# CREi Lecture 3

**Ivan Werning** 



## Plan for Today

- Short: Macroprudential policies
- Main: Mobility in Currency Unions

Draw on two papers for today:

Farhi-Werning "A Theory of Macroprudential Policies in the Presence of Nominal Rigidities"

Farhi-Werning "Labor Mobility within Currency Unions"









### Dilemma





### Dilemma



**Fiscal** Unions



### Dilemma



### Macropru

**Fiscal** Unions



### Dilemma



### Macropru



### Taming Minsky

**Fiscal** Unions



financial decisions

e.g. credit boom high leverage and risk taking



macro impact

e.g. low return shock lower future loans



decisions

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decisions

e.g. low return shock e.g. credit boom high leverage and risk taking lower future loans Is there a market failure? Not necessarily.

**Externality needed.** 



financial decisions

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### monetary policy?

macro impact



financial decisions

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### ? monetary policy? .on

macro impact

## Macroprudential: Main St. → Wall Street

### financial decisions

### tax on asset<sub>i</sub> held by j

### Macropru formula: linked to MPCs and wedges

General model: incomplete markets, financial constraints with prices etc. (pecuniary externalities)

macro impact

$$j = \sum_{\text{good}} \text{wedge}_{\text{good}} \times \text{MPC}_{\text{good}}^{j}$$

### **General Theory**

Agents  $i \in I$ 

- Goods  $\{X_{j,s}^i\}$  indexed by...
  - "state" s (financial transactions we may want to tax)
  - igcent commodity igcent (spot markets or transactions we cannot tax)

- States"...
  - states, periods
  - trade across states...financial markets
  - taxes or quantity controls available

(preferences)  $\sum_{s \in S} U^{i}(\{X_{j,s}^{i}\};s)$ 



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(preferences)  $\sum U^i(\{X^i_{j,s}\};s)$  $s \in S$  $\sum D_s^i Q_s \le \Pi^i$  $s \in S$  $\sum_{j \in J_s} P_{j,s} X_{j,s}^i \le -T_s^i + (1 + \tau_{D,s}^i) D_s^i$  $\{X_{i,s}^i\}\in B_s^i$ macroprudential borrowing financial tax constraints

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### (technology) $F(\{Y_{j,s}\}) \leq 0$



state s

## Wedges

- In each state pick a reference good  $j^*(s)$
- Define wedges  $\tau_{j,s}$ ...









# $\frac{P_{j^{*}(s),s}}{P_{j,s}} \frac{F_{j,s}}{F_{j^{*}(s),s}} = 1 - \tau_{j,s}$

 $\tau_{j,s} = 0$ 

## **Corrective Interventions**



- Macropru formula: linked to MPCs and wedges
- Intuition: Keynesian cross
- Extension...

  - same formula! (wedges as sufficient statistics)



 $\frac{\tau_{D,s}^{i}}{1 + \tau_{D,s}^{i}} = \sum_{j \in I_{s}} P_{j,s} X_{I,j,s}^{i} \tau_{j,s}$ 

Decuniary externalities: incomplete markets, financial constraints with prices





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  - Dilemma Reprise II... (see also Fanelli)
    - flexible exchange rate
    - ex-ante risk and incomplete markets
    - Dollar and Peso debt
    - tradeoff between insurance via exchange rate

# Mobility





### Setting the Stage



### TodaySome surprises!

## Setting the Stage

- Trilemma and OCA literature...
  - Trilemma... Mundell (63), Fleming (62)

factor mobility... Mundell (61)

- openness... McKinnon (63)
- fiscal integration....Kenen (69)
- financial integration...Mundell (73)



## **Setting the Stage**

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### Today **Some surprises!**

### **Understudied in Macro!**

### **Growing literature in** trade/geography/urban
US Labor mobility...

- 2-2.5% interstate mobility in 2005 (Bonin et al)
- downward trend
- Europe...
  - cross-border ~0.1-0.2%
  - upward trend
- Policies that affect mobility...
  - Schengen Area
  - Liberalizing Job "Posting" (Muñoz, 2021)
  - Erasmus program
  - placed based policies



**Questions:** Migration out of depressed regions

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Insight: workers take not only their labor, but also their demand

Result: equilibrium vs. efficient it depends!

- Model 1: Internal Demand Imbalances (equilibrium = efficient) robust to price/wage and rationing
- Extensions, work in progress (equilibrium > efficient)

Model 2: External Demand Imbalances (equilibrium < efficient) price rigidity or wage with intensive rationing</p>



#### **Model 1: Internal Imbalances**

- Non-traded and traded model like previous lecture
- Heterogeneity: free mobility, but preferences for locations
- Simplifying assumptions
  - One-period model
  - Fixed price (wage similar)
- Ex post asymmetric shocks
  - preferences
  - technology
  - endowments (wealth)



#### Agents

Agents types j
 total mass µ<sup>j</sup>
 mass µ<sup>i,j</sup> in region i



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#### Agents

Agents types *j*  $^{\bullet}$  total mass  $\mu^{j}$ mass  $\mu^{i,j}$  in region *i* 

 $U^{i,j} = \max_{\substack{C_T^{i,j}, C_{NT}^{i,j}, N^{i,j}}} U^{i,j}(C_T^{i,j}, C_{NT}^{i,j}, N^{i,j})$ 

 $\mu^j = \sum_{i \in I} \mu^{i,j}$ 

 $P_T C_T^{i,j} + P_{NT,i} C_{NT}^{i,j} \le W_i N^{i,j} + E_T^j + T_i + \sum \pi^{j,k} \Pi_k$  $k \in I$ 

 $U^{i,j}$ 

Rich location preference and mobility costs embedded in utility

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 $I = \{\text{Spain}, \text{Germany}\}$ 

 $U^{i,j}$ 

Rich location preference and mobility costs embedded in utility

#### Example

previous residence...

U<sup>i</sup>,j

 $I = \{\text{Spain}, \text{Germany}\}$ 

 $J = \{$ Spainiard, German $\}$ 

Rich location preference and mobility costs embedded in utility



**I** J<sup>i</sup>, j

 $I = \{\text{Spain}, \text{Germany}\}$ 

 $J = \{$ Spainiard, German $\}$ 

 $J = \{Mobile Spainiard, Mobile German, Inmobile Spainiard, Inmobile German\}$ 





Final non-traded good produced competitively

- Each variety
  - produced monopolistically
  - The technology  $Y_{NT,i,l} = A_i N_{i,l}$
  - fixed price
- Symmetry...  $P_{NT,i,l} = P_{NT,i}$   $Y_{NT,i,l} = Y_{NT,i} = A_i N_i$

# $Y_{NT,i} = \left( \int_{0}^{1} Y_{NT,i,l} 1^{-\frac{1}{\varepsilon}} dl \right)^{\frac{1}{1-\frac{1}{\varepsilon}}}$

$$\Pi_i = (1 - \tau_{\pi,i}) \left( P_{NT,i} - \frac{1 + \tau_{L,i}}{A_i} W_i \right) Y_{NT,i}$$

#### **Government Budget**

Regional budget balance...

 $\sum_{i=1}^{j} \mu^{i,j} T_{i} = \tau_{L,i} W_{i} N_{i} + \tau_{\pi,i} \left( P_{NT,i} - \frac{1 + \tau_{L,i}}{A_{i}} W_{i} \right) Y_{NT,i}$ 

No transfers across regions (no fiscal union)

#### **Equilibrium Without Free Mobility**

- Households optimize
- Firms meet demand
- Government budget holds
- Markets clear

#### **Equilibrium With Free Mobility**

- Households optimize
- Firms meet demand
- Government budget constraints hold
- Markets clear
- Agents locate optimally

$$\mu^{i,j} = 0$$
 if



 $U^{i,j} < \max_{i' \in I} U^{i',j}$ 

#### **Equilibrium With Free Mobility**

- Households optimize
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 $\tau_{\pi,i} = 1$ 





# $T_i = \frac{P_{NT,i}Y_{NT,i} - W_iN_i}{\mu_i}$

Profits fully taxed  $\tau_{\pi,i} = 1$ 





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- Preferences over consumption and labor
  - region specific, not agent specific

$$U^{i,j} = f^{i,j} \left( U^{i,j} \right)^{j}$$



# $T_i = \frac{P_{NT,i}Y_{NT,i} - W_iN_i}{\mu_i}$

 $\left( ilde{U}^{i,j},C^{i,j}_{NT},N^{i,j}
ight)$ 

Profits fully taxed  $\tau_{\pi,i} = 1$ 

- Preferences over consumption and labor
  - region specific, not agent specific
  - separable between consumption and leisure
  - homothetic over consumption



# $T_i = \frac{P_{NT,i}Y_{NT,i} - W_iN_i}{\mu_i}$

 $U^{i,j} = f^{i,j} \left( \hat{U}^{i}(\tilde{u}^{i}(C_T^{i,j}, C_{NT}^{i,j}), N^{i,j}) \right)$ 

 $C_T^{i,j} = E_T$ 





 $C_{NT}^{i,j} = \alpha^i(p_i)E_T$  $N^{i,j} = \alpha^i (p_i) \frac{E_T}{A_i}$ 

Per capita allocation...



 $C_{NT}^{i,j} = \alpha^i(p_i)E_T$  $N^{i,j} = \alpha^i (p_i) \frac{E_T}{A_i}$ 

Per capita allocation...

 $C_T^{i,j} = E_T$ 

#### Labor wedge

 $C_{NT}$ 

 $C_{NT}^{i,j} = \alpha^i(p_i)E_T$  $N^{i,j} = \alpha^i (p_i) \frac{E_T}{A_i}$ 

 $\tau_i = 1 + \frac{1}{A_i} \frac{U_N^{i,j}}{U_C^{i,j}} \quad \text{birst best} \quad \tau_i = 0$   $\tau_i = 0$ Bust  $\tau_i > 0$ 

**Proposition.** region *i* is independent of location decisions.

## Given $P_T$ per-capita allocation of agents of type j in

**Proposition.** region *i* is independent of location decisions.

Movers out of depressed region

- better off...
  - ... aggregate economic activity in currency union increases...
- Image: partial vindication of Mundell (1961)...
- undersigned und
- Intuition: move with your demand

Given  $P_T$  per-capita allocation of agents of type *j* in

**Proposition.** Given  $P_T$  per-capita allocation of agents of type j in region i is independent of location decisions.

Movers out of depressed region

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 maggreg
 Proposition (Optimal mobility). For any given monetary policy P<sub>T</sub>
 For any given monetary policy P<sub>T</sub>
 constrained efficient allocation → consistent with free mobility

### **Sticky Wages**

- Sticky wages instead of sticky prices
  - Fix  $W_i$ 
    - rationing: equal sharing of labor within region...
    - In the or monopolistic suppliers
- All results go through unchanged!

#### Model #2: External Imblances

- Each region produces different traded good
  - all goods tradable...
  - … but allow home bias

Each traded good produced from local labor rigid price





Problem of agent of type *j* living in region *i* 

 $C_{k}^{i,j}, N^{i,j}$ 

 $\sum P_k C_k^{i,j} + \leq W_i N^{i,j} + T_i + \sum \pi^{j,k} \Pi_k$  $k \in I$  $k \in I$ 

 $U^{i,j} = \max U^{i,j}(\{C_k^{i,j}\}, N^{i,j})$ 

#### **Rest of Model**

- Key differences
  - structure of demand
  - no endowment good
- Rest, same as before...
  - Firms
  - Government
  - Equilibrium
  - Additional assumptions: profit tax, preferences


Income in country i  $P_i Y_i$ 



#### Income in country i $P_i Y_i$

Country i spending on k  $\alpha_k^i P_i Y_i$ 



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Income in country i  $P_i Y_i$ 

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$$N^{i,j} = \frac{1}{\mu_i} \alpha_k^i \frac{P_i}{P_k} Y_i$$



Income in country i  $P_i Y_i$ 

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In total income for k  $\sum \alpha_k^i P_i Y_i = P_k Y_k$ 



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**consumption index** 

 $C^{i,j} = \frac{1 P_i}{\mu P^i Y_i}$ 

 $C_k^{i,j} = \frac{1}{\mu_i} \alpha_k^i \frac{P_i}{P_k} Y_i$ 

price index

### Structure of Demand

**Proposition (Structure of demand).** 

Exists fixed  $\{Y_i^*\}$  such that demand satisfies  $Y_i = \lambda Y_i^*$ 

#### Positive constant $\lambda$

- union-wide aggregate demand
- pinned down by monetary policy

**Proposition (Per-capita allocations).** Given  $\lambda$  per-capita consumption and labor allocation of agents of type *j* in region *i* depends on the equilibrium only through the sufficient statistic  $\mu_i$ , to which it is inversely proportional.

- As before: movers better off
- Now: stayers strictly improve!
- Simplest case: no home bias

### **Social Optimum**

#### Restricted social planning problem given

Full social planning problem

 $\max_{\lambda} W(\lambda)$ 

 $i \in I$ 

 $j \in J$ 

 $\sum \mu^{i,j} = \mu^j$ 

 $\sum \mu^{i,j} = \mu_i$ 

 $W(\lambda) = \max_{\mu_i, \mu^{i,j}} \sum_{i \in I, j \in J} \lambda^j \mu^{i,j} U^{i,j} \left( \lambda \frac{P_i}{P^i} \frac{Y_i^*}{\mu_i}, \lambda \frac{Y_i^*}{A_i \mu_i} \right)$ 

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## **Optimal Mobility**

**Proposition (Optimal mobility).** Constrained efficient allocation given union-wide aggregate demand management  $\lambda$  are inconsistent with free mobility.

- Impact on stayers' welfare
- Labor wedge is sufficient statistic  $\tau_i$
- Not internalized by private agents
- Government intervention required
  - not enough migrations out of depressed regions
  - potentially wrong destinations too

## **Optimal Mobility and Monetary Policy**

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## **Optimal Mobility and Monetary Policy**

**Proposition (Optimal mobility).** Constrained efficient allocation given union-wide aggregate demand management  $\lambda$  are inconsistent with free mobility.

Proposition (Optimal monetary policy). Constrained-efficient allocations satisfy  $\sum_{i \in I} \lambda^{j} \mu^{i,j} \frac{P_{i}}{P_{i}}$ not enough migrations out of depressed regions potentially wrong destinations too

$$\frac{1}{i} \frac{Y_i^*}{\mu_i} U_C^{i,j} \tau_i = 0$$



Extensions...



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**Conjecture**. Wage rigidity + Extensive Margin Rationing  $\rightarrow$  too much economic migration

### **Greg Howard: "The Migration Accelerator"**



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#### Result...

- Iower fiscal union transfers
- sufficient mobile: even negative is possible



### Conclusions

Key insight

- movers take demand for goods, not just labor supply...
- … possible inefficiencies
- Mundell...
  - more mobility always good
  - natural to conjecture:
- **Results:** surprisingly, subtle results, depend on...
  - structure of demand and imbalances
  - form of rigidity and rationing
  - housing
  - available tools

# Thank You! Gràcies! Gracias!



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# Vamos, vamos Argentina!



# Vamos, vamos Argentina!

# You! ies! ias!



# Vamos, vamos Argentina!

