EARLY CONCEPTUAL AND EMPIRICAL WORK LEADING TO THE DEVELOPMENT OF FSIS

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1 Introduction

- Already in the 1990s, it was agreed that macroprudential surveillance - monitoring of conjunctural and structural trends in financial markets so as to give warning of the approach of financial instability - is of immense importance given the costs of crises - as much as 15% of GDP.
- To illustrate the “state of the art” prior to the introduction of FSIs, drawing on Davis (1999), we set out three approaches to developing macroprudential indicators:
  - Theories of financial instability
  - The nature of financial instability
  - Early econometric studies
- These give background for the derivation of various types of data that are needed for macroprudential analysis.

Structure

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3. Deriving indicator variables from experience of financial instability
4. Insights from early econometric studies
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Appendix: Application to the Asian crisis

2 Theories of financial instability and related indicator variables

- Selective synthesis required of different theories (see Davis (1995, 1999) for references)
  - Financial fragility: financial crises follow a “credit cycle”, triggered by an exogenous event (“displacement”), leading to rising debt, underpricing of risk and asset bubbles followed by negative shock and banking crisis;
  - Monetarist: bank failures impact on the economy via a reduction in the supply of money, while policy regime shifts are hard to allow for in risk management;

- Uncertainty: as opposed to risk as a key feature of financial instability, linked closely to confidence, and helps explain the at times disproportionate responses of financial markets in times of stress and difficulties with innovations;
- Disaster myopia: that competitive, incentive-based and psychological mechanisms lead financial institutions and regulators to underestimate the risk of financial instability in presence of uncertainty;
- Asymmetric information and agency costs: well-known market failures of the debt contract help to explain the nature of financial instability e.g. credit tightening as interest rates rise and asset prices fall;
- Industrial: 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, e.g. new entry leading to heightened uncertainty on market dynamics

- Further aspects
  - Herding by banks and institutional investors
  - Inadequacies in regulation, notably an underpriced "safety net"
  - International aspects of financial instability, such as exchange rate policy and foreign currency financing

Indicator variables derived from theory

- Specific set for each theory (e.g. financial fragility covers debt, asset prices, investment)
- Some overlap – particular focus on credit market structure, competition, prices, quantities and exposures
- Both macroeconomic and financial indicators are relevant

3 Deriving indicator variables from experience of financial instability

3.1 Generic types of crisis (Davis 2002)

- Crises seem diverse in specific details but broad generic types can be distinguished:
  - bank failures following loan or trading losses
  - systemic consequences of asset price volatility after a shift in expectations
  - collapse of market liquidity and issuance

- Subcategories of financial turbulence
  - Link to financial deregulation
  - Disintermediation and reintermediation
  - Failure of a single large institution
  - Commodities and property related lending and speculation
  - Crises linked to international debt impact of foreign currency liabilities on balance sheets and volatility of capital flows
  - Crises with an equity market linkage

Selected episodes of financial instability 1970-98 and types

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

- 3.2 Data requirements for analysing risks to financial stability, derived from stylised patterns in light of theory
- Regime shift to laxity or other favourable shock
- 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
- Regime shift to rigour – possibly as previous policy unsustainable - or other adverse shock
- Heightened rationing of credit
- Operation of safety net and/or severe economic crisis

Examples of generic patterns

	USA Great Depression (1933)	USA Penn Central (1970)	UK Secondary Banks (1973)	Germany Herstatt (1974)	LDC debt crisis (1982)	USA Contl Illinois (1984)	Canada regional banks (1985)
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	●						

Guide for assessment using generic patterns

Phase of crisis	Nature	Example of features
Primary (favourable) shock	Diverse	Deregulation, monetary or fiscal easing, invention, change in market sentiment
Propagation - buildup 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

4 Insights from early econometric studies

- Demirguc Kunt and Detragiache (1998a), contemporaneous determinants of financial crises for 53 countries over 1980-94 using logit; relevant variables include economic growth, inflation, real short-term interest rates, vulnerability to balance of payments problems and to sharp capital outflows and explicit deposit insurance schemes.
- Demirguc-Kunt and Detragiache (1998b) assessed effect of financial liberalisation; 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 and more severe if overall institutional environment of a country was underdeveloped.

- Kaminsky and Reinhart (1996) determinants of banking and currency crises for 20 countries from 1970-95. 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.
- Hardy and Pasarbasioglou (1998) lagged determinants of financial crises for 38 countries 1980-97 using logit; relevant variables included 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.

- Notes regarding early econometric studies
  - Provide a list of variables shown to be directly linked to financial instability; can provide a forecast of financial instability, hence "early warning models"
  - If used mechanistically, omit the crucial element of judgement required, as well as risking to omit the changing nature of financial markets, and 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.
  - May mix emerging and advanced countries whose financial structure and behaviour may differ, as may different regions (Davis et al 2011)
  - More recent work (such as Barrell et al (2010)) seeks to overcome some of these issues

5 Suggested data needs

5.1 Overall considerations in selecting data

- the importance of economy
- derivation of data needs for theory and experience
- qualitative aspects
- the need for benchmarks and norms

5.2 Types of financial data required for macroprudential surveillance

- flow of funds data
- financial prices
- monetary data
- detailed data on banks
- qualitative data
- external data needs
- macroeconomic data

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
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 +

Qualitative information	**External financial data**	**Memo: macroeconomic data**
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

- 5.3 How should data be examined?
  - observation of overall patterns
  - judgmental approach
  - informed by events of the past and internationally
  - conceptual framework derived from theory
  - the use of econometrics
  - shocks and propagation mechanisms
  - See Appendix for an application to Asian crisis

6 Conclusions

- It was suggested already in the 1990s (e.g. in Davis 1999) that the theory of financial instability as well as the experience of financial crises in the past as well as econometric studies provide sufficient material to enable meaningful use to be made of financial and macroeconomic data in macroprudential surveillance.
- These data may be employed in a judgmental manner to provide grounds for vigilance on the part of central bankers and supervisors.
- 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 which have often preceded financial crises in the past.

- While account should be taken of individual countries' special features, analysis of experience both at home and abroad is essential; many mistakes have been made when assuming that countries are in some way unique.
- The globalisation of the world financial system of course makes a narrow focus on individual countries also 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) used as early warning systems may at best supplement, but not replace, a judgmental approach to surveillance.

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Appendix: Application to the Asian crisis

- Some unique elements...
- ...but largely in line with theory
- and some warning signals were available
- despite shortcomings in information
- See data for Thailand below

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
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

Qualitative information	**External financial data**	**Memo: macroeconomic data**
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)