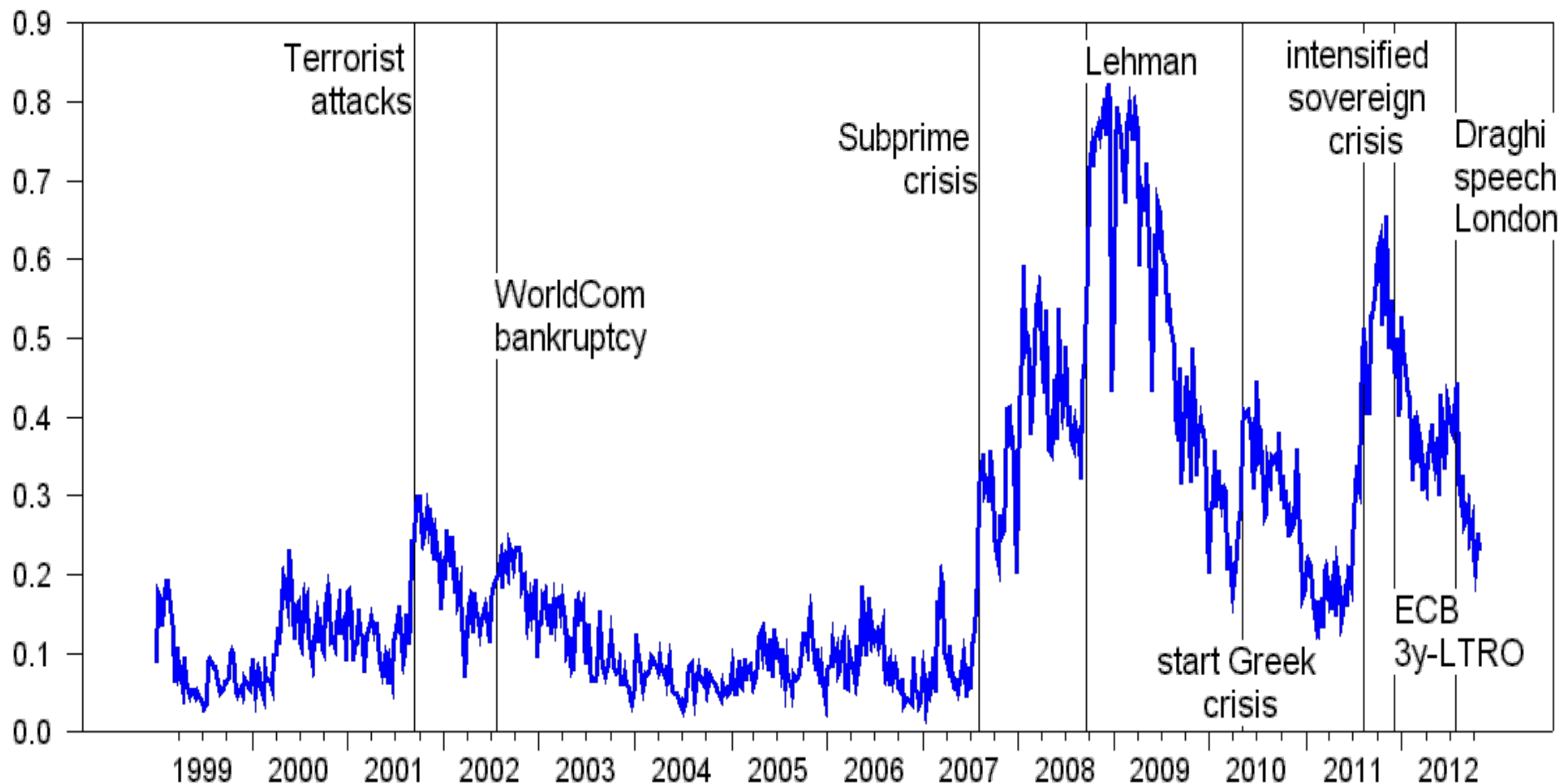# The First Two Years of the Macro-prudential Research Network (MaRs)

of the European System of Central Banks

Second Conference of the ESCB Macro-prudential Research Network, ECB, Frankfurt, 30 October 2012

# Composite indicator of systemic stress ("CISS")

- ➤ Scope: Equity, bond, money and FX markets plus banking/financial intermediation - 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")

Studying systemic financial instability in an empirical macroeconomic model

➢ Bayesian Markov-switching vector autoregression model (Hartmann, Hubrich, Kremer and Tetlow, 2011)

➢ Key ideas

  ➢ Introduce a true indicator of systemic instability (CISS)

  ➢ Allow for regime changes/"phase transitions" in parameters and error variances: important nonlinearities

➢ Variables: Production; inflation; 3-month money market rate; loan volume; and CISS

➢ Data: Euro area; monthly; 1987-2010

➢ Addresses at least three MaRs research questions

  1. How can financial instability be represented in an aggregate model?

  2. How does widespread financial instability affect the real economy?

  3. What role is played by nonlinearities, amplification and feedback effects?

Impact of widespread financial instability on growth
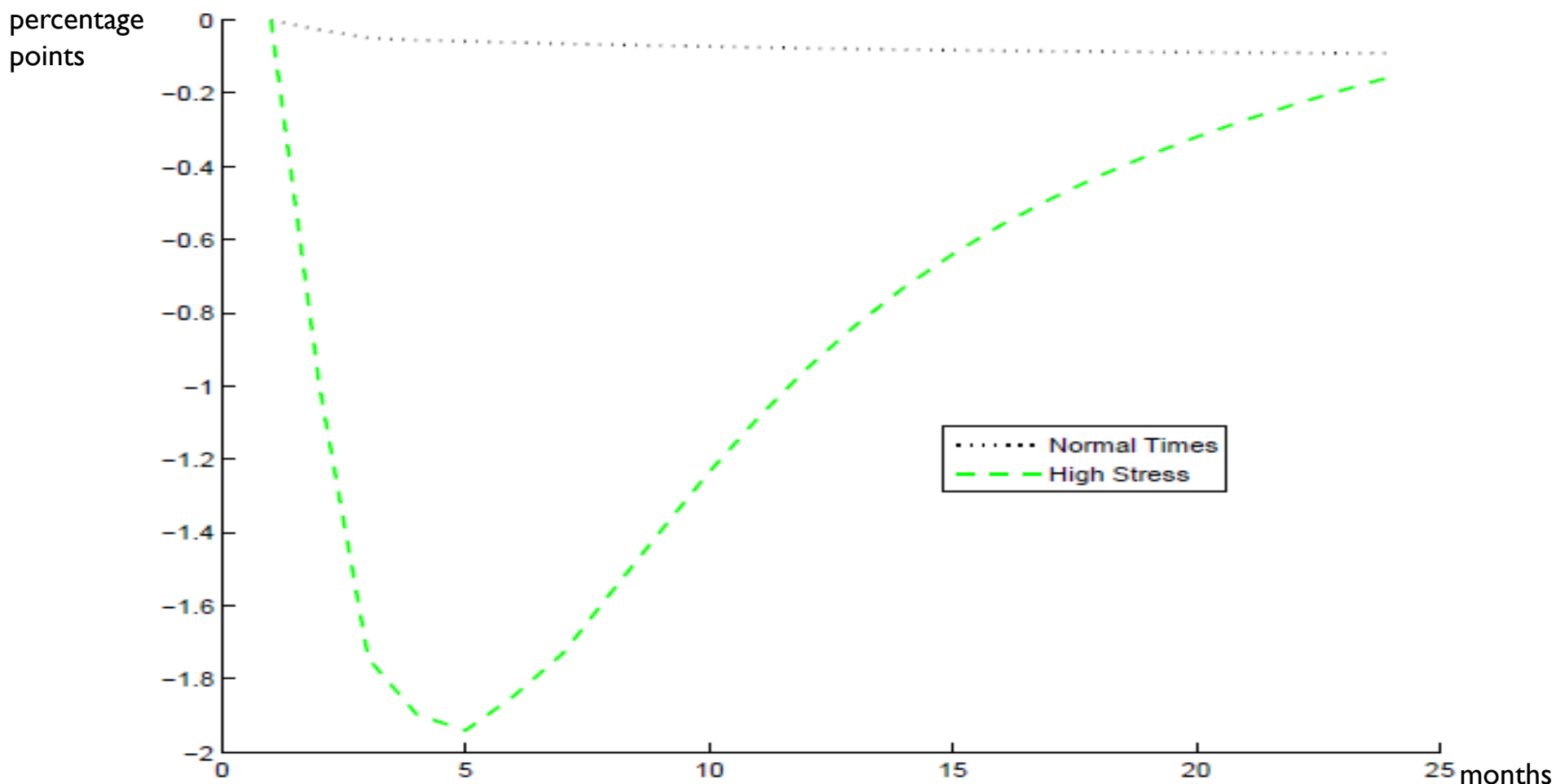
Impulse response functions of 1 standard devation increase of systemic stress on industrial production (shock much smaller than September 2008)

Outline

➢ General overview of MaRs and way forward

➢ Progress of each work stream

➢ MaRs and the future of economics

➢ Annex

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General overview of MaRs…

The General Council established MaRs in spring 2010 to develop core conceptual frameworks, models and/or tools that would provide research support to improve macroprudential supervision in the EU

➢ The work of MaRs is organised around three work streams addressing specific research questions (see annex slides)

1. Macro-financial models linking financial stability and the performance of the economy (work stream 1)

2. Early warning systems and systemic risk indicators (work stream 2)

3. Assessing contagion risks (work stream 3)

➢ ECB website: http://www.ecb.europa.eu/home/html/researcher_mars.en.html

General overview of MaRs…

➢ Overall, MaRs has made significant progress over the last two years, both in terms of individual projects but also on projects conducted jointly by groups of central banks in the ESCB

➢ Comprehensive summary in the report released today

➢ Individual projects
  ➢ MaRs has produced 81 papers so far (40 in WS1, 28 in WS2 and 13 in WS3), out of a work program of 126 individual research projects
  ➢ 41 of them have been published or are accepted/forthcoming in the ECB Working Paper series with a "MaRs stamp" on the cover page
  ➢ 9 papers have been published in academic journals, a few already in top journals (e.g. *Journal of Financial Economics*, *Economic Journal* and *Economic Policy*)

General overview of MaRs…

➢ **Joint cross-country projects**

1. "Canonical model" for assessing macroprudential regulatory policies (9 NCBs and ECB)

2. Database on financial crises in EU countries (inputs from all NCBs)

➢ First conference 5-6 October 2011:
http://www.ecb.europa.eu/events/conferences/html/mar_net.en.html
(today and tomorrow second)

…and way forward

➢ General Council decided to continue MaRs until end 2013

➢ In the additional time the focus of the work will be on
  1. fully completing the joint cross-country projects
  2. derive further analytical tools for supporting macroprudential policies and
  3. more answers to MaRs research questions for which a broader basis and more robust results would be desirable

➢ Interaction with academia and other authorities (including third conference)

➢ Final report planned for spring 2014

➢ General overview of MaRs and way forward

➢ **Progress of each work stream**

➢ MaRs and the future of economics

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Progress of work stream 1

➢ A large part of work stream 1 projects focused on how widespread financial instability can be integrated into aggregate models (see session 1)

➢ Relatively fundamental research, addressing one of the main weaknesses of contemporaneous economics laid bare by the crisis

➢ Different models feature different characterisations of financial instability: Nonlinearities; regime changes; representations of bank default (one bankruptcy rules); fire sales; widespread illiquidity of markets etc.

➢ Most papers focus on the role of unravelling of widespread imbalances and aggregate shocks
   ➢ Asset side: Banks' exposure to bubbles
   ➢ Liabilities side: Wholesale financing, build-up of aggregate liquidity

Progress of work stream 1

➢ Theoretical and empirical research illustrates the transmission of financial instability to the real economy

  ➢ Constraints on credit supply, credit demand
  ➢ Breakdown of risk sharing disturbing households' consumption plans

➢ Asset price shocks contribute to business cycle fluctuations

➢ Recessions are significantly more severe if bank credit plays an important role in a crisis

➢ Some approaches from this relatively fundamental research will be developed further to derive analytical tools for supporting macroprudential policies

Progress of work stream 1

➢ More traditional macroeconomic models can still be useful, for example for the understanding the sources of the leverage cycle (see session 6 and first MaRs conference)

➢ Firm and bank leverage reinforce each other (moral hazard between banks and depositors with a costly state verification problem between entrepreneurs and banks)

➢ Shadow banking associated with securitisation amplifies the leverage cycle

➢ Boom-bust in housing markets: Optimism about future house valuations increases household leverage, demand for houses and real estate prices (boom); if expectations are disappointed there is overborrowing and deleveraging (bust)

Progress of work stream 1

➢ A very important area of progress relates to models helping to assess the effectiveness of regulatory policy instruments (see session 3)

➢ Relies critically on the advances in integrating widespread financial instability in aggregate models (see before): Benefits and costs

➢ Different instruments considered so far:

  ➢ Loan-to-value (LTV) ratios, capital requirements, leverage caps, liquidity ratios, dynamic provisioning, limits on FX lending or currency mismatches and margin requirements on repos

  ➢ Most of these instruments are found to be effective, but (i) some suggested to be finetuned and (ii) risks of unintended side effects need to be managed

  ➢ Multitude of market imperfections that contribute to systemic risk cannot be addressed with a single regulatory instrument (indiscriminate combinations of different regulations can, however, also become counterproductive)

  ➢ Critical element: Controlling fire sale risk

Progress of work stream 1

➢ Some more traditional approaches address the interaction of monetary and macroprudential policy (not yet incorporating widespread financial instability; see first MaRs conference)

  ➢ Combination of an independent macroprudential policy leaning against credit bubbles and a monetary policy focusing on inflation are the best responses to asset price or credit supply shocks in order to maintain price stability

  ➢ Welfare comparison of an extended interest rate rule and a counter-cyclical LTV as means to counter boom-bust cycles in housing leads to ambiguous results (lenders and borrowers are affected in opposite ways)

➢ Interaction between macroprudential policies and monetary policy should be revisited with the new macroeconomic frameworks featuring financial instability, possibly leading to different insights

Progress of work stream 1

➢ One MaRs effort that stands out is the development of a "canonical model" for assessing macroprudential policies (see session 3)

➢ Features
  ➢ Heterogeneous banks, households and firms which can default
  ➢ Interbank market with a central bank
  ➢ Business and mortgage defaults result in various frictions and externalities, like fire sales

➢ First full version of the model almost ready, needs to be coded and calibrated

➢ Envisage simulations to assess the effects of macroprudential regulatory policy instruments (capital and liquidity requirements, dividend restrictions, LTV and loan-to-income ratios, leverage ratios, taxes and levies)

Progress of work stream 2

- One of the areas of research of work stream 2 has been the production of various measures for the current level of systemic instability

- Composite indicator of systemic stress (CISS; see introduction)
    - Part of new ESRB risk dashboard

- Distance-to-default indicators to estimate the probability of joint bank failures

- Use of these indicators
    - Identification of crises in real time
    - Historical comparisons of instability levels
    - Can they be useful as left-hand side variables in early warning models?

Progress of work stream 2

➢ A joint cross-country project has produced a database of various types of crises in EU countries (see session 2)

➢ Provide a homogeneous basis for assessing the performance of systemic stress and early warning indicators for banking, currency and fiscal crises

➢ New consistent definitions of crises including public or international support measures (both for bank and debt crises)

➢ Database is completed and has been made available to interested researchers: http://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1485-annexes.zip

➢ Provides a basis conducting "horse races" between competing indicators

Progress of work stream 2

➢ WS2 researchers have developed new methodologies to select early warning indicators (Bayesian model averaging, self-organising maps, contagion effects (stress of neighbourhood is taken into account))

➢ Results suggest that attention should be paid to
  ➢ Domestic bank credit (in various transformations) and leverage
  ➢ Indicators of macroeconomic imbalances
  ➢ Global aggregates (e.g. for credit gaps)

➢ Novel early warning approach based on decoupling of financial firms' credit risk conditions from the macroeconomic and financial variables that usually explain them

Progress of work stream 2

➢ Given the challenge in predicting crises, an important area of early warning research is also the detection of imbalances in asset prices or credit developments

➢ Caution should be exercised with simple statistical detrending or filtering methods to detect imbalances, in particular for dynamic economies

➢ New approaches to detect excessive credit based on a structural life-cycle and a regime-switching model

➢ Importance of market sentiment and intensity of herding behaviour for the emergence of equity bubbles (see session 2)

Progress of work stream 3

➢ Main focus on cross-border connectedness and contagion risks among European banks

➢ Part of the work on interlinkages in money markets

    ➢ Further evidence of tiering in this market (some banks distribute liquidity)

    ➢ Losses from interbank exposures are strongly bi-modal (very small/very large), which is a source of fragility
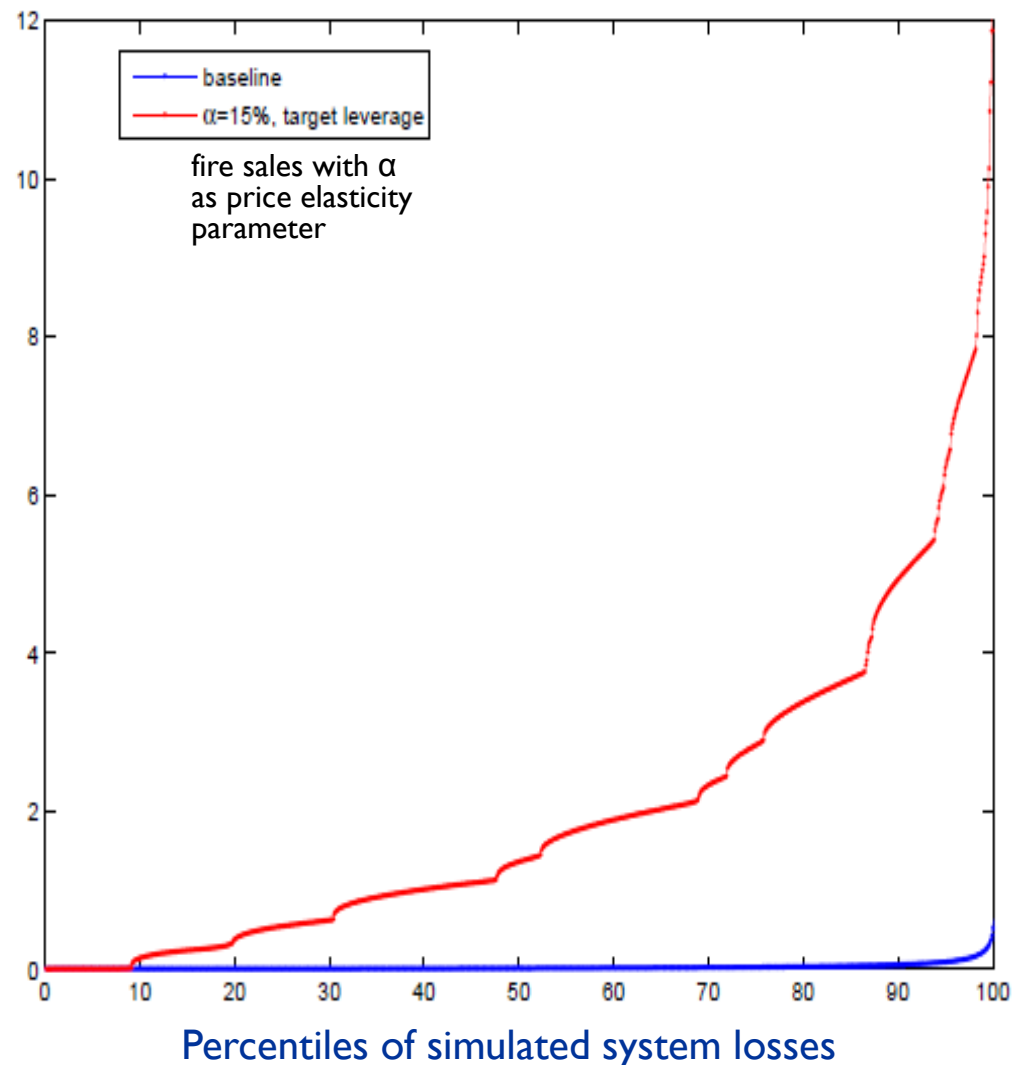
Progress of work stream 3

➢ Several projects analyse contagion more directly (see session 4 and 5)

➢ Global empirical study of regional bank fragility and spillovers using market data

➢ New methodology to disentangle short-term contagion from long-term market integration

➢ Further progress on applying the network approach at the macro level, using financial accounts

➢ Network approach to counterfactual simulation of interbank contagion introduces fire sales and shows how they amplify contagion effects in a nonlinear fashion

Average reduction in capital ratio per bank (percent)

- ➤ Counterfactual simulations of interbank contagion comparing static baseline to scenario with fire sales and leverage target (behavioural components)

- ➤ Interbank network simulated from aggregated exposures and EBA geographical distribution of 89 European banks

- ➤ "Cliff effects" and nonlinearities in the distribution of system losses through contagion

- ➤ Fire sales significantly amplify contagion effects

baseline
α=15%, target leverage

fire sales with α as price elasticity parameter

Percentiles of simulated system losses

Progress of work stream 3

- Special initiative on sovereign contagion research (see session 7)

  - Range of methodologies: Dynamic factor models, multivariate frequency decomposition, cointegration analysis, forecasting error variance decompositions, dynamic copulas and event studies
  - Different data: Sovereign bond yield spreads, sovereign CDS, bank equity returns
  - Most papers (but not all) find evidence of contagion since the sovereign crisis
  - Two papers argue that fundamentals and risk aversion can explain sovereign yield increases and bad news about a country economy may be confounded with news about a lack of commitment by other countries

➢ General overview of MaRs and way forward

➢ Progress of each work stream

➢ **MaRs and the future of economics**

➢ Annex

MaRs and the future of economics

➢ The new aggregate frameworks incorporating widespread financial instability directly address one of the main weaknesses of contemporaneous economics

➢ The use of such frameworks is necessary for convincing scientific foundations for assessing macroprudential regulatory policies

➢ Five years into the crisis the academic economics community has made only very few significant efforts in this direction

➢ Central banks participating in MaRs would find it desirable to see the wider economics community, in particular academic research and teaching, to take up more decisively these directions

➢ Experiences of the crisis suggest that additions to economics along those lines, which amount to a new paradigm, may be needed

➢ This could ensure that central bank and financial regulatory policies will also benefit from sound scientific foundations in the future

➢ It may benefit from considering also approaches from disciplines other than economics, whilst MaRs researchers are not definitively moving away from standard economics based on rationality and equilibrium (not tackling agent-based modelling for example)

➢ General overview of MaRs and way forward

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MaRs management structure

➢ Chair: Philipp Hartmann (ECB)

➢ Network Secretary: Angela Maddaloni (ECB); to be succeeded by Fiorella de Fiore and Kalin Nikolov (both ECB)

➢ Work stream 1
  ➢ Coordinators: Laurent Clerc (Banque de France) and Philipp Hartmann (ECB)
  ➢ Consultant: Professor Xavier Freixas (Universitat Pompeu Fabra, Barcelona); to be succeeded by Professor Javier Suarez (CEMFI, Madrid)

➢ Work stream 2
  ➢ Coordinators: Carsten Detken (ECB) and Katerina Smidkova (Czech National Bank)
  ➢ Consultant: Professor Hans Degryse (Katholieke Universiteit Leuven)

➢ Work stream 3
  ➢ Coordinators: Paolo Angelini (Banca d'Italia) and Cornelia Holthausen (ECB)
  ➢ Consultant: Professor Hans Degryse (Katholieke Universiteit Leuven)

Research questions MaRs work stream 1

Macro-financial models linking financial stability and the performance of the economy

- ➢ How can financial instability be represented in an aggregate economic model?
- ➢ How does widespread financial instability affect the real economy?
- ➢ What are the main transmission channels of financial instability at the aggregate level?
- ➢ What role is played by non-linearities, amplification and feedback effects?
- ➢ What are the cumulative effects of the two-way interaction between financial instability and the performance of the economy at large, including the build-up and unravelling of financial imbalances?
- ➢ How can the leverage cycle be described theoretically and empirically?
- ➢ How can these models help understand the causes and features of the recent financial crisis?
- ➢ How can models help identify the appropriate macroprudential policies to maintain systemic stability?

Research questions MaRs work stream 2

Early warning systems and systemic risk indicators

➢ What are the key macroprudential early warning indicators for groups of countries with relatively similar financial structures in the European Union?

➢ How can the different indicators be aggregated at the EU level?

➢ What are the best early indicators of widespread imbalances, asset price bubbles, credit booms and over-indebtedness, distinguishing particularly between credit and valuation developments that are driven by (fundamentally justified) factors in the real economy and developments that involve systemic risks?

➢ What are the best indicators of current systemic stress or instability?

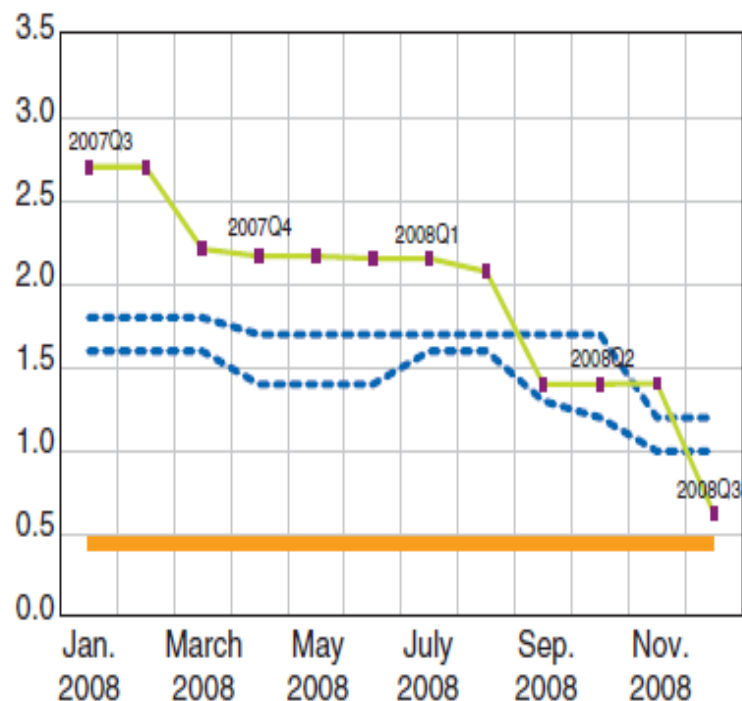# Research questions MaRs work stream 3

Assessing contagion risks

➢ How large are cross-border bank contagion risks compared to domestic risks?
➢ How significant are the risks of spillovers between different types of intermediaries?
➢ Is bank contagion risk significantly enhanced when feedback effects are taken into account?
➢ Can one distinguish between contagion risk, as one form of systemic risk, and the unravelling of imbalances, the Minsky-Kindleberger type of systemic risk?

Real time euro area GDP growth forecast errors and coincident growth releases (%)

a) For 2008

b) For 2009