# Discussion of
# "Measuring Systemic Risk"
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Rama CONT

## Outline

- Systemic risk: mechanisms and measures
- Summary of the paper
- Methodological issues
- Estimation method
- Predictive properties

## Summary and contributions

This (timely) paper addresses an important topic : the measurement of systemic importance of financial institutions in view of a designing a systemic surcharge to financial institutions. Main point: argues for the introduction of a 'systemic tax' based on the sum of

-an institution risk component $=$ expected loss of bank on its (guaranteed) liabilities

-a systemic component: Expected Shortfall of during a crisis event.
Contributions include

- A model for motivating the importance of introducing a 'systemic tax' on banks

- A measure of 'systemic risk contribution'

- An estimation method and empirical results

# Systemic risk: mechanisms

Various mechanisms have contributed to financial instability in recent (and not so recent) crises:

- Correlated exposures
- Contagion of insolvency: counterparty risk
- Contagion of illiquidity: funding mechanisms
- Price–mediated contagion: fire sales (amplified by pro-cyclical regulatory requirements)

## Systemic risk: metrics

Accordingly, various indicators have been proposed for measuring systemic risk (at an aggregate level) and the systemic importance of financial institutions, based on

- **Market indicators** : returns, CDS spreads, option-implied volatility
- Interbank exposures ( network approach)
- Liquidity ratio, leverage ratios and maturity mismatch in funding
- Concentration of exposures to risk factors

Different indicators focus on different mechanisms and it is important to understand what we are measuring (mechanism) and how we are measuring it (data input, estimation method).

## Metrics of Systemic importance: methodology

One can distinguish

- Top down approaches: define a global indicator of systemic risk, then decompose it into 'marginal contributions' of each institution
- Bottom-up approaches: examine the system-wide impact of the default or loss in one institution on the financial system. Network approaches, approaches based on balance sheet information, fall in this class.

This paper focuses on a top-down approach ; bottom up approaches are not discussed or mentioned.

## Summary and contributions

- Central planner maximizes
  utility of bank owners+ expected cost of 'Debt insurance'+
  'crisis externality'

- Define Systemic Expected Shortfall SES(i) as 'equity loss
  below target level in a crisis scenario' defined itself as 'loss of
  aggregate capital below a target level'

- Target levels defined as (exogenously chosen) fraction $z$ of
  total assets

- Main theoretical result: 'efficient outcome' is obtained by
  taxing each bank proportionally to
  Default Prob. x ES(i)+B x Crisis Prob. x SES(i) +C

## Systemic Expected Shortfall

- SES(i) = 'expected equity loss below target level conditional on a crisis scenario' defined itself as 'loss of aggregate capital below a target level'

$$SES(i) = E[zA_i - w_i | W < zA]$$

- Nice properties: additive decomposition of aggregate expected shortfall into marginal participation of each bank

- Simple interpretation: taxing banks proportionally to SES(i) = asking them to pay the share of 'aggregate loss' they generate during a crisis scenario

- Problem: crisis scenario exogenously defined, may have nothing to do with failure of bank $i$ (as opposed to bottom up measures of default impact in network models)

## Model

- 'Debt' not distinguished from 'deposits': regulator does not guarantee debt.
  Framework does not distinguish debt from deposits, does not distinguish an investment bank from a commercial bank.
  How would the Volcker rule fit in here?

- 'Utility of bank owners' includes 'cost of capital': "there is an opportunity cost of using capital instead of debt".
  Modigliani Miller? $\rightarrow$ recent work of Admati & Hellwig

- "Leverage" measure which intervenes does not take liquidity/ funding structure into account.

- Crisis defined exogenously as loss of fraction $z$ of assets. value of $z$ ad-hoc but influences empirical results.

# Methodological issues: how are we measuring it?

- Paper chooses to focus on estimators solely based on **market data**: CDS spreads, equity returns.

- Would not be the best choice for a regulator, who has access to further, non-public data such as counterparty exposures, funding structure and other balance sheet information.

- In particular, it is doubtful that only equity returns and CDS spreads would provide information on liquidity contagion channel (Adrian & Shin, Morris & Shin,...) which are not known to investors at large.

- As opposed to metrics based on historical returns, which are backward looking, metrics based on exposures are forward-looking: exposures represent **potential future loss**.

# The use of CDS spreads

Credit Default Swap (CDS) spreads have been used as a source in various academic studies for computing "implied default probabilities" and here, as an input to a measure of systemic importance.

This is particularly problematic when comparing financials vs non-financials since

- CDS spreads are fixed by a small number of dealers ($< 10$) and many of the banks given as examples are part of this dealer network.
- Counterparty risk was a significant component of CDS spreads during the crisis and interpreting CDS spreads as a pure signal on credit risk of the underlying is problematic.

Even in the case of case of a fully collateralized CDS whose spread is fixed in a 'competitive' market, the spread is not simply related to the ('objective') default probability of the underlying name.

## Predictive properties?

- A key issue in the design of 'metrics' of systemic importance and systemic risk is their predictability in view of their use for 'early warning systems' by regulators.

- Ideally predictive power should relate to losses in absence of central bank intervention but in practice central banks do intervene during a crisis which makes it empirically difficult to assess such 'predictive ability'.

- The empirical study makes a case for the MES as useful tool for analyzing cross sectional systemic contribution but less so for predictability.

- Recent study by ECB testing similar measures also shows little (or no) predictive ability.
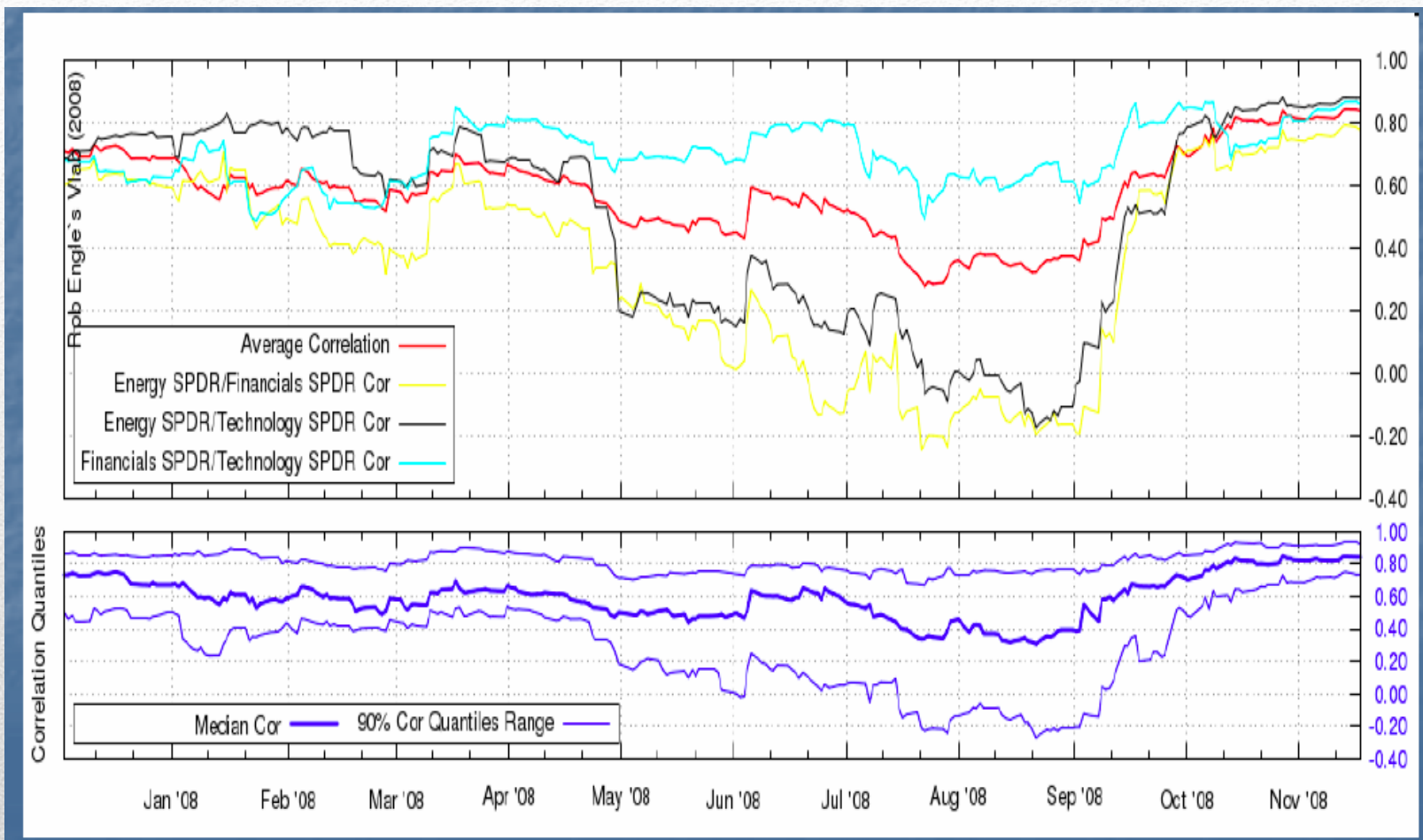
Correlations among US stock returns, 2008

Probability of a simultaneous default of two or more large euro area banks within two years
(Jan. 2007 – Mar. 2012; probability; percentages)
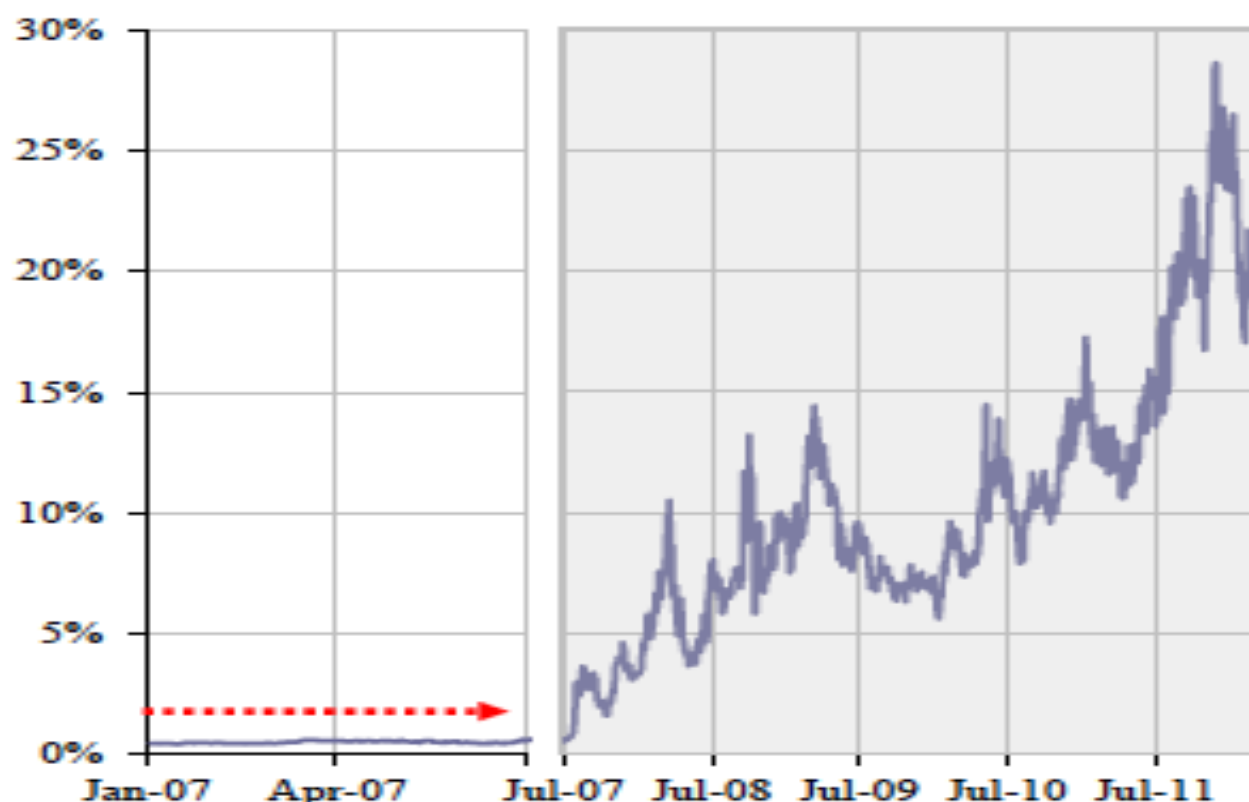
Source: Bloomberg and ECB calculations.
Notes: For further details of the indicator, see Box 16 in ECB, Financial Stability Review, December 2007.

EUROPEAN CENTRAL BANK

## Conclusion

- Main point: argues for the introduction of a 'systemic tax' based on the 'Systemic Expected Shortfall' of a bank and proposes a way to estimate this indicator.

- Simple framework, easily implemented, understandable (even by) regulators. Widely read by regulators, will become an important reference on the topic.

- Estimation based solely on market data is convenient but poses methodological questions.

- Def. of 'crisis scenario' exogenous but important in estimation.

- Does not take into account network effects, liquidity/ funding.

- Predictive power? Perhaps more useful as a cross-sectional analysis of historical data rather than early warning system.