

Fiscal Policy and Macro-systemic Risks

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Integrated Macro-Financial Modeling for Robust Policy Design

MACFINROBODS

Paris, June 16, 2015



Theme of the Presentation

- Existing macro models are broadly fine for **limited disturbances** around the baseline
 - They capture the drivers of normal business cycles
 - They are basically linear
- But the crisis reminded us that **macro-systemic risks can result in major disturbances** to the global economy and to national economies.
- To capture macro-systemic risks, models need to pay attention to **risks emanating from the public sector**
 - Public finances as a source of risk in and of itself
 - Implication of the interaction between public finances and financial systems for macroeconomic stability

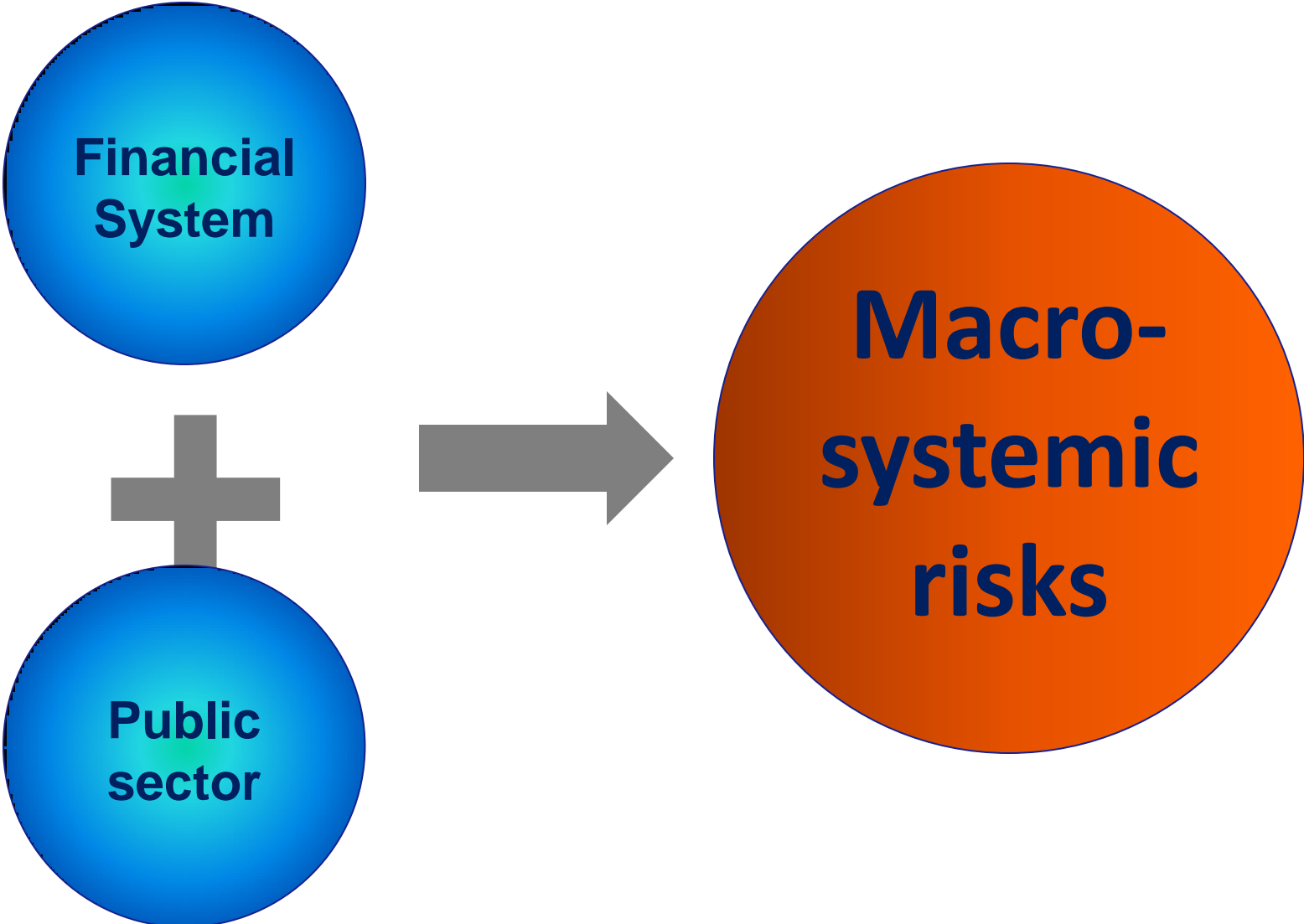


Outline of the Presentation

- 1. Macro-systemic risks**
- 2. Non-normal distribution of fiscal risks**
- 3. Implications for a standard model**
- 4. Fiscal non-linearities and multiple equilibria**
- 5. The importance of rules-like behavior**
- 6. Conclusion**

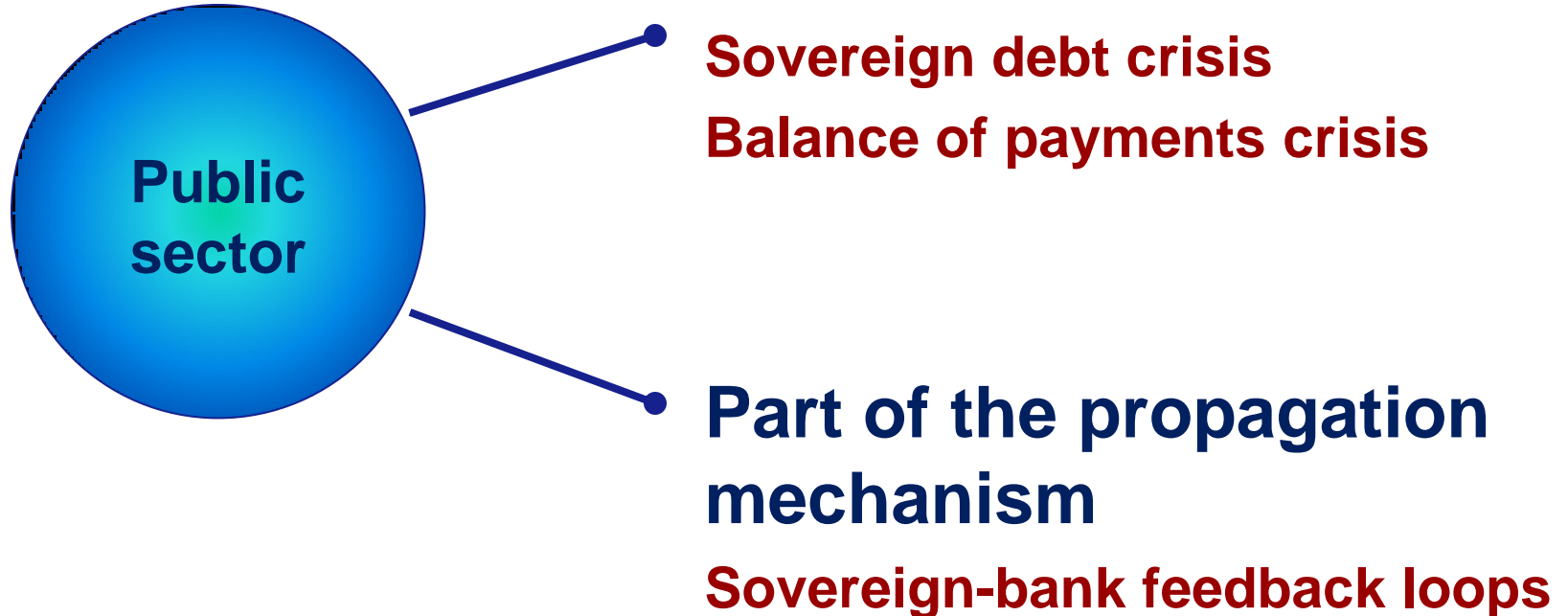
1. Macro-systemic risks

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Public sector as a source of macro-systemic risks



1. Macro-systemic risks

Reexamining assumptions regarding behavior of fiscal risks

Unexamined assumptions about the behavior of fiscal risks:

- **Fiscal risks are independent:** the realization of one risk does not make the realization of any other risk more or less likely
- **Fiscal risks are symmetric:** positive and negative shocks to the public finances are equally likely and equally beneficial/costly
- **Consequences of fiscal risks are linear:** costs/benefits increase proportionally with the size of the underlying disturbance



1. Macro-systemic risks

Reexamining assumptions regarding behavior of fiscal risks

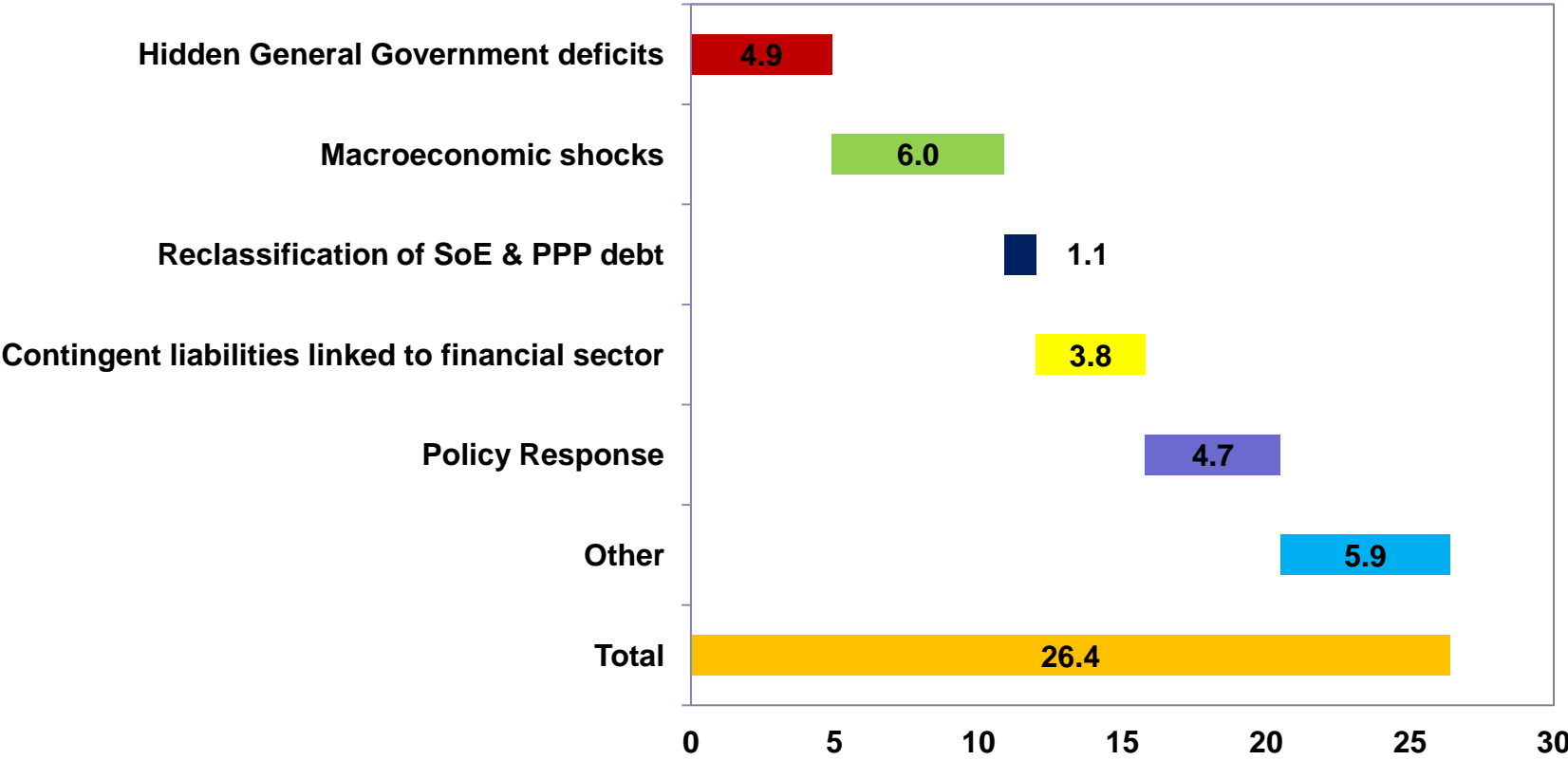
However, the global crisis reminded us that, in fact:

- Fiscal risks are *highly correlated*
- Fiscal risks are *asymmetric*
- Consequences of fiscal risks are *non-linear*

1. Macro-systemic risks

Public sector as a source of risk

Unexpected increase in General Government Debt in Selected Countries
(2007-2010, percent of 2010 GDP)

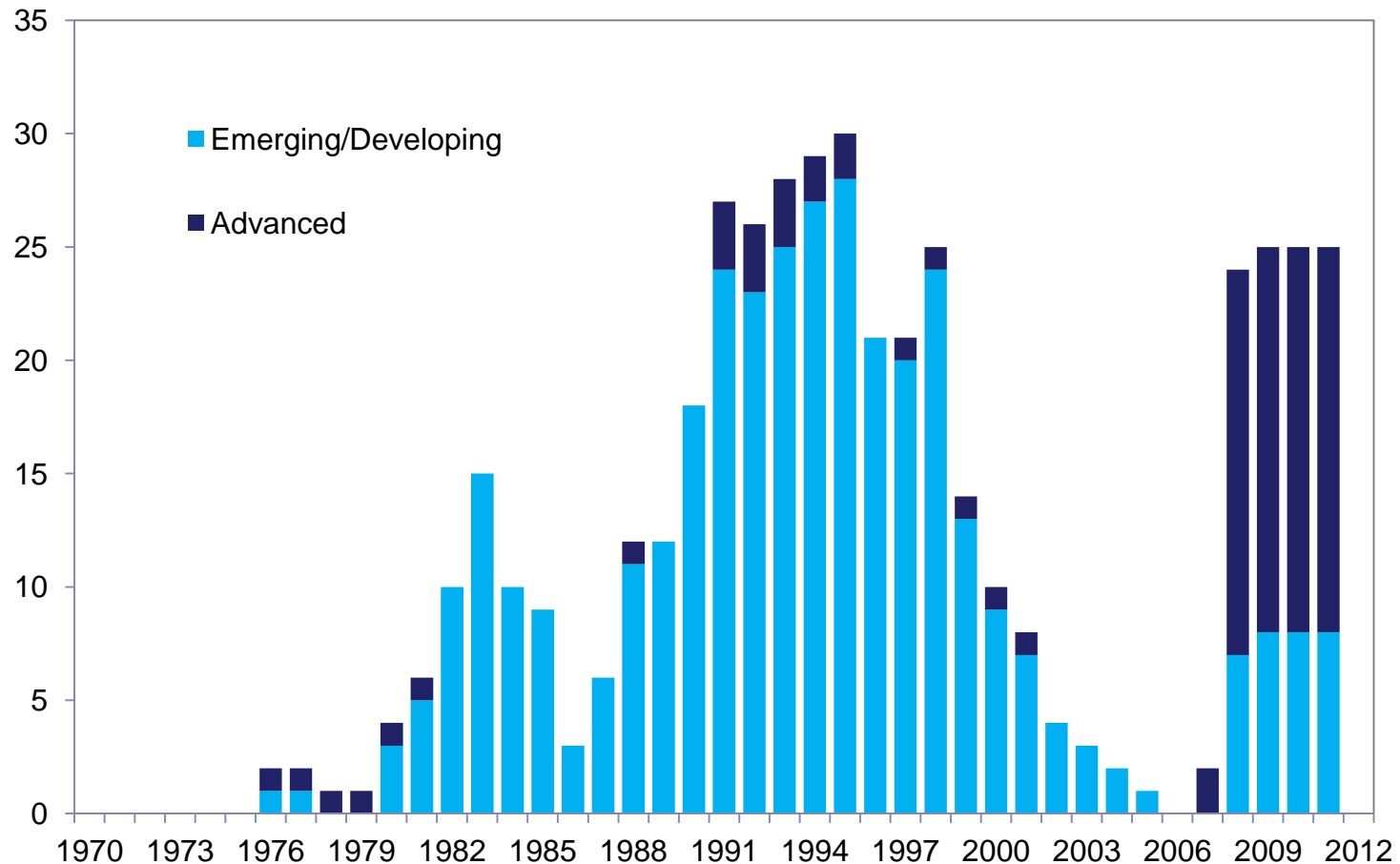


Note: PPP-GDP weighted average across ten countries with largest increase in general government gross debt to GDP during 2007-2010. Includes France, Germany, Greece, Iceland, Ireland, Netherlands, Spain, Portugal, UK, and USA

1. Macro-systemic risks

Sovereign-bank feedback loops

Annual Frequency of Ongoing Banking Crises, 1970-2011

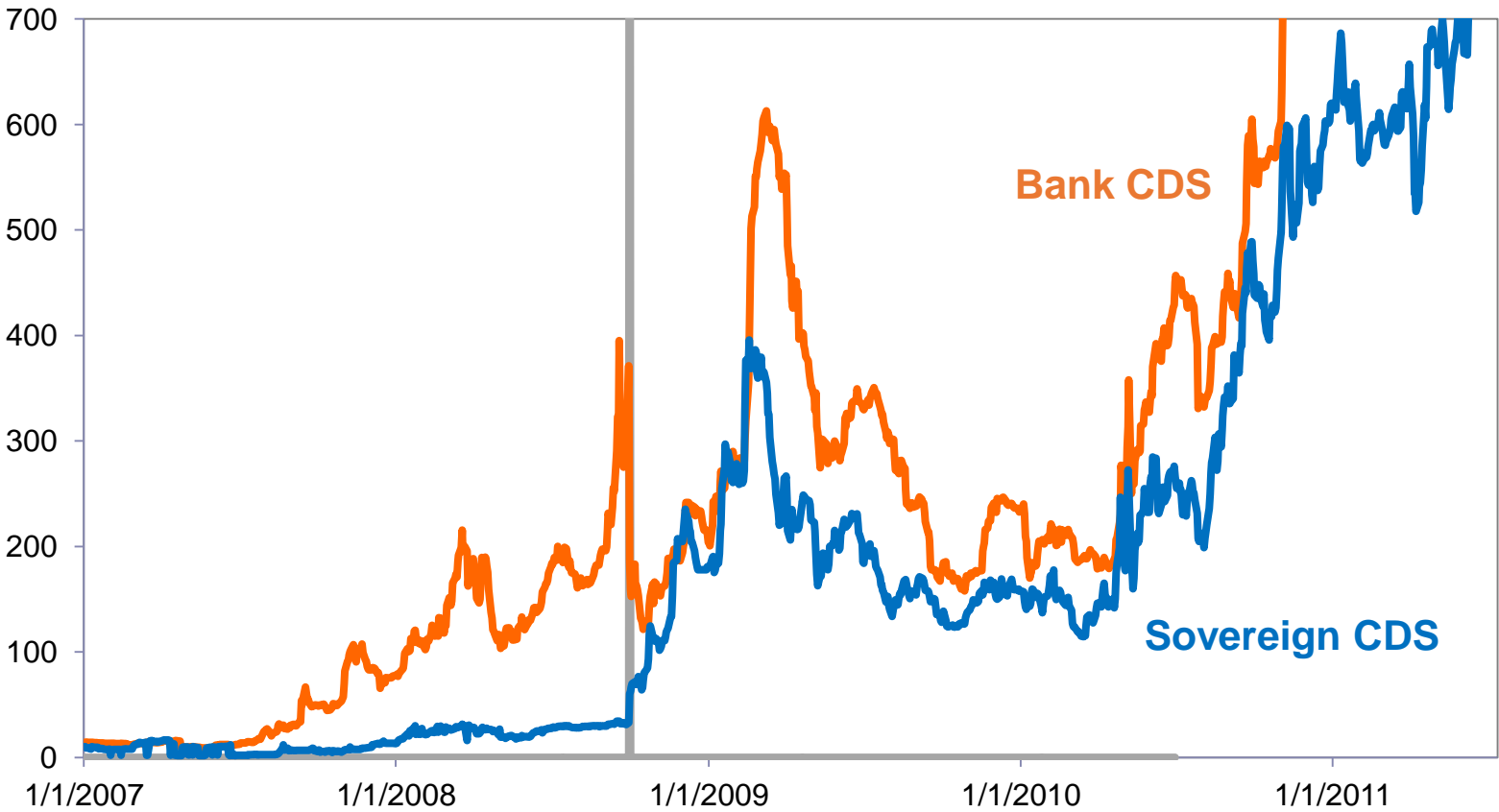


Source: Obstfeld (2013), based on Laeven and Valencia (2012)

1. Macro-systemic risks

Sovereign-bank feedback loops

Ireland: Sovereign and Bank 5-year CDS Spreads, 2007-2010
(basis points)



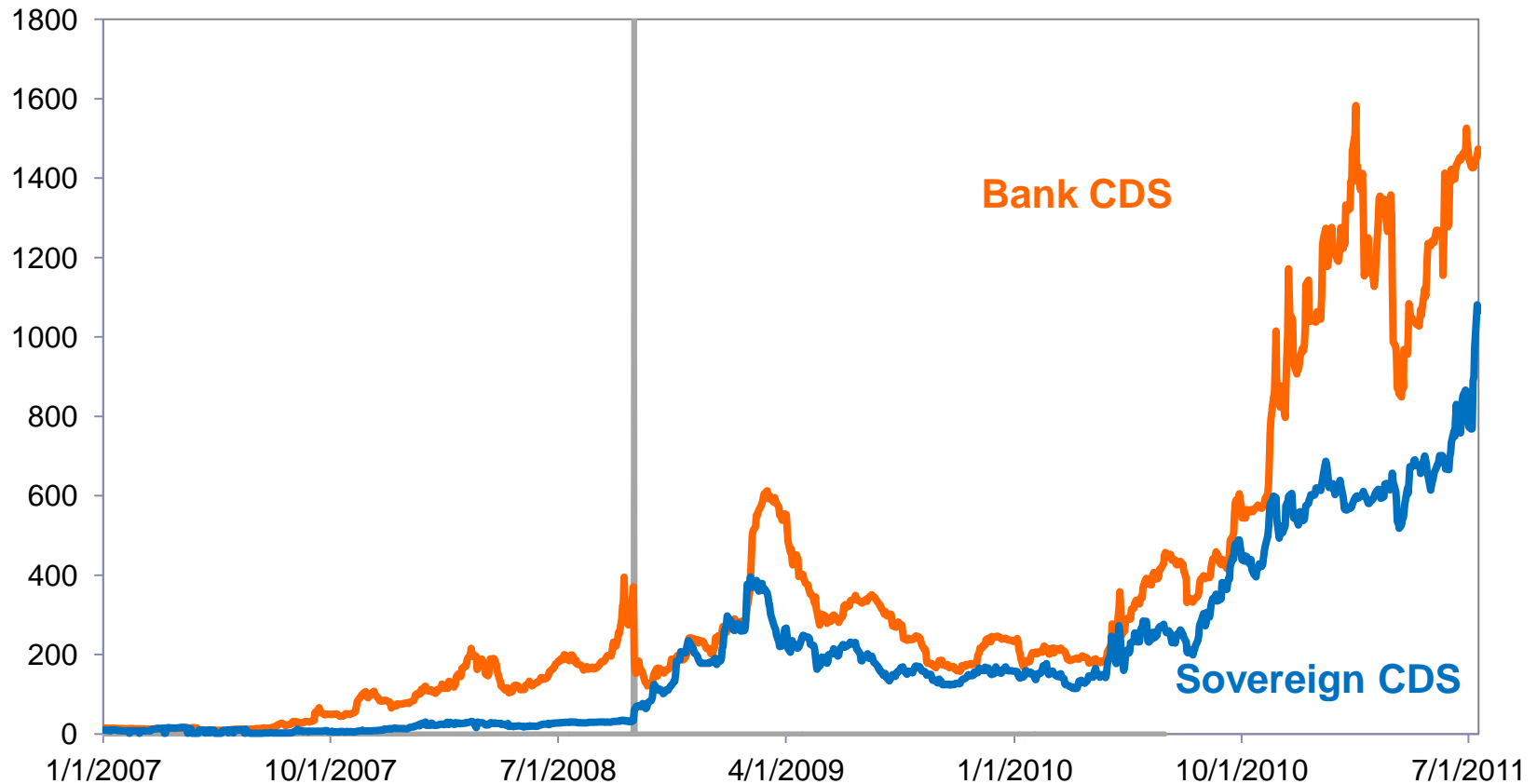
Source: Datastream.

1/ Daily data. Bank CDS for Ireland is computed as the simple average of bank CDS for Allied Irish Bank and Irish Life and Permanent.

1. Macro-systemic risks

Sovereign-bank feedback loops

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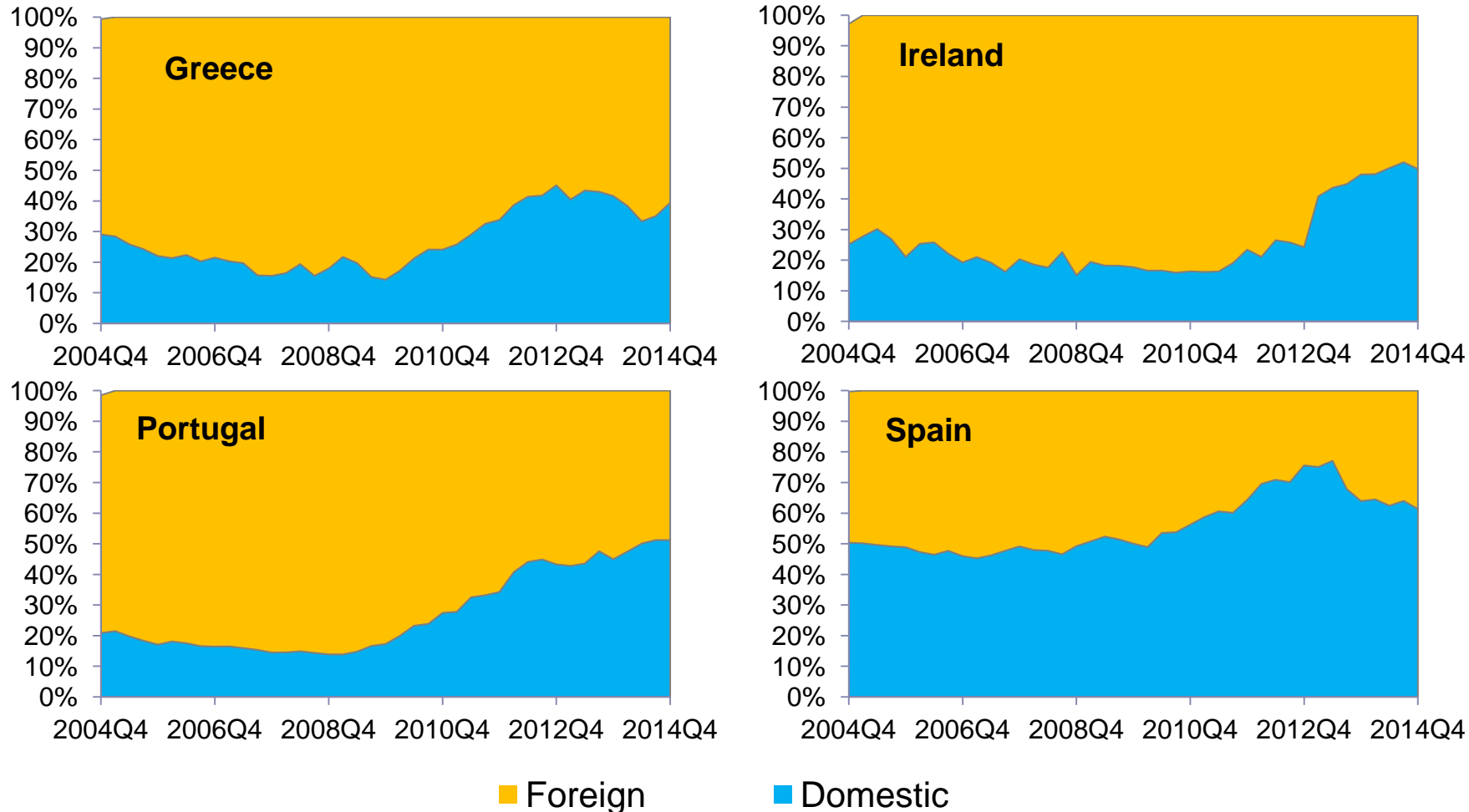
Source: Datastream.

1/ Daily data. Bank CDS for Ireland is computed as the simple average of bank CDS for Allied Irish Bank and Irish Life and Permanent.

1. Macro-systemic risks

Sovereign-bank feedback loops

Selected Euro Area Countries: General Government Debt Securities, Holdings by Foreign and Domestic Investors (2004Q4-2014Q4)

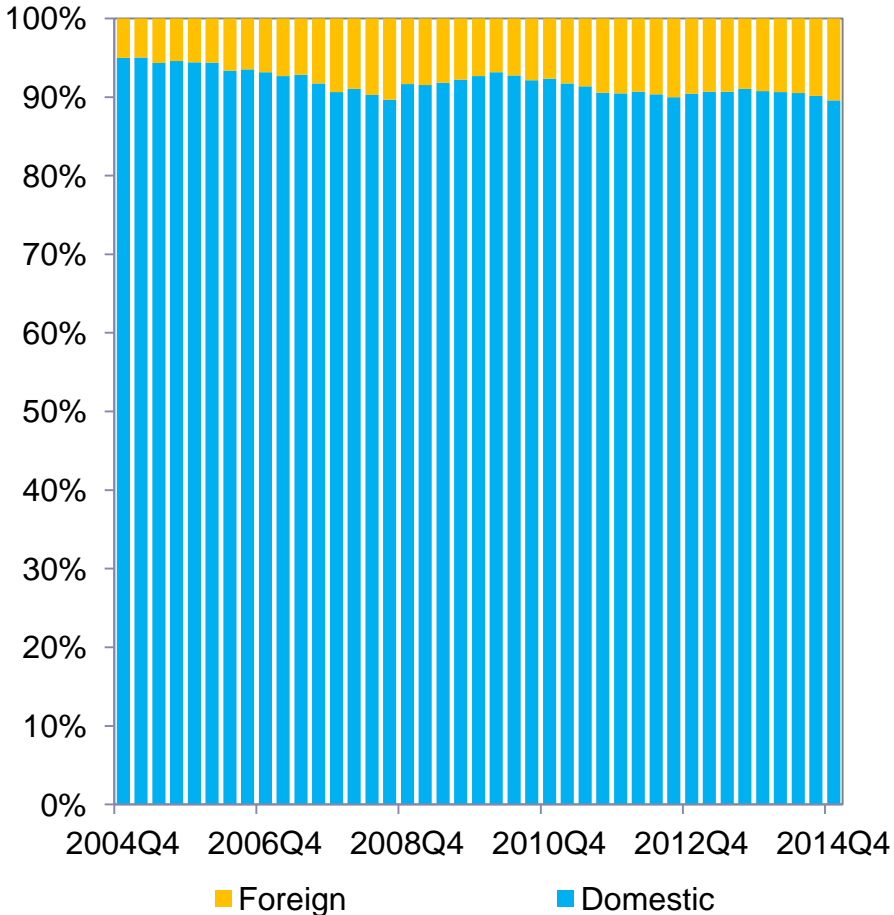


Source: Arslanalp and Tsuda (2012), updated database through 2014Q4 available at <https://www.imf.org/external/pubs/cat/longres.aspx?sk=40135.0>

1. Macro-systemic risks

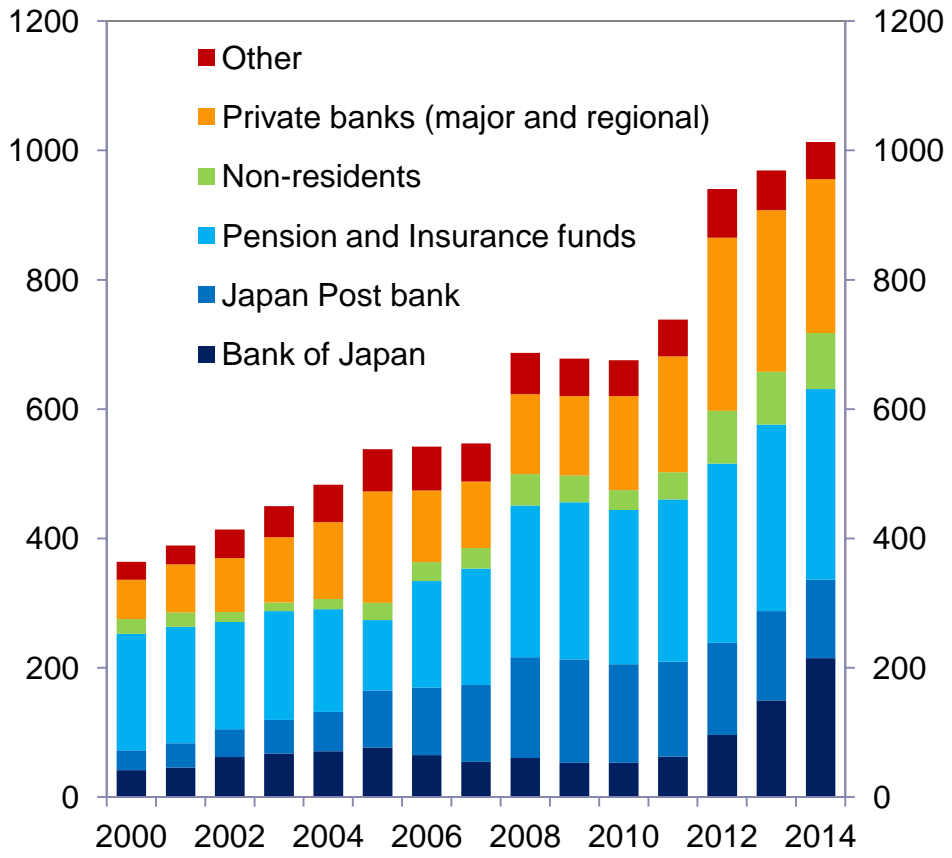
Sovereign-bank feedback loops

Japan: General Government Debt Securities, Holdings by Foreign and Domestic Investors (2004Q4-2014Q4)



Source: Arslanalp and Tsuda (2012), updated database through 2014Q4 available at <https://www.imf.org/external/pubs/cat/longres.aspx?sk=4>

Japan: Holdings of JGBs and Treasury Bills, 2000-2014 (trillion Yen)



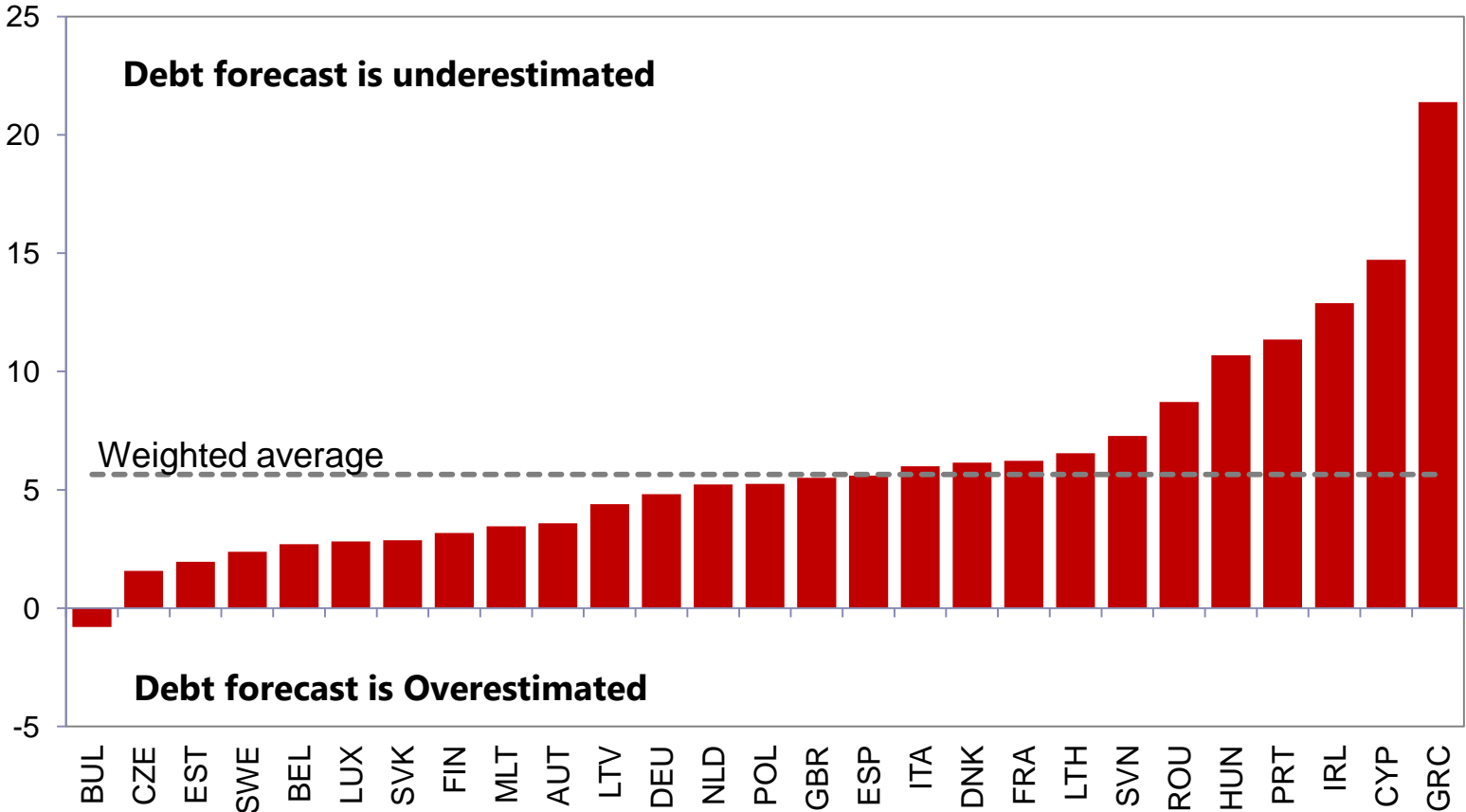
Sources: Ministry of Finance of Japan, Japan Post Bank, and IMF staff estimates. Annual data correspond to end-June figures.

2. Non-normal distribution of fiscal risks

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Fiscal risks are asymmetric

European Union: Forecast Error for General Government Debt (Year t+2)
(2001-2013 average as percent of GDP; actual minus forecast)

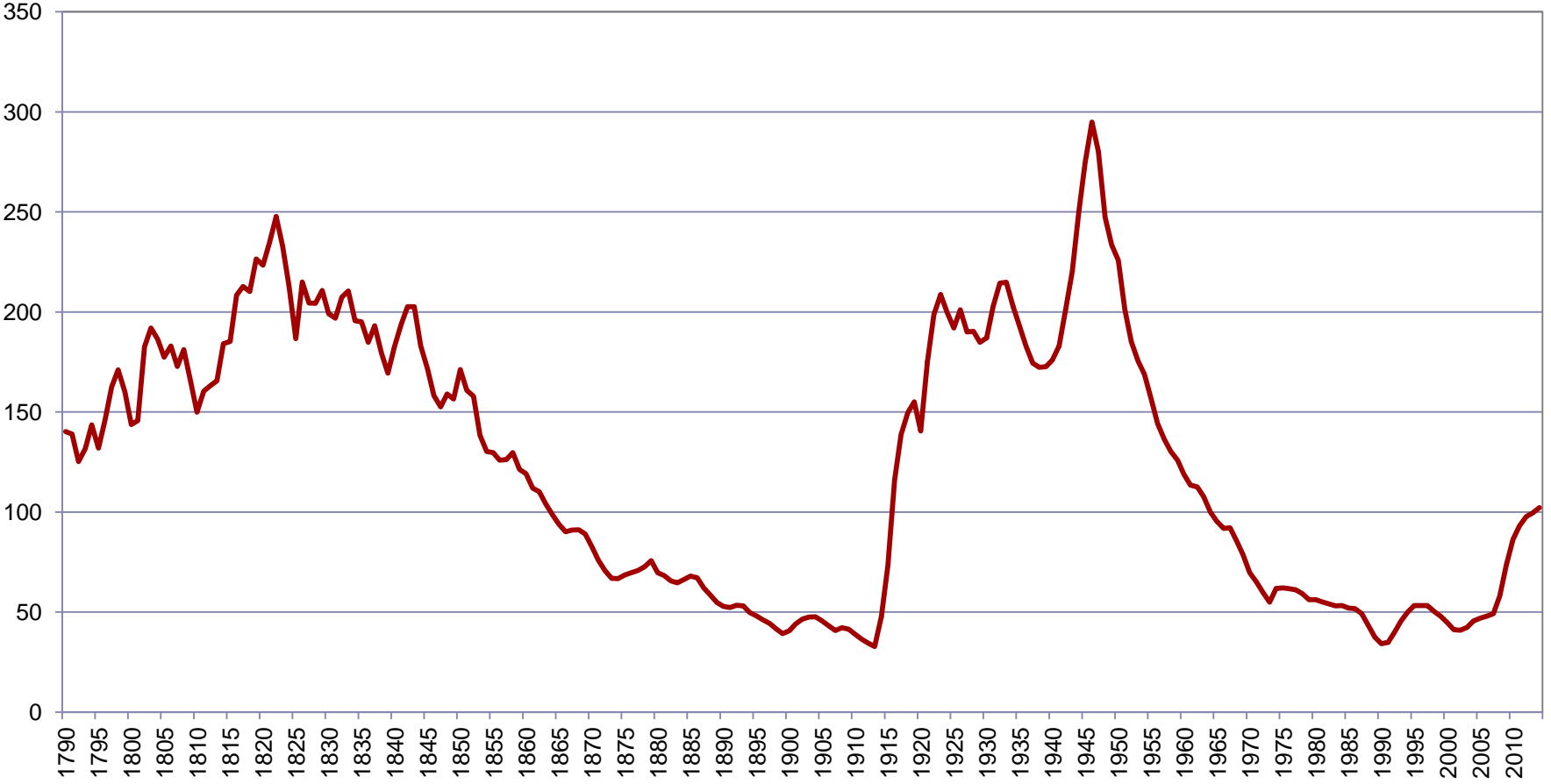


Sources: EU Stability and Convergence Programmes, and IMF staff estimates.
 Note: Includes all EU member states, except Croatia because of data availability.

2. Non-normal distribution of fiscal risks

Public debt in the United Kingdom

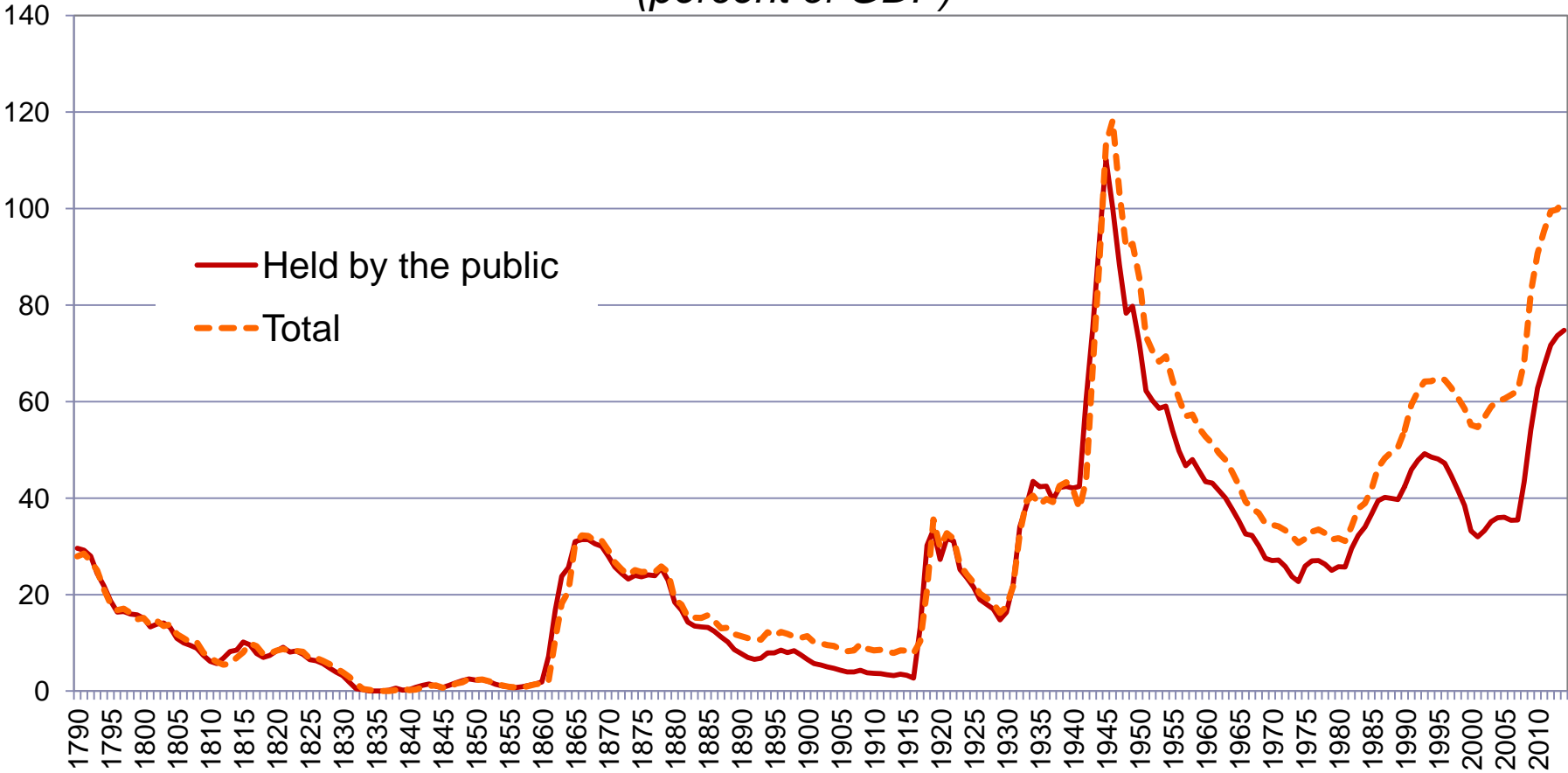
United Kingdom: National/Government Debt
(percent of GDP)



2. Non-normal distribution of fiscal risks

Public debt in the United States

United States: Federal Government Debt
(percent of GDP)

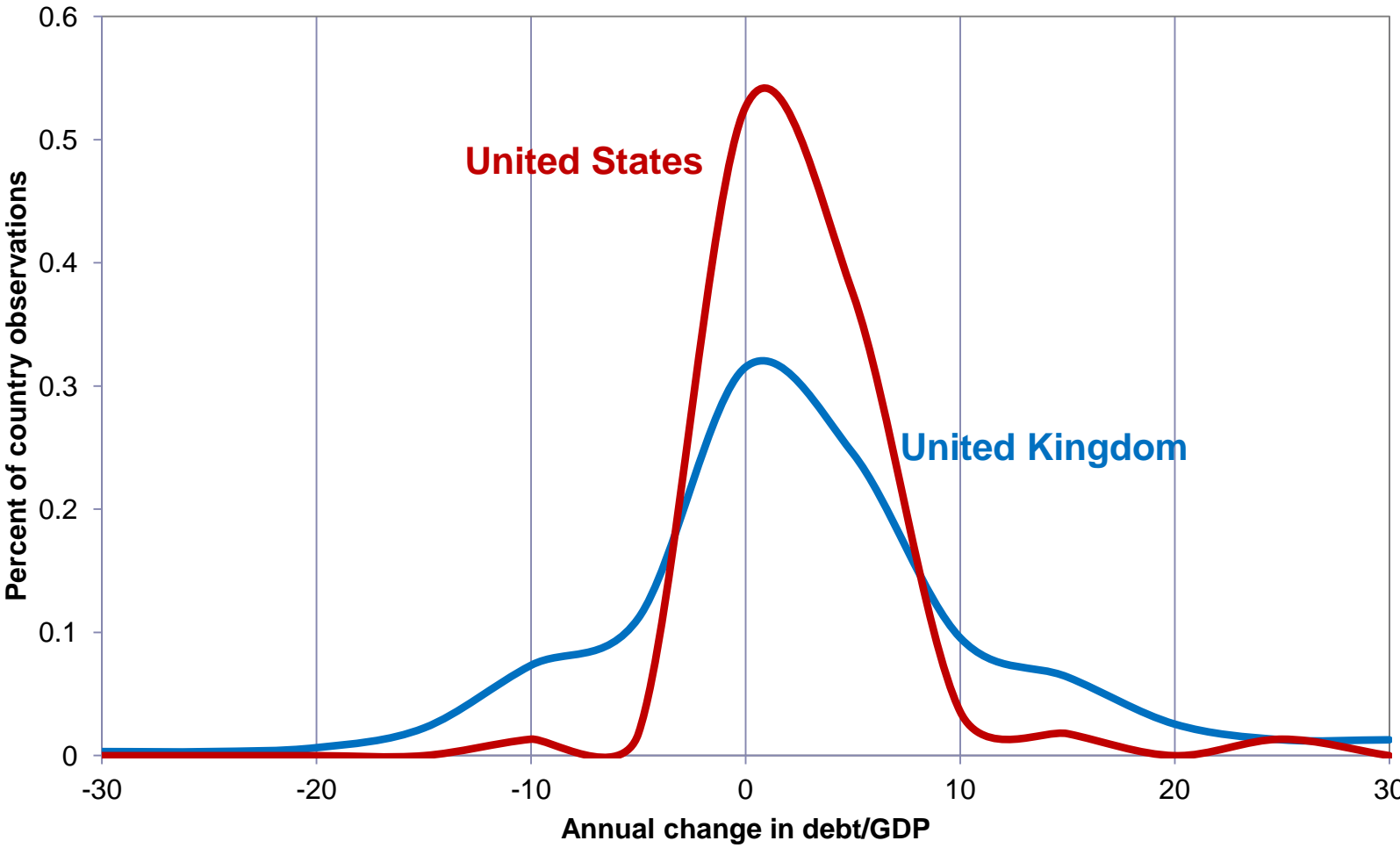


Sources: CBO, BEA (NIPA tables), and US Treasury

2. Non-normal distribution of fiscal risks

Fiscal risks are asymmetric

United Kingdom and United States: Distribution of Changes in Debt to GDP





2. Non-normal distribution of fiscal risks

Tests for skewness in the distribution of shocks to debt

	1st difference of the debt ratio				Residuals of an R(1) of the debt ratio			
	US		UK		US		UK	
	Statistic	Significance	Statistic	Significance	Statistic	Significance	Statistic	Significance
Kendall-Stuart	1.890	0.000	0.832	0.000	1.970	0.000	1.006	0.000
Bera-Premaratne symmetry test	2.519	0.006	2.341	0.010	2.571	0.005	2.855	0.002
Bai-Ng symmetry test	1.784	0.037	2.169	0.015	1.779	0.038	2.718	0.003
Jarque-Bera test for normality	727.623	0.000	75.836	0.000	760.752	0.000	87.824	0.000
Jarque-Bera-Uzua test for normality	776.506	0.000	81.197	0.000	811.515	0.000	93.509	0.000
Bootstrapping test of symmetry around the MEAN	1.890	0.008	0.832	0.008	1.970	0.006	1.006	0.001
Bootstrapping test of symmetry around the MEDIAN	1.890	0.012	0.832	0.010	1.970	0.010	1.006	0.003

3. Implications for a standard model

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Tax smoothing

- **Tax smoothing setting: The planner's problem**

Let $1 + \lambda = (1 + i) / (1 + \gamma) = (1 + r) / (1 + g)$ **be (1+) the IRGD.**

$$\text{Min}_{\tau_t} E_0 \sum_{t=0}^{\infty} (1 + \lambda)^{-t} \tau_t^2$$

s.t.

(y-o-y budget) $d_{t+1} = (1 + \lambda)d_t - (\tau_t - g) + \varepsilon_{t+1}$

(solvency) $E_0 \lim_{x \rightarrow \infty} (1 + \lambda)^{-x} d_x = 0$

d_0, g given; ε_t is i.i.d.

Notice that any bias in epsilon is included in g.

$\tau_t - g$ is the primary balance. There is no ceiling on debt.

3. Implications for a standard model

Solution

- This is a version of the stochastic discounted optimal linear regulator (Ljungqvist and Sargent, 2012). The solution is

$$\tau_t = \lambda d_t + g$$

$$d_{t+1} = d_t + \varepsilon_{t+1}$$

- This implies that $\tau_{t+1} = \tau_t + \lambda \varepsilon_{t+1}$. Debt and taxes are a random walk.
- Taxes should be set to pay interest and *expected* expenditure (incl. the shock's mean, if not zero)

3. Implications for a standard model

War and Peace

- **Government expenditure can be a very large value, (g^{WAR}), with low probability, or a low value (g^{PEACE}), with high probability. Thus, average expenditure (g), is only moderately above peacetime expenditure.**
- **Optimal policy: $\tau_t = g + \lambda d_t$**

In war: $d_{t+1} = d_t + g^{WAR} - g > d_t$, i.e. borrow

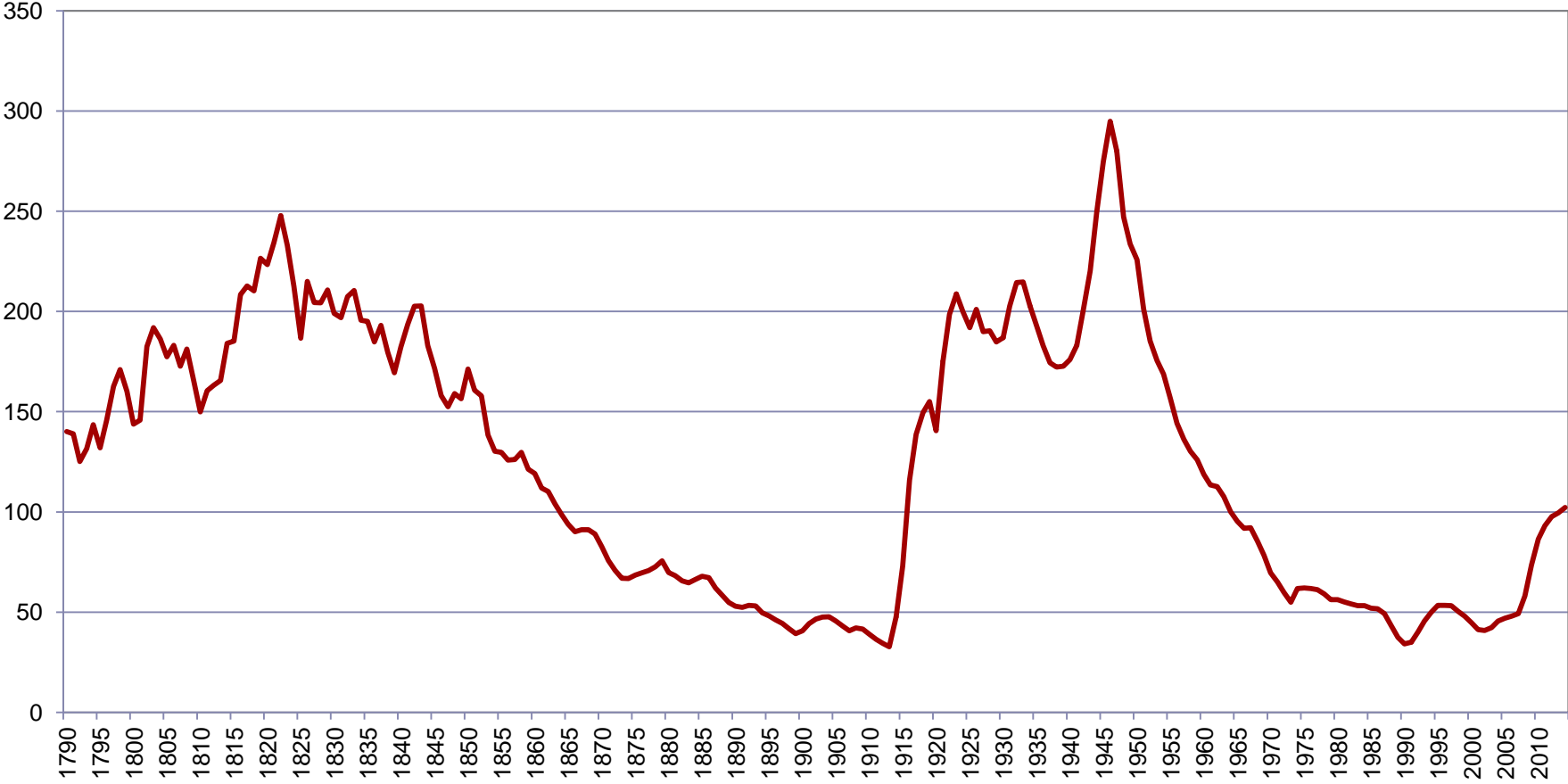
In peace (now): $d_{t+1} = d_t - (g - g^{PEACE}) < d_t$, i.e., reduce debt

This policy and debt pattern broadly matches the historical experience—and quite closely epitomizes the XIX Century Gladstone doctrine

3. Implications for a standard model

History of public debt reduction policies: the United Kingdom

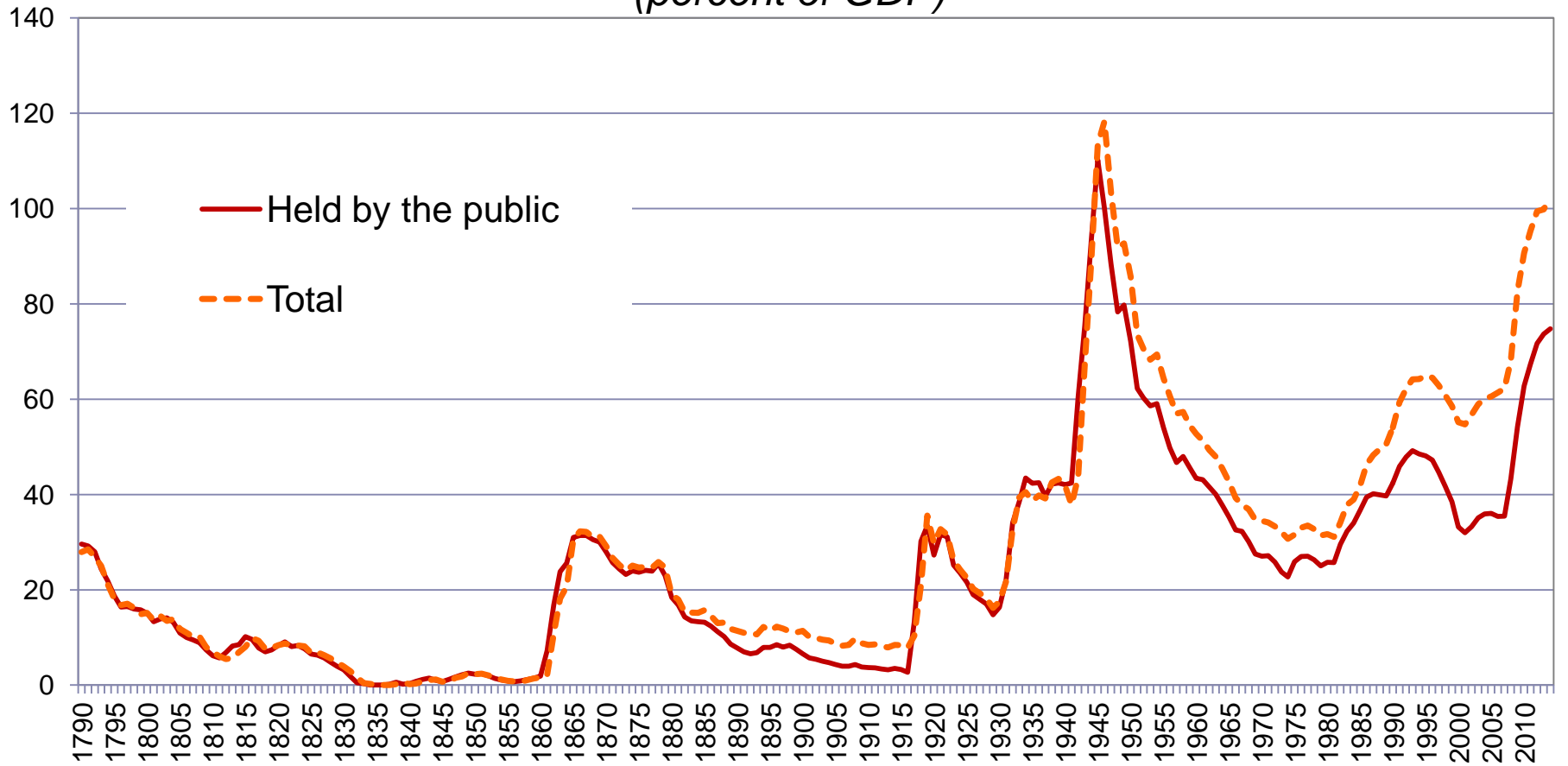
United Kingdom: National/Government Debt
(percent of GDP)



3. Implications for a standard model

History of public debt reduction policies: the United States

United States: Federal Government Debt
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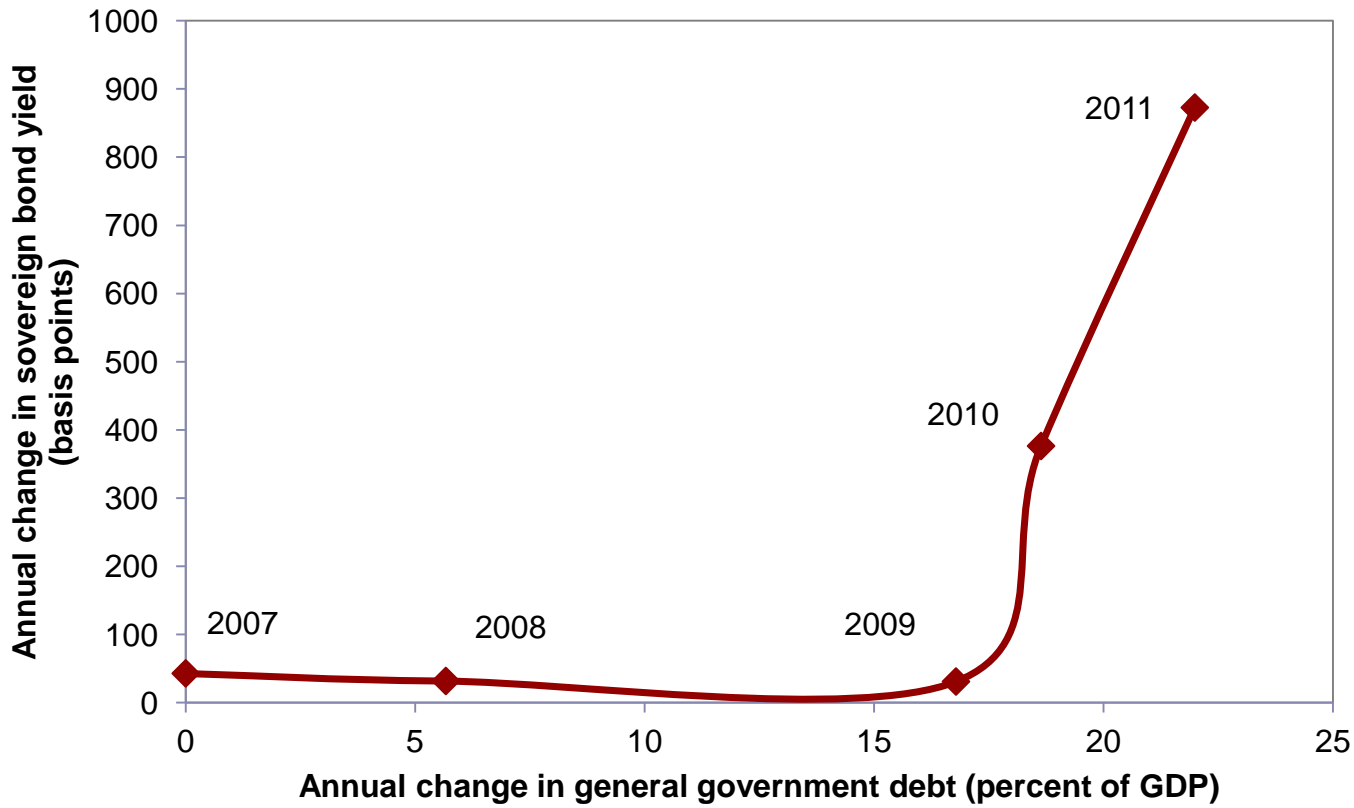
Sources: CBO, BEA (NIPA tables), and US Treasury

3. Fiscal non-linearities and multiple equilibria

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Fiscal non-linearities: Example of Greece

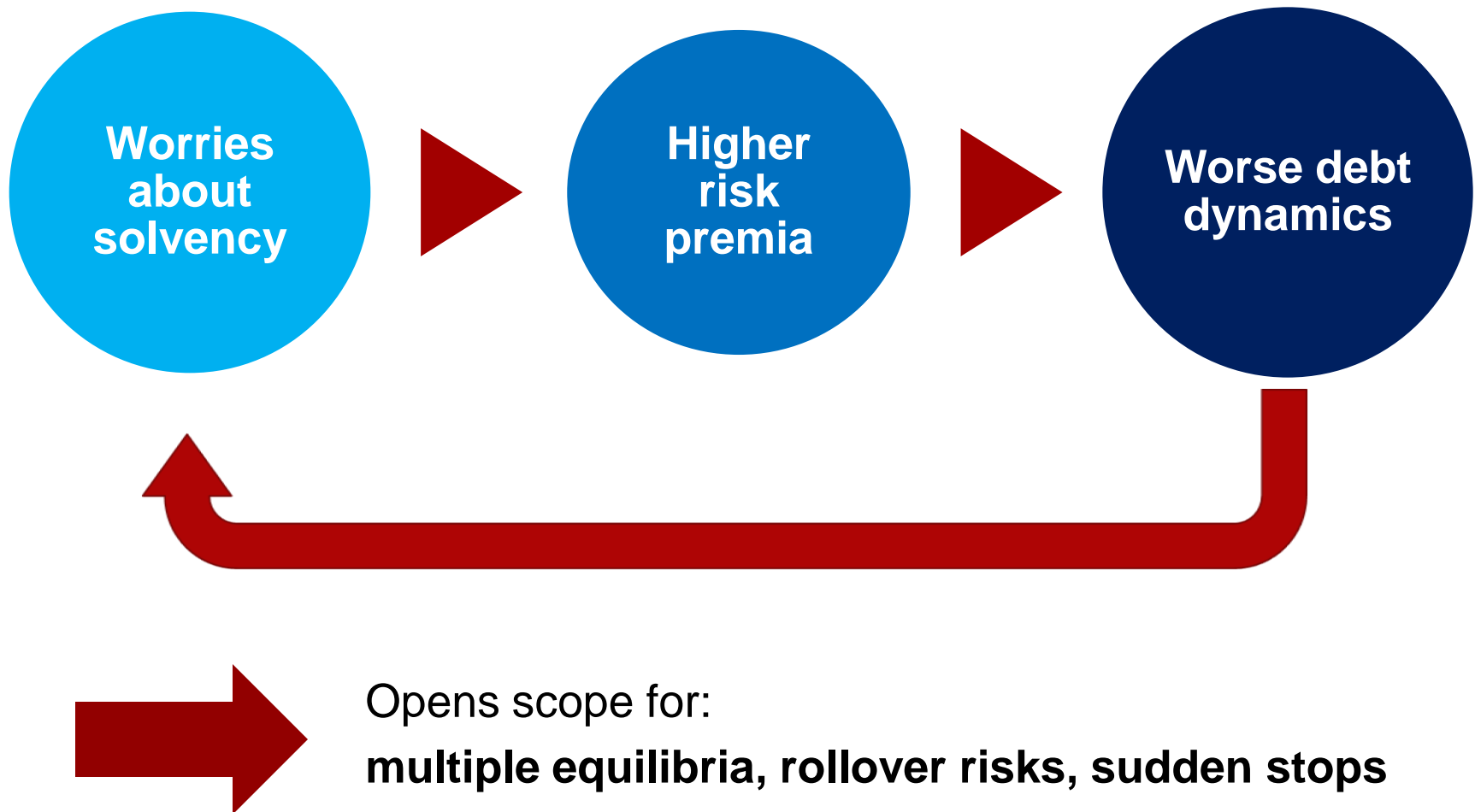
Greece: Government Debt and Sovereign Bond Yields, 2007-2011



Sources: Datastream, IMF Fiscal Monitor, and IMF staff estimates

4. Fiscal non-linearities and multiple equilibria

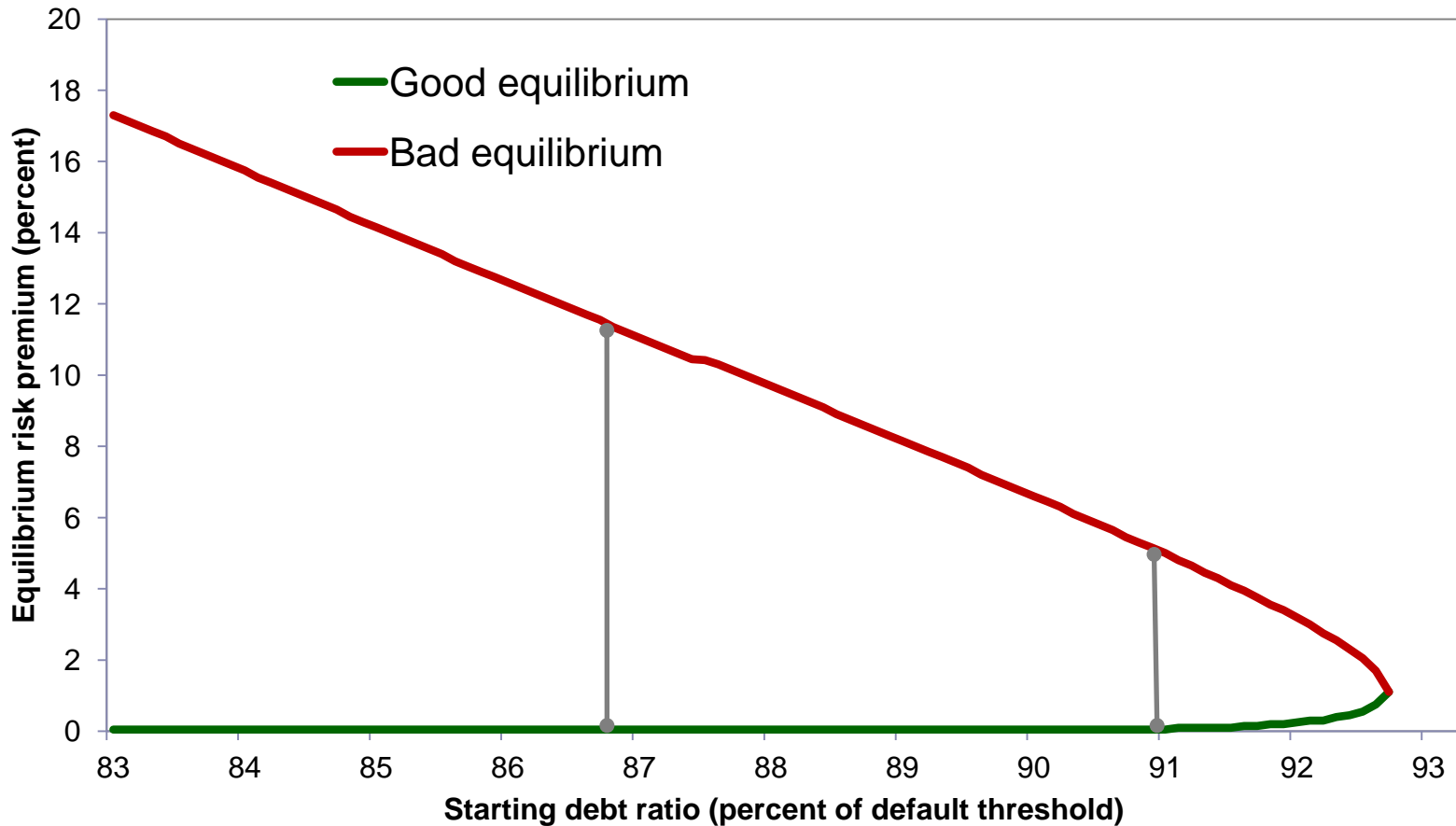
Self-fulfilling expectations



4. Fiscal non-linearities and multiple equilibria

Multiple equilibria

Debt level, non-linearities, and multiple equilibria



Source: "Dark Corners" presentation by Olivier Blanchard at the Joint Luncheon of the American Economic Association and American Finance Association during the 2015 AEA Annual Meeting in Boston.

Fiscal Monitor

Now Is the Time
Fiscal Policies for Sustainable Growth

APR **15**

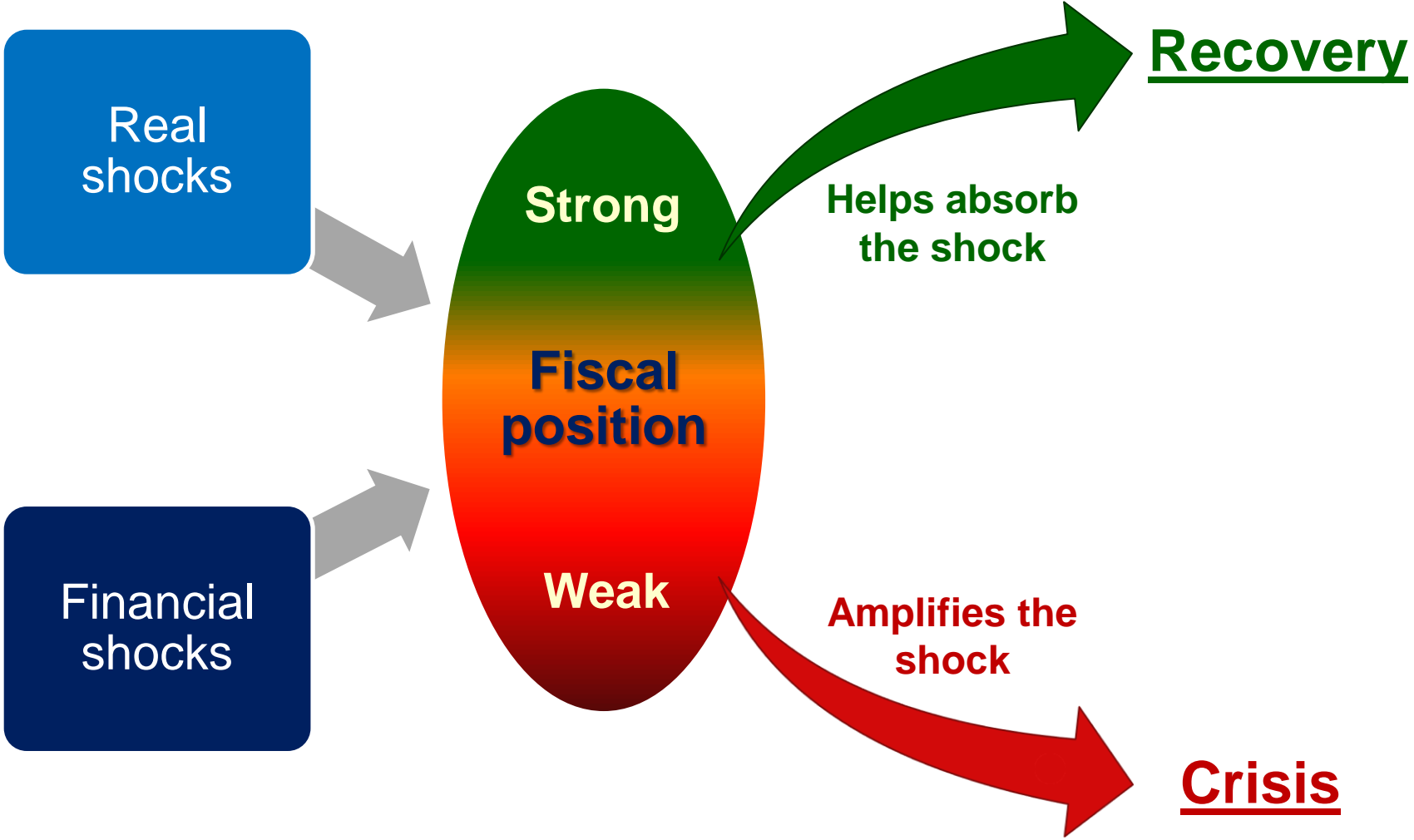


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5. The importance of rules-like behavior

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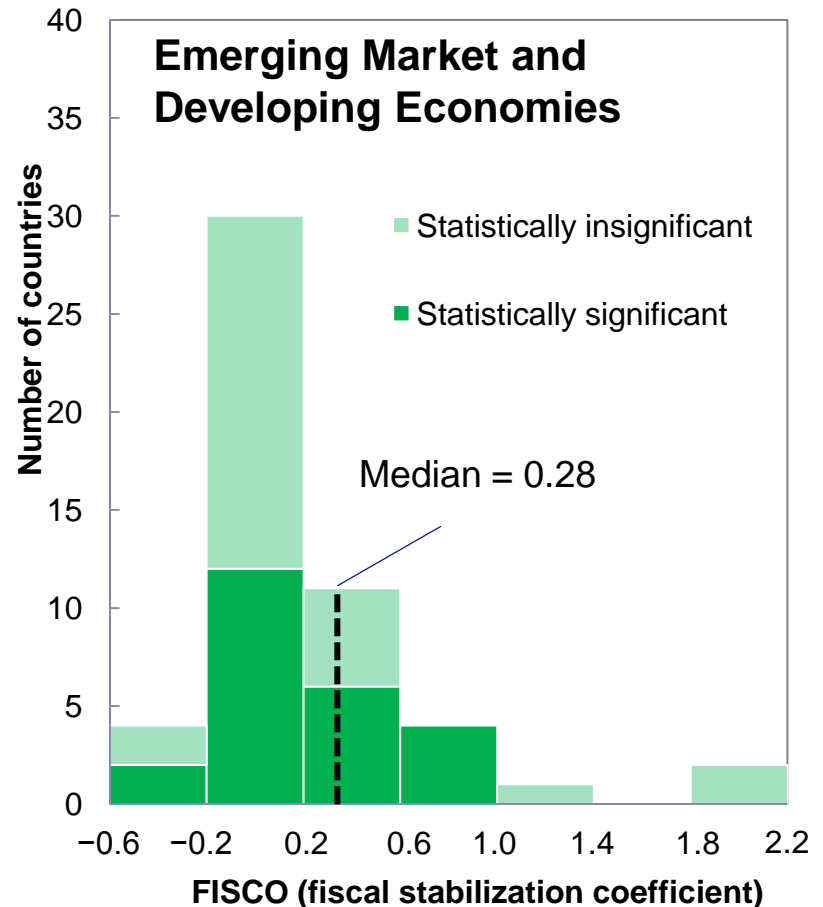
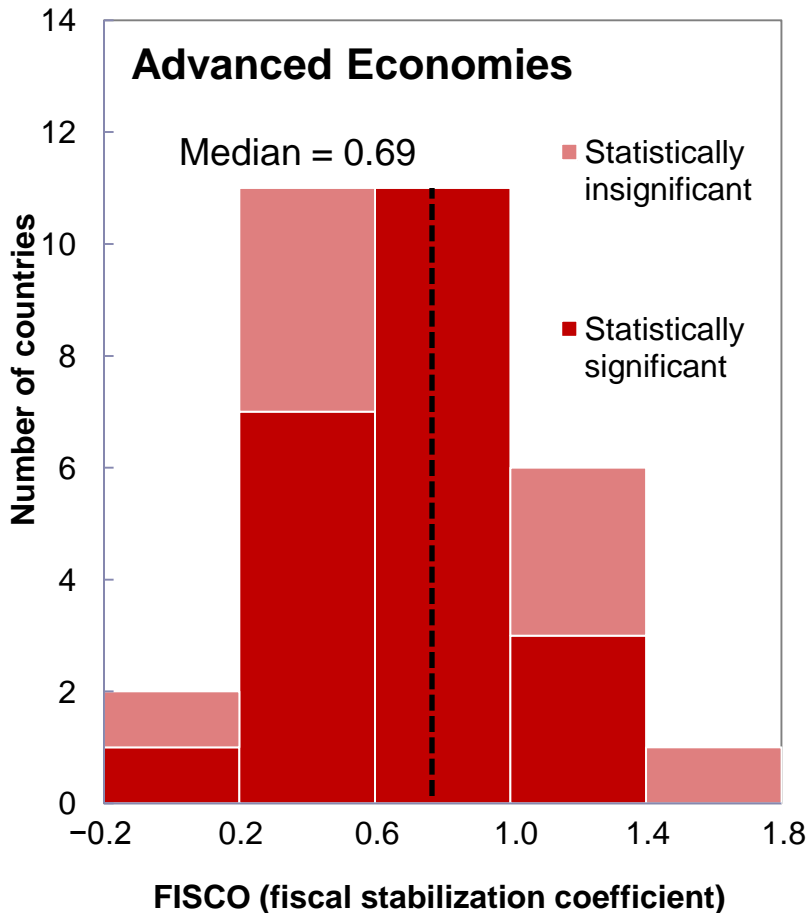
Fiscal policy can help absorb or amplify shocks



5. The importance of rules-like behavior

FISCO: Fiscal stabilization coefficient

Distribution of Fiscal Stabilization Coefficients

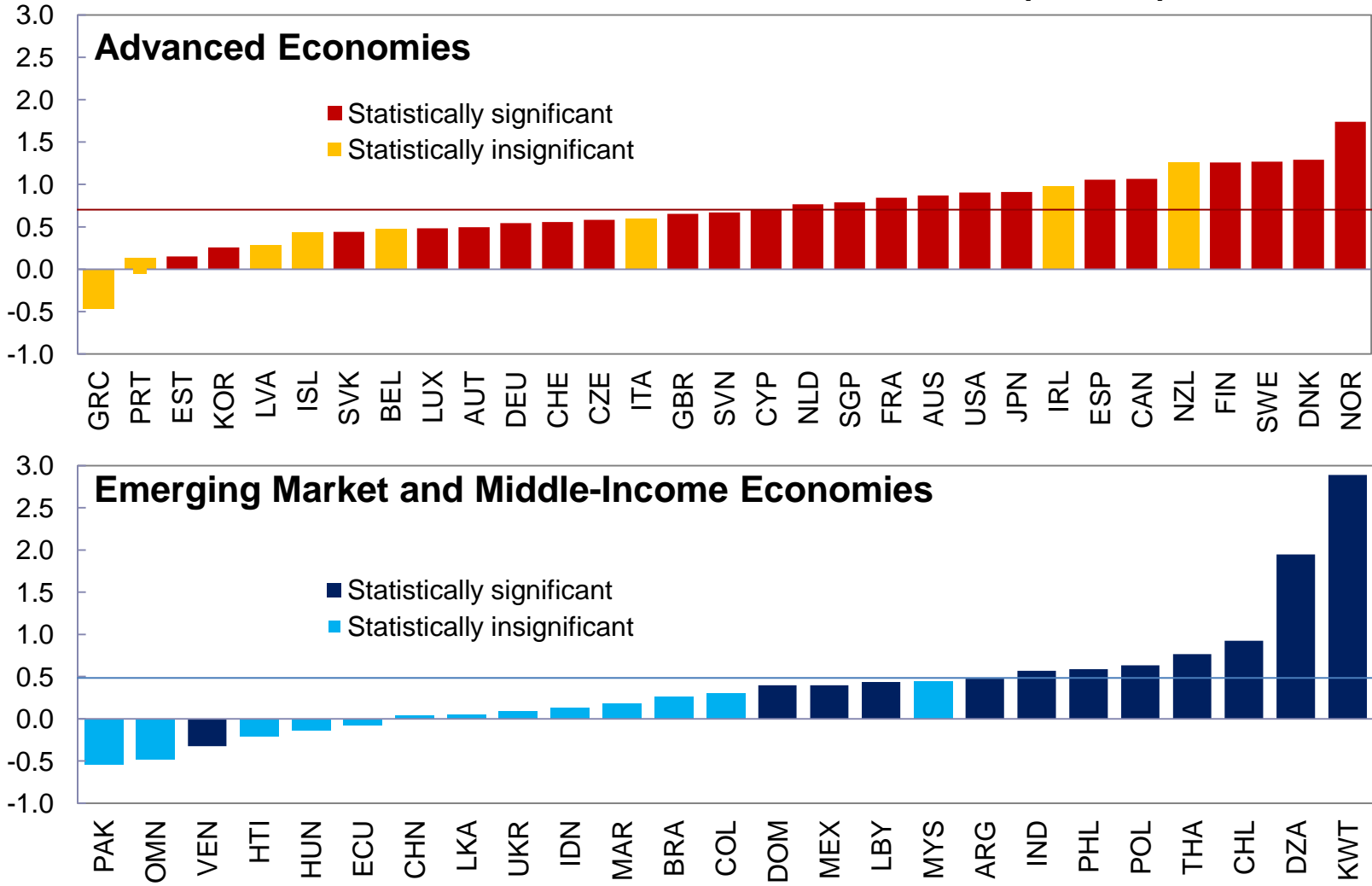


Source: IMF, *Fiscal Monitor*, April 2015.

5. The importance of rules-like behavior

FISCO: Fiscal stabilization coefficient

Selected Fiscal Stabilization Coefficients (FISCO)

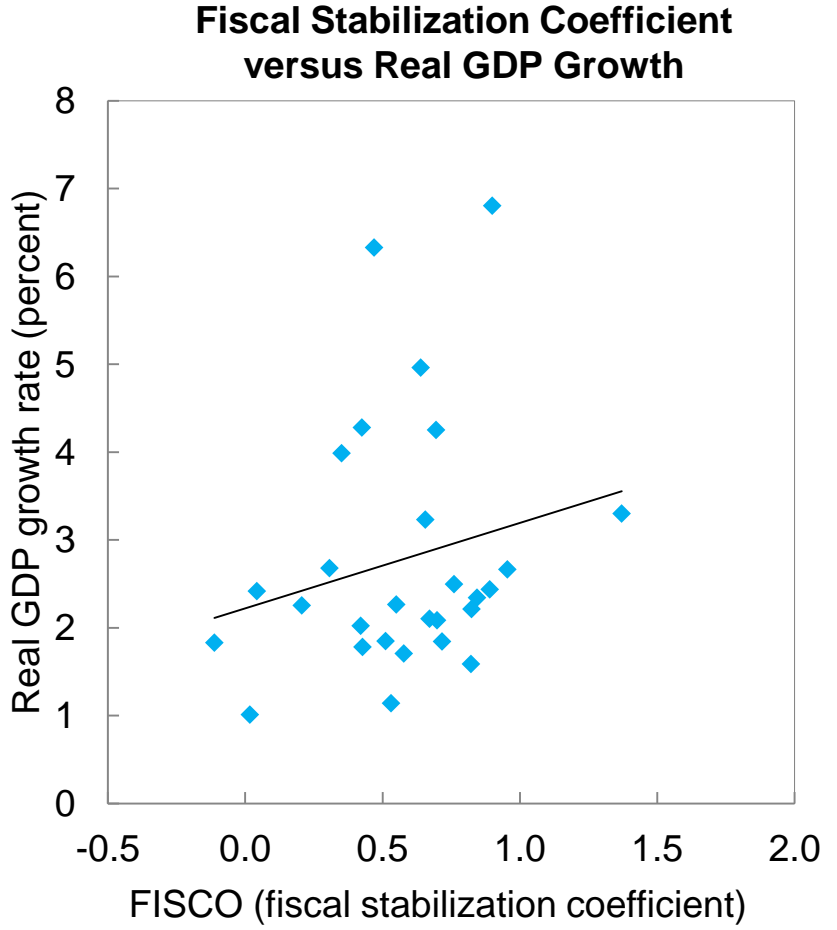
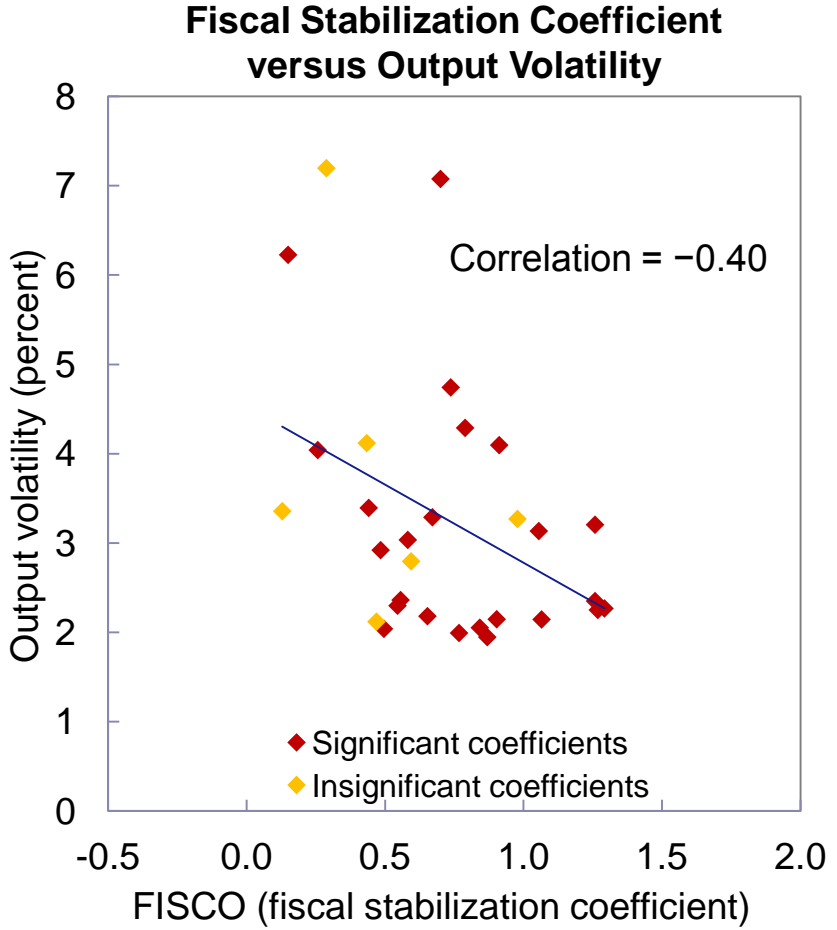


Source: IMF, *Fiscal Monitor*, April 2015.

5. The importance of rules-like behavior

FISCO, output volatility, and medium-term growth

Fiscal Stabilization, Output Volatility, and Growth: Cross-Country Correlations, 1980–2013

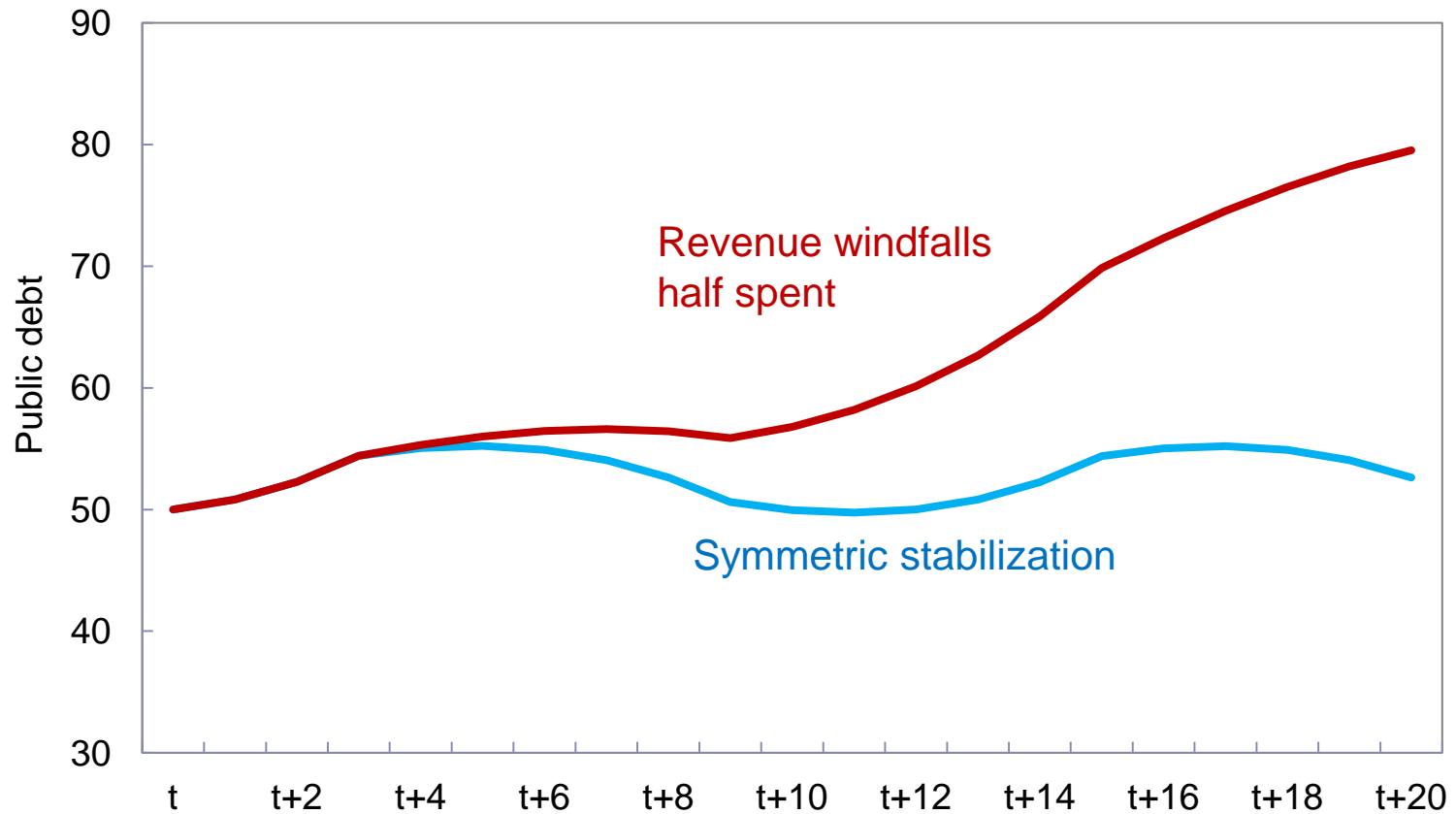


Sources: IMF, *Fiscal Monitor*, April 2015, and IMF staff estimates

5. The importance of rules-like behavior

Asymmetry through the business cycle

Asymmetric Stabilization: Unpleasant Public Debt Arithmetic



Source: IMF, *Fiscal Monitor*, April 2015.

6. Conclusion

- The global crisis underscored the need to better understand the **drivers and consequences of macro-systemic risks**
- Modeling the **behavior of public finances** is a crucial element to understanding such dynamics
 - **Systematic conduct of fiscal policy** can affect macroeconomic performance and the likelihood of macro-systemic disturbances
 - **Fiscal policy affects the propagation** of financial and real shocks, amplifying or helping to absorb their impact
 - **Sovereign-bank feedback loops** provide a clear example of the propagation mechanism

Thank you!