



Framework, Data and Models for Macropru: A European Perspective

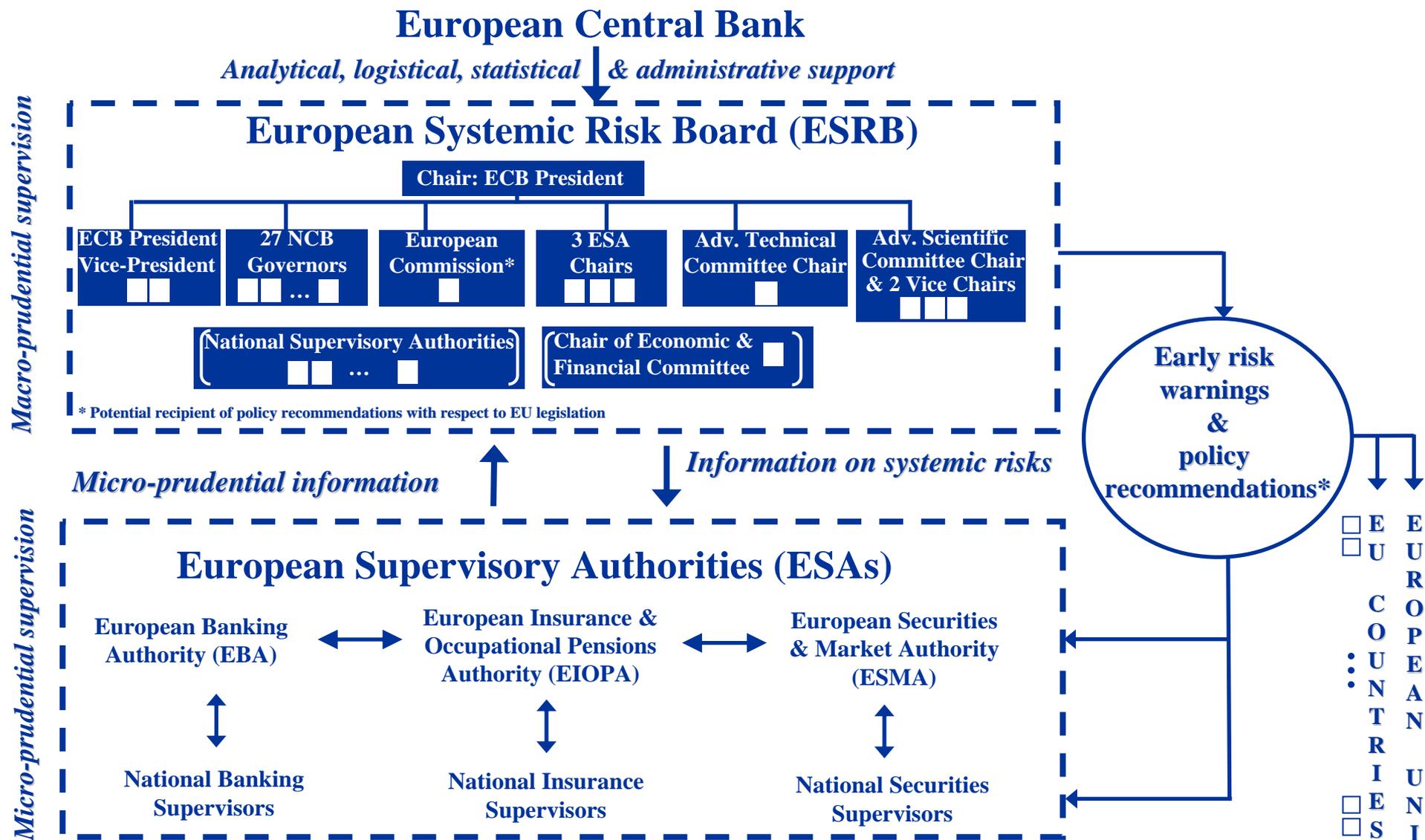
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European System of Financial Supervision

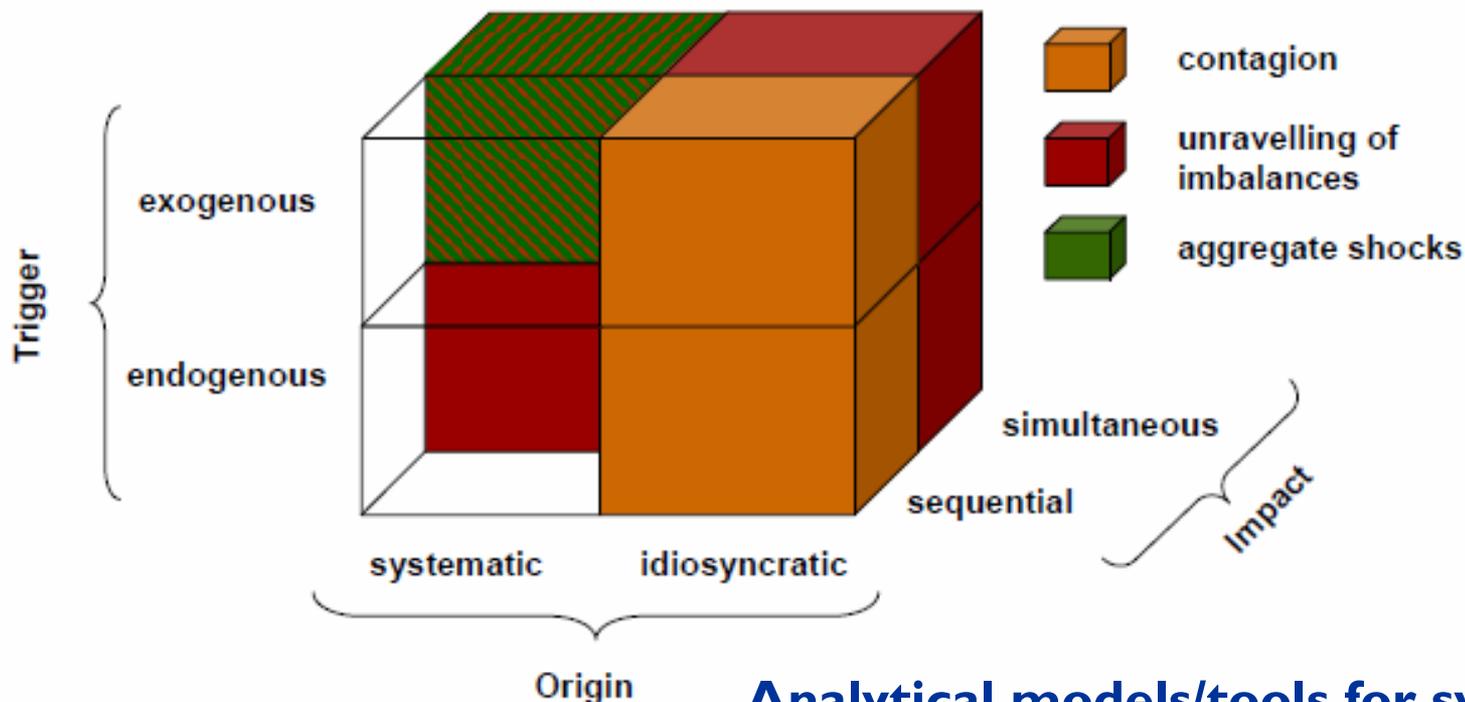


Introduction

- Key area of financial stability policy to be particularly developed further is **macroprudential supervision and regulation**
- Public oversight and regulation that aims at identifying and containing **systemic risk** (rather than risks of individual intermediaries or markets)
- One definition of systemic risk (ECB 2009): Risk that financial instability becomes so widespread that it impairs the functioning of a financial system to the point where economic growth and welfare suffer materially
- Can involve all components of financial systems (“horizontal”)...
 - Intermediaries (including so-called shadow banks),
 - Markets and
 - Market infrastructures...and two-way relationship with the economy at large (“vertical”)
- Today: Go from an economic framework, to the data needed and to the analytical tools to be fed with the data

Forms of systemic risk and analytical approaches

The systemic risk cube:



Analytical models/tools for systemic risk:

- **SR 1: Contagion** – **Contagion and spillover models**
- **SR 2: Endogenous build-up and unravelling of widespread imbalances** – **Early warning indicators and models**
- **SR 3: Aggregate shocks** – **Macro stress testing models**

Source: Author based on de Bandt, Hartmann and Peydró (2009) and ECB (2010a)

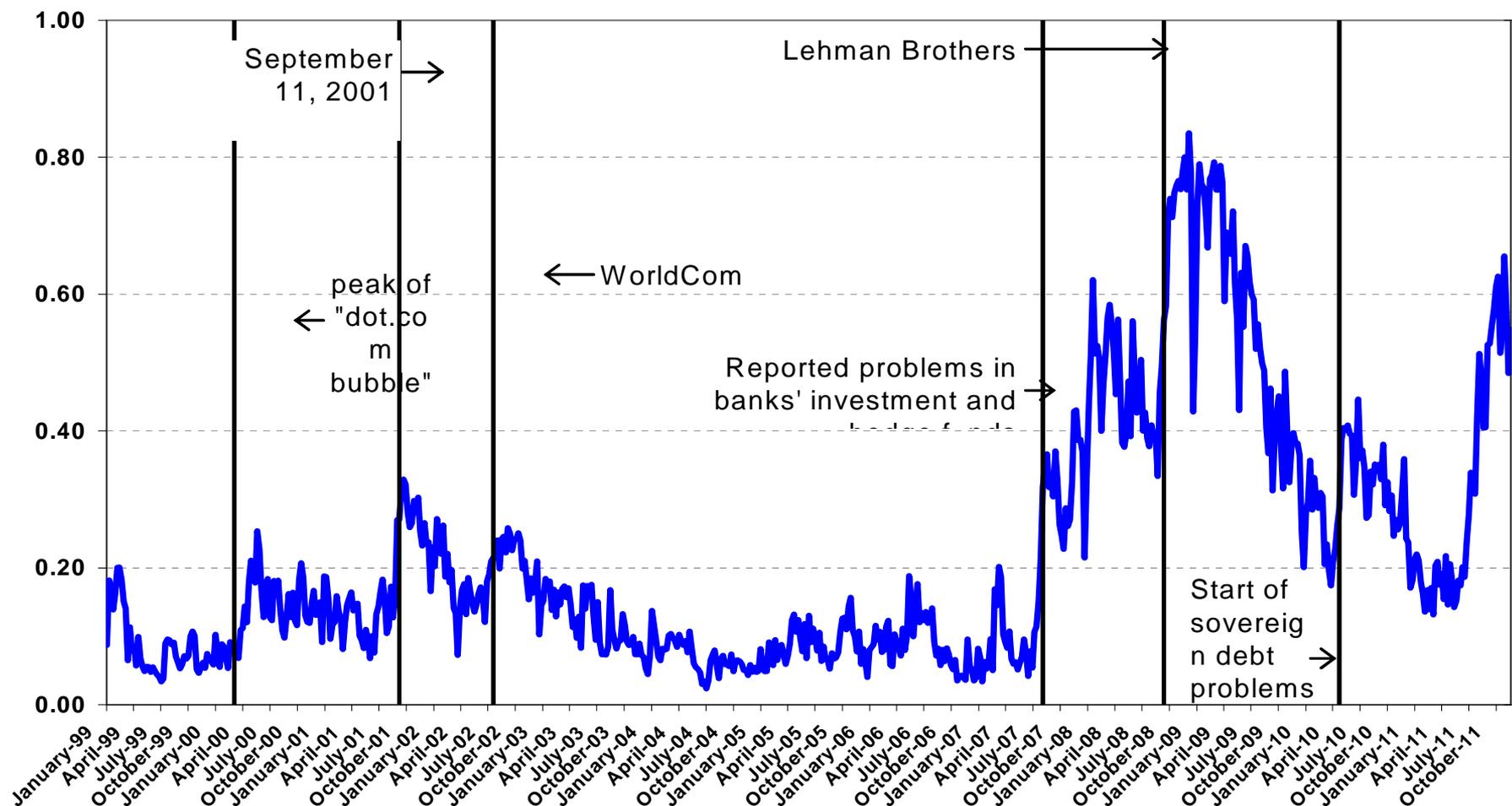
Range of data needed for macropru

- **Wide set of information**
 - Standard financial and macroeconomic data and statistics
 - Supervisory data (in particular individual data) and statistics
 - Market intelligence
- **Range of financial (incl. supervisory) and macroeconomic data (close to “ideal” list)**
 - **Macro data/national accounting:** Growth and components (aggregate shocks, real transmission), credit aggregates (widespread imbalances), flow of funds (real transmission), public finances (widespread imbalances), global imbalances (widespread imbalances, aggregate shocks)
 - **Financial market data:** asset prices (incl. high frequency or real estate), volatility and interest rates (widespread imbalances, aggregate shocks, contagion), credit spreads (widespread imbalances, aggregate shocks), risk premia, attitudes towards risk (widespread imbalances, aggregate shocks), ratings (contagion), market activity (incl. high frequency; widespread imbalances)
 - **On and off-balance sheet data (incl. P&L; sufficiently timely and frequent)**
 - Financial intermediaries (incl. shadow banks, hedge funds etc.): individual data (supervisory for regul. firms), granular breakdowns (items, maturities, exposures (direct and geogr.), currencies), default risk (contagion, widespread imbalances)
 - Non-financial firms: default risk, investment (aggregate shocks, real transmission)
 - Households: wealth (incl. real estate), default risk, consumption (aggregate shocks, real transmission)
 - **Payment and settlement data:** Direction of flows, reconstruction of exposures (contagion)
- **Often multiple inputs for quantitative indicators or analytical models**

Selected data challenges

- **Unavailability/gaps versus costs of reporting**
 - Financial institutions (e.g. shadow banks, hedge funds)
 - Financial markets (e.g. repo markets, financial innovation)
 - Granularity of off- and on-balance sheet data
- **Confidentiality versus access (e.g. EBA et al. 2011)**
 - Safety
 - Complicated use, irregular or no access
 - Example: Direct exposures across intermediaries (key data!)
- **Standardisation across sectors, authorities and databases**
 - Example: Statistical versus supervisory data (definitions, concepts, valuation rules etc.; e.g. ECB and CEBS 2010)
 - Legal identification and matching of entities and instruments (see next session, Gross 2010)
- **International issues: See above, US or EU should not go alone**
- **ESRB regulation provides it with the right to receive all the information it needs to fulfil its tasks (in particular from ECB and ESAs)**
- **Once ESRB/ESAs agreed, Europe advanced very quickly**

Composite indicator of systemic stress (“CISS”)

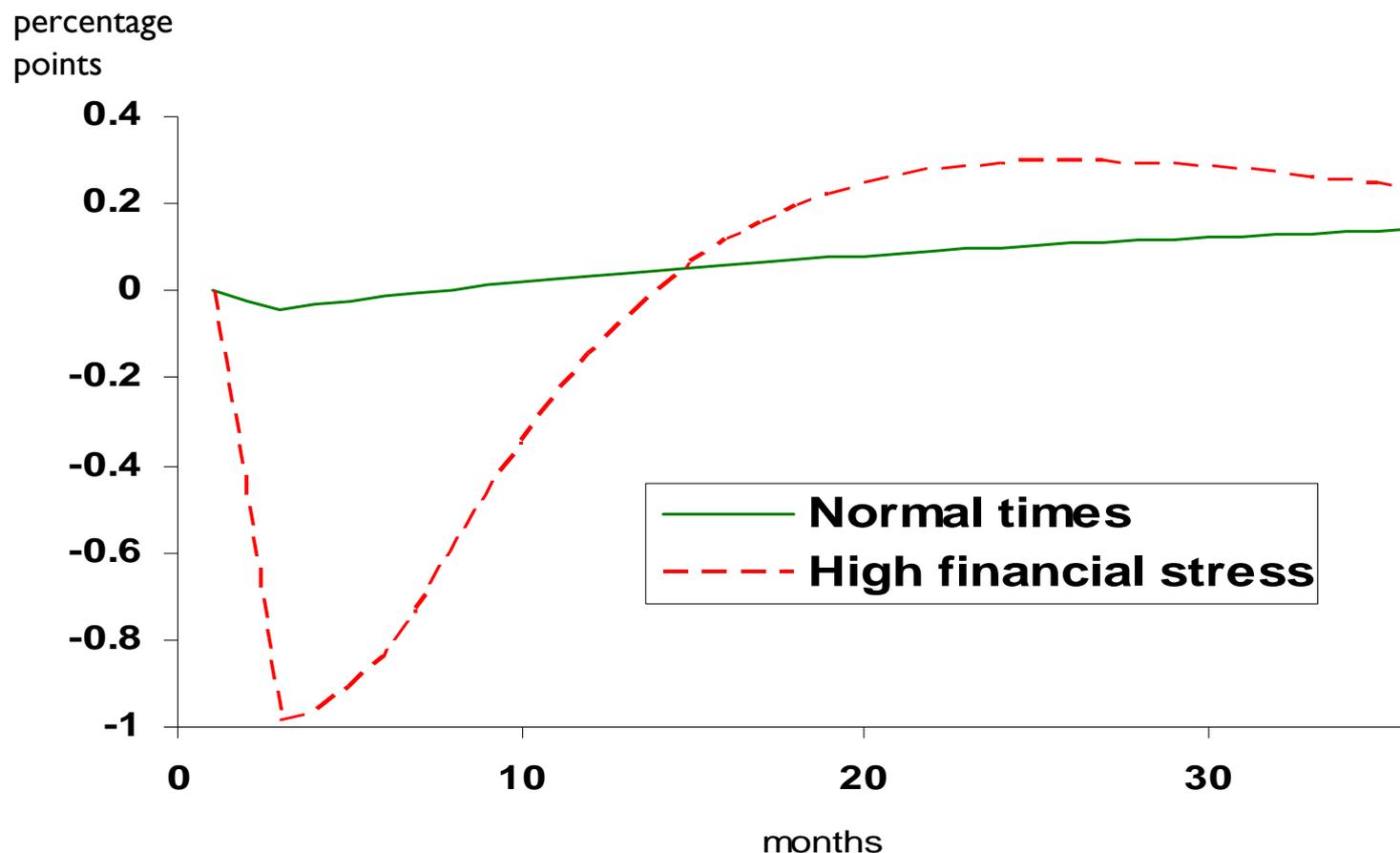


- **Scope:** Equity, bond, money and FX markets plus banking (various sub-items) - **real time**
- **Basic sub-measures** include volatilities, trends, spreads, recourse to marginal lending (weekly data)
- **Normalisation** between 0 and 1 and **aggregation** weighted with correlations (“systemic”)

Widespread financial instability and the macroeconomy

- **Example from the ESCB Macroprudential Research (MaRs) network (see Annex)**
- **How is systemic financial instability transmitted through the aggregate economy: For example September/October 2008**
- **Answers needed, inter alia, for**
 - forecasts
 - regulatory impact assessments
- **Bayesian multivariate Markov-switching vector autoregression model (Hartmann, Hubrich, Kremer and Tetlow 2011)**
- **Key ideas:**
 - Introduce a true indicator of systemic financial instability in an empirical macro model (**Composite Indicator of Systemic Stress**)
 - Allow for non-linearities/“phase transitions” in parameters and error variances (both can switch regime)
- **Variables: production, inflation, 3-month MM rate, loan volume and CISS**
- **Data: euro area, monthly, 1987-2010**

Impact of systemic stress on growth



Impulse response functions of 1 SD increase of systemic stress on industrial production (shock much smaller than September 2008)

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Annex

Ultimate sources of systemic risk

SPECIAL FEATURES OF THE FINANCIAL SYSTEM

Information intensity of financial contracts

Balance-sheet structures of intermediaries

High degree of connectedness

Incomplete markets

Asymmetric and imperfect information

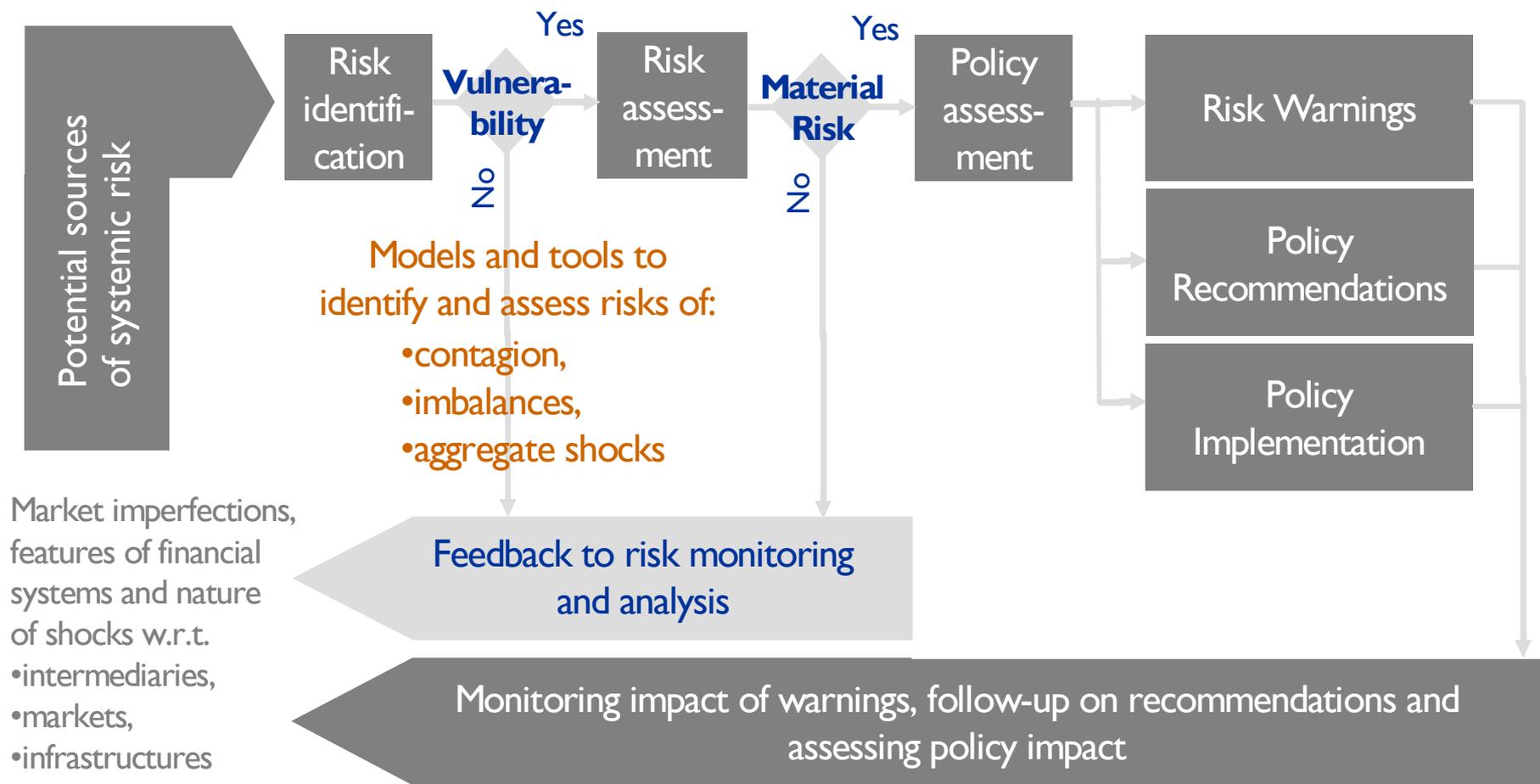
Externalities

Public good character of systemic stability

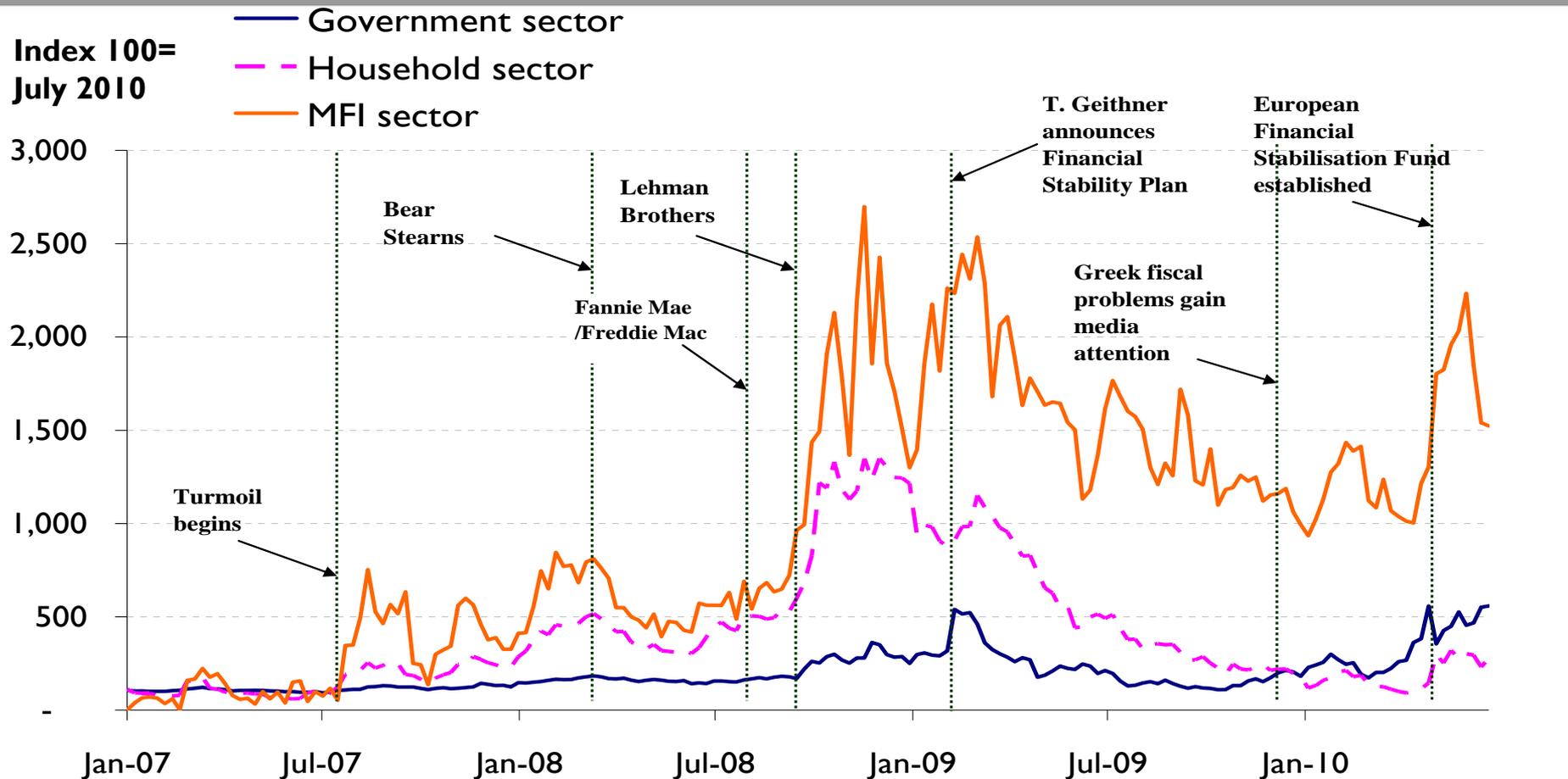
Multiple equilibria

**Powerful feedbacks and amplification:
Non-linearities/
regime changes**

Macroprudential oversight: process



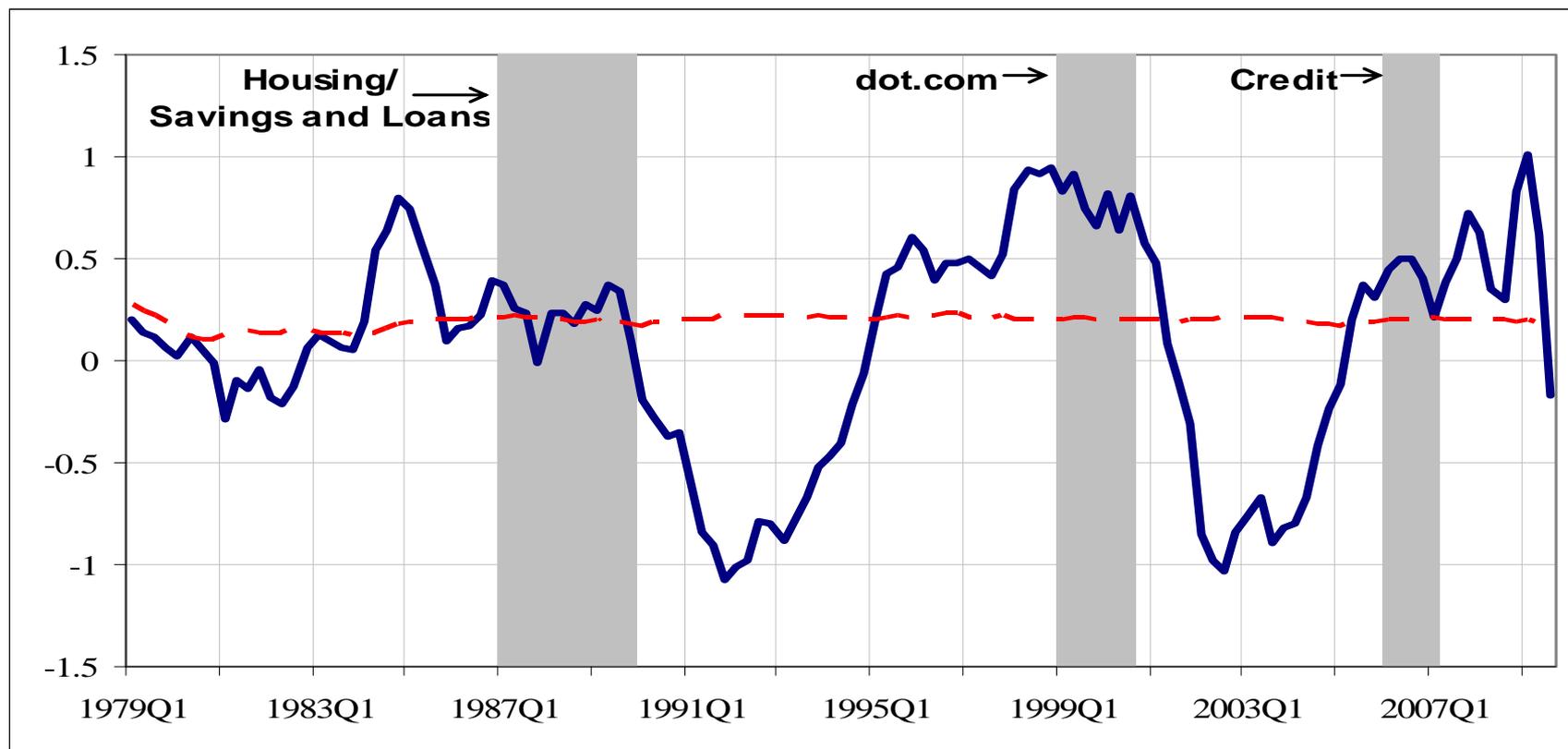
Sector-level aggregate spillover measure



- **Contribution of a given sector to the overall risk of all sectors in the euro area economy (ΔCoVaR)**
- **Sector and total system asset values derived from Merton credit risk model using financial accounts**
- **CoVaR measure inspired by Adrian and Brunnermeier (2010) for individual banks**

Source: Castrén and Sydow (2010)

“Global” credit gap as EWI for asset bubbles



- — De-trended private credit to GDP ratio (GDP-weighted average across countries)
- - - “Optimal” signal threshold (each time 70th percentile – “quasi” real time)
- ■ Widespread mortgage/equity bubble episode (≥ 8 countries 1.75 SD above trend)
- “Costly” bubbles (followed by 3 years of GDP growth 3 p.p. below potential)

Macroprudential regulatory instruments I

- **To contain contagion risks**
 - Enhance capital for counterparty exposures, introduce capital surcharge or levy for systemic risk
 - Move derivatives trading on central clearing counterparties
 - Introduce procedures for orderly resolution of gone concern (incl. living wills, bail-in debt)
- **To prevent the build-up of widespread imbalances**
 - Counter-cyclical capital requirements and dynamic provisioning
 - Balanced accounting approach (market prices, liquidity)
 - Limit leverage, maturity and currency (emerging economies) mismatches
 - Influence compensation practices to remove incentives for risk taking and herding
 - Loan-to-value ratios and debt-to-income limits (e.g. Korean and Hong Kong experiences)

Macroprudential regulatory instruments 2

- **Ensure resilience against unexpected aggregate shocks**
 - High capital and liquidity levels (e.g. based on stress tests)
 - Additional contingent capital (going concern)
 - Foreign currency lending limits (emerging economies)
- **Challenges** (related to research and also data gaps)
 - Transmission channels not well understood (impact assessments)
 - Calibration of individual instruments difficult
 - Interaction of different instruments
 - Level playing field across financial sub-sectors and avoidance of regulatory arbitrage (shadow banking)
 - Effects on overall economy (benefits and costs)

Macroprudential Research (MaRs) network

- **Approved by General Council of the ECB in spring 2010 for 2 years**
- **Central bank research network at the level of the European Union (27)**
- **Objective: Develop core conceptual frameworks, models and/or tools that would provide research support to improve macro-prudential supervision in the EU**
- **Three work streams**
 - **WS1: Macro-financial models linking financial stability and the performance of the economy (fundamental, slow moving)**
 - **WS2: Early warning systems and systemic risk indicators (operational, fast moving)**
 - **WS3: Assessing contagion risk (very data dependent)**
- **Currently:**
 - **118 projects (WS1: 57, WS2: 47, WS3 17)**
 - **About 200 economists involved**
- **Consultant: Xavier Freixas (U. Pompeu Fabra)**
- **Reports to ESCB Heads of Research and General Council**
- **Final report in 2012**

Progress of MaRs one year on

- **WS1: Macro-financial models linking financial stability and the performance of the economy**
 - Several theories integrating financial instability in aggregate models, putting some emphasis on defaults and nonlinearities
 - Novel explanations for the leverage cycle
 - New approaches illustrating interactions between monetary and macroprudential policies
 - Joint coordinated cross-country project on “a canonical model for macroprudential policy”
- **WS2: Early warning systems and systemic risk indicators**
 - A number of new methodologies
 - Improved use of data
 - Novel visualisations of risks
 - Some of the new tools are already in use in the respective central banks
- **WS3: Assessing contagion risks**
 - Joint coordinated cross-country project assessing interconnectedness among EU banks and estimating interbank exposures using TARGET2 data
 - New results on interlinkages in interbank markets and differentiating short-term contagion from long-term integration