondary banking crisis (1973), the initial US thrifts crisis as shown above, and failure of “Jusen” and non-bank-banks during the Japanese banking crisis. Often the nonbank institutions were poorly regulated and hence aggravated the tendency to over lending.

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<sup>6</sup> It is not denied that all sharp asset price changes will tend to affect market liquidity to a greater or lesser degree

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 or LTCM (Section 4)). Whereas most types of financial instability link to shocks which affect the balance sheets of a range of institutions simultaneously, owing to actual or perceived similarities in vulnerability, failure of a “core institution” brings to the fore direct counterparty linkages between the firm in question and others. Rescue of such firms raises the issue of “too big to fail” that may worsen moral hazard.

*Commodities* (LDC debt) and *property-related* lending and speculation (UK secondary banking, Scandinavia, Japan as well as US thrifts) have been a significant source of instability in the past, owing to their heavy demands for external debt finance, and uncertain returns due to cyclical instability of prices (Davis and Zhu 2003).

One can also distinguish those crises *linked to international debt*, where the additional complication of foreign-currency liabilities affecting balance sheets when exchange rates change and volatility of capital flows enters the picture (Asia, LDC debt, Mexico). Much of the recent academic work has focused on such events in emerging market economies (see Dornbusch (2001), Mishkin (2000)).

Often such international crises are linked directly to currency crises, that may precede or help to trigger more general financial instability (Kaminsky and Reinhart 1999). A trigger is often widespread perception of a misaligned pegged exchange rate. Domestic instability may occur as a consequence of the monetary policy response to exchange rate pressure or collapse (ERM crisis) but also if domestic financial and non financial institutions have incurred extensive liabilities in foreign currency mismatched with assets (Asia). These types of “*twin crises*” link two of our archetypes – bank failures linked to loan or trading losses and asset price volatility.

The international interbank market has also tended to play a crucial role in destabilising capital flows, not least given lenders in the interbank market may not have the correct incentives to discriminate between banks (by price or quantity rationing) and discourage risk-takers, especially when there is perceived to be an explicit or implicit guarantee of bank liabilities (Bernard and Bisignano 2000). Balance sheet weakness that helps precipitate the crisis may be in the public sector (LDC debt) or the private sector (Asian crisis). It may result from either prior solvency problems at banks such as non-performing loans (Thailand, Malaysia) or maturity and currency mismatch by banks and non-banks (Indonesia, Korea).

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. Examples are the stock market crash of 1987 (Section 4), and the recent banking difficulties in Japan.

## 4 Examples

In this section we seek to provide further insight into the three types of financial instability by providing details of three archetypal events, which illustrate the key features of bank failure, price volatility and liquidity failure aspects of financial instability. These are, respectively the Japanese banking crisis, the Stock Market Crash of 1987 and Russia/LTCM in 1998. It will be seen that besides their contrasting features, there are also generic elements in common, viewed in the light of theory. We address this point in more detail in Section 5.

### 4.1 Bank failures after loan losses - the Japanese banking crisis

From the beginning of the 1980s, Japan faced a growing pool of investable funds relative to traditional domestic investment opportunities, as corporate fixed investment slowed while household saving remained strong. One response was a growing balance of payments surplus, despite rapid economic growth. A further impetus to such expansion was given by a cut in interest rates in wake of Louvre Accord. Funds were directed from households to banks, initially via direct deposits and later indirectly via corporate deposits following bond issuance<sup>7</sup>, according to Hargraves et al (1993). Banks sought to on-lend such inflows, but were increasingly disintermediated from higher quality borrowers, since large companies needing external finance preferred to access newly-deregulated securities markets.

The growth in lending was directed instead largely to commercial property. Direct lending to property and construction rose from 9.4% to 14.9% of banks' balance sheets between 1981 to 1991; but many other loans had a significant indirect real estate content. For example, banks often channelled credit through separate or subsidiary "non-bank banks" such as mortgage companies, able to engage in property-related business from which the parent bank was excluded. Such non bank banks had Y67 trillion in loans in 1991, a fourfold increase on 1986, 63% of which were secured by real estate, and 41% to property and construction companies. Banks' exposures to these institutions rose from near zero in 1981 to over 10% of their total loan books in 1991.

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<sup>7</sup> After 1985, lax monetary policy made bank deposits less attractive to households. Other investments also became unattractive - overseas securities were seen as excessively risky after the appreciation of the yen began after the Louvre Accord, and government deficits declined. Excess demand boosted the price of domestic shares and increased the attractiveness of securities issuance by companies (especially in the form of bonds with attached equity warrants). The funds accumulated by companies as a result of equity issuance were invested to a considerable extent in financial assets, mainly large bank time deposits - protected by government guarantee, and on which terms had now been deregulated - as well as real estate investments and financial assets.



Despite the increased riskiness of the balance sheet over the 1980s, it does not appear that margins widened to allow for risk. As regards explanations for the scope and pricing of lending to real estate, according to the Japanese Ministry of Finance (1993), "frameworks for effective risk management and compliance with the principles of self accountability (remained) inadequate", with banks competing for market share in loans. Nakajima and Taguchi (1993) maintain that a large number of banks made management errors in overlending to real estate due to three factors: growth inertia (banks had become used to grow rapidly prior to deregulation, so found it difficult to slow down); bandwagon effects (managerial risk being felt to be minimised if competitors are emulated); and moral hazard arising from the safety net<sup>8</sup>, which led banks to assume they would be rescued by the authorities or other banks in case of difficulty and hence increased the incentive for risk taking, while (corporate) depositors had little incentive to monitor banks' risk taking. A third explanation by Hargraves et al (1993) focuses on flows of funds and points out that funds flowed into the banks with no profitable outlet other than risky real estate investments.

Monetary policy was tightened in 1989 to counteract the risk of a spillover of asset price increases into general inflation, while in 1990 quantitative restrictions were applied to lending for real estate purposes. Together these provoked sharp falls in equity and real-estate prices in Japan from their 1990 peak. These in turn led to increasing difficulties for Japanese banks, given, as noted above, that a large proportion of loans were secured by real estate collateral, were lent directly to real estate companies, or were lent via non-bank banks to similar customers. Non-performing loans increased further as the economy as a whole went into recession in 1991. Meanwhile, because banks are allowed to count 45% of unrealised capital gains as capital, the fall in equity prices led to difficulties of capital adequacy independent of loan losses. Also since accounting rules required that equities be recorded at the lower of book and market value, falls in equity prices had to be booked as losses.

Monetary policy was relaxed sharply in response to the banking crisis and the recession, but this was insufficient to stimulate the economy for many years, despite the discount rate falling eventually to zero, while massive easing of fiscal policy led to a soaring debt ratio of well over 100% of GDP by 2000. Banks continued to operate despite massive unrealised losses, and bankrupt firms were allowed to continue existing, rather than being declared bankrupt and the loans being restructured or written off. There is some evidence of credit constraints as a result of this situation, as well as sluggish demand for credit as solvent firms sought to correct balance sheet disequilibria. As late as 1997 the banking problem turned to a crisis as a number of banks failed, forcing reorganisation of the major banks and their recapitalisation – without resolving underlying problem loan issues. The fiscal cost alone of the crisis to date is 20% of GDP.

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<sup>8</sup> Unlike the US, there was no formal safety net in Japan until after the crisis in the 1990s, but the government had ensured for some decades that no bank closures occurred, which may have given bankers a sense of security.

Sluggish growth may be blamed at least partly on unwillingness of the authorities to resolve the banking problem by rapid nationalisation and recapitalisation plus bad loan disposal, as took place in Scandinavia. Unlike in Japan, strong growth had resumed in Sweden and Finland by the mid 1990s following such a drastic policy response to a similar banking crisis.

#### **4.2 Price volatility after a shift in expectations – the US stock market crash**

Whereas popular accounts tend to focus on the events of October 19-20 1987, focus on the Crash itself abstracts from the need for an explanation why the market rose so much prior to the Crash. Davis (1995a), summarising available accounts, suggests that there was a deviation between fundamentals and prices - a form of speculative bubble - which was reflected in historically unprecedented yield ratios between bonds and equities. Such a situation leads to a suspicion that forms of herding or trend-chasing, led by institutions fearing to perform worse than their peers, was involved. But clearly many other factors may have played a role in generating buoyant investor expectations, such as the merger wave in many countries, falling interest rates over 1987, buoyant economic prospects, rapid credit growth (notably growth in corporate debt) and lower transactions costs, which fostered an impression of high liquidity and led funds into the illusion that they could exit before prices fell sharply. The bubble occurred despite a degree of monetary tightening - over the year prior to the crash the Fed funds rate rose from 6.3% to 6.9%, while real monetary growth decelerated from 14.3% to -1.5%.

As regards the immediate causes of the collapse, since a bubble relies on continuously rising prices, it can be burst by any form of adverse news; in practice, factors underlying the crisis itself may have included current account imbalances between the US, Germany and Japan, which led to fears of a falling dollar and caused rises in long term US interest rates in the week prior to the crash. Also, tensions in the policy co-ordination process between the G-3 countries (following the Plaza and Louvre accords on exchange rates) may have played a role in triggering the crisis. Evidence supportive of the bubble hypothesis is that none of these items could in themselves justify a price adjustment of the magnitude observed (Fortune 1993).

Some commentators in the United States also blamed the interaction between pension fund managers' portfolio insurance and index arbitrage<sup>9</sup> strategies for causing volatility at the time of Crash itself. Basically, it was considered that computer-driven sell orders for futures, which are a normal feature of portfolio insurance (or 'dynamic hedging') strategies when prices fall helped drive the market down much faster than would otherwise have been the case. The initial wave of selling of futures is thought to have driven futures to a discount to the market itself (known as backwardation) as well as reducing stock prices themselves and triggering further portfolio insurance-related sales of futures. The

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<sup>9</sup> Index arbitrage involved buying and selling simultaneously a stock index futures contract and the underlying stocks, so as to profit from any discrepancy (known as spread or basis) between them.

backwardation, seen as a market failure in the futures markets, encouraged index arbitrageurs to sell stocks and buy futures, thus, according to Brady (1989), leading to a so-called cascade effect or accelerating declines in prices.

Note also that *if* US pension funds were relying on portfolio insurance strategies to protect them against market falls, such strategies could be held partly responsible for provoking the bubble. Only in the US was portfolio insurance used to a significant extent, whereas markets collapsed world-wide. The view of the Crash itself as dominated by portfolio insurance is also disputed (for a survey see Fortune (1993))<sup>10</sup>. What is less disputed is that institutions were heavily involved in the selling wave that accompanied the crash, with a particular tendency to dispose of cross border holdings. Such sales helped to generate the contagion across markets, which was such a feature of October 1987.

The crash posed major issues for monetary policy makers in both the short and medium term. In the short term the major concern was to avoid potential systemic risk arising from failure of investment banks, which was combated by an easing of liquidity and moral suasion on banks to lend. Such an easing was continued, however, owing to fears that there would be a major recession in the wake of the crash. In fact the latter fears seem not to have been justified, and the easing of monetary conditions sowed the seeds of inflation in a number of countries.

### 4.3 Collapse of market liquidity and issuance – Russia/LTCM

In considering the events of 1998, it is important to note that the crisis followed a long bull period, where equity prices had risen sharply and credit quality spreads on bonds had contracted. Issuance even of low grade bonds was very high. The Asian crisis had had little effect on this pattern, although bid-offer widening was apparent in the mortgage backed securities market - where LTCM was active - in April 1998.

The trigger for serious turbulence was the moratorium on sovereign debt and effective devaluation of the rouble by Russia in August. It led to a sharp fall in equity prices, a *rise* in core government bond prices (in the context of a “flight to quality”) and a rise in spreads, most markedly on low grade corporate bonds (although the rise in yields was cushioned by an overall fall in bond yields). Issuance collapsed for the US high yield market (to \$2 bn in October compared with \$15 bn per month in the second quarter), and was sharply reduced for all private debt instruments. Crucially, it was apparent at the time that not all of the widening in spreads was linked to credit risk perceptions, but to an extreme

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<sup>10</sup> On the one hand, any form of strategy which aimed to lock in current values, such as stop-loss selling of equities (that is, selling when the price had fallen to a pre specified level), would equally have induced a rush of sales when the market fell; and this was probably the more prevalent strategy. Also Fortune (1993) suggests that the discounts between stock index and futures prices were in fact illusory, resulting from such phenomena as delays in reporting of individual share prices, late openings or trading halts for individual stocks, but their appearance led traders to panic; in other words, the problem was in the cash market and not the futures markets. Moreover Grossman (1988), examining US daily transactions data for 1987 as a whole, found no link from stock market volatility to programme trading.

liquidity preference and a general unwillingness to deal in corporate bonds. In the words of McDonough (1998), there was an “abrupt and simultaneous widening of credit spreads globally, for both corporate and emerging market sovereign debt, (which) was an extraordinary event beyond the expectations of investors and financial intermediaries”.

Underlying these patterns, a wide variety of institutions had taken long positions in Russia and other emerging markets. The spillover to the US and other mature markets was linked to the financing of these positions in a leveraged manner in those markets. Rapid attempted liquidation by a large number of investors in the context of high leveraging led to sharp price changes. The overall widening of spreads in turn inflicted heavy losses on the significant number of large investors which had purchased other higher-risk and/or lower-liquidity assets (e.g. junk bonds or mortgage backed securities – and off-the run<sup>11</sup> Treasuries) while going short in high-quality debt on the assumption that the existing widening of spreads that had occurred after the initial Asian crisis would be unwound (i.e. spreads would “mean revert”). Such losses led to further margin calls, liquidation and hedging, putting further demands on liquidity.

LTCM was one such investor, a hedge fund with large and (50:1) leveraged positions across what were thought to be a diversified range of financial markets. US and European banks had major credit exposures to it. Simultaneous price shifts in previously uncorrelated markets in the wake of Russia wiped out its capital and threatened insolvency. A rescue was undertaken by private-sector banks to preserve orderly market conditions (McDonough 1998). Notably, there was concern if LTCM had suddenly been put into default, its 75 counterparties would have rushed to “close out” hundreds of billions of dollars of positions, causing massive illiquidity and price shifts, harming both the counterparties and other market participants. Such a move might generate further uncertainty in a vicious circle, which would ultimately impact sharply on the cost of capital<sup>12</sup>.

Despite the rescue, LTCM heightened uncertainty by leading to fear of the unknown regarding unwinding of its positions and similar hedge fund<sup>13</sup> or bank failures, which would entail the unloading of assets into illiquid markets at distressed prices. There was a sharp increase in price volatility and departures from normal pricing relationships (spreads between long term on-the-run and off-the-run Treasuries widened from a norm of under 10 bp to 35 bp, despite similar duration and the same credit risk) implying a major premium was placed on liquidity. Further widenings were seen in the yield spreads on eurodollar bonds and on private sector instruments over US treasury bills, as well as on swaps of fixed for floating rates, showing also heightened concern about counterparty risk. Even in

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<sup>11</sup> On the run Treasury securities are the most recently issued stocks and heavily traded; off the run are earlier issues of the same maturity which lack liquidity, being largely in the hands of long term investors. As both are obligations of the US Treasury, there is no distinction in credit risk, and the spread is one of the “cleanest” indicators of liquidity risk.

<sup>12</sup> The US investor Warren Buffett reportedly sought to resolve the situation, but his help was refused.

<sup>13</sup> One of the key issues raised by the crisis was the lack of transparency of hedge funds, despite which banks appeared willing to offer financing. See Basel Committee (1999).

currency markets such as the dollar-yen, there was a sharp rise in bid-offer spreads – and, separately, a one-day move of 15 yen as the so-called yen carry trade was rapidly unwound. There was concern about a possible credit crunch - as issuance of corporate debt and commercial paper fell, but a rise in bank lending tended to substitute - apparently, US non-financial firms were apparently able to switch between markets and backup lines of credit with banks, on tighter terms.

Much larger institutions than LTCM had similar if not greater positions with comparable leverage i.e. the markets lacked “macro portfolio diversification”. LTCM had \$ 80 bn in US Treasury arbitrage positions while commercial banks had \$ 3000 bn. Direct creditors and counterparties of LTCM were hence not the only ones likely to be hit by losses from an enforced unwinding of LTCM’s positions. In such circumstances, market makers were naturally reluctant to take the opposite side of the market<sup>14</sup>. According to the Wall Street Journal, they “cut back on the size of trades, quoted wider bid-offer spreads or did not quote at all”. Consequently, liquidity plunged and market prices moved to levels that were at times wholly unjustified by fundamentals. Markets that were traditionally uncorrelated became highly correlated, and VaR (value-at-risk) models were interpreted as prompting further sales. In effect there were contagious, endogenous and wider systematic elements that led a whole sector of exposures into difficulties even as their individual models may show low risk (Morris and Shin 1999).

There was paralysis among long term investors who could have corrected pricing anomalies, due to risk aversion and/or lack of credit. Trading techniques such as dynamic hedging and portfolio insurance apparently worsened such tendencies, and exacerbated market price movements once they began. The result was intensified focus on paper that could be liquidated quickly, regardless of its quality in other respects.

Beyond the rescue of LTCM per se, resolution of the crisis required several cuts in US interest rates, in order to restore confidence in market operations. These intensified the rise in equity prices which only peaked in 2000.

## **5 Generic features of crises**

It is instructive to view the three events set out in Section 4 in the light of the theory outlined in Section 1. These on the one hand give insights into which aspects of theory are most important, and on the other enable us to develop a set of generic features of crisis that can be of considerable assistance in assessment of vulnerability of financial systems. Full detail on these aspects is given in Davis (1995a, 1999b); here we offer a flavour. For brevity, we use the abbreviations JB for the Japanese banking crisis, EC for the stock market crash and RL for Russia/LTCM.

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<sup>14</sup> The institutions making markets had themselves been financially weakened in the crisis.

Concerning "debt and financial fragility" theory, a prior displacement can be seen for JB, in the deregulation of securities markets in the early 1980s and loss of corporate lending business. All the events entailed a growth in debt (to property for JB, underwriters and corporate debt for EC and lower quality borrowers and hedge funds for RL), with higher leverage incurred by the borrowers. There were also rises in asset prices, be they of real estate (JB), equities (EC) and lower quality bonds (RL). Ex post it appears that risk was under priced in each case, although except in JB it is arguable whether the underpriced risks were solely "normal business cycle risks" as the theory suggests. This point is strengthened since the crises other than JB did not occur at business cycle peaks. Indeed, following the "monetarist" approach it can be argued that the events to some extent followed "regime shifts" and are hence hard to price for; EC followed a mild monetary tightening. Moreover, the EC and RL were unprecedented events in terms of the speed of occurrence, size of adjustment and spread of markets affected. Monetary contraction in terms of declines in the money supply after the crisis were generally absent, however, due to a monetary policy response (EC, RL, JB).

There was also "uncertainty" owing to the above-mentioned regime shifts. Financial innovations featured in both EC (portfolio insurance and programme trading, giving rise to "illusions of liquidity") and RL (hedge funds, use of VaRs for risk management purposes), which had not been fully tested over the cycle. The onset of the crises was accompanied by loss of confidence in the markets and institutions concerned, for example as Russia's default during RL led to a re-evaluation of credit risk generally. The JB crisis was accompanied by the innovation of active corporate bond issuance.

Equally, "disaster myopia", was generated in JB by the existence of the safety net and in EC again by portfolio insurance. During RL it appears that investors underestimated credit risk as well as market and liquidity risk during the run up to the crisis, driven by short termism and the "bonus culture" as well as by the long non-inflationary upturn. They failed to recognise the market's lack of "macro portfolio diversification". The lack of response of spreads to Asia is another indicator of disaster myopia. Such disaster myopia may even have been exacerbated by over-confidence in VaRs intended to prevent the assumption of excessive risks, but which disregard market liquidity risk, and assume the future will resemble the past. Risk was concentrated before JB in property, and during RM at the level of "macro portfolios". Credit rationing affected the institutions directly concerned in EC and RL, as well as bond market issuers, especially in the latter case. The credit rationing suffered by Japanese banks came in 1997, long after the onset of the crisis.

Concerning "asymmetric information and agency costs", JB is argued by some commentators to be a case of agency costs whereby the safety net was exploited, although others argue for simple lack of competence in credit evaluation. In EC and RM an increase in credit rationing followed falling asset prices, which themselves generated moral hazard and adverse selection. Regarding "bank runs", as noted, there were runs long after the JB crisis in 1998; the withdrawal of funds from US investment

banks in EC as well as from markets for lower-quality credits and from LTCM and other hedge funds in RL all had elements of bank runs. "Herding" by banks and non banks into property helped generate the JB crisis; collective shifts by institutional investors preceded EC, and there were elements of herding by investment banks, hedge funds and institutional investors into lower quality credit markets prior to RL. In all cases herding in effect generated an endogenous aspect of risk, where mild exogenous shocks were amplified by balance sheet structures and portfolio responses.

For "industrial" aspects, the entry behaviour of financial institutions was instructive prior to all the crises. In the case of the JB it was the entry of non banks to property lending and also investment banks to corporate bonds issuance that in effect generated credit risk for Japanese banks. For EC, attempts by underwriters to increase their business by using "bought deals" on UK issues, to gain reputation and future business, led to market risk (and credit risk for banks lending to them). In RL, banks were keen to lend to hedge funds as a new market segment, as well as to expand position taking activities themselves, leading to exposure to market risk, credit risk and market liquidity risk. Own-account position taking may in turn be linked to increased competition in banks' core deposit and loan markets, which led them to seek alternative sources of profit.

Inadequacies in regulation were most evident in the case of JB where regulators failed to act over growing exposures of the banking system to property prices and thereafter exercised forbearance over capital ratios that were low or zero. A role of international capital flows were not strongly apparent in these events, showing that OECD country crises tend to be "home grown" whereas EME crises (LDC debt, Mexico, Asia) are often directly related to them.

Following on from this discussion of theory seen in the light of experience, we can identify certain common features to all three types of crisis, which are helpful in anticipating crisis events. Indeed, examination of the features of diverse financial crises, set out in Table 2, suggests that there are common *generic patterns* in advance of crises. Key aspects are:

- *regime shifts*, first to laxity (such as deregulation), later to rigour (e.g. monetary tightening);
- easing of *entry conditions* to financial markets, leading to heightened competition and risk taking;
- *debt accumulation* and asset price booms, generating vulnerable balance sheets in the financial and non financial sectors;
- *innovation* in financial markets, which increases uncertainty during the crisis; and
- *risk concentration* and lower capital adequacy for banks, which reduces robustness to shocks.

These elements can be readily traced in the descriptions of archetypal crises given in Section 4 above and their analysis in the light of theory.

More generally, we consider these features to provide the most basic dataset of indicators common to crises<sup>15</sup>. 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 to the occurrence of financial instability. As shown in Davis (1999a), a wider range of crises reflects similar features, allowing in turn the development of sets of “macroprudential” or “financial soundness” indicators.

A useful distinction to employ when interpreting such generic developments is between shocks and propagation mechanisms<sup>16</sup>. Following “financial fragility” theory, in our view crises follow a pattern whereby there is an initial positive shock (what Kindleberger (1978) calls a “displacement”) which leads to propagation of vulnerability via credit expansion, asset price rises etc. Finally there is a secondary negative shock or trigger, which leads to the crisis. Shocks resulting in failure of certain institutions or markets lead to more general instability in two complementary ways. They may lead on directly to failure of another institution or market with strong counterparty links, which generates contagion via further balance sheet links to the rest of the financial system. Or they may generate uncertainty about solvency for institutions or markets, whose balance sheet/instruments outstanding are both opaque and share some characteristics with the failed firm. These may in turn lead on to macroeconomic consequences as estimated in Davis and Stone (2003). Note that shocks are of very variable nature (deregulation, war, natural resource discovery, adjustment of monetary or fiscal policy regime...) but propagation mechanisms are more common, and much of the useful work of surveillance lies in outlining the current state of “vulnerability” in terms of them. The overall pattern is illustrated in Table 3, which integrates the generic aspects identified above – Table 4 shows its application to the Japanese banking crisis.

Clearly, the generic nature of the features means that careful judgement is needed in interpreting actual data. Moreover, some diverse data gathering is needed to help predict crises of the three main types. At a most basic level, banking data need to be supplemented by data on securities market developments (including “market intelligence”) so as to capture the risks of a securities-market led crisis. There needs to be careful coordination in monitoring these two aspects since banks may be affected by crises originating in securities markets and vice versa. Stress testing can play a useful role in such analysis (Blaschke et al (2001)). An audit of incentives that could lead to financial instability is also warranted. For a broader discussion of macroprudential surveillance see IMF (2000), BIS (2001), Carson and Ingves (2003).

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<sup>15</sup> See also Demirguc Kunt and Detragiache (1998a and b) and Kaminsky (1999).

<sup>16</sup> I am indebted to Darren Pain of the Bank of England for this insight.



## **Conclusion**

We have maintained that despite the apparent diversity of financial instability seen in the world, a useful summary categorisation is between bank, market-price and market-liquidity based crises. There are important subcategories of each type, such as domestic versus international, single-institution based, equity-related, property, commodities, deregulation and disintermediation linked crises. Financial crises are usefully examined in the light of the theories of financial instability, not least to illuminate common generic patterns that can be helpful in macroprudential surveillance.

Besides having general applicability, notably to OECD countries, the typology and generic features have some relevant implications for euro area countries (for more detail see Davis (2001a)). An immediate point to make is that most historic periods of financial instability in Europe have linked to the first type of crisis (i.e. banking crises), with market crises occurring in, or largely originating in the US or international capital markets. The likely securitisation of euro area markets may pose challenges in adaptation, whereby securities market problems are likely to generalise across the monetary area while banking crises can remain local. On the other hand, the presence of both banks and securities markets as a source of financing in a monetary area is beneficial in offering a form of diversification for the financial system (Davis 2001b). European financial systems should thus become less vulnerable to economic repercussions of banking crises as securities markets develop.

In Davis (2001a) we also suggest that in a large and diverse monetary area with segmented local banking markets, regional crises can pose a major challenge to policy makers, while the existence of a large monetary area in a global sense means that there will inevitably be international transmission of shocks generated within it. There is also a need for special care in the case of new monetary arrangements that have not yet experienced major financial instability. Meanwhile money and securities market liquidity become of great systemic importance in a securitised financial system; equity prices too may become of major importance for financial stability; disintermediation becomes a major factor with which banks must contend and adjust as best they can; non banks such as investment banks and even hedge funds may become of systemic importance; and even institutional investors strategies can cause major asset price shifts which threaten systemic stability. Finally, as noted in Davis (2001c), at a longer time horizon, population ageing may also generate major threats to financial stability in the EU.

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**Table 1: Selected periods of financial instability since 1970**

<b>Date</b>	<b>Event</b>	<b>Main feature</b>
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
1979-89	US thrifts	Bank failures following loan 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
1985-9	Texas banking crisis	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

Source: Davis (1999a)

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

	USA thrift crisis (mid 1980s)	Stock market crash (1987)	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 (1999a)

**Table 3: Generic aspects of financial instability**

<b>Phase of crisis</b>	<b>Nature</b>	<b>Example of features</b>
Primary (favourable) shock	Diverse	Deregulation, monetary or fiscal easing, invention, change in market sentiment
Propagation - build-up of vulnerability	Common – main subject of macroprudential surveillance	New entry to financial markets, Debt accumulation, Asset price booms, Innovation in financial markets, Underpricing of risk, risk concentration and lower capital adequacy for banks, Unsustainable macro policy
Secondary (adverse) shock	Diverse	Monetary, fiscal or regulatory tightening, asymmetric trade shock
Propagation - crisis	Common	Failure of institution or market leading to failure of others via direct links or uncertainty in presence of asymmetric information – or generalised failure due to common shock
Policy action	Common – main subject of crisis resolution	Deposit insurance, lender of last resort, general monetary easing
Economic consequences	Common – scope depends on severity and policy action	Credit rationing leading to fall in GDP, notably investment

**Table 4: Application to the Japanese banking crisis**

<b>Phase of crisis</b>	<b>Japan</b>
Primary (favourable) shock	Deregulation of securities markets, monetary easing
Propagation - build-up of Vulnerability	New entry to financial markets (non banks, bond issue), Debt accumulation by property companies, Asset price boom in commercial property booms, Underpricing of risk and risk concentration by banks. Inflation necessitating monetary tightening
Secondary (adverse) shock	Monetary and regulatory tightening
Propagation - crisis	Property and equity price collapse, widespread failure of borrowers, insolvency of institutions
Policy action	Deposit insurance and lender of last resort, some recapitalisation much later
Economic consequences	Prolonged recession