Dealing with the Trilemma: Optimal Capital Controls with Fixed Exchange Rates

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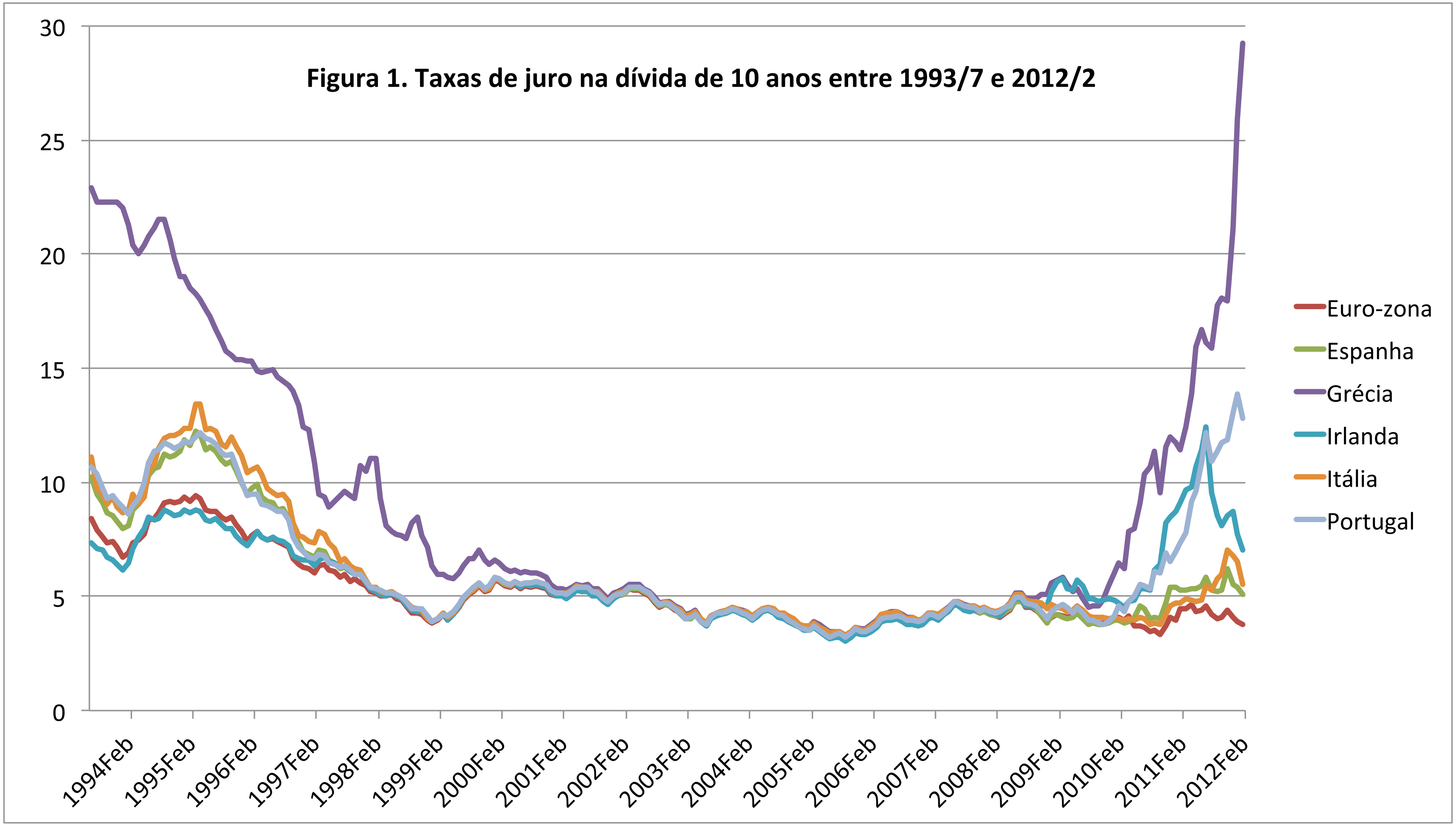
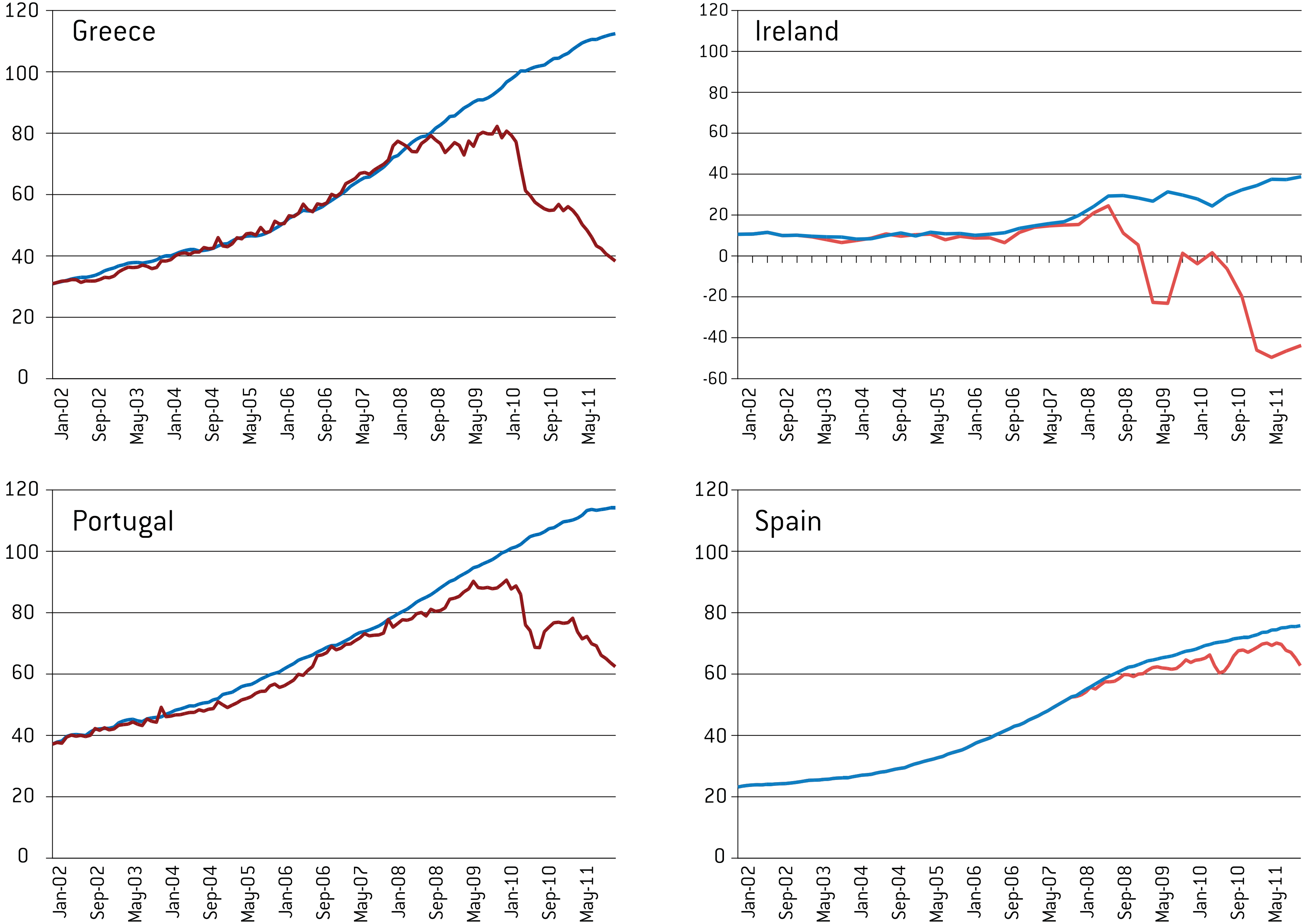
Portugal's challenge – risk premium



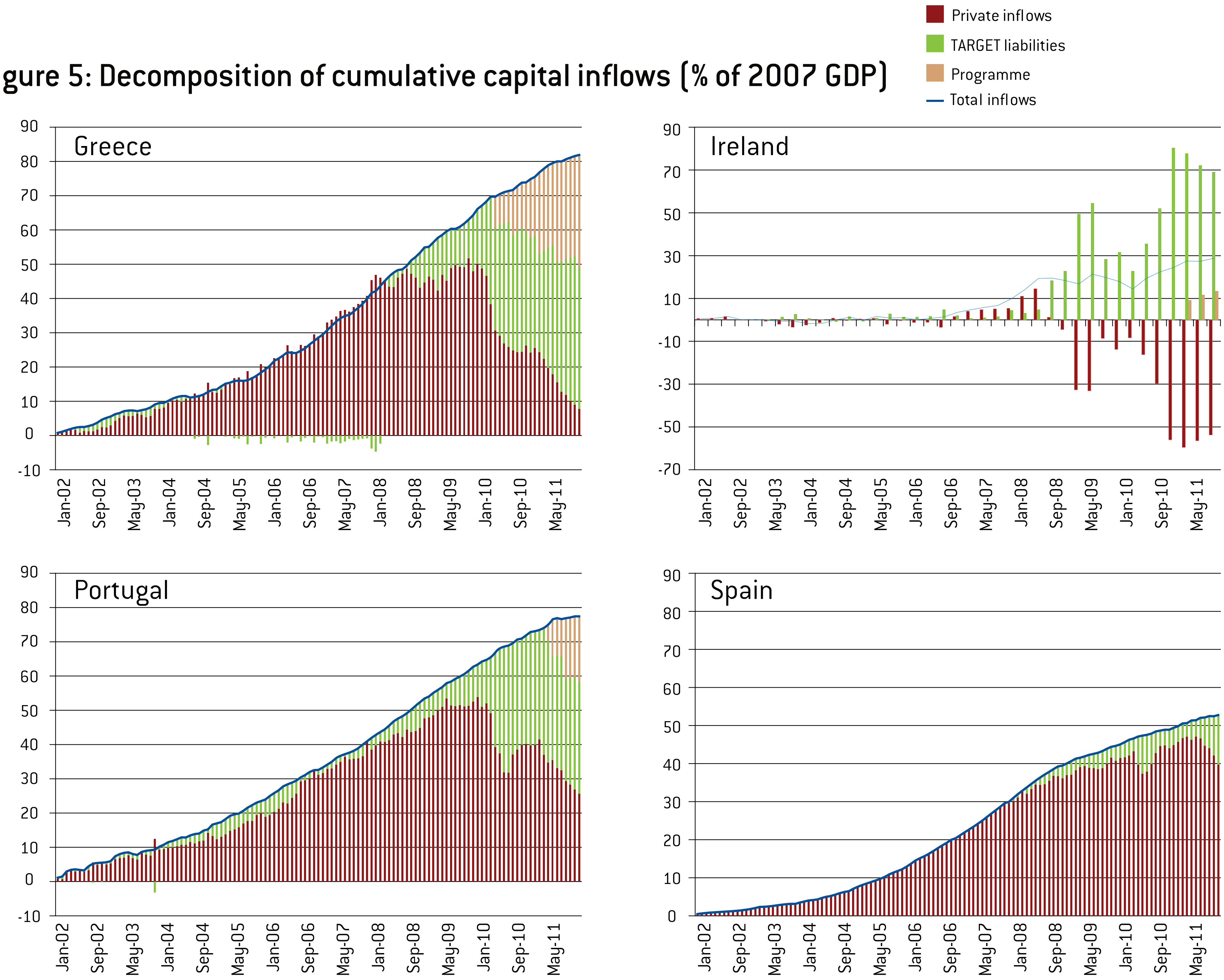
Portugal's challenge – sudden stop

Figure 2: Total and private capital inflows, selected southern euro-area countries, 2002-11 (% 2007 GDP)

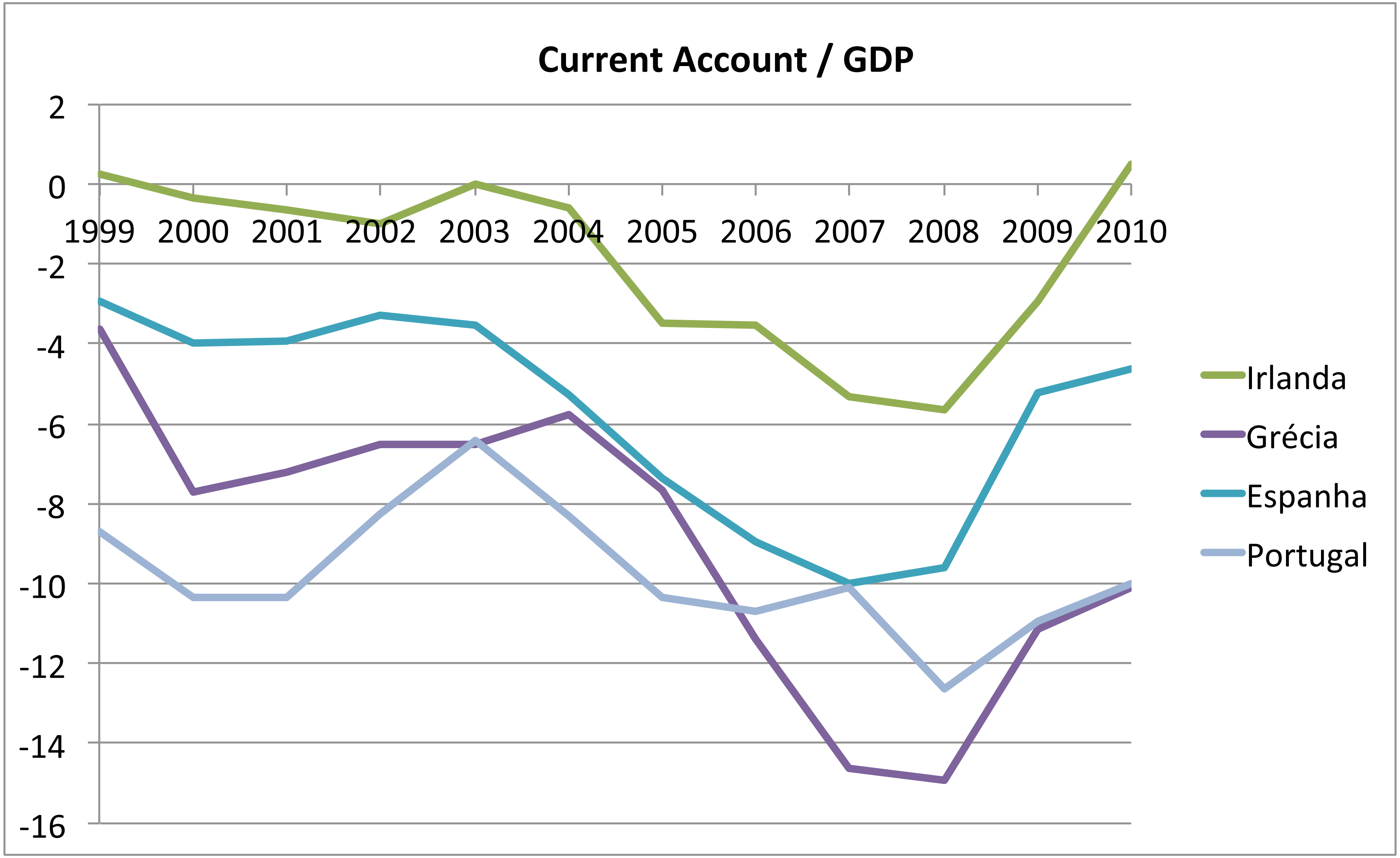


Portugal's challenge – public assistance

Figure 5: Decomposition of cumulative capital inflows (% of 2007 GDP)



Portugal's challenge – adjustment



Risk premium and Mundell's trilemma

- Arbitrage condition for domestic investor:

$$1 + i_t = (1 + \tau_t)\frac{E_{t+1}}{E_t}(1 + i_t^*)(1 + \Psi_t)$$

- With flexible exchange rate, a risk-premium shock or sudden stop comes with a devaluation of the currency. With fixed exchange rate, domestic interest rates must rise one-to-one. With fixed exchange rates surrender control over monetary policy.

- This paper: cyclical Tobin tax on capital flows.

- First questions:
  - Hasn't this been done?
  - Is it feasible?

A simpler framework

1. Two periods, $0, 1$.
2. Log utility in consumption $\sigma = 1$.
3. Small open economy, foreign variables are exogenous.
4. Instead of Calvo, can do "neoclassical" or "simple sticky-information" by saying that at date 0, only λ share of agents know about the shock, by period 1, all know it.
5. Cole-Obstfeld: Shares of expenditure constant, Cobb-Douglas aggregators, trade is balanced.

The model's equations

Six equations for $t = 0, 1$:

$$
\begin{aligned}
Q_t &= \left[\alpha + (1-\alpha) S_t^{\eta-1}\right]^{\frac{1}{\eta-1}} \\
&\Rightarrow \quad Q_t = S_t^{1-\alpha} \\
Y_t &= (1-\alpha)\left(\frac{Q_t}{S_t}\right)^{-\eta} C_t + \alpha \Lambda_t S_t^{\gamma} C_t^* \\
N_t &= Y_t / A_t \\
&\Rightarrow \quad N_t = \frac{S_t C_t^*}{A_t}\left[(1-\alpha)\frac{C_t}{C_t^* Q_t} + \alpha \Lambda_t\right]
\end{aligned}
$$

1. Price index / consumption aggregator linking real exchange rate to ToT
2. Goods market clearing
3. Production function

The model's equations

- The Backus-Smith condition:

$$\frac{C_1}{C_1^* Q_1} = \frac{C_0}{C_0^* Q_0} (1+\tau)(1+\Psi)$$

- The budget constraint, taking NFA_0 as exogenous:

$$NFA_0 = -\left(\frac{Y_0}{S_0} - \frac{C_0}{Q_0}\right)\frac{1}{C_0^*} - \beta\left(\frac{Y_1}{S_1} - \frac{C_1}{Q_1}\right)\frac{1}{C_1^*}$$

$$\Rightarrow NFA_0 = \alpha\left(\frac{C_0}{C_0^* Q_0} - \Lambda_0\right) + \alpha\beta\left(\frac{C_1}{C_1^* Q_1} - \Lambda_1\right)$$

- Flexible prices:

$$\frac{P_{H,t}}{P_t} = \frac{Q_t}{S_t} = M\frac{C_t N_t^{\phi}}{A_t}$$

- Rigid prices:

$$S_t = E_t P_t^* / P_{H,t} = 1 \Rightarrow Q_t = 1$$

Policymaker's problem

$$\max_{\tau} \quad \left\{ \ln(C_0) - \frac{N_0^{1+\phi}}{1+\phi} + \beta \left(\ln(C_1) - \frac{N_1^{1+\phi}}{1+\phi} \right) \right\}$$

$$\begin{aligned}
\frac{C_1}{C_1^* Q_1} &= \frac{C_0}{C_0^* Q_0} (1+\tau)(1+\Psi) \\
NFA_0 &= \alpha \left(\frac{C_0}{C_0^* Q_0} - \Lambda_0 \right) + \alpha\beta \left(\frac{C_1}{C_1^* Q_1} - \Lambda_1 \right) \\
N_t &= \frac{Q_t^{1/(1-\alpha)} C_t^*}{A_t} \left[(1-\alpha) \frac{C_t}{C_t^* Q_t} + \alpha \Lambda_t \right] \\
Q_t^{-\alpha/(1-\alpha)} &= M \frac{C_t N_t^{\phi}}{A_t} \qquad \text{or} \qquad Q_t = 1.
\end{aligned}$$

Zero optimal capital controls

If shocks to $A_1/A_0, C_1^*/C_0^*, NFA_0, \Lambda_1/\Lambda_0$.

$$\max_\tau \quad \left\{ \ln(C_0) - \frac{N_0^{1+\phi}}{1+\phi} + \beta \left(\ln(C_1) - \frac{N_1^{1+\phi}}{1+\phi} \right) \right\}$$

$$\frac{C_1}{C_1^* Q_1} = \frac{C_0}{C_0^* Q_0} (1+\tau)(1+\Psi)$$

$$NFA_0 = \alpha \left(\frac{C_0}{C_0^* Q_0} - \Lambda_0 \right) + \alpha\beta \left(\frac{C_1}{C_1^* Q_1} - \Lambda_1 \right)$$

$$N_t = \frac{Q_t^{1/(1-\alpha)} C_t^*}{A_t} \left[(1-\alpha) \frac{C_t}{C_t^* Q_t} + \alpha \Lambda_t \right]$$

$$Q_t^{-\alpha/(1-\alpha)} = M \frac{C_t N_t^\phi}{A_t} \qquad \text{or} \qquad Q_t = 1.$$

First lesson

Capital controls are an intertemporal tool. If the shocks or distortions affect both periods equally, capital controls will not help and should not be used.

No longer true with sticky prices, because shocks cause relative-price distortions.

Capital controls and price rigidity

$$
\begin{aligned}
& \max_{\tau} && \left\{ \ln(C_0) - \frac{N_0^{1+\phi}}{1+\phi} + \beta \left(\ln(C_1) - \frac{N_1^{1+\phi}}{1+\phi} \right) \right\} \\
\frac{C_1}{C_1^* Q_1} &= && \frac{C_0}{C_0^* Q_0} (1+\tau)(1+\Psi) \\
NFA_0 &= && \alpha \left(\frac{C_0}{C_0^* Q_0} - \Lambda_0 \right) + \alpha\beta \left(\frac{C_1}{C_1^* Q_1} - \Lambda_1 \right) \\
N_t &= && \frac{Q_t^{1/(1-\alpha)} C_t^*}{A_t} \left[(1-\alpha) \frac{C_t}{C_t^* Q_t} + \alpha \Lambda_t \right] \\
Q_t^{-\alpha/(1-\alpha)} &= && M \frac{C_t N_t^{\phi}}{A_t} \qquad \text{or} \qquad Q_t = 1.
\end{aligned}
$$

If shocks to A_t, C_t^*, then:

- zero if flexible prices (Costinot et al, 2011)
- not zero with rigid prices.

Intuition: Adjusting after-tax real interest rate.

Second lesson

Capital controls are an intertemporal tool that affects the real interest rates and help can if prices are rigid and shocks are temporary.

Even in limit of closed economy, capital controls still affect real interest rate.

Capital controls and expenditure-switching

$$\max_{\tau} \quad \left\{ \ln(C_0) - \frac{N_0^{1+\phi}}{1+\phi} + \beta \left(\ln(C_1) - \frac{N_1^{1+\phi}}{1+\phi} \right) \right\}$$

$$\frac{C_1}{C_1^* Q_1} = \frac{C_0}{C_0^* Q_0} (1+\tau)(1+\Psi)$$

$$NFA_0 = \alpha \left(\frac{C_0}{C_0^* Q_0} - \Lambda_0 \right) + \alpha\beta \left(\frac{C_1}{C_1^* Q_1} - \Lambda_1 \right)$$

$$N_t = \frac{Q_t^{1/(1-\alpha)} C_t^*}{A_t} \left[(1-\alpha) \frac{C_t}{C_t^* Q_t} + \alpha \Lambda_t \right]$$

$$Q_t^{-\alpha/(1-\alpha)} = M \frac{C_t N_t^{\phi}}{A_t} \qquad \text{or} \qquad Q_t = 1.$$

If shock to Λ_t, non-zero capital controls, but second best.

Third lesson

Capital controls also shift demand against domestic goods. Their use must balance intertemporal effect against expenditure switching. In a free trade area they can typically only reach a second best.

But if allow for tariffs, can separate these two margins.

Risk premium shocks

With flexible prices shocks can be offset by capital controls leaning against the wind:

$$\frac{C_1}{C_1^* Q_1} = \frac{C_0}{C_0^* Q_0} (1 + \tau) (1 + \Psi)$$

If capital controls are not used, and prices are flexible, a sudden stop leads to:

- Output falling.
- Current account surplus in short run.

Negative risk premium shock

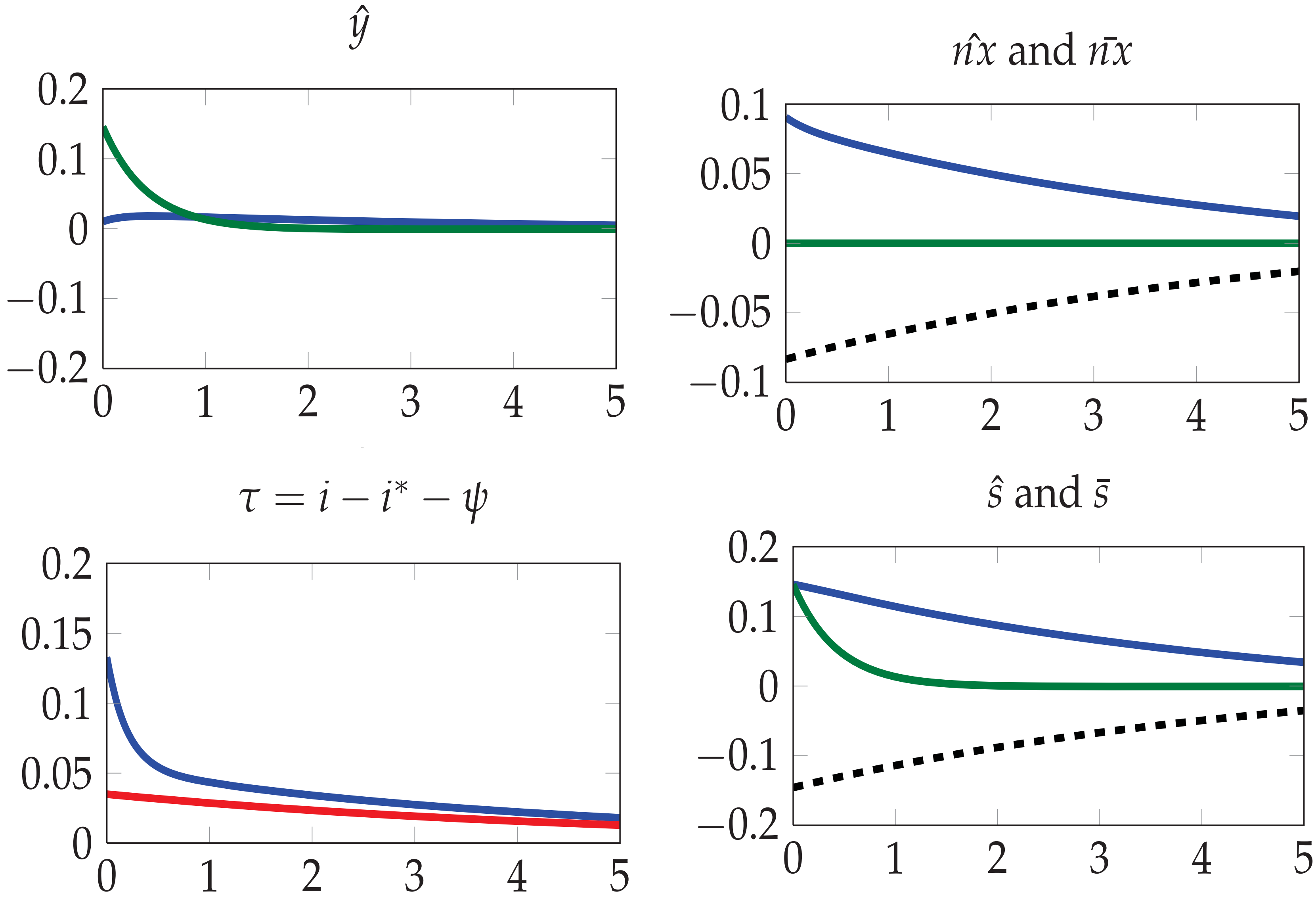


Figure 7: Mean-reverting risk premium shock, $\alpha = 0.4$.

green - no controls, blue - optimal controls

Missing from sudden-stops

- Maturity mismatch and liquidity
- Asset fire sales
- Foreign-denominated debt
- Imported inputs bought on credit
- Financial accelerator
- Monetary policy could, in principle sterilize shifts in flows, prevent risk premia from changing

Skepticism about capital controls

1. Empirical evidence that controls on capital inflows have almost no effect on total inflows (Ostry et al, 2011).

2. Edwards (1999): controls on outflows rarely work, breed corruption.

3. Magut, Reinhart, Rogoff (2011): exhaustive study of capital controls again with discouraging results.

4. Role of trade credit and FDI.

5. The maturity of flows.

6. I prefer another interpretation of τ, the cyclical Tobin tax: domestic financial repression.