Systemic Risk, Sovereign Yields and Bank Exposures in the Euro Crisis

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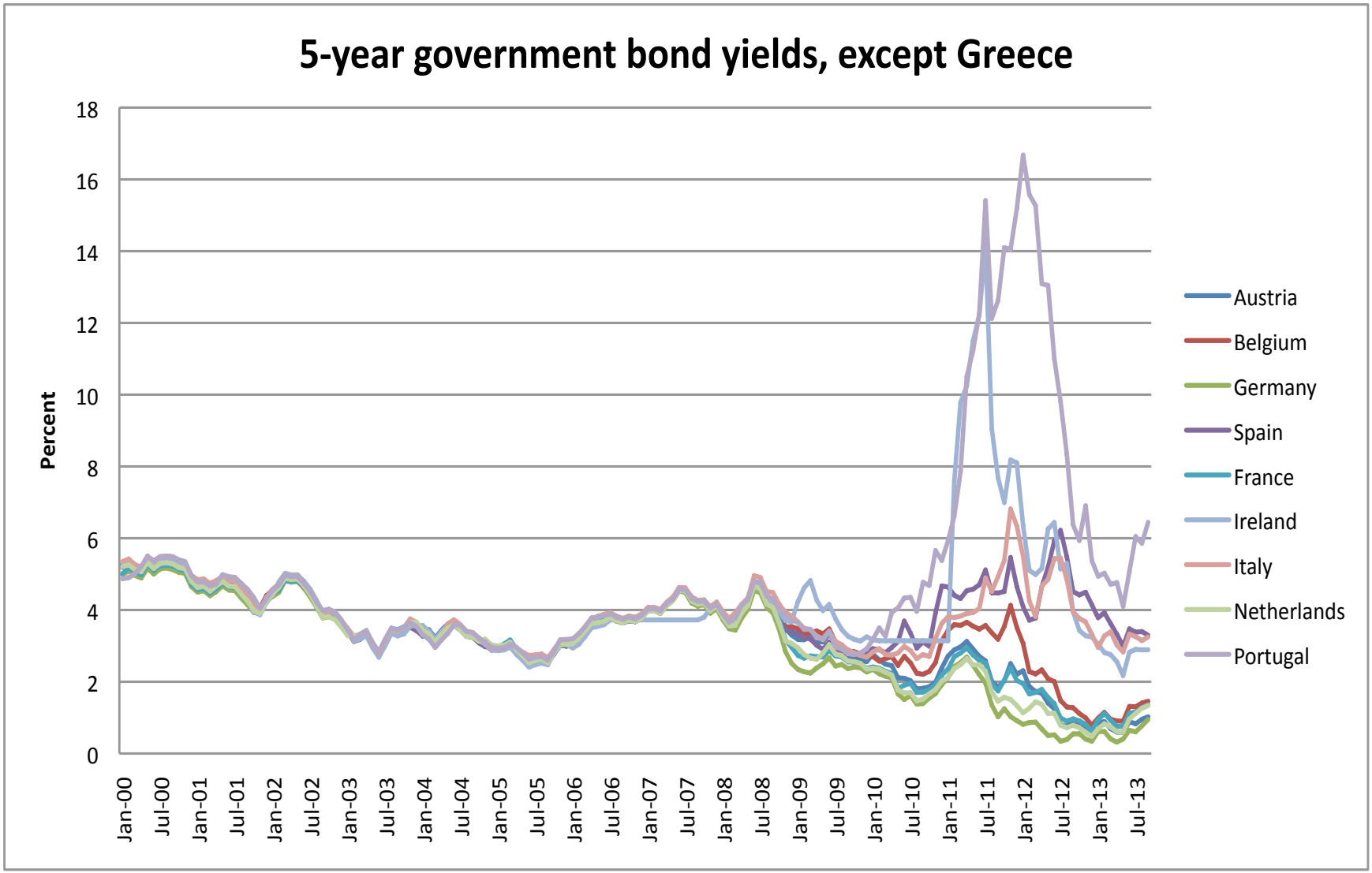
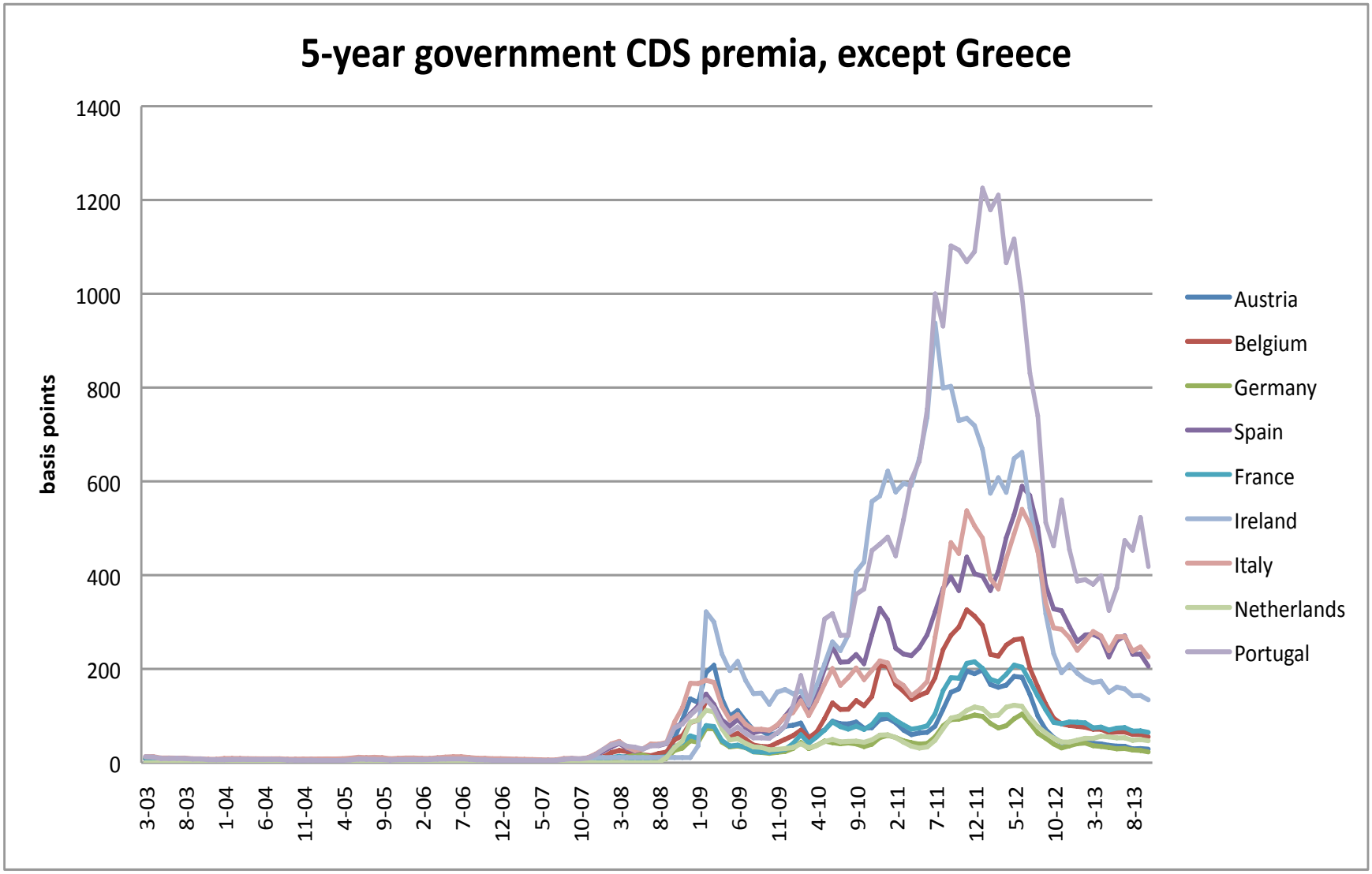
This paper

- Focus on the European sovereign debt crisis.
- Sovereign default risk or euro breakup risk?
- How do bank portfolios react to these two risks?
- Policy implications.

Stylized Fact # 1



Stylized Fact # 1 (cont.)



Risk of euro breakup?

(a) 20 November 2010

(b) 4 December 2010

Risk of euro breakup? (cont.)

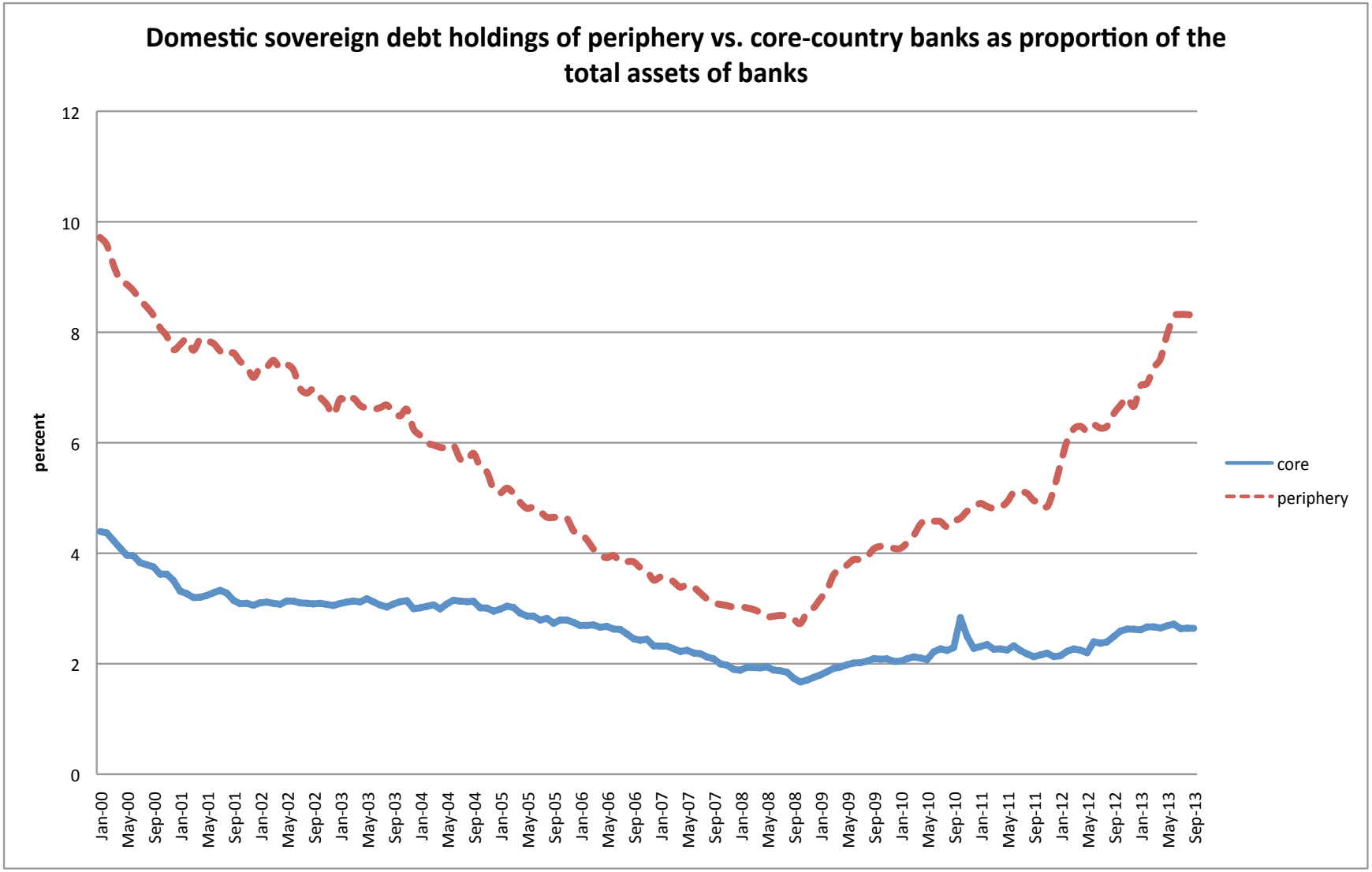
(c) 16 July 2011

(d) 17 September 2011

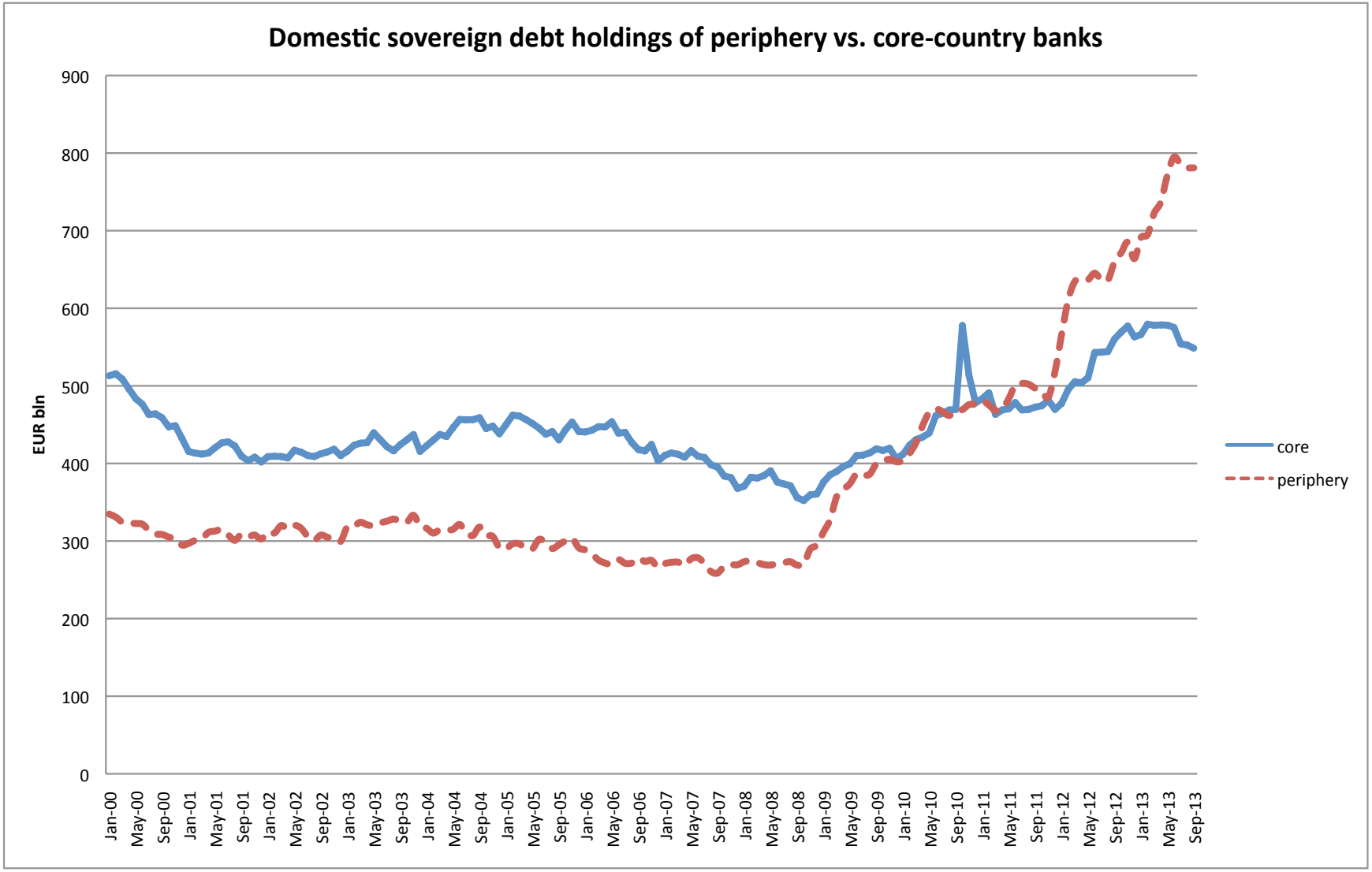
Risk of euro breakup? (cont.)

- Nouriel Roubini:
  "Greece will leave the eurozone in the next 12 months, and Portugal after. . . There is a 50% chance that the eurozone will break up in the next 3 to 5 years" (January 2012).
- Mario Draghi:
  "the premia that are being charged on sovereign states borrowings . . . have to do more and more with convertibility, with the risk of convertibility" (26 July 2012).

Stilized Fact # 2



Stilized Fact # 2 (cont.)



Objective

- Final objective: understand how default risk and redenomination risk affect banks' sovereign exposures.
- Preliminary step: decompose sovereign yields in country-specific component (default risk) and a common component (euro breakup risk).

Preliminary step: systemic *vs.* country risk

- Our method: Dynamic factor model.
- Previous literature: Identification of systemic risk via principal component (Ang and Longstaff, 2011) or observables (Attinasi et al, 2009; De Santis, 2012; Di Cesare et al., 2013; Caceres et al, 2010; Sgherri and Zoli, 2009; Giordano et al, 2012).
- Result 1: The common factor correlates with euro breakup risk.
- Result 2: Increase in the euro-area yields (relative to the swap rate) mainly reflects country specific risk.
- Result 3: CDS premia also reflect systemic risk, especially in core countries.

Final objective: home bias in banks' sovereign portfolios

- Our method: Vector error correction model using (observed) aggregate banks' exposures and (country/common) yield differentials.
- Previous literature: (estimated) banks' exposures suggest carry trades especially by periphery banks (Acharya and Steffen, 2012).
- Result 1: higher country-specific risk $\Longrightarrow$ periphery banks increase domestic exposure, core banks reduce it;
- Result 2: greater common risk $\Longrightarrow$ all banks increase domestic exposures.

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Systemic *vs.* country risk

The model

- To illustrate the dynamic factor model, consider the case of 2 countries:

$$\begin{bmatrix} \Delta y_{1t} \\ \Delta p_{1t} \\ z_{1t} \\ \Delta y_{2t} \\ \Delta p_{2t} \\ z_{2t} \\ \mathbf{x}_t \end{bmatrix} = \begin{bmatrix} \alpha_{1G} & \alpha_{1C} & 0 \\ \alpha_{2G} & \alpha_{2C} & 0 \\ \alpha_{3G} & \alpha_{3C} & 0 \\ \alpha_{4G} & 0 & \alpha_{4C} \\ \alpha_{5G} & 0 & \alpha_{5C} \\ \alpha_{6G} & 0 & \alpha_{6C} \\ \alpha_1 & 0 & \mathbf{0} \end{bmatrix} \begin{bmatrix} f_{Gt} \\ f_{1t} \\ f_{2t} \end{bmatrix} + \xi_t \equiv \Lambda \mathbf{f_t} + \xi_t,$$

- f_t^G is a global common factor, f_{1t} and f_{2t} are the country-specific factors;
- Λ is the matrix of factor loadings;
- ξ_t is the vector of idiosyncratic errors

Systemic *vs.* country risk (cont.)

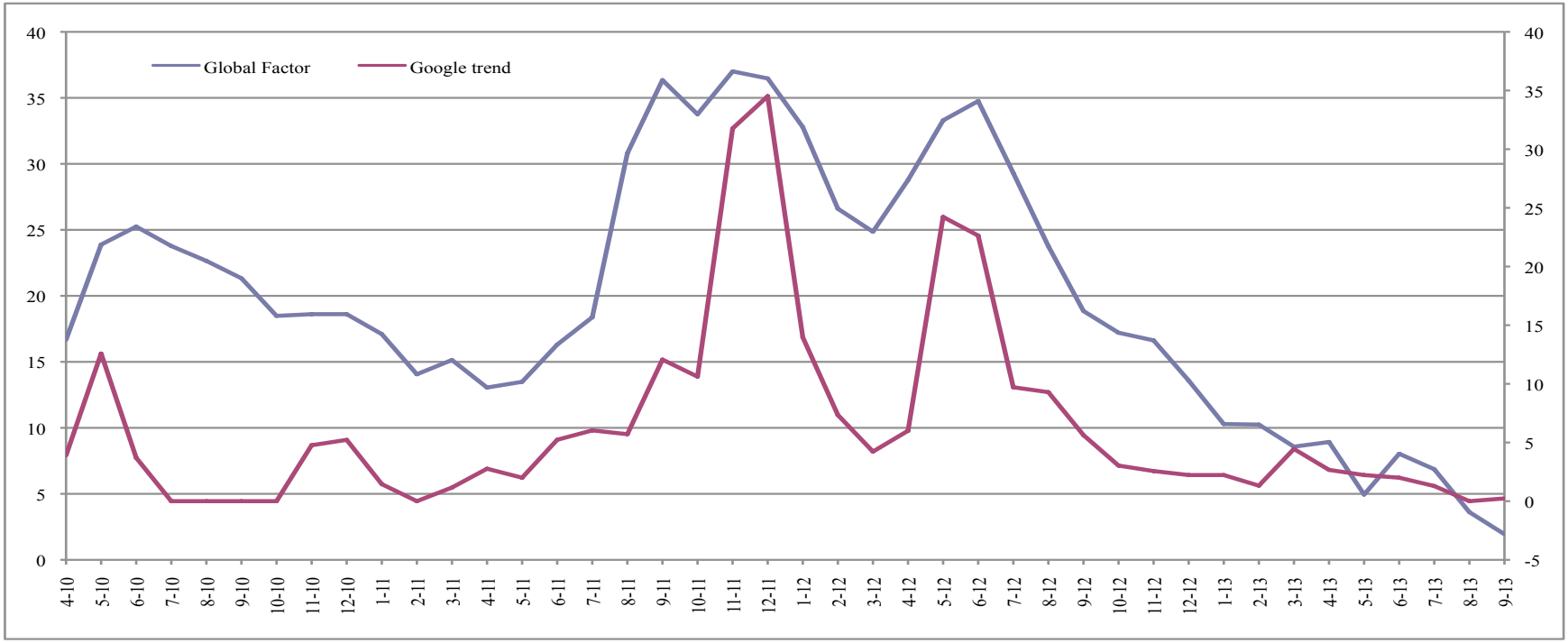
The model

- The latent factors are assumed to have an autoregressive structure:

$$f_t = A(L)f_{t-1} + u_t,$$

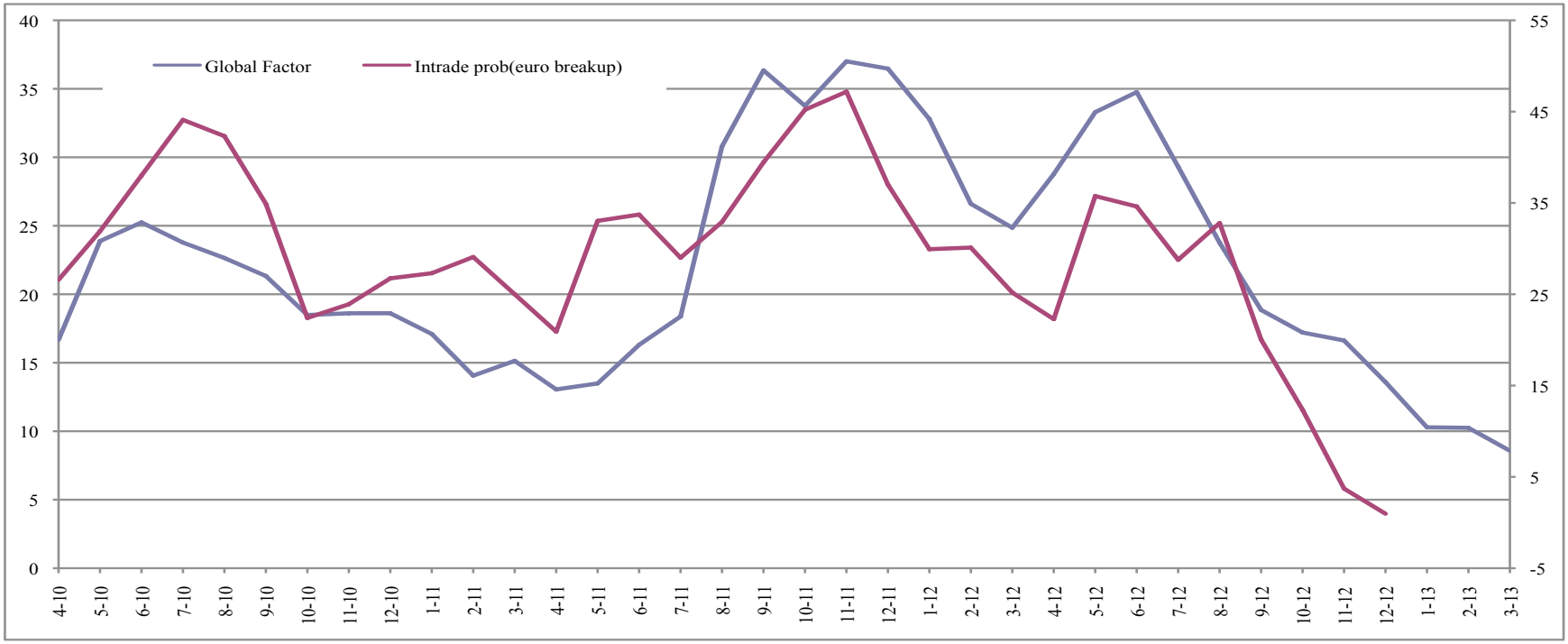
  where $A(L)$ is diagonal with two lags, so that the factors are orthogonal.
- The common and country-specific factors are estimated via a two-step procedure (see Doz et al., 2011).

Systemic *vs.* country risk (cont.)



Google Trends index measures how often search-terms related to the collapse of the euro were entered in the Google search engine.

Systemic *vs.* country risk (cont.)



The probability that any country that used the Euro as of March 12th, 2008 would announce its intention to drop the Euro before the end of 2013, based on Intrade data.

Systemic *vs.* country risk (cont.)

Variance decomposition: yield differentials relative to the swap rate

	Common	Country	Idiosyncratic
Austria	0.05	0.86	0.09
Belgium	0.17	0.45	0.38
Germany	0.36	0.32	0.32
Spain	0.21	0.72	0.07
France	0.01	0.95	0.04
Greece	0.03	0.27	0.69
Ireland	0.00	0.34	0.66
Italy	0.29	0.74	—
Netherlands	0.04	0.92	0.04
Portugal	0.01	0.83	0.16
Denmark	0.02	0.97	0.01

- Result 2: Increase in the euro-area yields mainly reflects country specific risk (except for Germany).

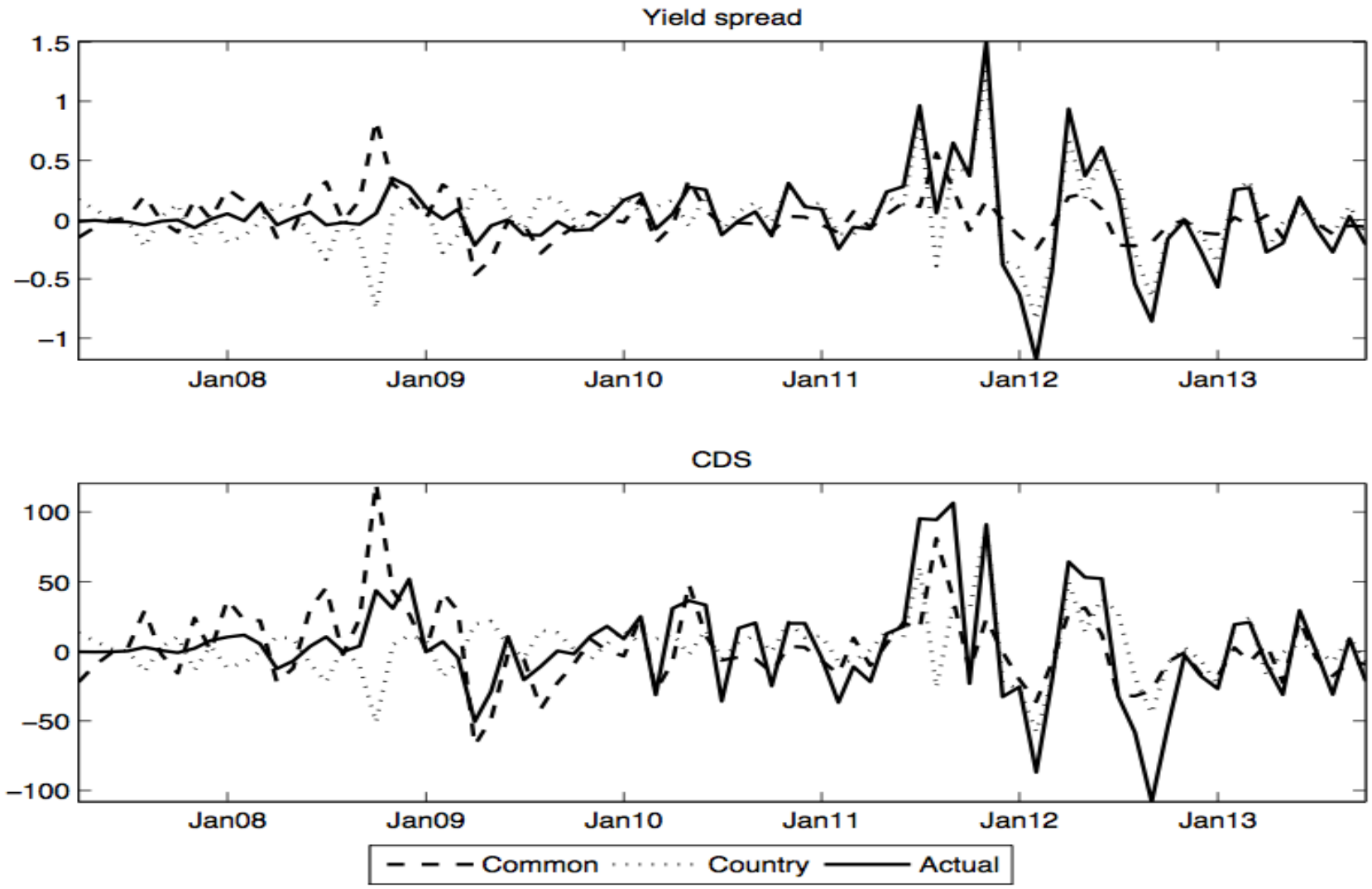
Systemic *vs.* country risk (cont.)

Variance decomposition: CDS premia

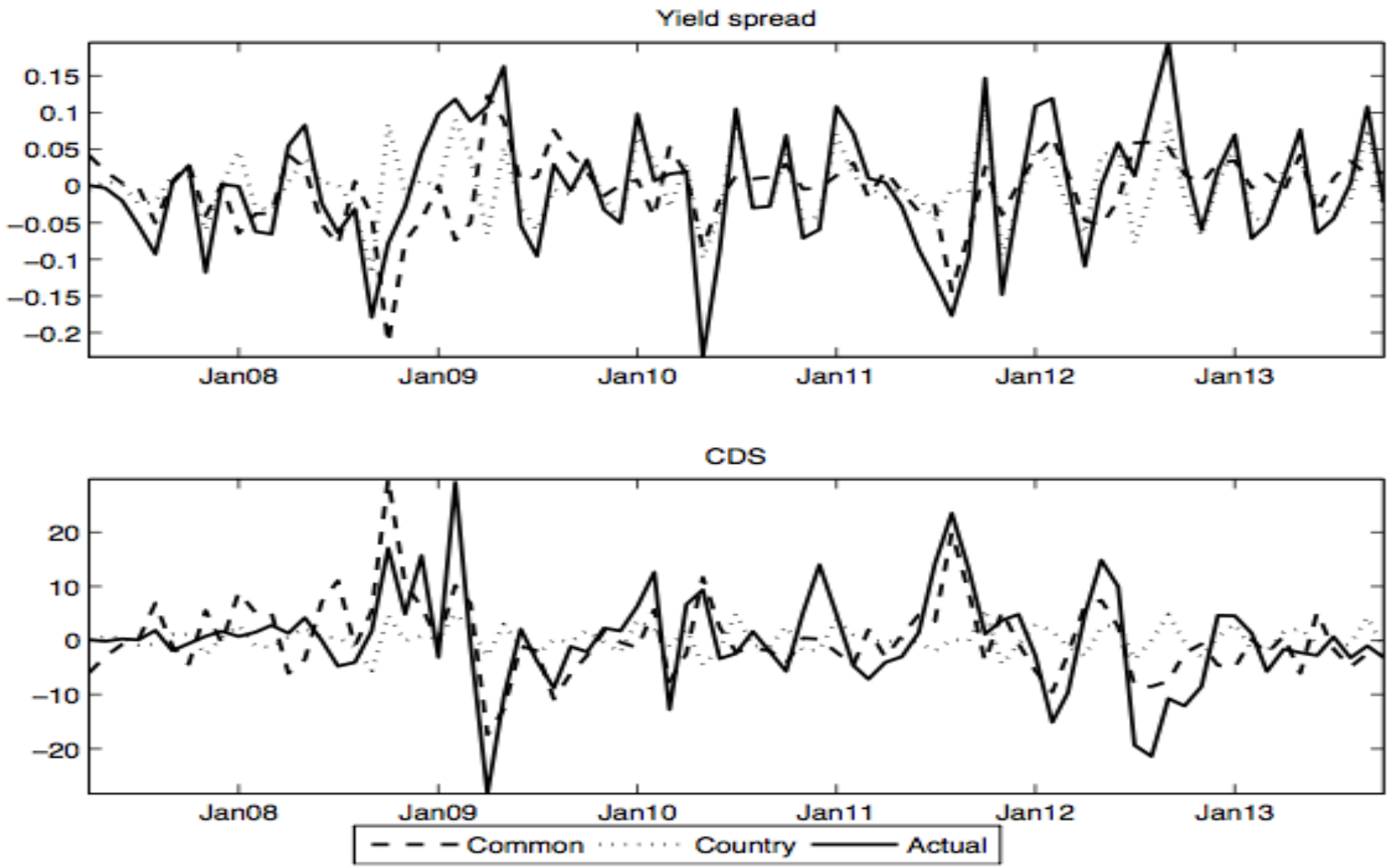
	Common	Country	Idiosyncratic
Austria	0.67	0.15	0.19
Belgium	0.56	0.17	0.27
Germany	0.60	0.07	0.33
Spain	0.43	0.47	0.10
France	0.65	0.04	0.31
Greece	0.05	0.61	0.34
Ireland	0.13	0.21	0.66
Italy	0.59	0.35	0.06
Netherlands	0.49	0.06	0.45
Portugal	0.11	0.73	0.16
Denmark	0.56	0.01	0.58

- Result 3: CDS premia also reflect systemic risk, especially in core countries.

Common and country components of the Italian yield differential and CDS premium



Common and country components of the German yield differential and CDS premium



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Home bias in banks' sovereign portfolios

Why this form of home bias may increase in response to higher domestic sovereign debt yields?

1. High-risk sovereign issuers may exert "moral suasion" on "their" banks to buy domestic sovereign debt in time of stress.
2. Undercapitalized banks, most in periphery countries, may bet for resurrection by engaging in "carry trades" (Acharya and Steffen, 2012).
3. Domestic banks are better hedged against the redenomination risk of domestic sovereign debt than foreign banks.

Home bias in banks' sovereign portfolios: the model

- For each country in the sample, the estimated VECM model can be represented as follows:

$$\Delta y_t = \alpha \left[\beta' y_{t-1} + \gamma\, d_{t-1}\right] + \Theta\, \Delta y_{t-1} + \Gamma\, \Delta D_t + u_t,$$

- where $y_t = \begin{bmatrix} spread_t & sovexp_t \end{bmatrix}'$ in the baseline model and $y_t = \begin{bmatrix} common_t & country_t & sovexp_t \end{bmatrix}'$ in the factor-based model;
- α and β are the matrices of adjustment and cointegrating parameters, respectively;
- d_t and D_t are vectors of restricted and unrestricted deterministic variables, respectively.

Home bias in banks' sovereign portfolios: results

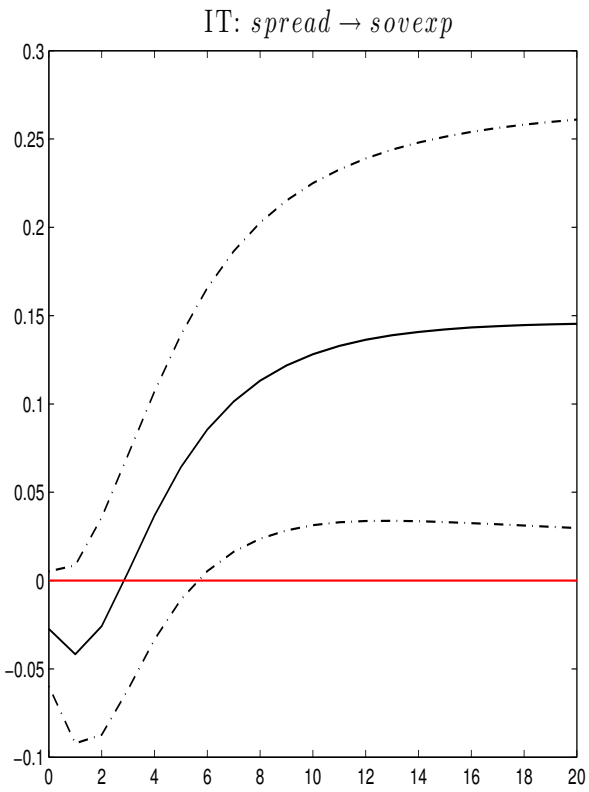
Unconditional evidence

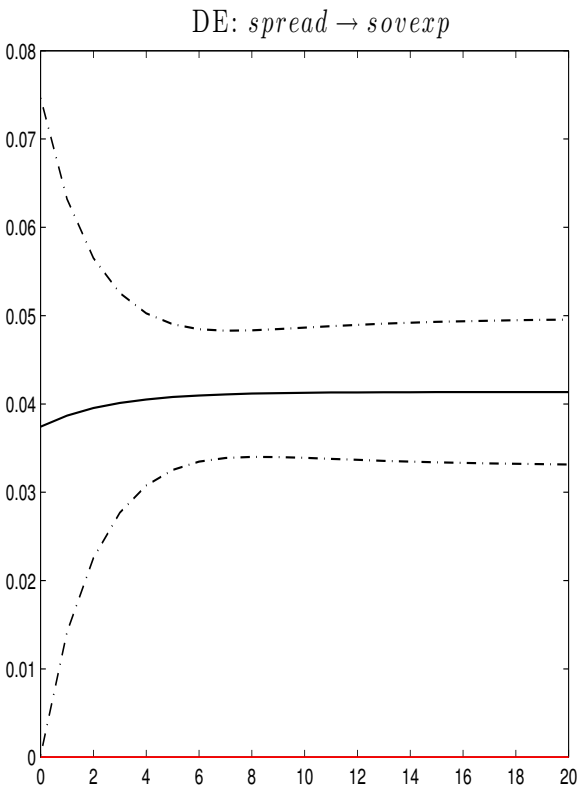
- In almost all countries banks increase their domestic exposures in response to an increase in domestic yields.

Conditional evidence (country/systemic shocks)

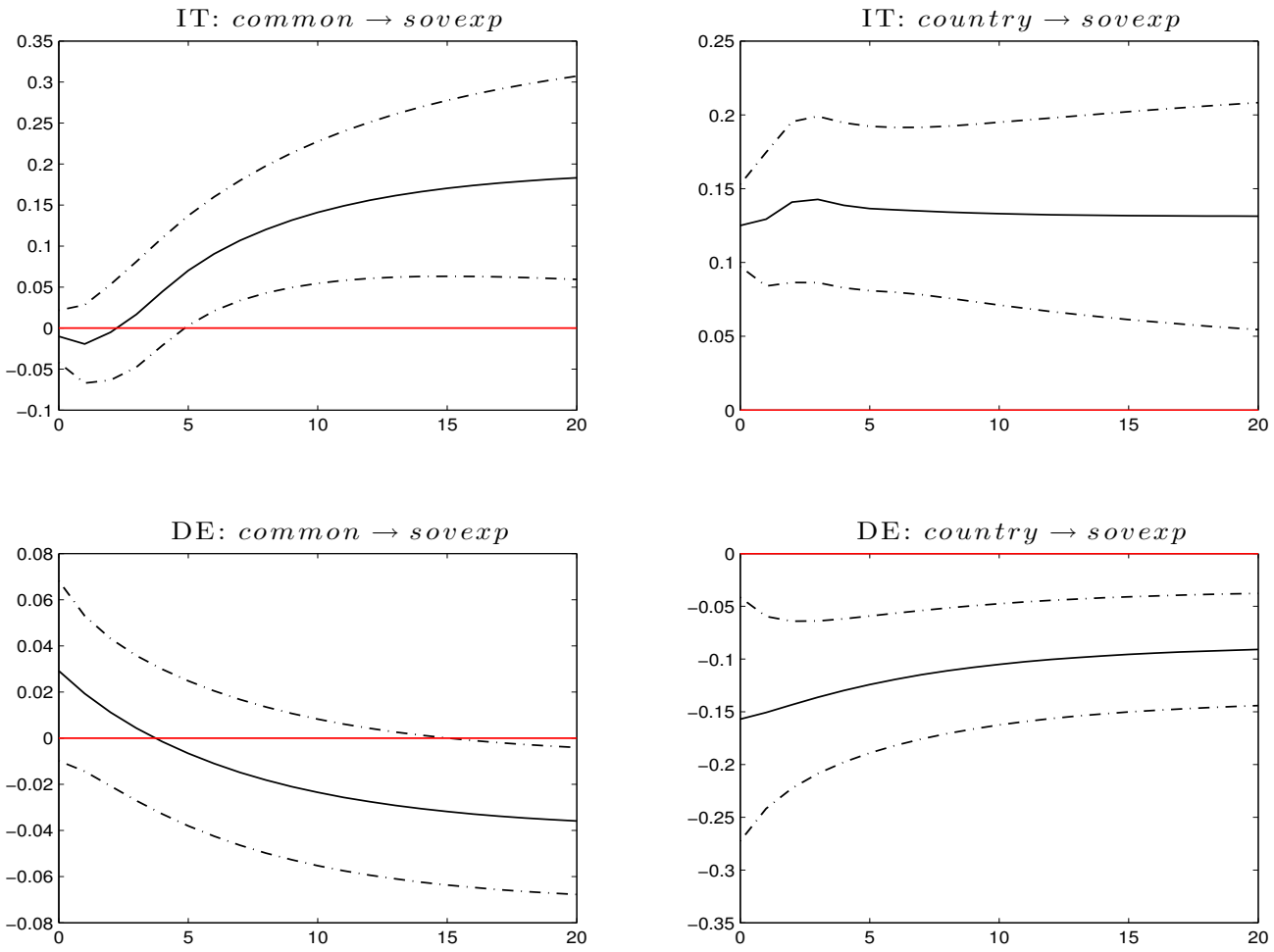
- In most periphery countries banks respond to increases in the country risk factor by raising their domestic exposure, while in core countries they do not.
- In almost all countries banks increase their domestic exposures in response to an increase in the common risk factor.

Home bias in banks' sovereign portfolios: results (cont.)





Home bias in banks' sovereign portfolios: results (cont.)



Home bias in banks' sovereign portfolios: interpretation

- Country shock:
  For periphery-country banks only, the evidence supports the "moral suasion" and/or the "carry-trade" hypothesis.

- Common shock:
  Increased risk of euro collapse and currency redenomination has increased the home bias of banks, especially in core countries.

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Policy Implications

- **Moral suasion** could be tempered by shifting prudential supervision from national to supranational level (SSM).
- **Carry trades** by banks could be discouraged by change in prudential regulation: (i) positive risk weights on sovereign debt and/or (ii) limits on the concentration on sovereign debt.
- The home bias due to banks' **comparative advantage** in dealing with redenomination risk can only be addressed by reducing the probability of euro breakup (Draghi's 2012 speech, OMT).