

# MOBILITY AND FISCAL IMBALANCE

by

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# Objective

- ▶ Examine how labor mobility affects optimal fiscal gap and fiscal imbalances in federations
- ▶ **Optimal fiscal gap:** Transfers required to achieve to second-best optimum
- ▶ **Fiscal imbalance:** Deviation from the optimal fiscal gap
- ▶ Sources of fiscal imbalance: productivity shocks and fiscal externalities
- ▶ Prominent issue in Canadian federation in recent years
  - ▶ Negative fiscal shock: Federal government reduced transfers to provinces to address own fiscal problems
  - ▶ Natural resource shocks exacerbated horizontal imbalances
  - ▶ Large migration flows to resource-rich provinces

# Summary of Findings

- ▶ Role of fiscal gap (federal transfers):
  - ▶ Reduce differences in MCPF across regions
  - ▶ Induce efficient migration in response to productivity shocks
- ▶ Labor mobility increases optimal fiscal gap under reasonable circumstances
- ▶ Vertical fiscal externalities lead to fiscal imbalance
- ▶ If federal government can commit to future transfers:
  - ▶ Negative fiscal imbalance mitigates regions' over-spending
  - ▶ Federal transfers lower than in second-best optimum
- ▶ If federal government cannot commit to future transfers:
  - ▶ Greater over-spending to attract federal transfers
  - ▶ Federal government desire to equalize MCPF across regions ex post leads to positive fiscal imbalance
- ▶ In both cases, labor mobility mitigates fiscal imbalances

## Related Literature

- ▶ Optimal fiscal gap
  - ▶ Gordon *QJE* (1983), Boadway and Keen *ITPF* (1996), Dahlby *ITPF* (1996), Dahlby and Wilson *CJE* (1994), Persson and Tabellini *JPE* (1996), *Etrica* 1996) and Sato *ITPF* (2000)
- ▶ Vertical fiscal externalities
  - ▶ Johnson *AER* (1988), Boadway and Keen *ITPF* (1996), Keen (1998) and Boadway, Marchand and Vigneault *JPubE* (1998)
- ▶ Labor mobility and horizontal fiscal externalities
  - ▶ Wildasin *AER* (1991), Mansoorian and Myers *JPubE* (1993), Sato *ITPF* (2000) and Kessler, Lulfessman and Myers *RES* (2002)
- ▶ Fiscal Imbalance and Commitment
  - ▶ Boadway and Tremblay *FinArch* (2006), Wildasin *NTJ* (2004), Vigneault (2007)

# The Benchmark Model

- ▶ Two regions: poor P and rich R
- ▶ Continuum of households of unit size in federation
- ▶ Households differ in an attachment-to-home parameter  $a$ , distributed uniformly over  $[0, 1]$
- ▶ For a type- $a$  household, utilities in regions P and R are:  
$$c - h(y) + b(g) + B(G) + 1 - a \quad \text{and} \quad \bar{c} - h(\bar{y}) + b(\bar{g}) + B(G) + a$$
  - ▶  $(c, \bar{c})$ : consumption in regions P and R
  - ▶  $(y, \bar{y})$ : outputs endogenously supplied
  - ▶  $(g, \bar{g})$ : regional public goods
  - ▶  $G$ : national public good provided by federal government
  - ▶  $h(\cdot)$ : disutility of supplying output

# Production

- ▶ Production per person in regions P and R:  
 $y + x + z$  and  $\bar{y} + \bar{x} + \bar{z}$ 
  - ▶  $x, \bar{x}$ : exogenous fixed components
  - ▶  $z, \bar{z}$ : exogenous stochastic components, where  $z, \bar{z} \in \{\varepsilon, -\varepsilon\}$
- ▶ Each region can have a good shock  $\varepsilon$ , denoted  $h$ , or a bad shock  $-\varepsilon$ , denoted  $l$
- ▶ Four states of nature  $k \in \{hh, ll, hl, lh\}$
- ▶ Probabilities of each state denoted  $p^k$
- ▶ Assume that  $\bar{x} + \bar{z}^k > x + z^k$  in all states of nature
- ▶ Taxes and transfers:
  - ▶ Regional tax rates on production in state  $k$ :  $t^k$  and  $\bar{t}^k$
  - ▶ Federal tax rate:  $T^k$
  - ▶ Federal transfers to regional governments:  $S^k$  and  $\bar{S}^k$

# Household Behavior

Household production decision in state  $k$ ,  $y^k$ , solves:

$$\max_{\{c^k, y^k\}} c^k - h(y^k) \quad \text{st} \quad c^k = (1 - t^k - T^k)(y^k + x + z^k)$$

$\implies$  Output supply function:  $y^k(1 - t^k - T^k)$

$\implies$  Value function:  $v(t^k + T^k, x + z^k)$

Similarly for region R:  $v(\bar{t}^k + T^k, \bar{x} + \bar{z}^k)$

Migration equilibrium condition in state  $k$ :

$$v(t^k + T^k, x + z^k) + b(g) + 1 - a^k = v(\bar{t}^k + T^k, \bar{x} + \bar{z}^k) + b(\bar{g}) + a^k$$

$\implies$  Populations in regions P and R are, respectively:  $a^k$  and  $1 - a^k$

## The Second-Best Optimum

A planner chooses  $(g, \bar{g}, G, \tau^k, \bar{\tau}^k)$  to maximize  $\sum E[v^k]$ :

$$\sum_k p^k \left[ a^k \left( v(\tau^k, x + z^k) + b(g) + B(G) \right) + a^k - \int_0^{a^k} n^k dn^k \right. \\ \left. + (1 - a^k) \left( v(\bar{\tau}^k, \bar{x} + \bar{z}^k) + b(\bar{g}) + B(G) \right) + \int_{a^k}^1 n^k dn^k \right]$$

subject to migration equilibrium condition:

$$v(\tau^k, x + z^k) + b(g) + 1 - a^k = v(\bar{\tau}^k, \bar{x} + \bar{z}^k) + b(\bar{g}) + a^k \quad (\Phi^k)$$

and national budget constraint:

$$a^k \tau^k \cdot \left( y^k (1 - \tau^k) + x + z^k \right) + (1 - a^k) \bar{\tau}^k \cdot \left( \bar{y}^k (1 - \bar{\tau}^k) + \bar{x} + \bar{z}^k \right) = G + g + \bar{g} \\ (\Lambda^k)$$

# Optimal Allocation of Population

In absence of migration constraint, optimal allocation of population would satisfy:

$v(\tau^k, x+z^k) + b(g) + 1 - a^k - v(\bar{\tau}^k, \bar{x} + \bar{z}^k) - b(\bar{g}) - a^k = \Lambda^k(\bar{tr}^k - tr^k)$   
where  $tr^k$  and  $\bar{tr}^k$  are per capita tax revenues

Since  $\bar{tr}^k > tr^k$ , the optimal population allocation is such that  
 $v(\tau^k, x+z^k) + b(g) + 1 - a^k > v(\bar{\tau}^k, \bar{x} + \bar{z}^k) + b(\bar{g}) + a^k$

⇒ Violates the migration equilibrium condition

⇒ Migration decisions imply too little population in region R

**Interpretation:** Additional tax revenue generated by a new migrant is a fiscal externality

⇒ Since net revenue benefit of migration to R is positive, should move persons such that utility in R is sufficiently lower than in P

# Optimal Provision of Public Goods

Optimal provision of  $G$  satisfies:  $B'(G) = \sum p^k \Lambda^k$

$\implies$  Quasi-Samuelson condition

$\implies$  Aggregate marginal benefit set equal to expected MCPF

Optimal provision of  $g$  and  $\bar{g}$  satisfies:

$$\sum p^k (a^k + \Phi^k) b'(g) = \sum p^k (1 - a^k - \Phi^k) b'(\bar{g}) = \sum p^k \Lambda^k$$

- ▶ Quasi-Samuelson conditions would apply if migration constraint not binding ( $\Phi^k = 0$ )
- ▶ Since  $\Phi^k < 0$ ,  $g$  under-provided and  $\bar{g}$  over-provided

**Intuition:** Distortions in  $g$  and  $\bar{g}$  induce more migration to R

# Optimal Allocation of Taxes

Optimal tax rates,  $\tau^k$  and  $\bar{\tau}^k$ , satisfy:

$$\Lambda^k = 1 + \frac{\Phi^k}{a^k} \frac{y^k + x + z^k}{y^k + x + z^k - \tau^k y^{k'}} = 1 - \frac{\Phi^k}{1 - a^k} \frac{\bar{y}^k + \bar{x} + \bar{z}^k}{\bar{y}^k + \bar{x} + \bar{z}^k - \bar{\tau}^k \bar{y}^{k'}}$$

where  $\frac{y^k + x + z^k}{y^k + x + z^k - \tau^k y^{k'}}$  is the MCPF in state  $k$

With migration constraint binding ( $\Phi^k < 0$ ), taxes are such that:

$$\text{MCPF}^k > \Lambda^k > \overline{\text{MCPF}}^k$$

$\implies \tau^k$  higher and  $\bar{\tau}^k$  lower than without migration constraint

$\implies$  Induces more migration to R to offset the tax externality

Without migration, MCPFs equalized between regions

# Optimal Fiscal Gap

- ▶ **Optimal fiscal gap:** Transfers to regions  $(S^k, \bar{S}^k)$  required to implement the planning optimum under cooperative decentralization
- ▶ Optimal fiscal gap is indeterminate
  - ▶ Relative size of transfers is determinate, but not absolute level
- ▶ Assume smallest non-negative transfers are used: In benchmark case,  $S^k > 0, \bar{S}^k = 0$  for all  $k$

**Note:** In more general case with  $n$  regions, optimal fiscal gap positive for all regions except one with highest tax base

# Impact of Migration on Optimal Fiscal Gap

- ▶ Start with no-migration case where  $x = \bar{x}$ ,  $a^k = 1/2$ ,  $g = \bar{g}$
- ▶ In the planning optimum,  $MCPF^k = \overline{MCPF}^k \implies$  Positive transfer to low-shock region equal to fiscal gap
- ▶ With mobility: migration could go either way – high-shock region has higher exogenous income but also higher tax rate
- ▶ Suppose migration goes to high-shock region

## Four effects on optimal fiscal gap:

1. Tax revenues fall in the low-shock region  $\implies S^k \uparrow$
2. Migration increases national aggregate tax base: can reduce tax rates and MCPF in both regions  $\implies S^k \uparrow$
3. Reduced MCPFs induces  $g, \bar{g} \uparrow$ :  $\implies S^k \uparrow$
4. Planner moves away from equalizing MCPF: increase tax rate in low-shock region to encourage migration  $\implies S^k \downarrow$

*First three reasonably dominate: migration increases fiscal gap*

# Non-Cooperative Outcome with Federal Commitment

## Timing of Decisions:

1. The federal government chooses  $G, S^k, \bar{S}^k, T^k$
  2. The regions simultaneously choose  $g, \bar{g}$
  3. Nature chooses shocks  $z^k, \bar{z}^k$
  4. The regions choose  $t^k, \bar{t}^k$  to balance their budgets
  5. Households choose their region of residence
  6. Households in each region choose outputs  $y^k, \bar{y}^k$
- ▶ Assume federal government can commit to its policies announced in Stage 1 before the regions choose  $(g, \bar{g})$
  - ▶ Characterize subgame perfect equilibrium

# Regional Government Policies

Regions maximize the sum of their residents' expected utility subject to budget constraint and anticipating migration decisions

- ▶ Vertical fiscal externality tends to induce rich region to over-provide public good
- ▶ For poor region, vertical externality is nullified by anticipated federal transfer
- ▶ In more general case, all regions face net vertical externality
- ▶ Migration generates horizontal fiscal externalities
  - ▶ New migrants contribute to the financing of public goods
  - ▶ Regional governments have incentives to attract migrants
  - ▶ Tend to set relatively low tax rates

*Either vertical or horizontal externality could dominate*

# Federal Government Policy

## Without mobility:

- ▶ To mitigate vertical externality, federal government reduces tax rate below second-best optimal value
- ▶ Requires reducing transfer to poor region negative fiscal imbalance
- ▶ MCPF higher in poor region than in rich region
- ▶ Public goods provision:
  - ▶ Negative imbalance lead to under-provision of  $g$  in poor region
  - ▶ Vertical fiscal externality lead to over-provision in rich region
  - ▶  $G$  set such that marginal benefit equals expected MCPF in poor region
    - ▶ Intuition: alternative use of federal revenues is transfer to poor region
    - ▶ Federal public good under-provided

# Federal Government Policy, cont'd

## With mobility:

- ▶ Migration introduces horizontal fiscal externalities
- ▶ Tends to mitigate vertical fiscal imbalance
  - ▶ Mobility increases MCPF perceived by regions
  - ▶ Tends to lower public good provision
  - ▶ Partly offsets vertical externalities
  - ▶ Allows federal government to increase transfers to poor region
- ▶ If horizontal externalities are strong enough, negative imbalance might disappear, although optimal fiscal gap also larger (but, second-best optimum not achieved)

# Non-Cooperative Outcome with No Commitment

Assume that federal government cannot commit to taxes and transfers before regions choose expenditures

## Tax and transfer policy of federal government:

- ▶  $(g, \bar{g})$  fixed  $\Rightarrow$  optimal for federal government to set transfer to equalize MCPF across regions ex post

## Regional policies:

- ▶ Regional governments anticipate federal policy
- ▶ Incentive to over-spend by all regions
  - ▶ Poor region wants to attract larger transfer
  - ▶ Rich region increases spending to reduce transfer to poor region

# Inability to Commit and Fiscal Imbalance

- ▶ Equalizing MCPF ex post requires larger transfer than in second-best optimum
- ▶ Positive fiscal imbalance

Impact of labor mobility:

- ▶ Horizontal externalities increase perceived MCPF
- ▶ Lowers regional spending
- ▶ Reduces the size of the fiscal imbalance

# Conclusions and Extensions

- Mobility enhances the case for centralized revenue-raising in a federation
- Mobility mitigates the fiscal imbalances arising from asymmetric shocks or ex ante asymmetry
- Extensions
  - ▶ Soft-budget constraints
  - ▶ Migration decisions made before government policies are chosen
  - ▶ Fiscal equity motive for federal transfers