International Capital Mobility Through the Lens of Neoclassical Model: Puzzles, Private Flows, and Global Imbalances

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Where does capital flow? Why does capital flow?

- Neoclassical Theory: Capital flows to high return countries
  - High return: MPK-capital scarcity
  - High return: High productivity/growth
  - High return: Risk adjusted return/productivity

- No matter how we define high return, we have many puzzles related to international capital flows.
  - Because international data does not seem to be fitting neoclassical predictions
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- Feldstein-Horioka: Savings and Investment are highly correlated, implying limited degree of capital mobility
  - S-I correlation may not be informative about capital mobility
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- Lucas (1990): Capital should go from capital abundant-low MPK USA to capital scarce-high MPK India assuming same level of TFP (A)
  - But, TFP (A) is not the same across countries.
  - Lucas adjusts MPKs (accounting for human capital) and shows there no MPK differences
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  - MPKs measured as $\alpha \frac{Y}{K}$ will reflect productivity differences.
  - MPK differences go away when adjusted with relative price of capital.
  - The relative price of output is low in poor countries; the use of PPP prices overestimate the market value of the productivity of physical capital.

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Broader Question: Does capital flows to productive places?

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  - Lucas Paradox: Private flows (FDI and equity) going from poor to rich countries
  - Institutions are the most important determinant of growth and productivity (Acemoglu, Johnson and Robinson)

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Our Approach and Contribution

The key in the investigation of “where” and “why” capital flows, relative to the neoclassical benchmark is measurement and comparability:

- How do we measure capital mobility?
- What do we mean by high return and/or high productivity?
- Which measures of capital mobility are comparable across countries?

Highly productive places based on MPK may not be so productive; MPK adjustments can account for the productivity differences (Lucas, 1990; Caselli-Feyrer, 2007)

Rich, capital abundant places can also be productive; high A. (Forbes, 2008; Kalemli-Ozcan et al., 2009)
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Measuring Capital Flows and Comparability

- Three main yardsticks: Current account balance (CA), returns (MPK), and actual quantity of capital flows (FDI, equity, debt).
  - CA: Reflects non-private, non-market activities, while the neoclassical predictions are about private-market behavior.
  - MPK: Not comparable across countries given the grave misallocation of capital within the countries. (Banerjee and Duflo, 1995)
  - Actual quantity of flows: Similar issue to CA; must be careful about private versus public flows.
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We document the patterns of international capital mobility in the last 40 years:

- Both for developing countries and the whole world
- By using both the current account and financial flows
- By focusing on both private and public flows
- Investigating dynamics of each decade, 70s, 80s, 90s.

Recent findings on “puzzles” of capital flows due to:

- Dominance of public/aid flows for poor and unproductive countries.
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- Misallocation of resources across firms can explain 40-60% the cross-country TFP differences.
  - Restuccia and Rogerson (2008), Hsieh and Klenow (2009), Bartelsman et al. (2009), Alfaro et al. (2009).

- Evidence on misallocation of capital: extensive variation in firm level MPKs and interest rates that firms borrow at.
  - Median r=15%; MPK=40%; Kalemli-Ozcan and Sorensen (2009)
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- Comparing adjusted-MPKs across countries implies
  - Price adjusted MPK are same and below 10% everywhere.
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See if these measures of capital flows are correlated with high productivity.

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GJ sample: 67 developing countries (non-OECD) for 1980–2000, sources: LM, PWT

- We use same data and also extend it to more developing countries and years, sources: LM, IMF, WB.

- Total Net Flows: CA/GDP as the current account balance normalized by GDP, averaged over time.

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Replicating GJ (Flows: Current Account/GDP)

Average Productivity Growth and Average Capital Inflows, 1980 and 2000
Non-OECD Countries

Alfaro and Kalemli-Ozcan: Puzzles
Replicating GJ (Flows: Change in NEP/Initial GDP)

Productivity Catch-Up and Change in External Debt

Non-OECD Countries

Alfaro and Kalemli-Ozcan

Puzzles

<table>
<thead>
<tr>
<th>Flows</th>
<th>Sample</th>
<th>CA/GDP Non-OECD</th>
<th>(CA/GDP)-Aid Non-OECD</th>
<th>CA/GDP Developing</th>
<th>(CA/GDP)-Aid Developing</th>
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<td></td>
<td></td>
<td>-0.0347***</td>
<td>0.0275</td>
<td>-0.0247*</td>
<td>0.0353**</td>
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<td></td>
<td></td>
<td>(0.0148)</td>
<td>(0.0165)</td>
<td>(0.0142)</td>
<td>(0.0169)</td>
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<tr>
<td>Productivity</td>
<td>Catch-Up Relative to US</td>
<td>GDP Growth (pcap) Relative to US</td>
<td>R²(growth) Countries</td>
<td></td>
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<td>Non-OECD</td>
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<td>(growth) Countries</td>
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<tr>
<td>-0.0129***</td>
<td>0.008</td>
<td>-0.0097***</td>
<td>0.0103*</td>
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<td>(0.037)</td>
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### It is Aid, not Debt

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<tr>
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<td>0.2949*** (0.1334)</td>
<td>-0.4580*** (0.1385)</td>
<td>0.2399 (0.2697)</td>
</tr>
<tr>
<td>Per-Capita GDP Growth Relative to US</td>
<td>0.1286*** (0.0417)</td>
<td>-0.1578*** (0.0553)</td>
<td>0.0493 (0.0847)</td>
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<td>$R^2(growth)$ Countries</td>
<td>0.17 67</td>
<td>0.07 67</td>
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Average Growth and Average Capital Inflows, 1980-2000

Non-OECD Countries

coefficient = -0.01286478, (robust) standard error = 0.00367214, t = -3.5

Non-OECD Countries
Average Growth and Average Capital Inflows, 1980-2000
Developing, No Aid

Average Growth and Average Capital Inflows Aid Adj., 1980-2000

Developing Countries

Per Capita Growth Relative to US

Capital Inflows (percent of GDP)

coef = .0102898, (robust) se = .00541034, t = 1.9
Growth and Change in External Debt (from LM), 1980-2000

Non-OECD Countries

Per Capita Growth Relative to US

Capital Inflows (relative to initial output)

coef = -.22614799, (robust) se = .13540614, t = -1.67
Developing, No Aid

Growth and Change in External Debt Aid Adj. (from LM), 1980-2000

Developing Countries, Excludes Outliers

Capital Inflows (relative to initial output)

Per Capita Growth Relative to US

coef = .19206658, (robust) se = .08903038, t = 2.16
Why not use a bigger set of developing countries?

We test the correlation between capital flows and productivity using 115 developing countries instead of a sample of 67 (by using data not only from PWT but also from WB).

coef = .32701003, (robust) se = .32690304, t = 1

coef = .81486643, (robust) se = .35593299, t = 2.29

coef = .06277373, (robust) se = .26375353, t = .24

coef = .81035194, (robust) se = .3239781, t = 2.5

coef = .19324222, (robust) se = .0913933, t = 2.11
What about a sample of developed and developing countries together?

- The basic exercise is about testing the predictions of the neoclassical model as in Lucas (1990)
- So it is important to test whether or not capital flows to productive places within the whole world not just within the developing countries.
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coef = .10466699, (robust) se = .26202191, t = .4

Alfaro and Kalemli-Ozcan

Puzzles

coef = .8565179, (robust) se = .3157009, t = 2.71
How to reconcile these findings with Lucas Paradox?

- If capital flows seem to be going to non-productive (=poor) places due to aid flows then there should not be Lucas Paradox in the same sample, when we regress on level of GDP instead of growth.

- Once we adjust with aid flows capital will go to productive places (=high growth) and Lucas paradox reappear if productive places are also the rich countries.

  - Kalemli-Ozcan et al. (2009) shows that in an integrated market such as the U.S. capital flows to productive states which are also happen to be the rich states.
  - Forbes (2009) shows that foreigners invest in the U.S. since U.S. has been relatively more productive on average.
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  - Kalemli-Ozcan et al. (2009) shows that in an integrated market such as the U.S. capital flows to productive states which are also happen to be the rich states.
  - Forbes (2009) shows that foreigners invest in the U.S. since U.S. has been relatively more productive on average.
CA/GDP versus Log GDP p.c.: All World, 1990–2005

coef = -1.9299562, (robust) se = .39085839, t = -4.94
CA/GDP versus Log GDP p.c.: All World, 1990–2005: No Aid

c coef = 2.9007664, (robust) se = .53465164, t = 5.43
Is there a role of global imbalances?

- The flows-productivity puzzle seems to be driven not only by high aid countries but also countries that are productive and high savers (exporting capital).

- Thus, global imbalances might be the reason why some productive places seem to be receiving less flows relative to non-productive places.

- We plot the partial correlation plots for capital flows (negative of current account) and growth after controlling S/GDP.
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Non-OECD, Conditional on Savings: 1990–2005

coeff = .51251446, (robust) se = .2322066, t = 2.21
Conclusion

The predictions of the neoclassical model are born out by the data:

- Aid adjusted flows go to productive countries
- Private flows (no government) also go to productive countries

Is this surprising? No, the benchmark neoclassical model is about private investors, not about government behavior.

In the 1990s, to resurrect the neoclassical model, it is also enough to account for global imbalances (i.e., high saver countries who are also productive and export debt capital).

Research must focus on the causes of global imbalances.
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Distribution of Real Interest Rates from Kalemli-Ozcan and Sorensen (2009)
### Distribution of MPKs from Kalemli-Ozcan and Sorensen (2009)

![Box plots of MPKs for different countries](image)

The box plots above show the distribution of Marginal Product of Capital (MPK) for various countries. The x-axis represents the countries, and the y-axis represents the MPK values. Each box plot indicates the interquartile range (IQR) of MPK values, with the median marked by a line within the box. The whiskers extend to show the range of the data, excluding outliers.

- **Countries** listed include: Mali, Kenya, Congo, Mauritania, Rwanda, Namibia, Tanzania, Senegal, Zambia, South Africa, Botswana, Ghana, Mozambique, Gambia, Uganda, Burundi, Nigeria, Swaziland, Guinea-Bissau, Guinea-Conakry, Angola.

### Key Points
- **Misallocation**
  - PWT A and B Rating Countries

### Related Reading
- Alfaro and Kalemli-Ozcan
- Puzzles
There are issues with the PWT data, where GDP and productivity numbers are based upon in most of the recent studies.

Deaton and Heston (2008) suggest to use only the good quality data; A and B rated countries.

We suggest to use private flows instead of CA.
All World, PWT A and B Countries, Equity Flows: 1970–2005

c( EqNetF2ylm \mid X )
c( ygr \mid X )
coef = .5511558, (robust) se = .26641845, t = 2.07