Finance at Center Stage: Lessons from Euro Crisis

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Simple model of Maurice's New Fiscal-Financial Trilemma

- I want to model the trilemma
- The simplest model I can think of
  - 3 periods
  - Small open economy
  - Representative household
    - has initial assets
    - receives an endowment
    - chooses consumption and savings to maximize lifetime utility subject to a budget constraint
  - Government issues bonds and taxes the household
  - Representative bank takes deposits and invests them into assets.
    - A fraction of assets γ is invested abroad
    - use γ as a measure international financial integration

Simple model of Maurice's New Fiscal-Financial Trilemma

- At the beginning of period 2, unexpectedly, Foreign assets lose value
- Domestic bank looses all its foreign assets and becomes insolvent
- Government steps in to rescue the bank by fully replenishing its lost assets
  - Government does not cooperate with other governments
- What are the trade-offs faced by the government?
  - Limit to its domestic capacity to tax
  - International financial integration matters
  - Size of domestic banking sector matters
  - Business cycle matters

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- Main result: increasing international financial integration lowers the maximum fiscally sustainable rescue
- Trade-off between the financial development of the country, its international financial integration, and its fiscal ability to independently backstop its banking sector.

Model: Households

- Households maximize

$$\sum_{t=1}^{3} \left(\frac{1}{1+\rho} \right)^{t-1} \log C_t$$

subject to BC (assume given X_0)

$$C_t + X_t = (1+r)X_{t-1} + Y_t - T_t$$

- Implies usual intertemporal budget constraint:

$$PV(C) = Y_1 - T_1 + \frac{1}{1+r}(Y_2 - T_2) + \frac{1}{(1+r)^2}(Y_3 - T_3)$$

- With $\rho = r$, Euler equation implies perfect consumption smoothing:

$$C_t = \overline{C} = \frac{(1+r)^2}{3+3r+r^2} PV(Y - T)$$

Model

- Government spending financed by bonds B and taxes T, subject to a budget constraint:

$$(1+r)B_{t-1} + G_t = T_t + B_t$$

- Bank takes deposits D and invests them into assets A (don't model risk):

$$K_t + A_t = D_t$$

- To support 2 assets without risk, assume HH save through a "Mutual fund" which invests half into bonds and half into bank deposits:

$$D_t = B_t = 1/2X_t$$

Model: "GFC" scenario

- A fraction γ of bank assets is invested abroad
  - γ is a measure of international financial integration
- Assume the model is in an equilibrium in period 1
- At the beginning of period 2, an unexpected crisis: bank foreign assets lose value
- Bank becomes insolvent
- Government steps in, and "rescues" the bank by exactly replacing the "missing assets":

$$G_2 = \gamma A_1$$

- Government funds this by additional taxation in period 2
- I want to consider an equilibrium with an interior solution in which bank survives

Model: "GFC" scenario

- Obviously, C_2 drops, but by less than T_2
  - Households dis-save initial assets to smooth consumption
- Government must raise more tax than γA_1 due to this lower tax base.

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- After solving for A_1, assuming the shock was unexpected, if $r = 0$

$$C_2 = \frac{2}{3}\left(1 + \frac{\gamma}{6}\right) Y_2 - \frac{\gamma}{3} X_0 - \frac{2\gamma}{9}(Y_1 - T_1) - \frac{\gamma}{9} T_2^E + \left(\frac{1}{3} + \frac{\gamma}{9}\right)(Y_3 - T_3^E)$$

- If we started in a steady state equilibrium in which $T_i = 0\ \forall i$ and in which also the expected output was constant $Y_i = Y\ \forall i$, then

$$C_2 = Y_2 - \frac{\gamma}{3} X_0$$

$$T_2 = \frac{2}{3}\gamma X_0$$

recall that initial size of banking sector is $\frac{1}{2}X_0$, and "lost" foreign assets $\gamma\frac{1}{2}X_0$

Model: "GFC" scenario

- The last two equations impose limits on the maximal size of γ which can support an interior solution s.t. $C_2 \geq 0$. Let's call it γ^{MAX}
- γ lowers the probability that the crisis can be rescued with domestic fiscal means
- Rescue costs more than the lost assets because household behave optimally

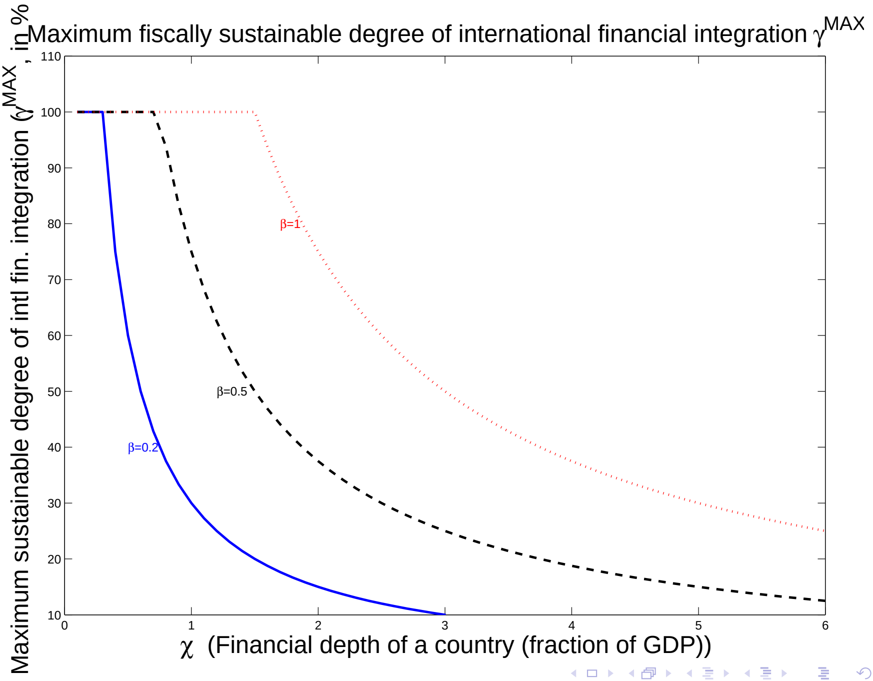
Model: Maurice's Trilemma

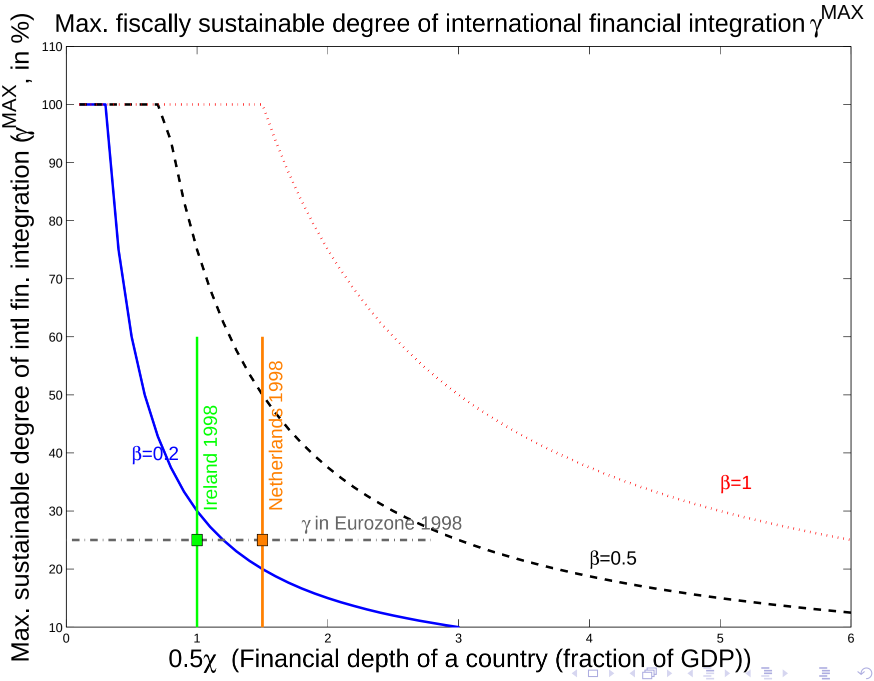
- Denote χ the size of financial sector relative to GDP ($\chi \equiv X_0/Y$)
- Denote β the maximal tax as fraction of GDP ($\beta \equiv T^{MAX}/Y \leq 1$)
- Then we can show that there is an upper limit on the size of international financial integration so that the banks can be salvaged with domestic means, assuming open capital markets

$$\gamma \leq \gamma^{MAX} \equiv \frac{3\beta}{2\chi}$$

- Also allow for a possibility of a recession in $t = 2$, s.t., $Y_2 = \alpha Y$, ($\alpha \in [0, 1]$)
- Then, more generally

$$\gamma \leq \gamma^{MAX} \equiv \frac{3\beta - (1-\alpha)}{2\chi + \frac{2}{3}(1-\alpha)} \tag{1}$$


Maximum fiscally sustainable degree of international financial integration γMAX
Maximum sustainable degree of intl fin. integration (γMAX, in %
110
100
90
80
70
60
50
40
30
20
10
0
1
2
3
4
5
6
β=1
β=0.5
β=0.2
χ (Financial depth of a country (fraction of GDP))



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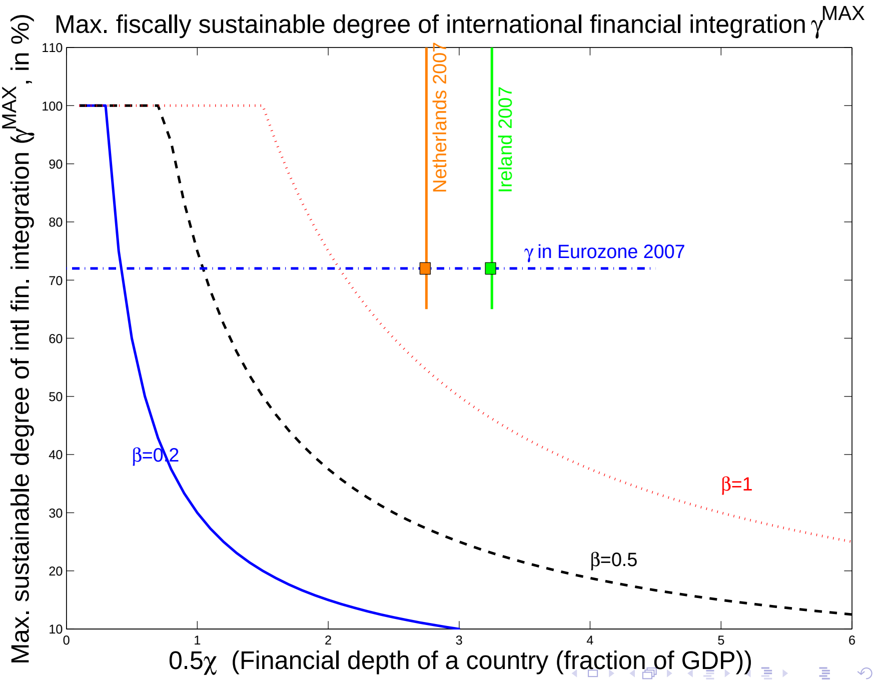
Ireland 1998
Netherlands 1998
γ in Eurozone 1998
β=0.5
β=1
0.5χ (Financial depth of a country (fraction of GDP))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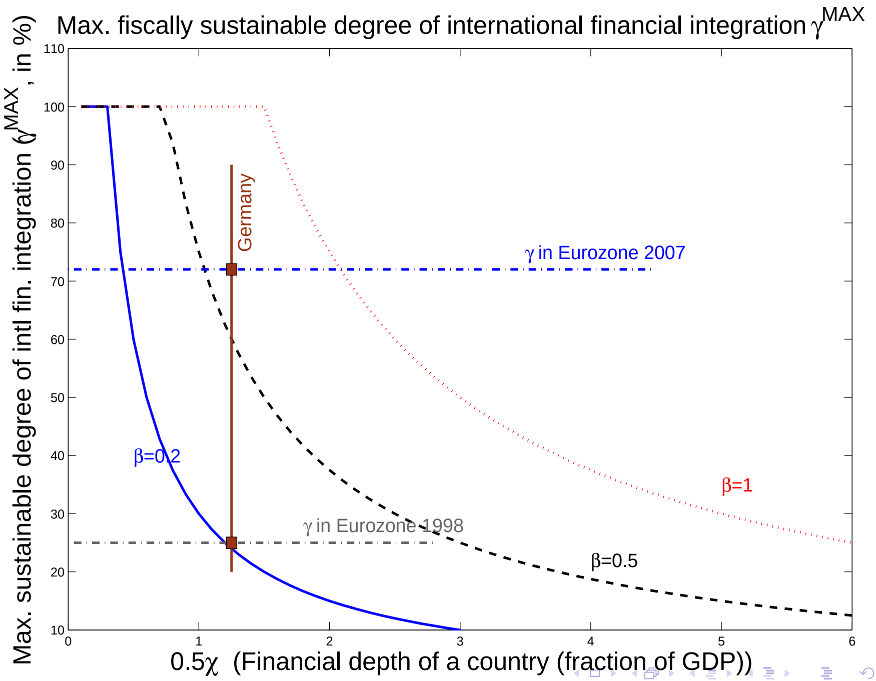
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γ in Eurozone 2007
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γ in Eurozone 1998
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0.5χ (Financial depth of a country (fraction of GDP))

Caveats

- I am assuming fiscal independence: no cooperation between the governments
- I am assuming constant interest rate
- As Maurice documents in great detail, financial integration grew for a reason: perceived diversification benefits as well as financial market deepening, which I have ignored.
- But the point is that there is a trade-off between these benefits and fiscal ability to independently backstop its banking sector.

Thank you!