ANALYTICAL METHODS FOR ASSESSING FINANCIAL SYSTEMS

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Structure of lecture

1. Overall considerations in macroprudential surveillance
2. A possible framework for macroprudential analysis
3. Stress Tests
4. The Asian crisis
5. Macroprudential surveillance and the Asian crisis

1 Overall considerations in macroprudential surveillance

- Taking a generic view of developments
- Conceptual framework derived from theory
- Focus on patterns which have preceded financial instability in the past
- Analysis of experience both at home and abroad; many mistakes have been made when assuming that countries are in some way unique. Globalisation of markets and institutions makes a narrow focus on individual countries less and less valid

- Distinguish shocks and propagation mechanisms/build-up of vulnerability (see diagram of generic patterns)
- The importance of economy in selecting data from lists of financial soundness indicators – focus on those relevant for country – but also use context of qualitative, policy and macroeconomic aspects
- Judgemental aspects of macroprudential assessment
- The use of benchmarks and norms
- Drawing on supervisory information and market intelligence
- The use of econometrics/stress tests

Generic patterns of financial instability

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

2 A possible framework for macroprudential analysis

- Structural macroeconomic aspects (e.g. vulnerability to asymmetric shocks owing to industry/trade structure)
- Conjunctural macroeconomic aspects (sustainability of monetary and fiscal policy, growth and inflation)
- Non financial sectors' vulnerability (balance sheets, borrowing, asset prices)

- Financial sector vulnerability - structural aspects (banking structure, entry, deregulation, safety net, quality of regulation, codes/standards)
- Financial sector vulnerability – conjunctural aspects (banks' profitability, balance sheet exposures, asset quality)
- Countervailing aspects of resilience e.g capital adequacy
- Probability of crisis arising from the above, seen in the light of theory, patterns preceding past crises, and norms for the economy
- Possible future shocks
- Stress tests – qualitative or quantitative – derived from perceived risks giving extent of possible losses in crisis
- Conclusions and policy issues – including possible effects of crises on macroeconomy

- Note – I utilised this structure in reporting on 5 EU countries for the Bank of England
- In preparing surveillance there is a need to consult all relevant economic and financial reports by national and international organisations, rating agencies and market commentators to get a view of possible risks
- Then gather qualitative information from all relevant players about the trends and potential risks (e.g. using a questionnaire) – central bank, ministry of finance, private bankers, banking associations, rating agencies, foreign bankers, international institutional investors

3 Stress tests

Stress tests for individual institutions

- Stress tests involve identification of consequences for portfolios of possible “worst cases” (using historical shocks, hypothetical changes or Monte Carlo tests – assessing a number of combinations)
- May be in terms of levels or volatilities of individual variables (sensitivity test) or for groups of risk factors (scenario analysis), possibly also with sharp changes in correlations
- Examples: policy regime shifts, deposit runs, collapses in market liquidity, counterparty failures, unprecedented shifts in interest rates, yield curve, exchange rates, equity or commodity prices

- Essential to begin by calibrating exposure to relevant risk, which may be indirect (via borrowers and other counterparties)
- Interest rate risk
  - Use of duration gap analysis for assets, liabilities and thus on equity – possibly also allowing for convexity, or if duration not available simple maturity gap
- Credit risk
  - Expected losses covered by pricing and provisioning – assess provisioning shortage by considering peer assessments; unexpected losses covered by capital – assess its adequacy by looking at macro determinants of NPL/assets
  - Assess capital adequacy in light of these

- Liquidity risk
  - Assess potential deposit withdrawals relative to assets, also judging which of latter could become illiquid
- Market risk
  - Impact on solvency of changes in asset prices using on and off balance sheet exposures both in underlying and derivatives, taking account of shifting correlations and impact on counterparties. Calibration issue, e.g. Derivatives Policy Group recommends 6% change in major currencies and 20% for others
- Country risk
  - Assess direct and indirect exposures to individual countries, which may be aggregated using appropriate weights e.g. based on ratings
- Individual stress tests also highlight data and institutional inadequacies. Should stress tests be standardised across banks with different portfolios?

Aggregate stress tests

- Go beyond tests for individual institutions to allow for externalities and market failures (contagion from institution failure, collapse of liquidity, flight to quality) in a group of institutions to a shock. Shocks must be standardised.
- Link to macro imbalances, look at system wide exposures and aggregate across products and intermediaries
  - simple tests via impact of shocks (e.g. to exchange rate, GDP, real interest rate, terms of trade, exchange rate and real estate prices) on credit risk and NPLs
  - complex tests on capital via NPLs, market, liquidity and interest rate risk, focusing e.g. on the correlation of liquidity shocks, asset price changes or changes in interest rates with exchange rate pressure

- Need to choose how many firms to include, how to treat foreign owned firms (stability of parent) Also how to aggregate; take individual firms' tests or supervisors undertake exercise themselves.Net versus gross problem e.g. in interbank market.

Stress tests at macro level

- Quantitative assessment of wider effect of a given shock on the financial system
- For example asset price shock affects banks directly, via borrowers' financial condition and via macroeconomy
- Ideally requires macroeconometric model of the economy, linked directly to the state of banks' balance sheets and profit and loss

- Subject to standard difficulties of modelling and forecasting (simplification, structural change and lack of long data series for estimation)
- Non-linearities (e.g. contagion)
- More simply, may use logit model of the macroeconomic determinants of the probability of crisis
- Qualitative approach – or use of spreadsheets – can still be helpful

4 The Asian crisis

- We outline events then apply our method of assessment to detect warning signs
- Viewed in the light of the analytical framework set out in the earlier lecture, some unique elements...
- ...but largely in line with theory
- and some warning signals were available, despite shortcomings in information, see data for Thailand on next slide

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**
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)

Aspects of vulnerability

- Historically strong economic growth…
- …and high investment growth, with diminishing marginal returns
- Rapid build up of private debt by banks and companies….
- ….often in foreign currency…
- …accompanied sharply rising asset prices (but fiscal position strong)

- Regime shift from closed to open economy leading to underestimate of risk by inexperienced domestic bankers
- Attempts to penetrate market and loss lead by international banks, aided by implicit guarantees by governments
- Current account deficits and loss of real competitiveness threatened exchange rate pegs…
- …leading to rise in official rates
- International lenders ignored contagion potentially affecting regional lending

Shocks triggering crisis

- Cyclical weakening
- Falling share prices/property prices
- Exchange rate pressure
- Loss of currency pegs
- Monetary tightening to counteract inflation
- Unexpected contagion across countries (loss of real competitiveness, trade exposures)

Consequences

- Withdrawal of international bank lending
- Sharp recession in domestic economies – rise in private saving
- Bank failures
- Potential for systemic risk, forestalled by IMF packages

5 Macroprudential surveillance and the Asian crisis

- The aim of this section is to draw out some of the aspects of the build-up to the Asian crisis that could have featured in a practical macroprudential surveillance exercise
- We follow the broad framework set out above, namely real economy – non financial sectors – financial sectors – risks - conclusions

- Consider structural aspects of the economy, in particular diversification and vulnerability to real shocks (export focus, electronics)
- Look for contagion risks (similar trade patterns), drawing on experience of earlier crises (e.g. Latin America in 1982)
- Assess macroeconomic policy (exchange rate pegs) and sustainability in the light of conjunctural trends (loss of competitiveness)

- Look for “displacements” that may have triggered credit cycle (deregulation, export boom)
- Observe trends in non financial sector indicators for abnormality – credit growth, asset prices, investment, foreign currency exposures, interest rate spreads, real exchange rates, sector balances (public, private, foreign)
- Examine flow of funds data for the household and corporate sectors (if available) for financial deficits and abnormal gearing - assess robustness to shocks (income, interest rates, asset prices)

- Consider the skills of domestic lenders and the information available to international ones in the light of structural changes such as deregulation/new entry. Also country risk of international lenders
- Other qualitative aspects of finance – easing of lending conditions, evidence of misallocation of investment financed by loans, moral hazard (safety net), quality of supervision
- Examine interbank exposures and linkages and potential dangers from foreign currency exposures/withdrawal of funding

- Assess robustness of banking system to shocks (capital adequacy, ROEs, margin trends, balance sheet trends, diversification)
- Stress tests for individual institutions and groups, including foreign currency mismatch
- Assess concentration of risk domestically
- In assessing risks in the light of the above, again consider the history of financial instability in the country concerned, and patterns preceding crises elsewhere

- Assess current global macro forecasts for potential risks
- Undertake macro stress tests/scenario analyses on regime shifts in monetary policy, withdrawal of international lending, fall in asset prices both separately and together, global and regional recession, loss of competitiveness. These may be qualitative or quantitative
- Seek to arrive at overall view of vulnerability and consider how policy could reduce it

Conclusions

- Theory of financial instability as well as the experience of financial crises in the past 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.
- 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.

- In our framework, analysis of experience both at home and abroad is essential; many mistakes have been made when assuming that countries are in some way unique (e.g. Norway/Sweden).
- Globalisation of the world financial system of course makes a narrow focus on individual countries also less and less valid
- Stress tests and econometric work are a useful complement but not a substitute for detailed qualitative analysis of the situation in a country in the light of experience
- Separate issue is appropriate policy if vulnerability detected (e.g. require capital build-up)

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