Risk Sharing among Large and Small Countries
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Bank Of France, Nov 10 2017
Contribution
Big Picture Question

- How do we think about cross-country risk sharing when countries are heterogeneous in terms of size and the stochastic process of output?

- How can we improve risk sharing across countries (EU fiscal integration, capital markets integration or even EU banking union etc) and simultaneously address
  - political economy issues
  - distributional issues
Set-Up

- 2 countries with different size and different stochastic process of output (exogenous)
- 2 periods
- single good
- representative agent within a country with log preferences
Main Exercise

- Consider 3 different risk sharing regimes

<table>
<thead>
<tr>
<th>Different Risk Sharing Regimes</th>
<th>$C_t$</th>
<th>$\Delta c_t$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete Markets</td>
<td>$C_{H,t} \neq C_{F,t}$</td>
<td>$\Delta c_{H,2} = \Delta c_{F,2}$</td>
</tr>
<tr>
<td>Financial Autarky</td>
<td>$C_{H,1} = C_{F,1}; C_{H,2} \neq C_{F,2}$</td>
<td>$\Delta c_{H,2} \neq \Delta c_{F,2}$</td>
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<tr>
<td>Income Pooling</td>
<td>$C_{H,t} = C_{F,t}$</td>
<td>$\Delta c_{H,2} = \Delta c_{F,2}$</td>
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</tbody>
</table>
Study the welfare implications of each one of the regimes for both H and F as a function of:

- the stochastic process of output
- size of the country

Derive novel results such as:

- large countries would prefer IP while small countries would prefer complete markets
- Because of asymmetries across countries, IP will lead to allocations that differ from complete-market, and may not be Pareto improving
Novel part (so far): This paper studies the welfare properties of an exogenous consumption allocation (IP—equal consumption across countries)

- Not clear to me why the natural allocation to consider is equalizing consumption per capita across countries
- In other words, what are the political or institutional constraints that make it the most plausible allocation?

Alternative approach: solve for the constrained global CP’s problem where the constraints are motivated by realistic institutional and political constraints (standard in the literature)

- example: EU fiscal union
  - governments contribute a certain amount to a common pool but transfers are costly since taxation and borrowing is costly
    - provides an endogenous bound on how much cross-country risk sharing is feasible
  - incorporate political constraints by imposing the Pareto welfare improving criteria as constraints in the global CP’s problem
Alternative Approach (2)
Comment 2

- Cross country heterogeneity in terms of size and stochastic processes largely studied – Coeurdacier, Reya and Winant (2015) and Hassan (2013)
- Suggestion: Introduce another very important source of heterogeneity — *within* country heterogeneity
  - example — income inequality!
  - parallel to the theory of comparative advantage in trade
    - free trade is Pareto welfare improving for all agents within a country conditional on costless lump sum transfers — results would differ if transfers are costly
    - similarly trade-offs plausible with capital account liberalization
Alternative Approach (3)

- Political pitch: EU fiscal union can decrease within country income inequality and make both rich and poor better off, taking into account the cost of taxation.

- Mechanism
  - Fiscal union can increase welfare by completing markets.
  - Use the welfare gains solely to lower *within* country income inequality (rich placed on their PC constraint).
Toy Model (1)

- 2 symmetric countries in terms of size but heterogeneity within country — income inequality
- shocks across countries are not perfectly correlated
- costly taxation and transfers (here reduced form, see Stavrakeva (2017) for microfoundation using distortionary labor taxes)
- global CP who cares only about the poor in each country; solves for the optimal amount of fiscal integration subject to PC constraints (Pareto welfare improving criteria)
- The benchmark (world prior to fiscal union) is financial autarky
  - can be relaxed by assuming the benchmark is a single bond or market segmentation where only the rich have access to certain capital markets
Toy Model (2)

- Global CP cares about the weighted sum of the poor consumers in both countries

\[
\max_{\tau^r_{i,t}, \tau^p_{i,t}, T^p_{i,t}, T^r_{i,t}} E_0 \sum_{t=1}^{2} \beta^{t-1} \sum_{i \in \{H,F\}} n_i \log \left( C^p_{i,t} \right)
\]

- where a fraction \( n_i \) in country \( i \) are poor and a fraction \( (1 - n_i) \) are rich

- Fiscal union resource constraint

\[
\sum_{i \in \{H,F\}} \left( T^p_{i,t} + T^r_{i,t} \right) \leq \sum_{i \in \{H,F\}} \left( \tau^p_{i,t} + \tau^r_{i,t} \right) [\mu_t]
\]

- Budget constraints

\[
\begin{align*}
C^r_{i,t} & \leq T^r_{i,t} - \left( \tau^r_{i,t} + \frac{\chi}{2} \left( \tau^r_{i,t} \right)^2 \right) + \alpha_i Y_{i,t} \quad \text{for } i \in \{H, F\} \\
C^p_{i,t} & \leq T^p_{i,t} - \left( \tau^p_{i,t} + \frac{\chi}{2} \left( \tau^p_{i,t} \right)^2 \right) + (1 - \alpha_i) Y_{i,t} \quad \text{for } i \in \{H, F\}
\end{align*}
\]

- \( \frac{\chi}{2} \left( \tau^r_{i,t} \right)^2 \) — exogenous convex cost of taxation

- where \( \alpha_i > 0.5 \)

- \( n_i \) and \( \alpha_i \) capture the degree of income inequality for country \( i \)
Non negative taxes and transfers and PC constraints

\[ \tau_{i,t}^p \geq 0 \left[ n_i \varphi_{i,t}^p \right], \quad \tau_{i,t}^r \geq 0 \left[ (1 - n_i) \varphi_{i,t}^r \right] \]

\[ T_{i,t}^p \geq 0 \left[ n_i \lambda_{i,t}^p \right], \quad T_{i,t}^r \geq 0 \left[ (1 - n_i) \lambda_{i,t}^r \right] \]

\[ E_0 \sum_{t=1}^{2} \beta^{t-1} \log \left( C_{i,t}^r \right) \geq E_0 \sum_{t=1}^{2} \beta^{t-1} \log \left( \alpha_i Y_{i,t} \right) \left[ (1 - n_i) \omega_{i,t}^r \right] \]

\[ E_0 \sum_{t=1}^{2} \beta^{t-1} \log \left( C_{i,t}^p \right) \geq E_0 \sum_{t=1}^{2} \beta^{t-1} \log \left( (1 - \alpha_i) Y_{i,t} \right) \left[ n_i \omega_{i,t}^p \right] \]
Re-write the problem as

\[
\max_{\tau_{i,t}^p, \tau_{i,t}^r, T_{i,t}^p, T_{i,t}^r} \sum_{t=1}^{2} \beta^{t-1} \sum_{i \in \{H,F\}} \left( n_i \left( 1 + \omega_{i,t}^p \right) \log \left( T_{i,t}^p - \left( \tau_{i,t}^p + \chi \left( \tau_{i,t}^p \right)^\eta \right) \right) + (1 - \alpha_i) Y_{i,t} \right) \\
+ (1 - n_i) \omega_{i,t}^r \log \left( T_{i,t}^r - \left( \tau_{i,t}^r + \chi \left( \tau_{i,t}^r \right)^\eta \right) + \alpha_i Y_{i,t} \right) 
\]
Toy Model (4)
First order conditions

\[
T_{i,t} : n_i \left( (1 + \omega_{i,t}^p) \frac{1}{C_{i,t}^p} + \lambda_{i,t}^p \right) \\
= (1 - n_i) \left( \omega_{i,t}^r \frac{1}{C_{i,t}^r} + \lambda_{i,t}^r \right) = \mu_t
\]

\[
\tau_{i,t} : n_i \left( (1 + \chi \tau_{i,t}^p) (1 + \omega_{i,t}^p) \frac{1}{C_{i,t}^p} - \varphi_{i,t}^p \right) \\
= (1 - n_i) \left( (1 + \chi \tau_{i,t}^r) \omega_{i,t}^r \frac{1}{C_{i,t}^r} - \varphi_{i,t}^r \right) = \mu_t
\]
Conclusion

- Interesting question of first order importance for policy

- Main suggestion: consider alternative ways to make it more realistic, more novel and more policy relevant