New Perspectives on the European Debt Crisis

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New perspectives

1. Focus on adverse macroeconomic effects of sovereign debt crises (w. V. Yue, QJE 2012)
   - Debt crises turn into Great Recessions
2. Think of the European debt crisis as a *domestic* debt crisis (w. P. D'Erasmo)
   - Outright defaults on domestic debt are infrequent but they do occur
3. Study unpleasant arithmetic of fiscal austerity (w. L. Tesar & J. Zhang)
   - Use workhorse Macro model to quantify required tax hikes and the size of fiscal externalities & welfare costs.
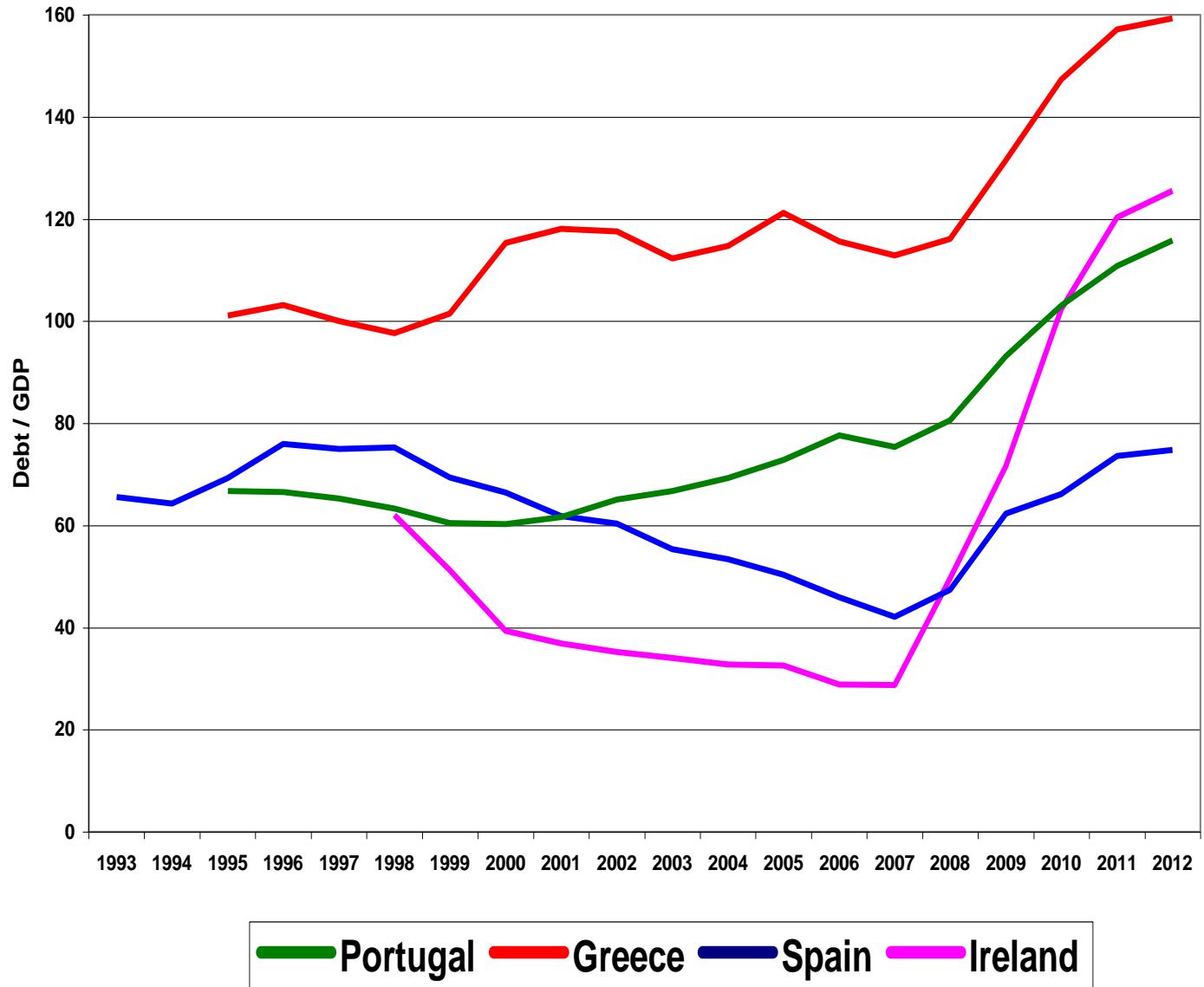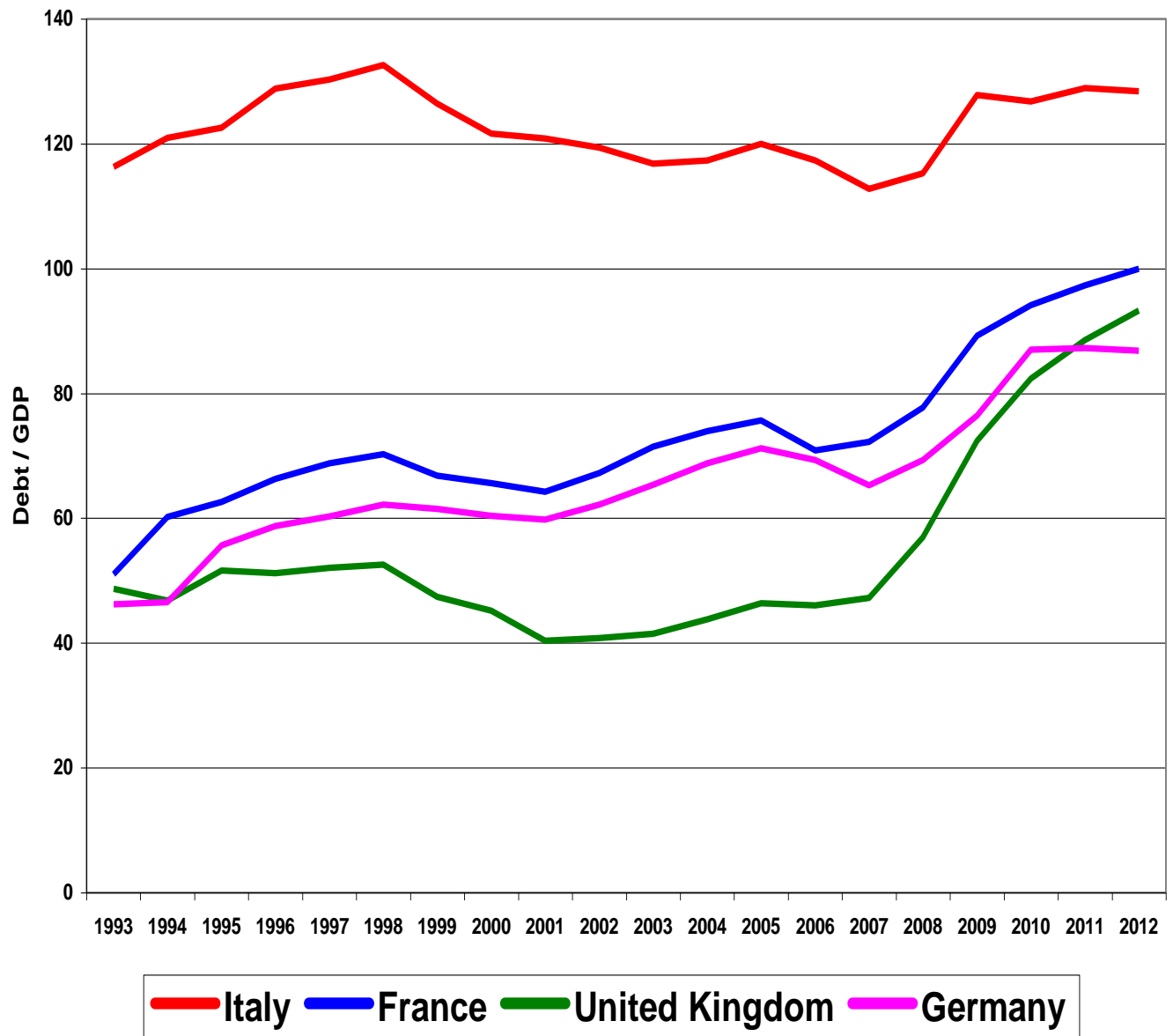
DEBT CRISES FACTS

Stylized facts of debt crises in Europe & beyond

- Surge in debt ratios
- Rise in spreads
- Sharp economic slowdown
- Banking system exposure (broad & narrow)
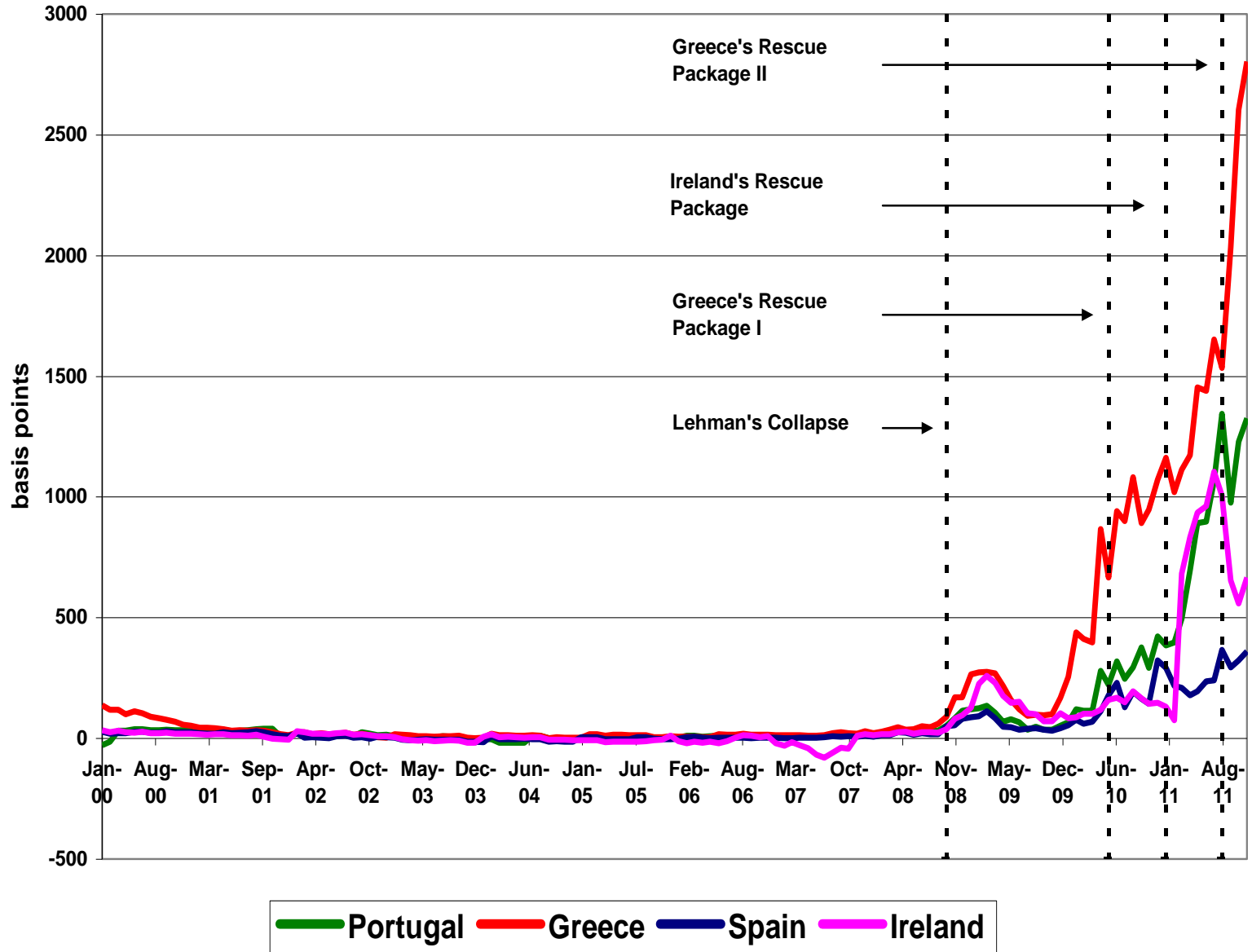- Dynamics around recent EM debt crises
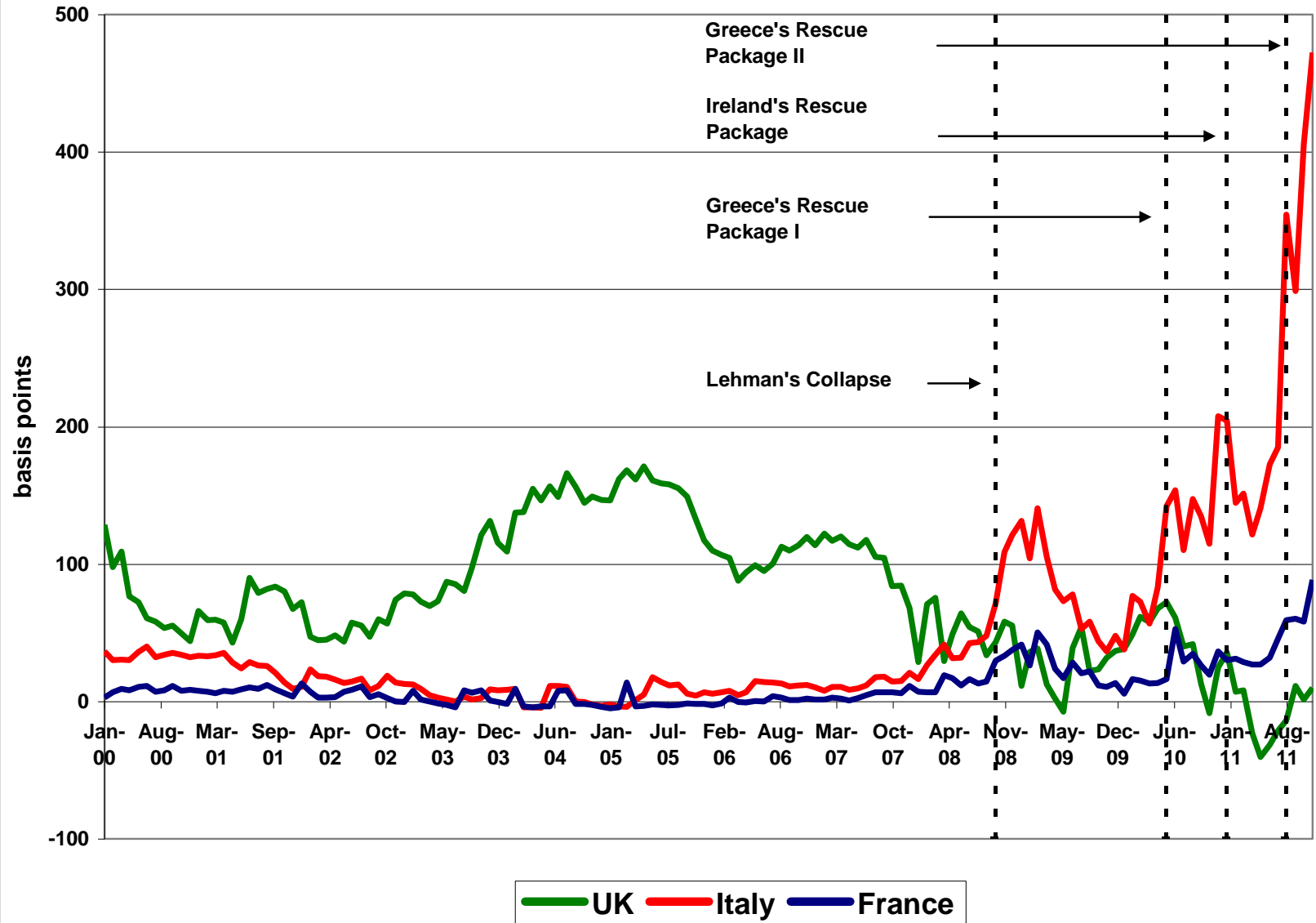
Surging debt ratios

Surging debt ratios

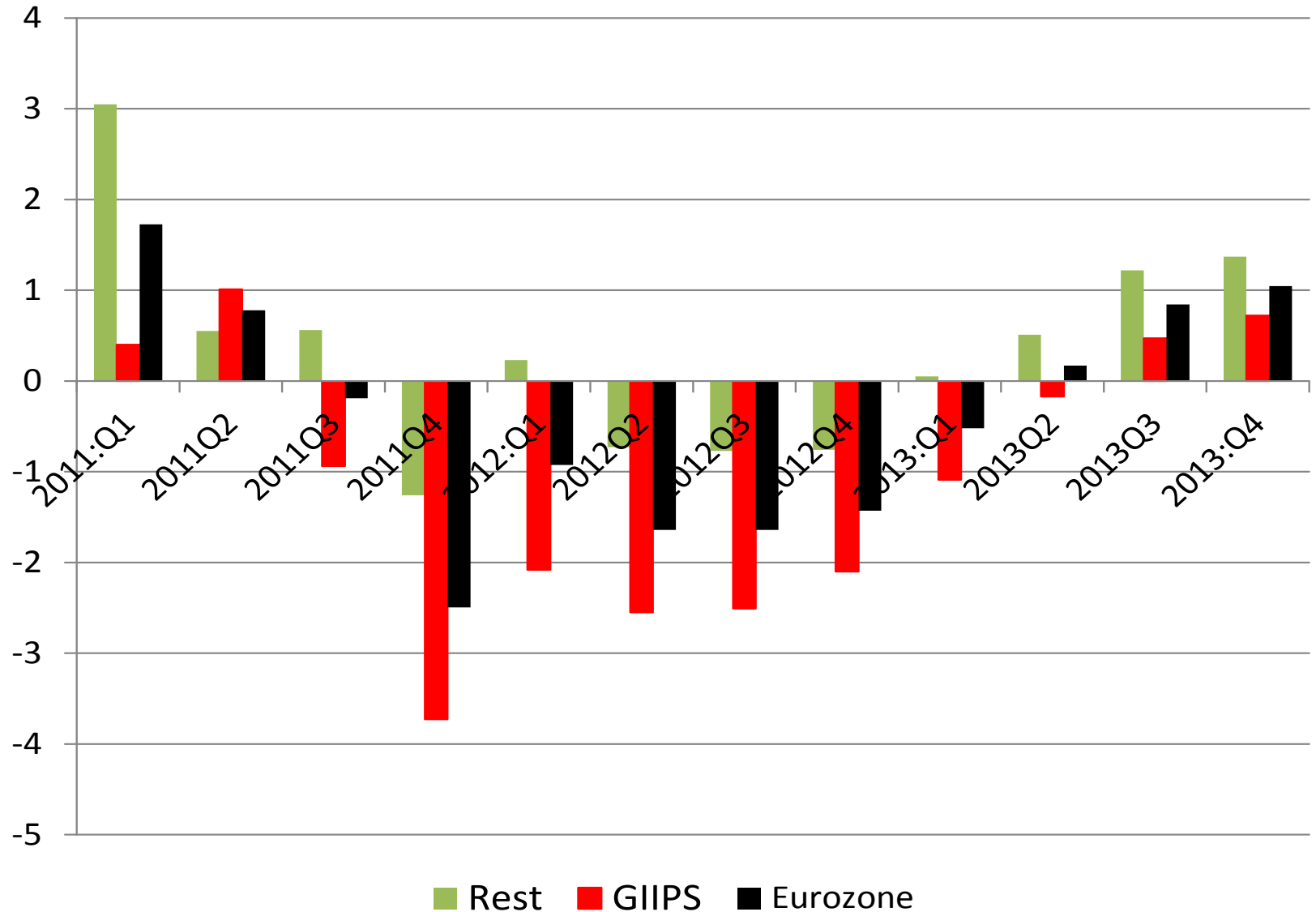# Widening spreads (v. German 5 yr. bonds)
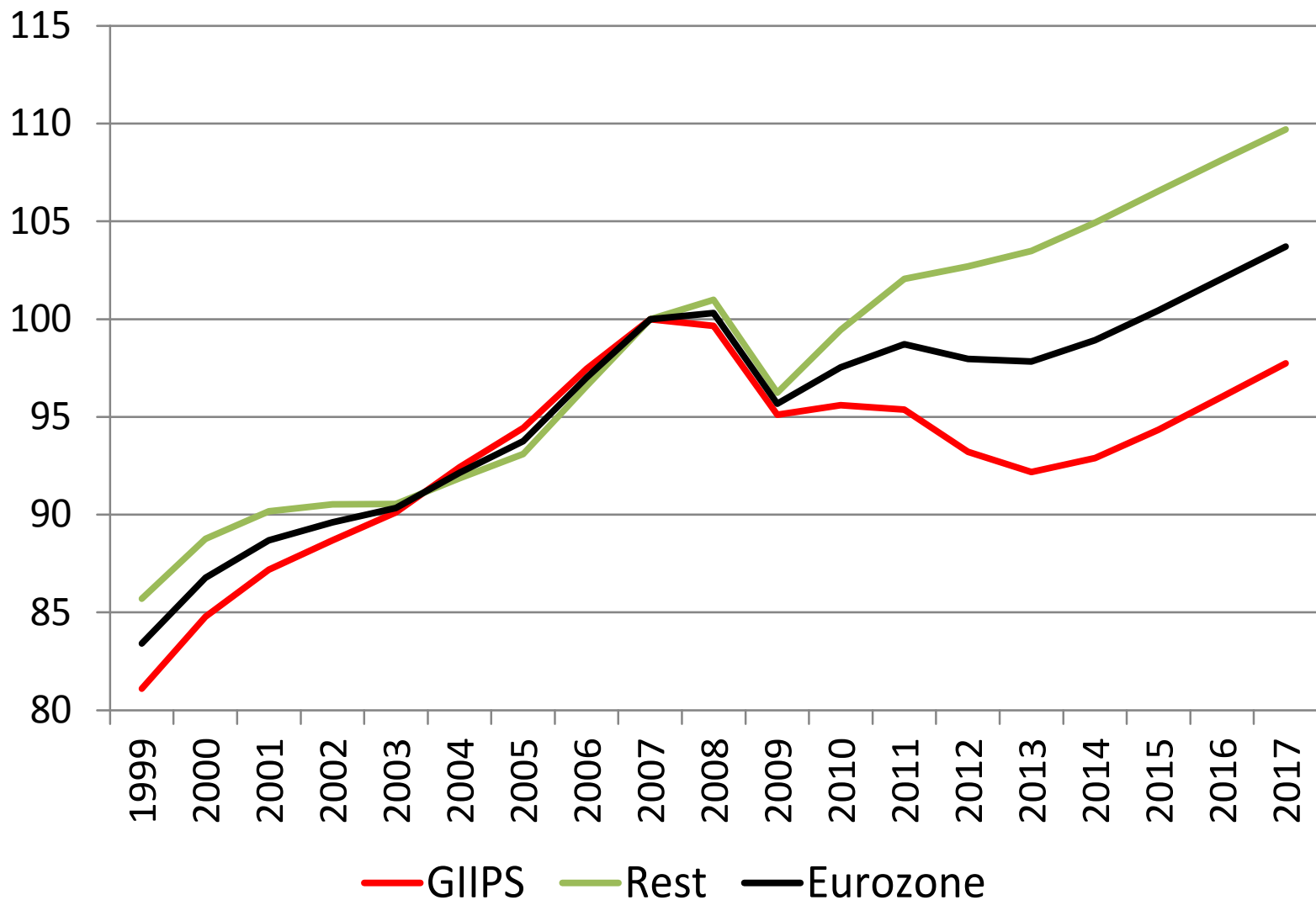
Widening spreads (v. German 5 yr. bonds)

Sharp slowdown
(annualized quarterly GDP growth, IMF forecast)

Another "Lost Decade"?
(real GDP index, 2007=100, IMF forecast 2013-17)

Banks' direct exposure (2011 Q2)
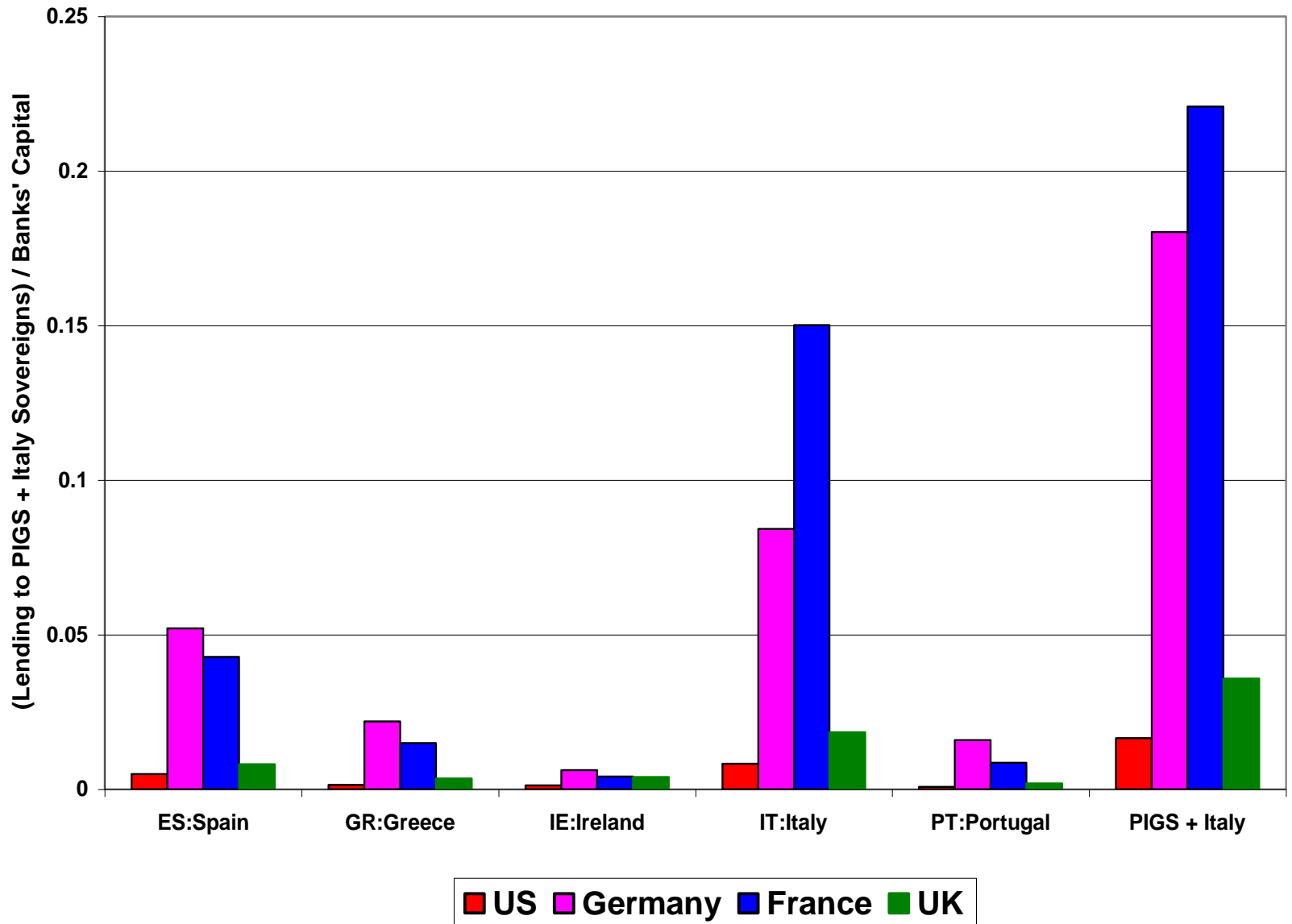
Banks' total "macro" exposure (2011 Q2)
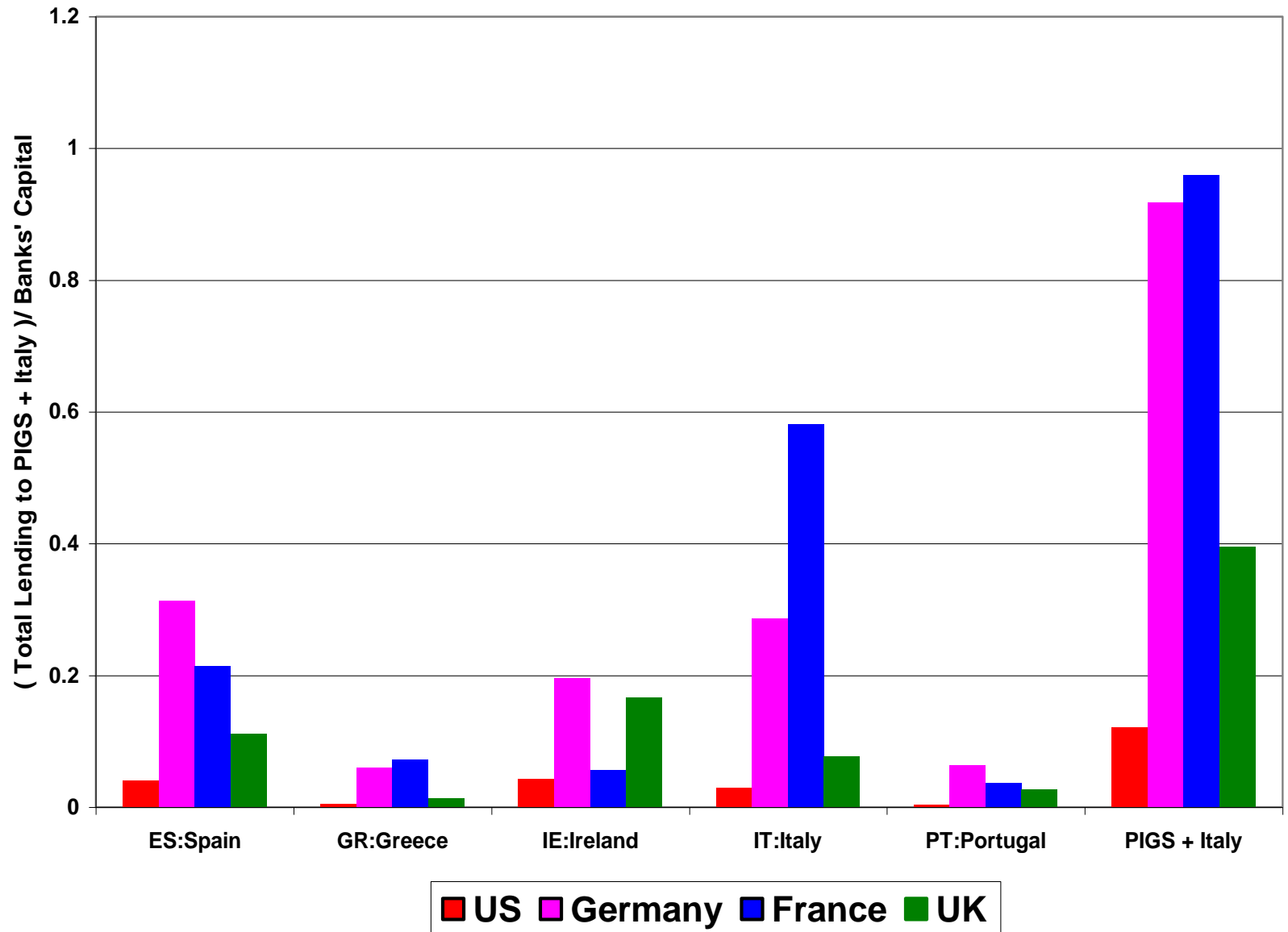
Macro dynamics around recent defaults

- 23 EM default events during 1977-2009
- Event windows for HP-filtered cyclical components
- Defaults coincide with the through of "Great Recessions"
  - Medians: *GDP* -5%,   *C* -6.5%,   *L* -20%,
    IntGds -20%,   *Imp. IntGds* -25%
    NX/GDP rise 12 ppts.

a. GDP

b. Consumption

g. Interest Rate

h. Debt/GDP
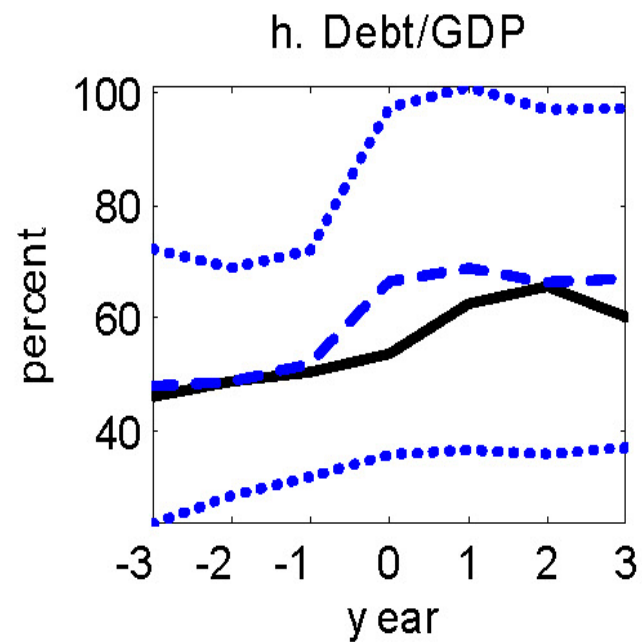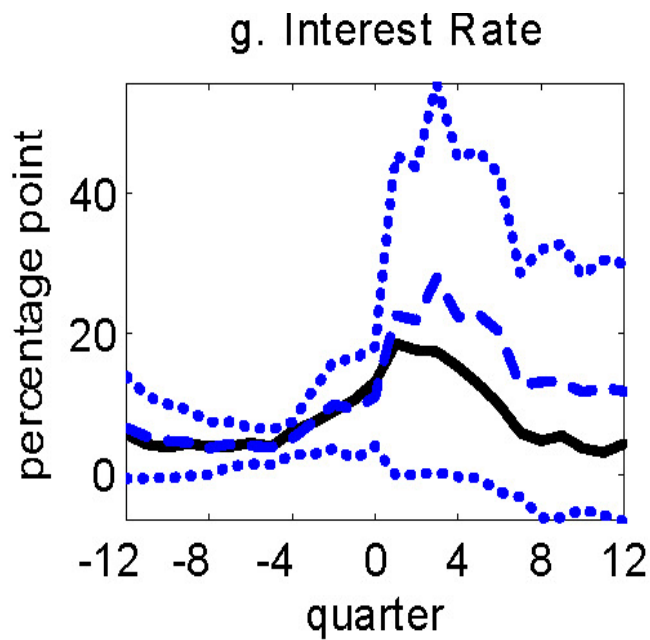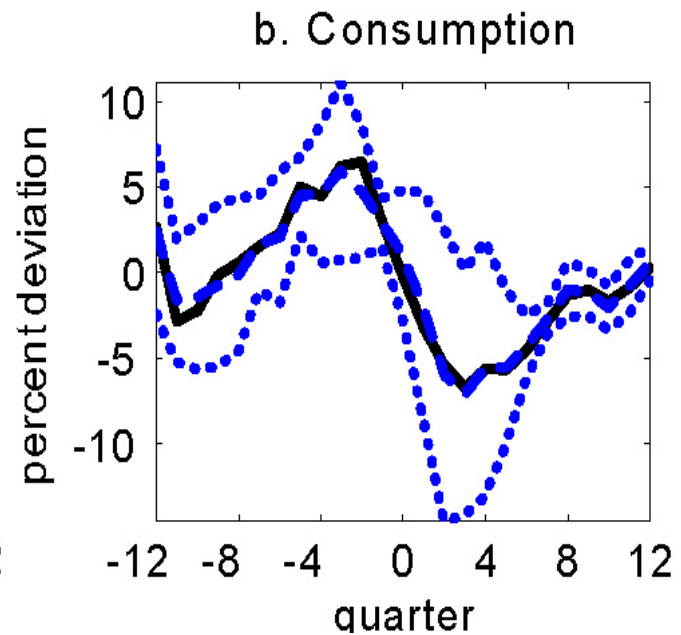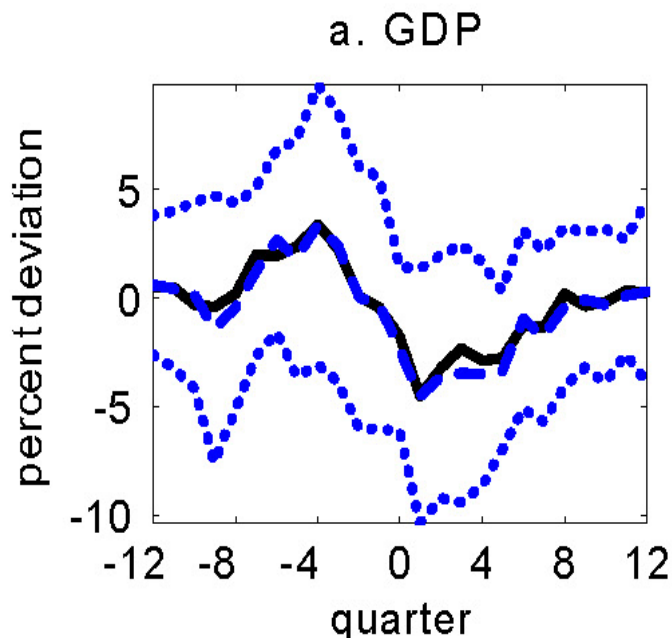
Median — — Mean ······ One Std. Error Band

DEBT CRISES & GREAT RECESSIONS

Four key empirical regularities

1. Debt crises coincide with through of Great Recessions
2. Spreads peak at the same time and they are generally countercyclical
3. Large TFP drops driven by reallocation of inputs (Gopinath & Neiman (10))
4. Average debt ratios of 50%+ coexist with default frequencies in the 2-5% range.

Questions

- Why do debt crises have large negative effects on private economic activity?
- How do these effects affect default incentives & dynamics?
- Can these effects help us explain the stylized facts?
- Is there a connection between trade openness and default?

Output dynamics in default models

- Exogenous output costs are key for obtaining eq. with debt & defaults in bad times.

  a) Proportional (Aguiar & Gopinath (06), Yue (10)):
  $$y_t^{def} = \lambda y_t$$

  b) Stepwise-increasing (Arellano (08)):

$$y_t^{def} = y_t \text{ if } y_t \leq \lambda E[y]; \quad y_t^{def} = \lambda E[y] \text{ if } y_t > \lambda E[y]$$

- At 2-5% def. frequency, a) yields negligible debt ratios, b) yields 6%

  - b) does better, but is disconnected from actual output dynamics and defaults occur below $\lambda E[y]$, hence at zero cost (i.e. in regular downturns)

Percent output costs of default
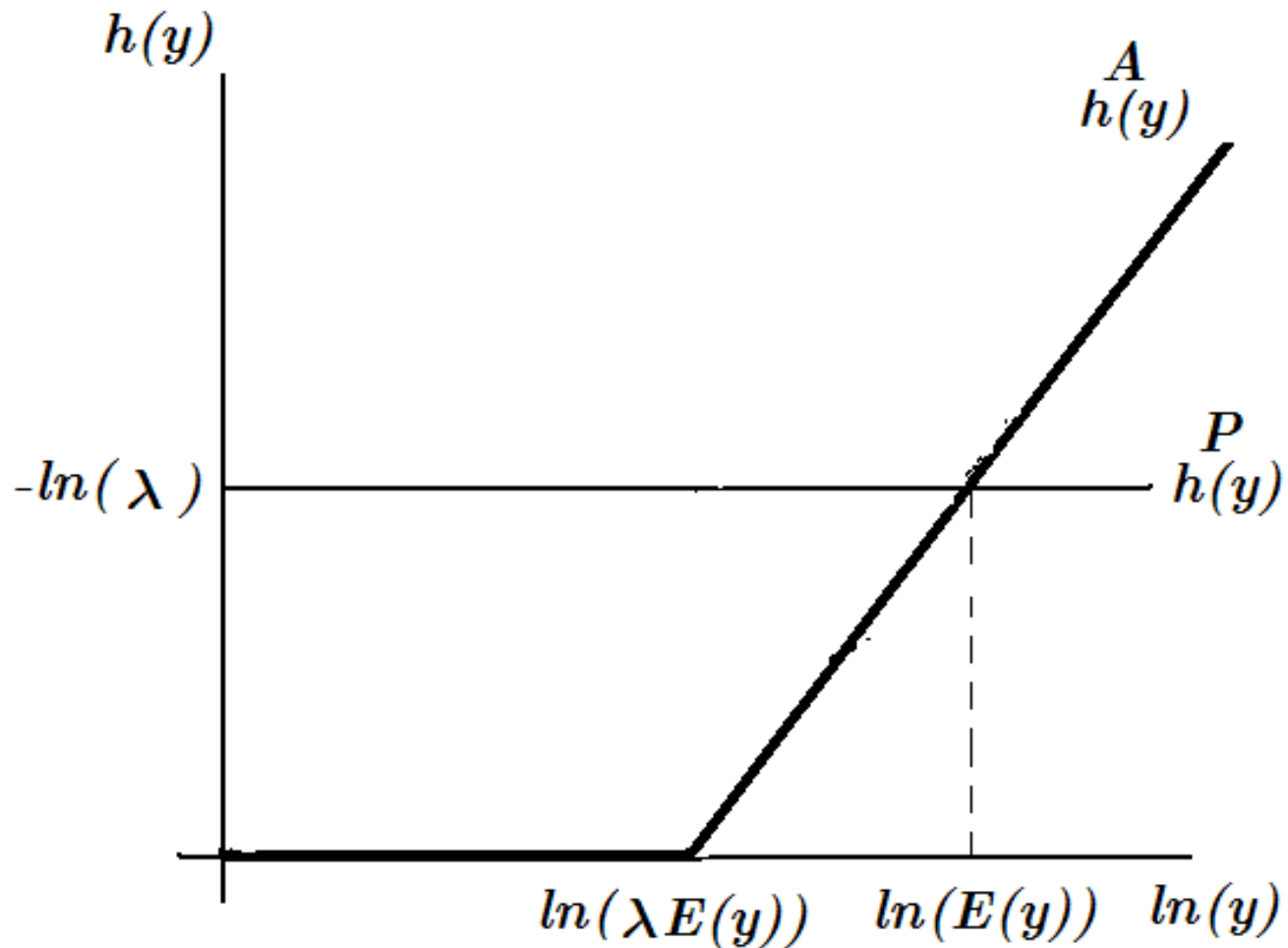
Modeling Default & Great Recessions (Mendoza-Yue Model)

- Firms use external working capital loans to pay for subset of imported inputs

- Default freezes all external borrowing, forcing substitution of inputs & labor misallocation

- Three key elasticities: domestic v. foreign inputs, across foreign inputs, and labor supply

- Efficiency loss drives *endogenous* cost of default

- Gov. defaults strategically taking this into account

$$\boxed{\text{Interest rate/Default}} \Longrightarrow \boxed{\text{Output}}$$

$$\Uparrow \qquad\qquad\qquad\qquad \Downarrow$$

$$\boxed{\text{Sovereign default risk}}$$
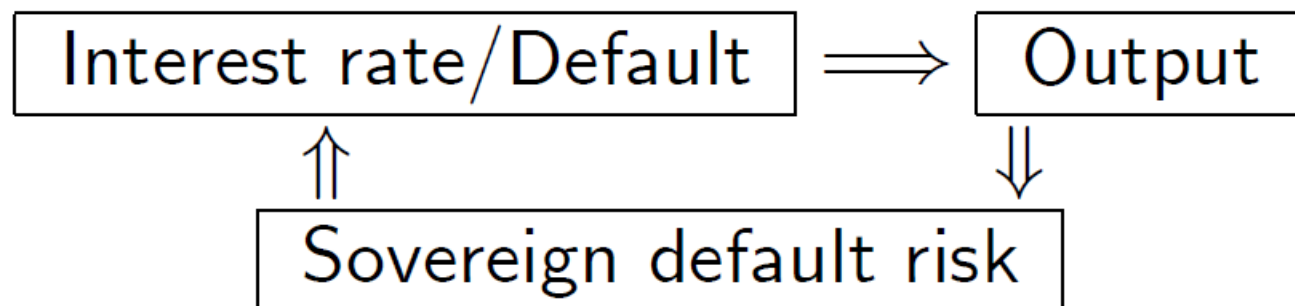
Percent output costs of default
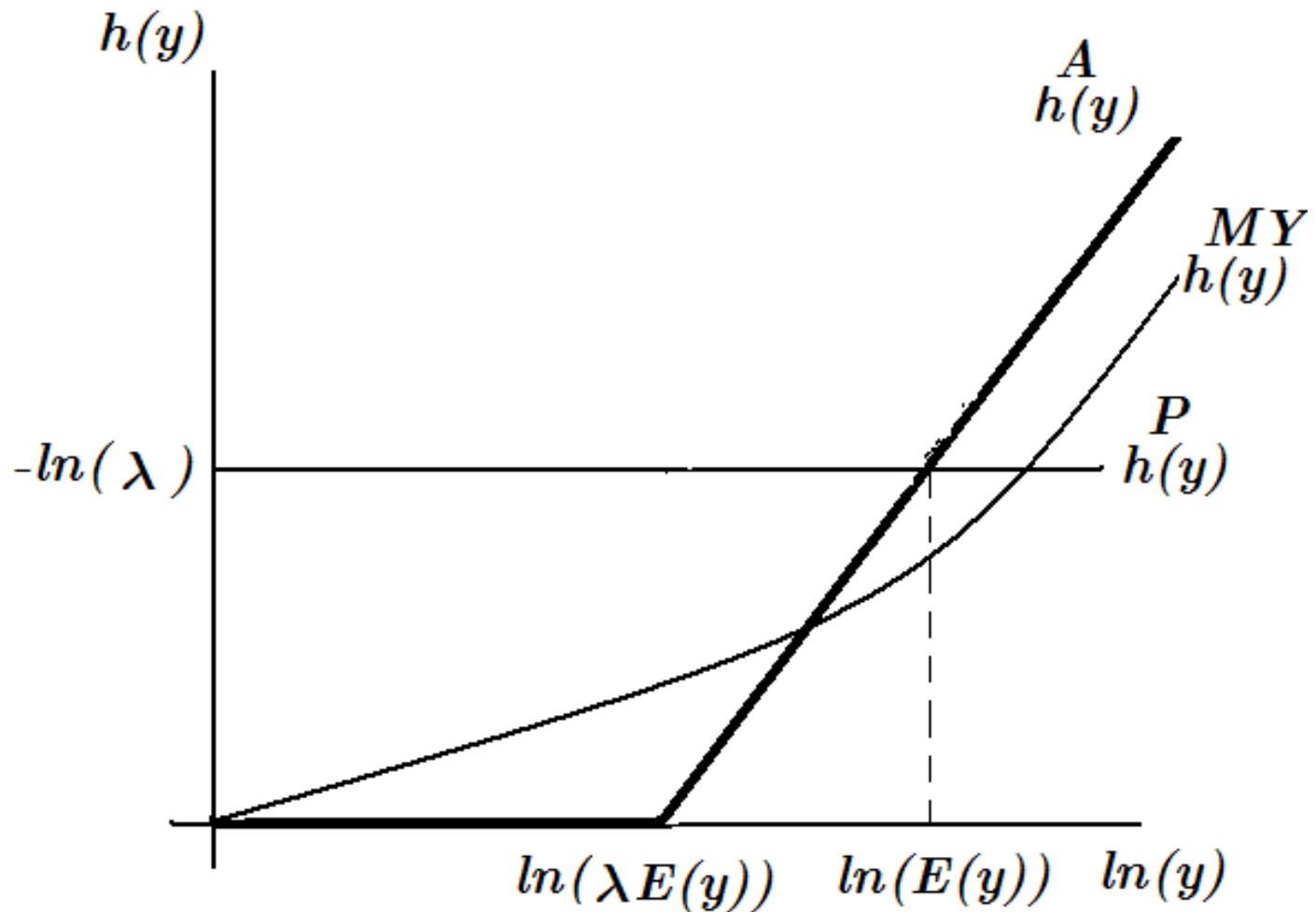
Output Cost of Default: Application to Argentina 2002
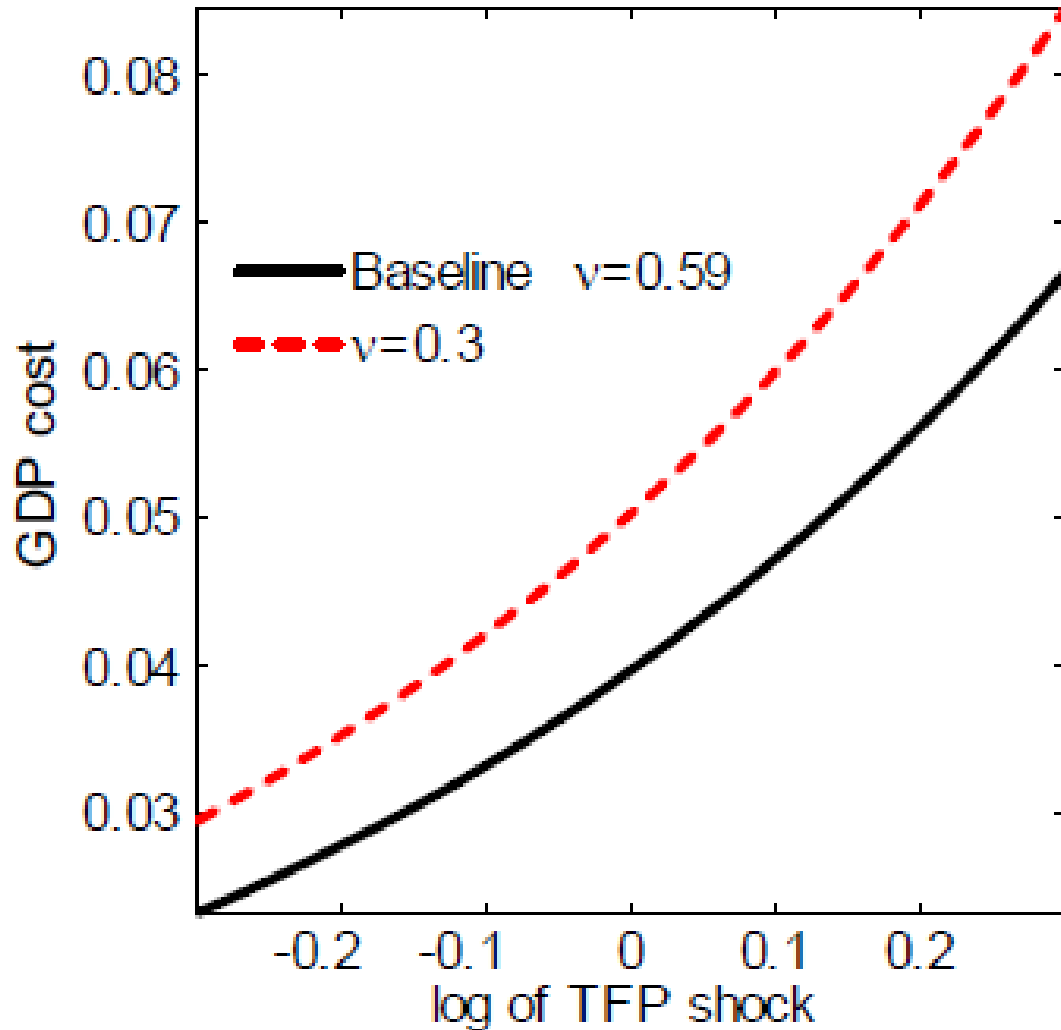
Output dynamics around default
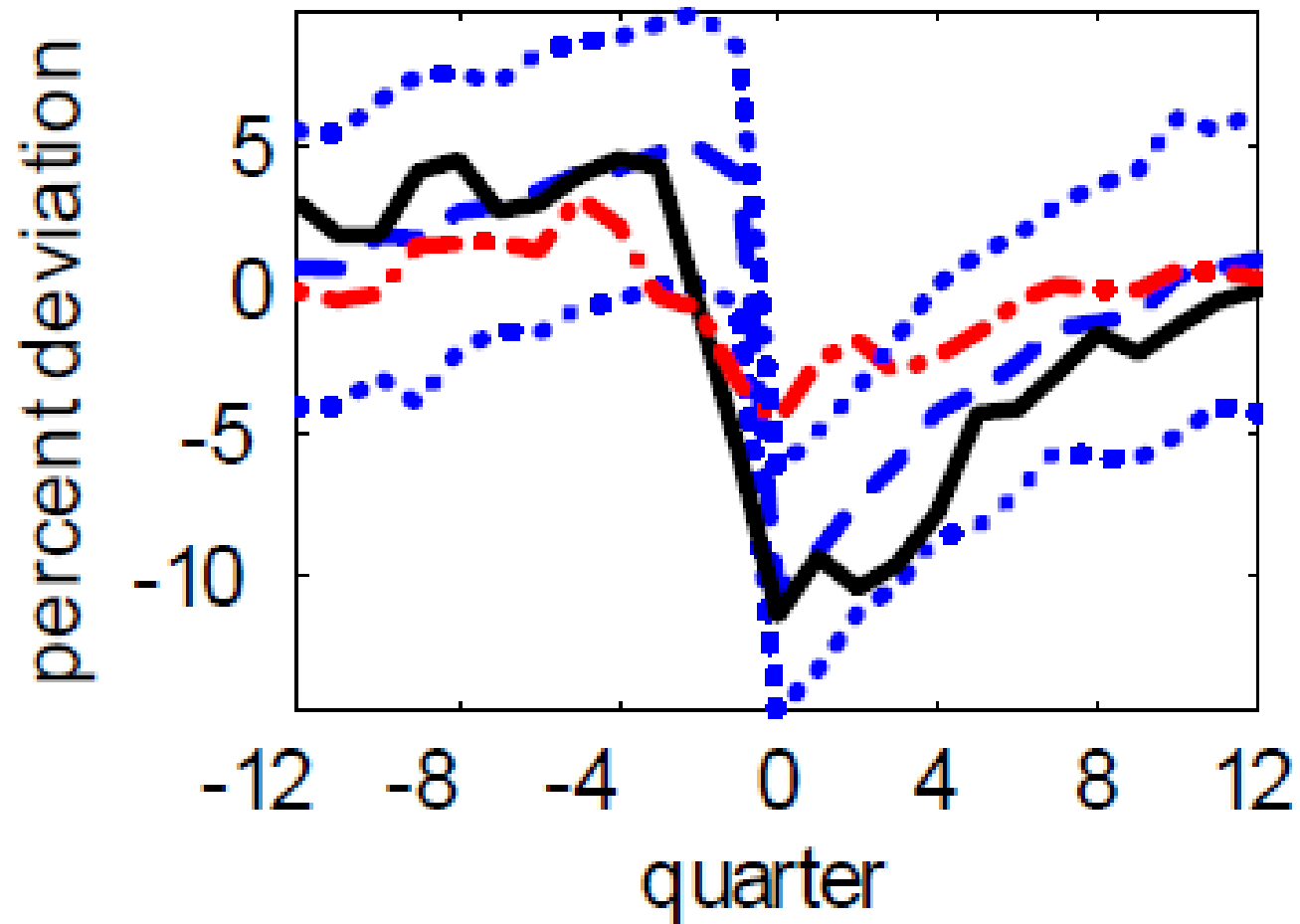
Interest rate dynamics before default
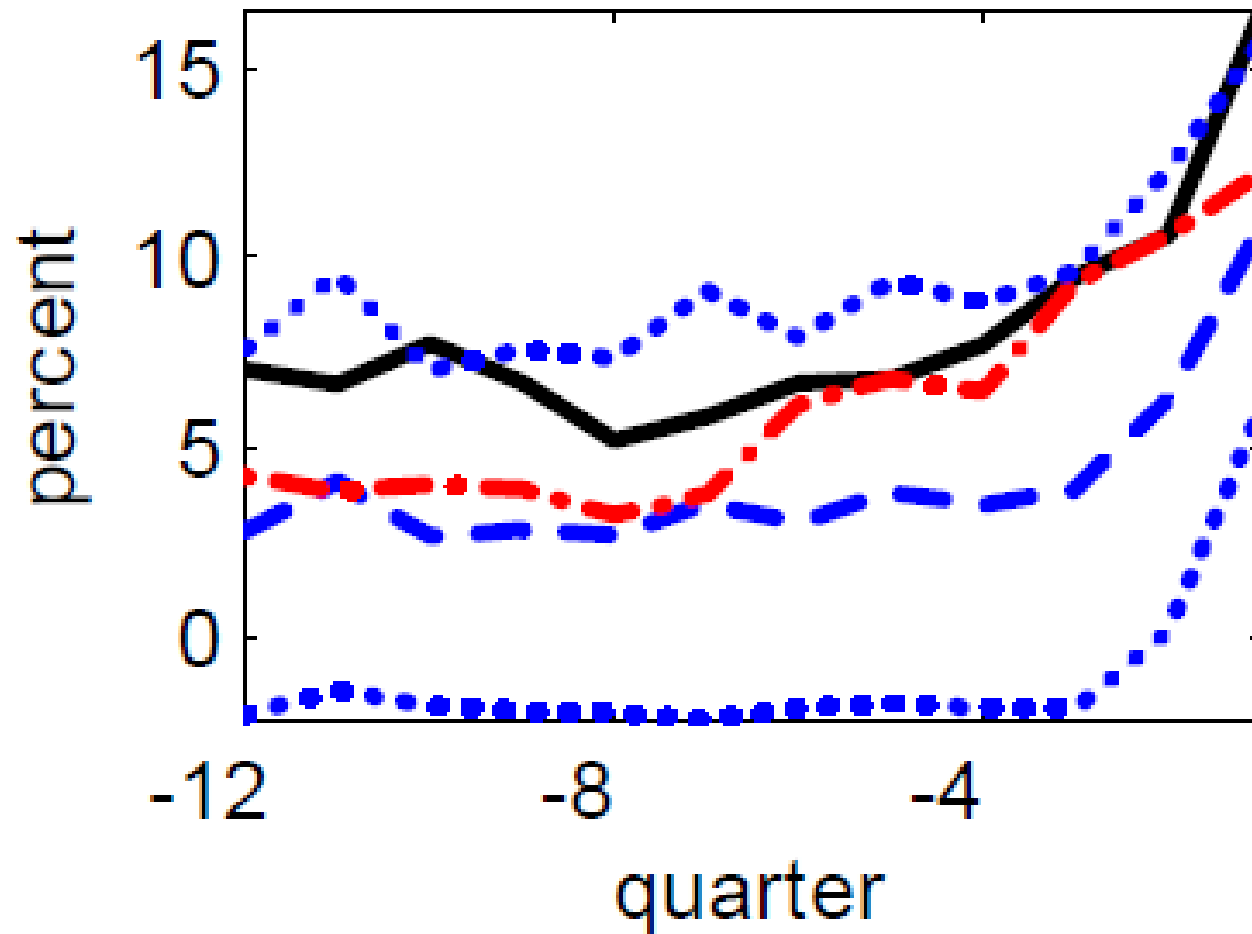
Financial amplification

- Defaults occur with "typical" TFP shocks (1.3 std. devs. on average)
- Output response to same size TFP shock is 81% larger in a default
- Slow recovery (low re-entry prob.)

Long-run moments

Statistics	Data	Model
Average debt/GDP ratio	35%	22.88%
Average bond spreads	1.86%	0.74%
Std. dev. of bond spreads	0.78%	1.23%
Consumption std./GDP std.	1.44	1.05
Correlations with GDP		
bond spreads	-0.62	-0.17
trade balances	-0.87	-0.54
labor	0.39	0.52
intermediate goods[1]	0.90	0.99

Main message

- Default triggers a financial amplification mechanism that hits the private sector and has feedback links with debt & default
- Working capital is tractable & empirically relevant way to model this mechanism
- Banking collapse is a more complex, but very relevant, alternative (Padilla (12))
- Default should be less frequent in economies more open to external trade!

THE EUROPEAN DEBT CRISIS AS A DOMESTIC DEBT CRISIS

Why a domestic debt crisis?

- High economic integration of EU
- Sov. debt denominated in same currency
- Large fraction of debt held inside EU
- EU institutions internalize EU-wide effects of default (e.g. effects on Greece & Spain, but also on creditors, Euro economy, etc)
- Reinhart & Rogoff (2011): The study of domestic defaults is a "*Forgotten History…*"

Strategic domestic default

1. Economy inhabited by heterogeneous agents with incomplete markets
2. Agents face idiosyncratic income shocks and aggregate G/T shocks, buy bonds for smoothing and self insurance
3. Gov. issues non-state contingent bonds, faces G shocks, levies lump-sum taxes
4. Gov. values <u>all</u> agents and defaults if default payoff exceeds repayment payoff
5. Gov. is utilitarian (aggregates welfare using economy's endogenous wealth distribution)

Default tradeoffs

- Default is a mechanism for "*short-run*" redistribution favoring the "poor," and provides state-contingency to fiscal policy (lower taxes, lower consumption inequality)

- …but it freezes a key asset market used for "*long-run*" consumption/tax smoothing & self insurance, and it lowers lenders' wealth

- Feedback loop: wealth distribution affects default incentives, but the dist. itself depends on risk premia, which depend on default risk

Main questions

- Can these tradeoffs support existence of domestic debt subject to default risk?
- Can this setup match the large domestic debt ratios and low frequency of default?
- How much does inequality/short-run redistribution affect default incentives?
- What is the long-run social value of public debt?

Distributional incentives: 2-period case

- t=0: exogenous initial wealth distribution:

  a fraction γ of hh's holds $b_0^L = 0$

  a fraction $(1 - \gamma)$ holds $b_0^H = \frac{B_0 - \gamma b_0^L}{1 - \gamma}$

- g shock at t=1 is the only random shock
- Gov. chooses B_1 and can default at t=1
- Debt holdings & date-1 consumption without default:

$$\gamma: \; b_1^L = B_1 - \epsilon; \qquad (1 - \gamma): \; b_1^H(\gamma) = B_1 + \frac{\gamma}{1-\gamma}\epsilon; \quad \epsilon \in [0, B_1]$$

$$c_1^{L,d=0} = y - g + b_1^L - B_1, \qquad c_1^{H,d=0}(\gamma) = y - g + b_1^H - B_1$$

Distributional incentives
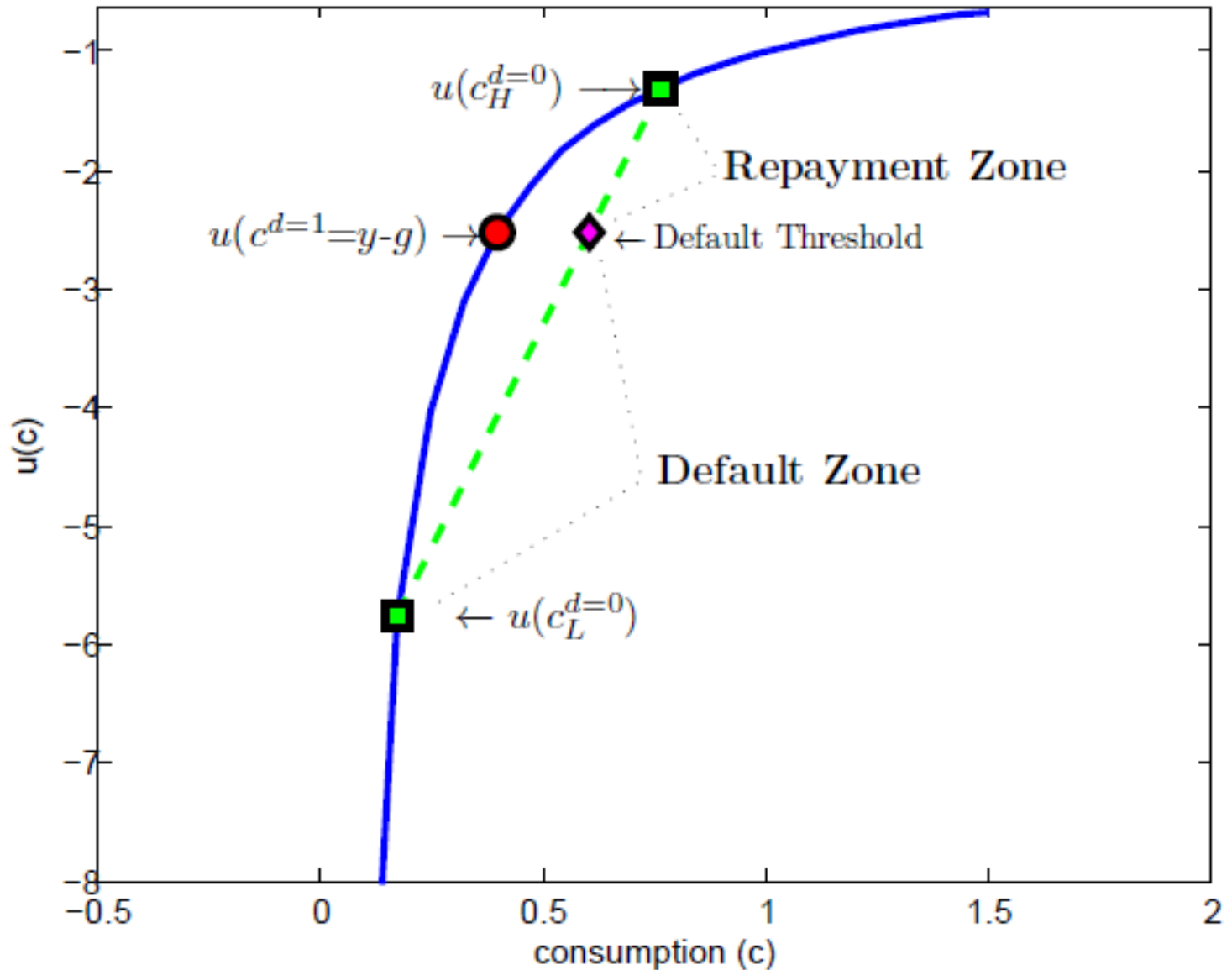
…but redistribution alone would always lead to default!
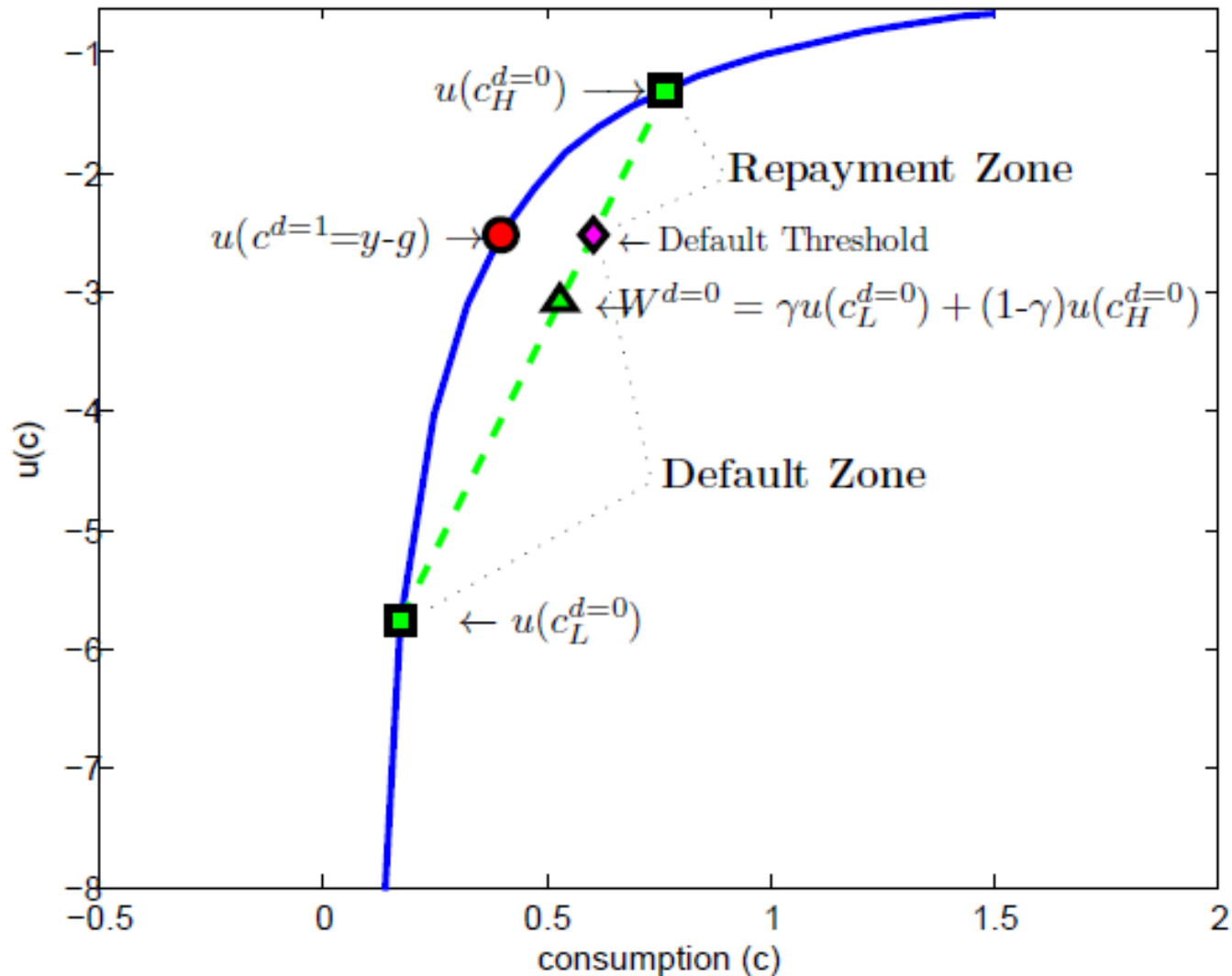
What explains debt then?

- Exogenous default costs (again!)
- The missing long-run tradeoffs:
  1. No idiosync. shocks, no income heterogeneity
  2. No tax smoothing & self insurance
  $\rightarrow$ Limited role of debt market
- Politicians weigh H agents more than the true wealth distribution

Supporting debt with costly default

Long-run social value of public debt
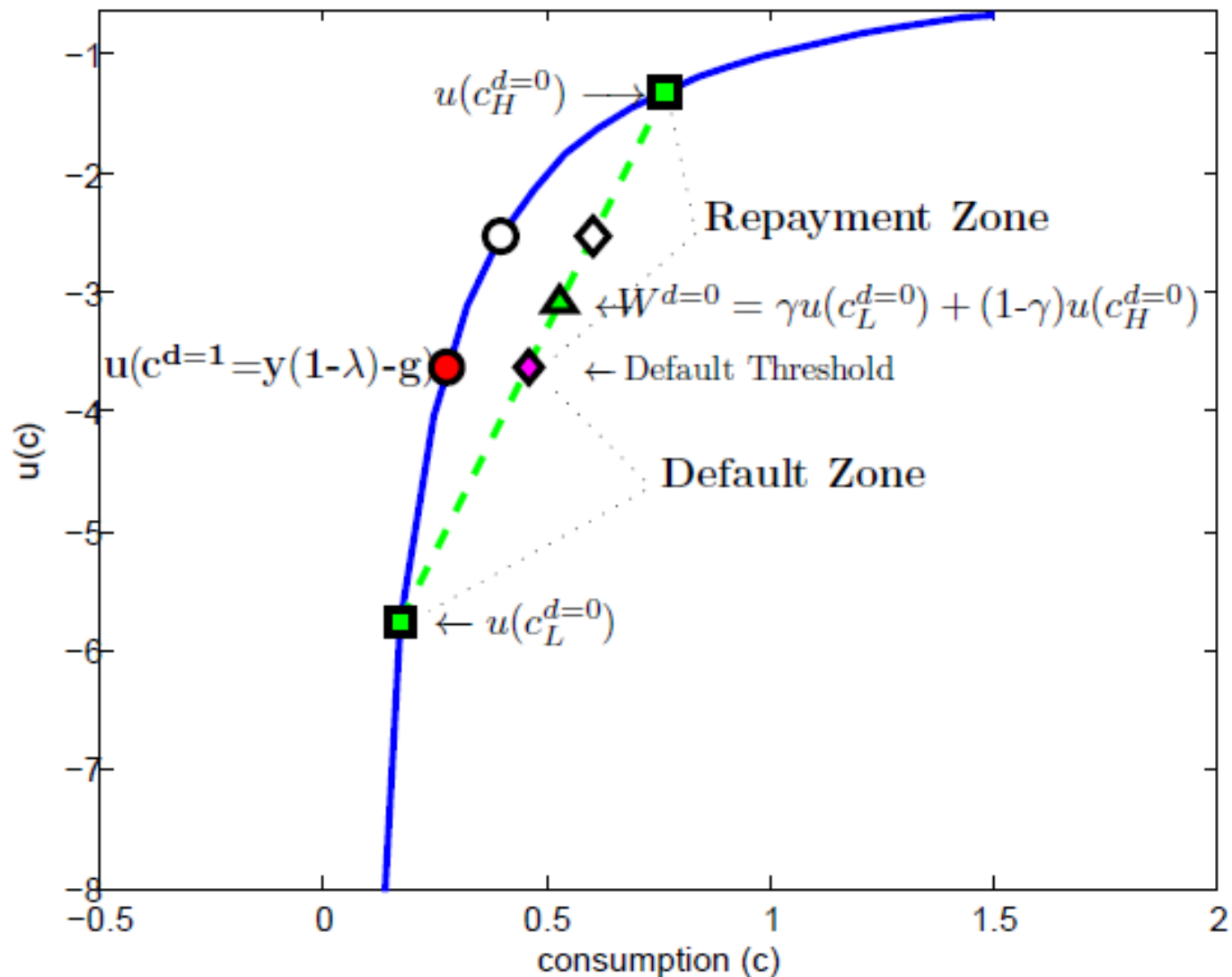## (stationary eq. without default)

- Steady state gov. budget constraint

$$\tau = \bar{g} + B(1 - q(B))$$

- Agents' constraints (using $\tilde{b} = (b - B)$):

$$c = y + \tilde{b} - q(B)\tilde{b}' - \bar{g}$$
$$\tilde{b}' \geq -B$$

  - Debt enhances borrowing ability, improves ability to self-insure, and allows tax smoothing

Welfare cost of closing the debt market
(consumption compensating variations)

B/Y	$q(B)$	$\tau(B)$	$\bar{\alpha}(B)$ (%)
0.1000	0.9998	0.1829	-0.6168
0.6333	0.9640	0.2057	-1.3729
0.9000	0.9591	0.2197	**-1.4073**
1.4333	0.9538	0.2491	-1.1837
1.9667	0.9510	0.2792	-0.7366
2.5000	0.9493	0.3096	**0.0513**

$$\alpha(b, y; B) = \left[\frac{V(b, y; B)}{V^{aut}(y)} \right]^{\frac{1}{\sigma - 1}} - 1$$

$$\bar{\alpha}(B) = \int \alpha(b, y; B) d\Gamma(b, y)$$

Full model simulation:
debt and default decision
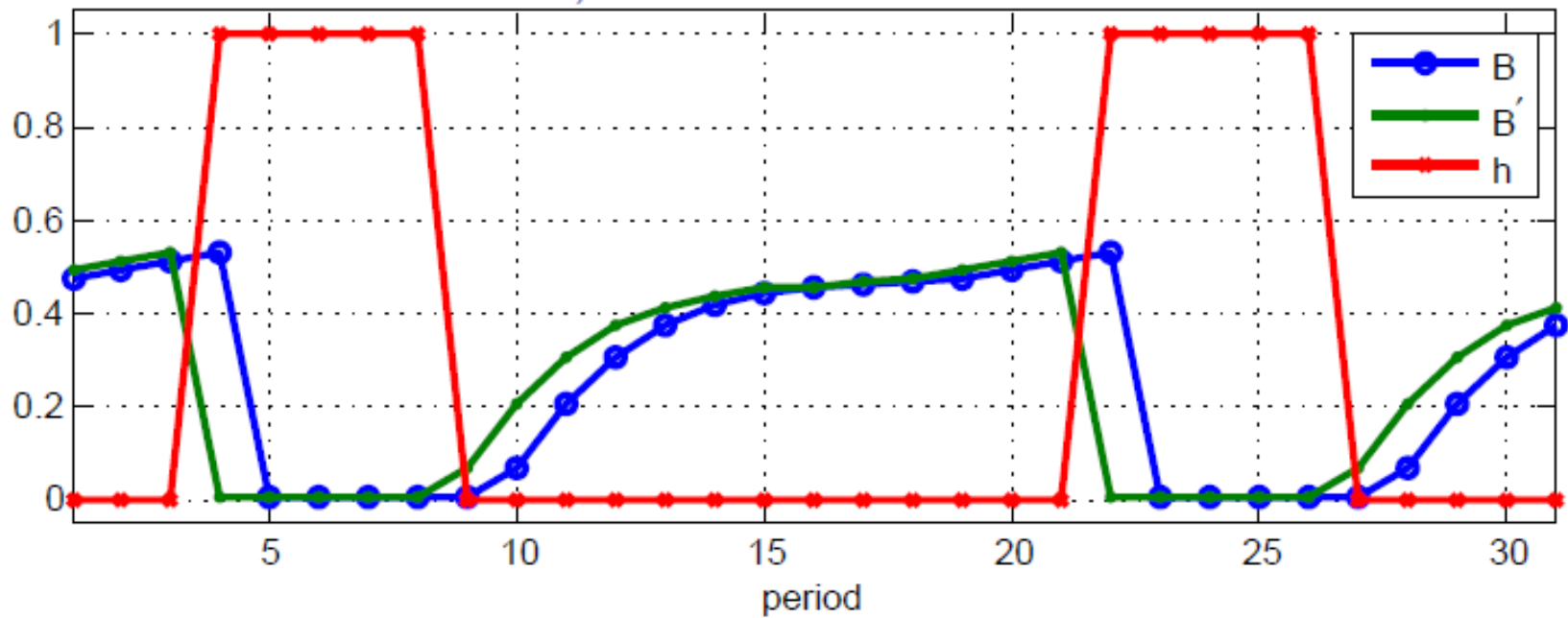
Full model simulation: debt and bond prices

UNPLEASANT ARITHMETIC OF FISCAL AUSTERITY
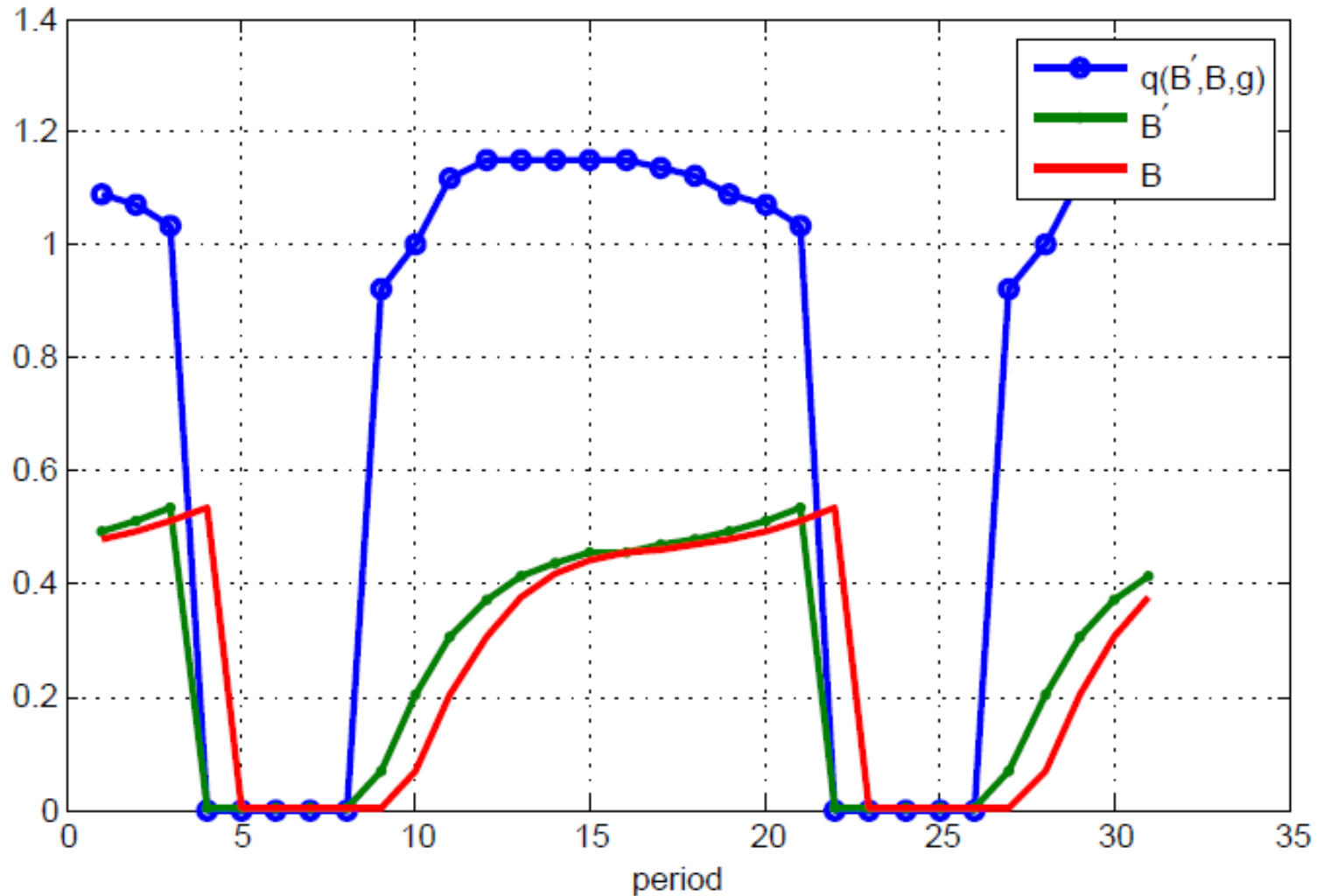
Arithmetic of fiscal austerity

- Workhorse two-country Neoclassical model with exogenous growth, capital adj. costs, and trade in goods and bonds
- Distortionary taxes on L, K and C
- EU setup: full integration, harmonized C tax, large entitlement programs
- G includes expenditures and transfers
- Intertemporal gov. budget constraint holds (debt markets work smoothly)
- 2008 fiscal shock: unanticipated rise in debt

Pre-crises tax rates & fiscal shock

	GDP Weighted Aggregates	
	FGN	GIIPS
Mendoza-Razin-Tesar Tax Rates:		
TAXC	17.00%	14.00%
TAXN	36.00%	34.00%
TAXK	19.00%	21.00%
2008-2011 debt change:		
DEBT08/GDP08	66.00%	79.00%
DEBT11/GDP08	80.00%	115.00%
DEBT SHOCK	14 ppts.	36 ppts.
FGN=France, Germany & Netherlands		
GIIPS=Greece, Ireland, Italy, Portugal & Spain		

Restoring fiscal solvency

- Tax hikes restore solvency when PDV of primary balance rises as much as debt:

$$\sum_{t=0}^{\infty} \left[\prod_{\tau=0}^{t} R_\tau(\tau, \tau^*) \right]^{-1} [\tau_K(r_t(\tau, \tau^*) - \delta)k_t(\tau, \tau^*)$$

$$+ \tau_L w_t(\tau, \tau^*) L_t(\tau, \tau^*) + \tau_C c_t(\tau, \tau^*)].$$

$$- \sum_{t=0}^{\infty} \left[\prod_{\tau=0}^{t} R_\tau(\tau, \tau^*) \right]^{-1} (g + e)$$

- Dynamic Laffer curves
- Fiscal externalities: Eq. prices & allocations depend on country tax structures
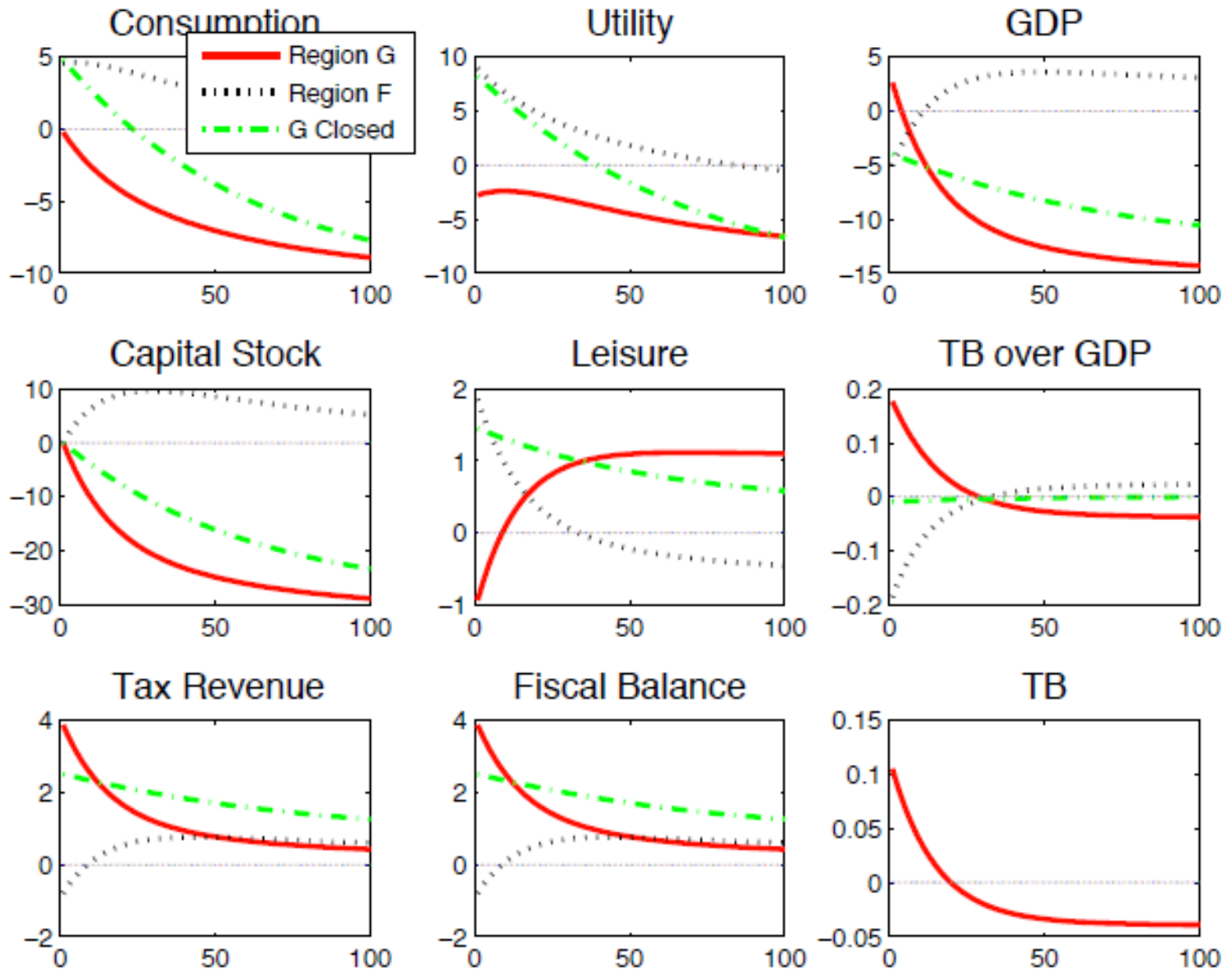
Arithmetical questions

- Can tax hikes restore fiscal solvency, and if so at what levels?

- How large are the fiscal externalities?

- What are the welfare implications?

- What are the benefits of coordination?

- How does tax austerity compare v. cuts in outlays and debt haircuts?

Dynamic Laffer curves: capital tax
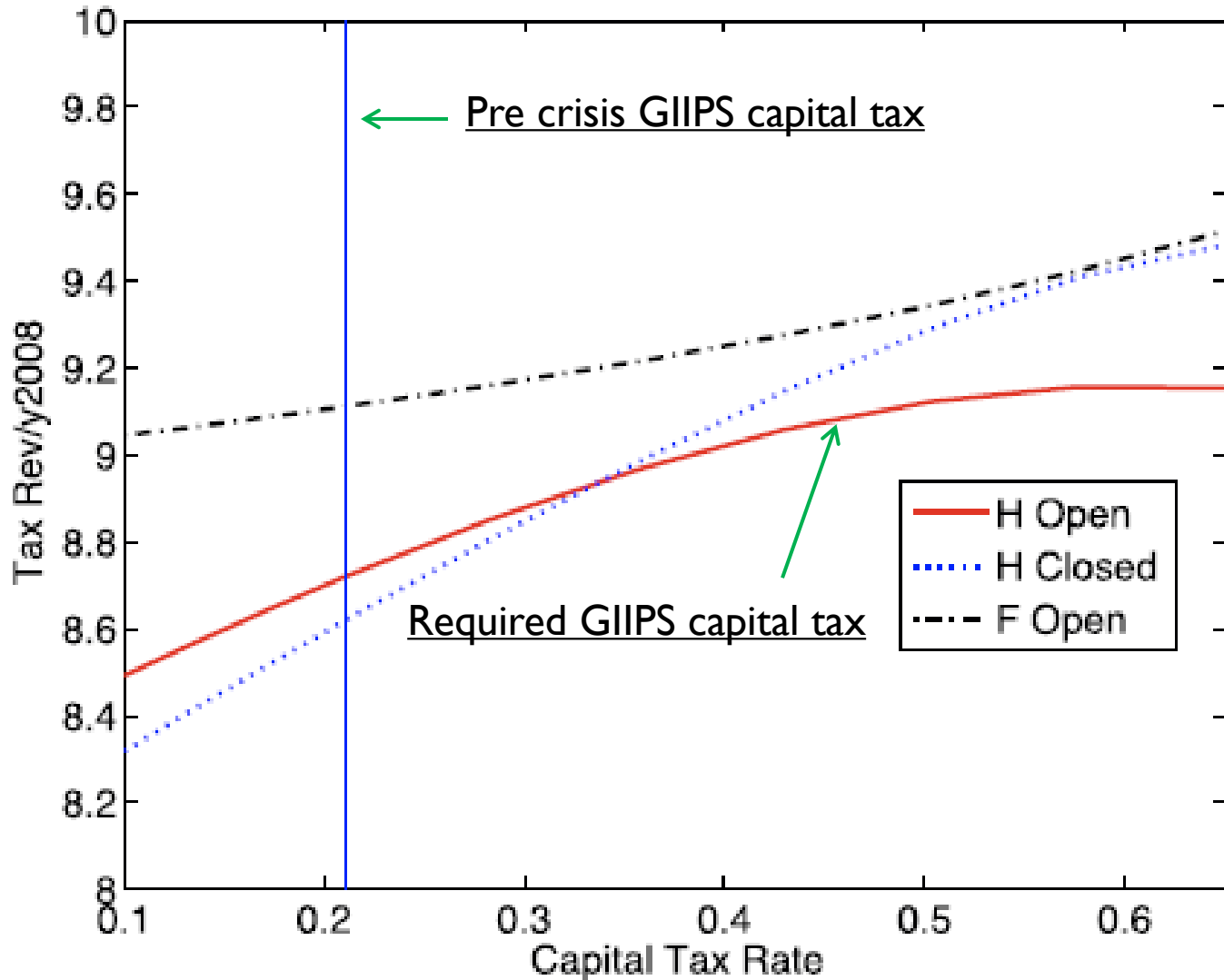
Transitional dynamics: Capital tax

Welfare & externalities: Capital tax

	FGN	GIIPS	GIIPS in autarky
Welfare effects (compensating variation in C)			
Transition	3.63%	2.53%	6.83%
Long-run	-2.14%	-7.62%	-9.91%
Total	1.49%	-5.09%	-3.08%
PDV of tax revenue (ppts. increase)			
	18.5	36.3	57.7
FGN=France, Germany & Netherlands			
GIIPS=Greece, Ireland, Italy, Portugal & Spain			

Caveats

- On the negative side:
    1. Neoclassical model has relatively inelastic capital tax base
    2. Abstracted from sov. risk+financial instability
    3. Ignored efficiency loss due to sectoral input misallocation, sticky prices
- On the positive side:
    1. Adjustment via cuts in unproductive outlays and haircuts would be less painful
    2. Haircuts are akin to making GIIPS's debt shock smaller and FGN's larger

New perspectives: Summary

- Sovereign debt crises & Great Recessions
  - Focus on fin. amplification and efficiency loss
- Domestic nature of European debt crisis
  - Not the classic two-player game between benevolent sovereign and foreign lenders
  - Tradeoffs of freezing a key asset market
- Unpleasant arithmetic of fiscal austerity
  - Tax hikes can restore solvency but welfare effects and EU-wide externalities are large