Monetary-Fiscal Coordination in a Liquidity Trap

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Monetary policy in open economies

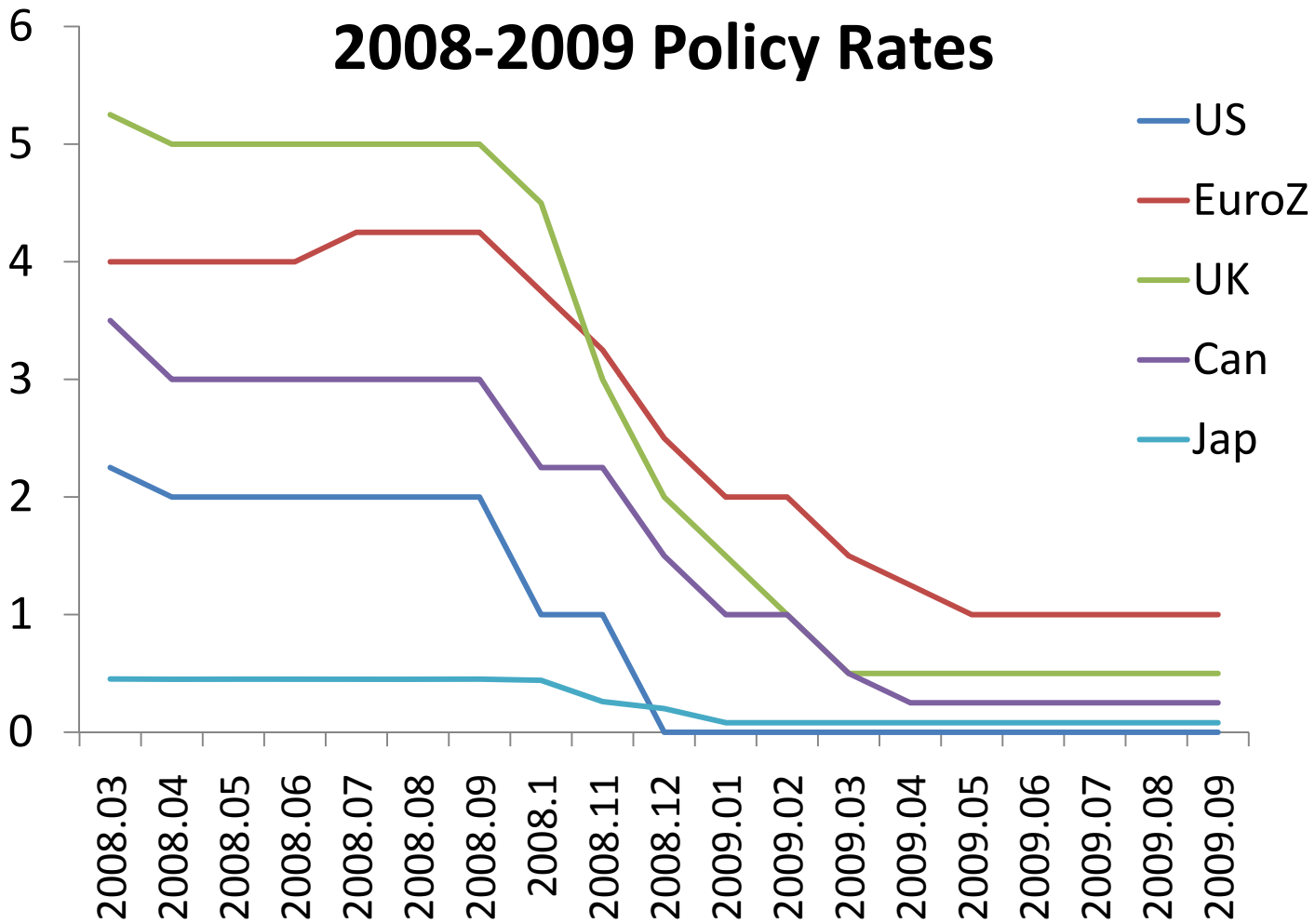
- Up until 2007-8, great satisfaction with inflation targeting
  - Low and stable rates of inflation
  - Much lower exchange rate price pass-through
  - Real exchange rates still quite volatile, but argument was that acted as efficient adjustment
- Key features of inflation targeting
  - Macro policy was monetary policy
    - No need for countercyclical fiscal policy
  - No need to coordinate on monetary policy

Post-2008

- Unprecedented global downturn
- Fall in demand outpaced ability of monetary policy to deal with it
  - Facing limits of monetary policy
- How does episode inform regarding optimal monetary policy/fiscal policy?
- What does it tell us about need for global coordination?

The Economics of Liquidity Traps

- Interest generally has been restricted to one country, or small open economies
- But last two years see episode of global liquidity traps
- Fall 2008 – most major policy rates fell to near zero
  - Unconventional monetary policy – limited use
- With continuing recession – need for fiscal expansion


2008-2009 Policy Rates
6
5
4
3
2
1
0
2008.03
2008.04
2008.05
2008.06
2008.07
2008.08
2008.09
2008.1
2008.11
2008.12
2009.01
2009.02
2009.03
2009.04
2009.05
2009.06
2009.07
2009.08
2009.09
US
EuroZ
UK
Can
Jap

Key question

- How does global dimension impact on the effects of fiscal policy?
- Standard reasoning – fiscal leakages
- Therefore, fiscal stimulus needs to be coordinated
- Seen as doubly important in liquidity trap

This paper

- Explores the determination of liquidity trap in international (2 country) model
  - How do LT's propagate?
- Explores fiscal response
  - How much leakage is there in LT?
- Explores nature of optimal policy response when both countries are in liquidity trap
  - Coordination is more effective?

Recent literature

- Krugman (1999)
- Svensson (2001)
- Eggertson and Woodford (2003,2005)
- Eggertson (2009)
- Jung et al. (2005)
- Fujiwara et al. (2009)
- Jeanne (2010)
- Bodenstein et al. (2010)

Basic Model

- Follows
  - Clarida Gali Gertler 2002
  - Engel, 2010
  - Beetsma and Jensen 2005
  - Apart from LT constraint, model is entirely standard
- Emphasize importance of home bias
  - Faia and Monacelli 2008

Results

- LT contagion is determined by financial markets and preferences
  - Linkages natural real interest rates
  - Absence/presence of `home bias' in preference
- Fiscal leakage theory is absent in LT
  - Fiscal policy response is beggar thy neighbor
- Coordinated response is very close to that of closed economy response
  - No free lunch
  - LT in one country mostly dealt with by domestic policy

Setup for results

- 2 country – endogenous fiscal policy, home bias in preferences

- If economy is always at efficient natural rate of output:
  - there is an optimal provision of public services
  - fiscal policy should play no role in stabilization

Household sector

- Labor supply determines marginal cost for firms
- Consumption of home and foreign goods
  - But consumption baskets not identical (home good preference)
- Financial markets facilitate international risk-sharing,
  - fluctuations in domestic `natural real interest rate' spill over to foreign markets
  - With home preference natural real interest rates not identical

Firm sector: totally conventional

- No investment/capital accumulation
  - Standard Woodford, Clarida et al. model
- Firms adjust prices stochastically
- In the aggregate, PPI price level follows a partial adjustment process
- Theoretical justification for inflation targeting

Monetary policy

- No markup shocks here, PCP, and optimal subsidies removes monopoly distortion
- Monetary policy should target natural real interest rate
  - if it can

$$R_t = \max\left(\widetilde{R}_t^r, 1\right)$$

- If this constraint doesn't bind, then optimal targeting policy keeps domestic PPI inflation zero.

Fiscal Policy

- There is an optimal size of government here, in an efficient, flexible price environment
  - Equalize marginal disutility of supply against benefit of public goods
  - Classic Samuelson rule for public good provision
  - Without LT, no motive for countercyclical fiscal policy
- Question to ask is : How much should we deviate from this in face of LT?

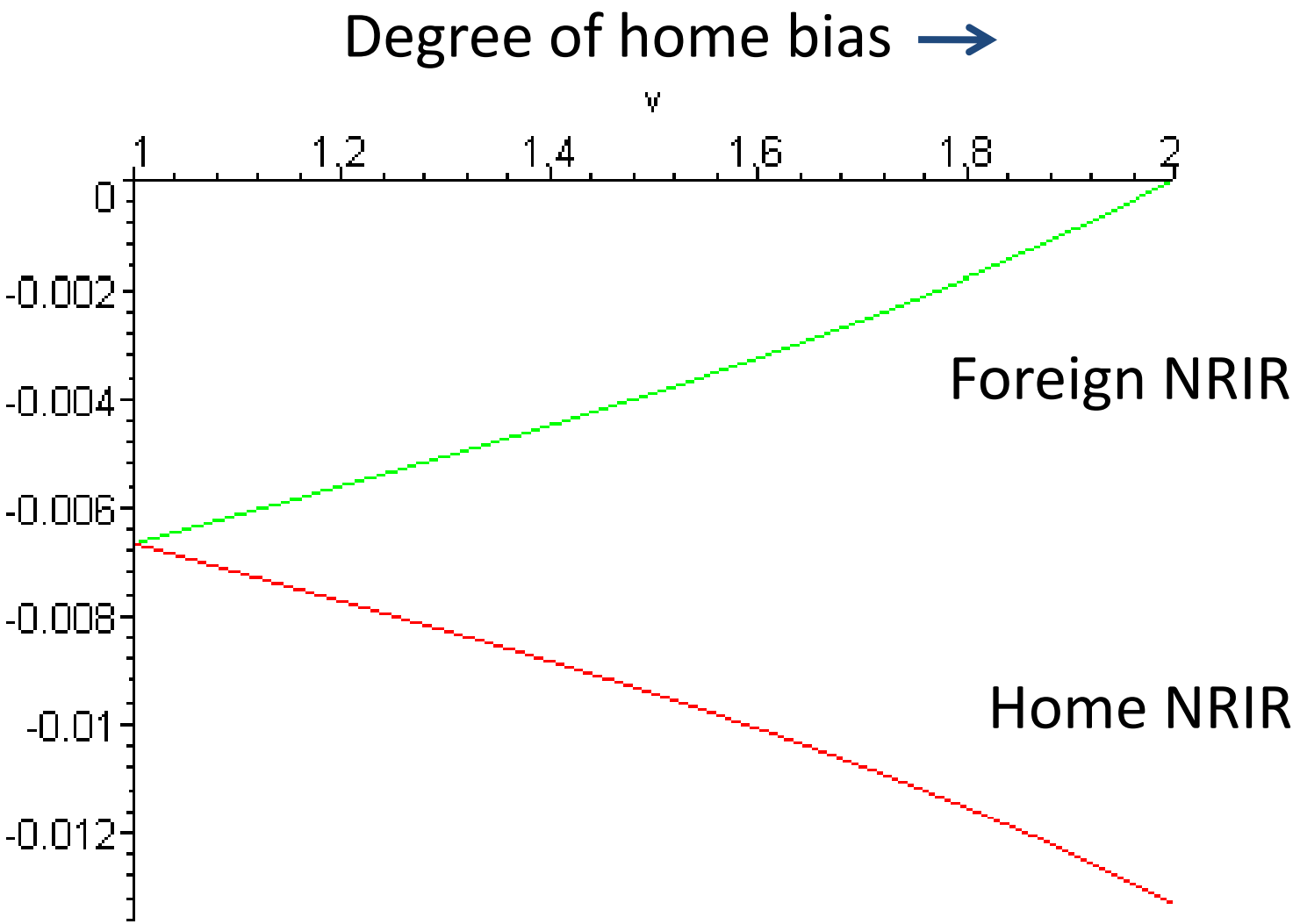
Efficient Equilibrium

- Household receives preference shocks which cause fluctuations in the natural real interest rate
  - This is a 2nd best approach to modeling financial market distortions, de-leveraging, and credit crunch that actually forced household savings to rise
- In frictionless world, monetary policy responds
- But if natural interest rate falls below zero
  - we hit limits of monetary policy

How is the shock propagated?

- If there are complete markets:
  - Return on any asset is equated, in common unit of account
- If also, consumption baskets are identical, then natural real interest rates are equated
  - Then must have global LT
- More realistic case – CPI's differ, so natural RIR's not equated
  - Therefore home economy hits LT first

Movement of natural RIR as `v' rises



Normative implications

- Financial markets offer risk sharing benefits
- In absence of LT, always gains from trade in financial markets
- But exposure to volatile external demand shocks may generate LT episodes
  - Indirectly, this represents an offsetting welfare cost of financial market integration

Dynamic model

- Supply (Inflation) equations

$$\pi_{Ht} = k(\gamma_1 n_t + \gamma_2 n_t^* + \gamma_3 g_t + \gamma_4 g_t^*) + E_t \beta \pi_{Ht+1}$$

Inflation depends on output gaps and fiscal policy gaps (current and expected future)

Dynamic model

- Demand Equations

$$E_t(\Delta y_{Ht+1} - \alpha_1 \Delta g_{t+1})$$

$$= \frac{1}{\sigma} E_t(r_t - \pi_{Ht+1} + (1 - v/2)\Delta\tau_{Ht+1} - \tilde{r}_{Ht+1})$$

Note: the only shock is to the natural real interest rate

Shocks under arbitrary policies

- Contrast the shocks when the policy rate is positive to those in LT
- Under a positive interest rate, assume a Taylor rule

$$r_t = \overline{r} + \gamma \pi_{Ht} \qquad \gamma > 1$$

- Let the shocks be AR(1) with persistence μ

First, case with identical C baskets

$$v = 1$$

- Then shock is identical in the two countries

$$\hat{n}_{t(\text{Taylor})} = \frac{(1-\beta\mu)\tilde{r}_t}{\Delta_1}$$

- A savings shock causes a fall in desired real interest rate, and a fall in GDP in both countries

Fiscal Policy Responses

- Response to a domestic fiscal expansion
  - Conventional results
  - Fiscal expansion raises domestic demand, output
  - But causes a TOT appreciation

$$\widehat{\tau}^{g}_{t(\text{Taylor})} = -\frac{\phi k(1-c_y)(\gamma-\mu)\widehat{g}_t}{\Delta_2}$$

Consumption also falls

$$\hat{C}^{g}_{t(\text{Taylor})} = -\frac{\phi k(1-c_y)(\gamma-\mu)\hat{g}}{2\Delta_1}$$

- So therefore, multiplier must be less than unity

$$\hat{n}_t = c_y(\hat{c}_t + \tfrac{1}{2}\hat{\tau}_t) + (1-c_y)\hat{g}_t$$

International Spillovers

- Two effects
  - reduction in private consumption (-)
  - fall in foreign terms of trade (+)
- Second effect dominates, for $\sigma>1$
- So international spillovers are positive

Comparison with closed economy

- Fiscal leakages
  - With Taylor rule

$$\hat{n}^{g}_{t(\text{Taylor})} = \hat{n}^{g(\text{Closed})}_{t(\text{Taylor})} - \frac{\kappa\phi c_y(\sigma-1)(\gamma-\mu)\Delta_0}{2\Delta_1\Delta_2}\hat{g}_t$$

  - So `leakages' are positive, and fiscal expansion less effective
  - Suggests need for coordination

Now assume that $\tilde{r}_t$ falls below zero

- Taylor rule cannot apply – set nominal interest rate to zero
- LT persists with probability μ
- Since we are dealing with identical countries case, LT occurs simultaneously

Magnification effect under LT

- Fall in demand – fall in π
- Real interest rate $r - \pi = 0 - \pi$
- So demand falls further
- Under a stability condition, this process converges
  - if LT shock goes on for too long, get indeterminacy

Fiscal policy in LT

- Fiscal expansion causes a depreciation in terms of trade
  - Reverse of effect under Taylor rule

- Fiscal expansion causes a rise in consumption
  - Reverse of effect under Taylor rule

Why does TOT move in opposite direction?

- Fiscal expansion raises domestic inflation rate

$$E_t(\pi_{Ht+1} - \pi_{Ft+1})^{g}_{t(\text{ZLB})} =$$

$$\frac{(1-c_y)(1-\mu)\mu\phi}{\Delta_4}(\hat{g}_t - \hat{g}_t^*)$$

To satisfy interest rate parity, need anticipated TOT appreciation

$$0 - E_t \pi_{Ht+1} =$$

Domestic inflation rises a lot, reducing Home PPI RIR

$$\downarrow$$

$$0 - E_t \pi_{Ft+1} + (1 - \tfrac{\nu}{2}) E_t(\hat{\tau}_{t+1} - \hat{\tau}_t)$$

$\uparrow$ $\qquad\qquad$ $\downarrow$

Foreign inflation falls, raising foreign PPI RIR

So need an anticipated TOT appreciation

Output effects

- Since TOT depreciates, and C rises, from goods market equilibrium
  - multiplier must be greater than unity

$$\hat{n}_t = c_y(\hat{c}_t + \tfrac{1}{2}\hat{\tau}_t) + (1 - c_y)\hat{g}_t$$

  - May be much larger than under Taylor rule

International Spillovers?

- Foreign TOT appreciates, but C rises
  - For σ>1, the first effect offsets the second
  - Foreign output falls

$$\hat{n}_t^* = c_y(\hat{c}_t - \frac{1}{2}\hat{\tau}_t) + (1 - c_y)\hat{g}_t^*$$

  - Fiscal expansion in home country is `beggar thy neighbor'

Comparison with closed economy

- Under LT, leakages are negative
  - The increase in TOT leads multiplier to be greater in the open economy

$$\hat{n}^{g}_{t(\text{ZLB})} - \hat{n}^{g}_{t(\text{ZLB-closed})} = \frac{(1-c_y)k\phi c_y \mu(\sigma-1)\Delta_5 \hat{g}_t}{\Delta_3 \Delta_4} > 0$$

  - But obviously, this can only happen by drawing demand away from foreign country
  - Coordination in the other direction?

General case (with home bias)

- Domestic negative demand shock leads to a greater fall in domestic desired real interest rate
- Home country `enters' liquidity trap first
- Foreign country may or may not be in LT
- Quantitative evaluation of multipliers

Effects of fiscal policies

Table 2	Taylor Rule	Global LT	Home LT	
	g	g	g	g*
Terms of Trade	-.05	.89	.05	.07
Home output	0.85	2.19	2.42	.09
Foreign output	0.03	-1.17	-.34	.84

Optimal Monetary and Fiscal Policy

- How should optimal policy respond in face of a LT shock?
- Assume optimal cooperative policy
  - (maximize sum of discounted utilities)
- Look at optimal discretionary policy
  - With v=1, then both countries can then only use fiscal policy – monetary policy is useless

Welfare function can be approximated

- Will depend on output gaps, fiscal spending gaps, and inflation rates in each country

$$W = W(n, n^*, g, g^*, \pi_H, \pi_F)$$

- Can design an optimal targeting rule for monetary and fiscal policy

The optimal fiscal response

- Government spending gaps countercyclical

$$g = -\Phi n$$

$$g = -\Gamma \pi_H$$

Conclusion

- Optimal stabilization role for fiscal policy
- But how much should it be used?
- How much coordination needed?

- Look at case where shock falls mostly in home economy (with home bias in preferences)
  - Small shock (home LT only)
  - Bigger shock (global LT)

Table 3		
No Fiscal Response	Home LT	Global LT
Home output	-5.9	-5.5
Foreign output	0.1	-0.87
Home fiscal	0	0
Foreign fiscal	0	0
Home inflation	-2.3	-2.1
Foreign inflation	-0.3	-0.71

Table 3		
Fiscal Response	Home LT	Global LT
Home output	-3.7	-3.1
Foreign output	0.2	-0.86
Home fiscal	5.1	4.6
Foreign fiscal	0.5	1.8
Home inflation	-1.6	-1.5
Foreign inflation	-0.28	-0.7

Characteristics

- Optimal Fiscal Response is aggressive, but domestically focused
- When home country is in LT only, foreign country optimal fiscal policy is almost zero
  - Response of Home is almost same even if foreign doesn't participate
- When home in LT only, foreign follows expansionary monetary policy, but limited effect
- With Global LT precipitated by Home, foreign participates, but much less

Interaction of Monetary and Fiscal Policy

- When global LT, commitment to future expansion can be effective
- Model shows that effective commitment in monetary policy significantly reduces need for fiscal expansion