

"Capital Flows to Developing Countries: The Allocation Puzzle"

Gourinchas & Jeanne (RES, 2012)

- Lucas (AER, 1990) asked why more capital doesn't flow to poor countries
- This paper argues that the capital that does flow, flows to the "wrong" countries.
- Neoclassical Growth Theory
Rapid Prod. Growth \Rightarrow Capital Inflows
(both because $I \uparrow$ and $S \downarrow$)
- The paper shows that on average the data indicate the exact opposite!
- Sample: 68 non-OECD developing countries, 1980-2010

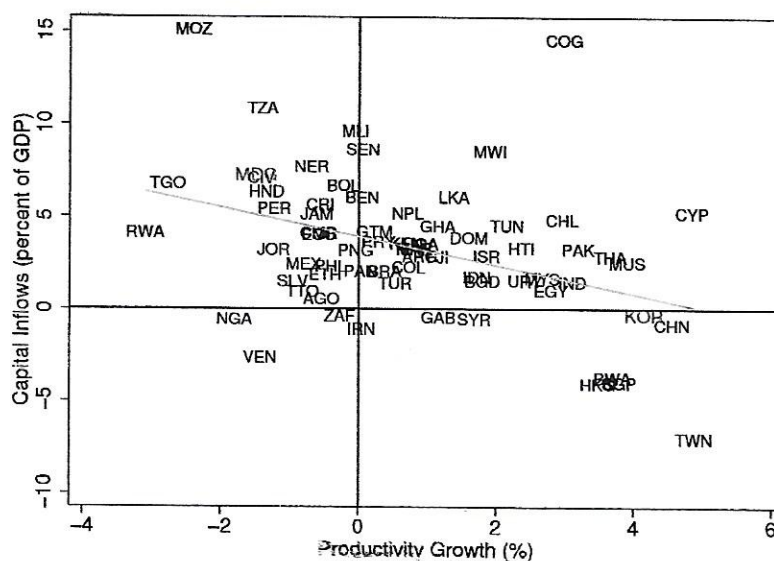


FIGURE 1

Average productivity growth and average capital inflows between 1980 and 2000. 68 non-OECD countries.

negative and at best zero. The non-OECD countries that have grown at a higher rate over 1980-2000 have not imported more capital. This finding is robust to many controls.

The allocation puzzle is illustrated by Figure 1, which plots the average growth rate of total factor productivity (TFP) against the average ratio of net capital inflows to GDP for 68 developing countries over the period 1980-2000.² Although the variables are averaged over two decades, there is substantial cross-country variation both in the direction and in the volume of net capital inflows, with some countries receiving more than 10 percent of their GDP in capital inflows on average (Mozambique, Tanzania), whereas others export about 7 percent of their GDP in capital outflows (Taiwan). More strikingly, the correlation between the two variables is *negative*, the opposite of the theoretical prediction.³ To illustrate with two countries that are typical of this relationship (i.e., close to the regression line), Korea, a development success story with an average TFP growth of 4.1 percent per year and an average annual investment rate of 34 percent between 1980 and 2000, received almost no net capital inflows, whereas Madagascar, whose TFP fell by 1.5 percent a year and average annual investment rate barely reached 3 percent, received 7 percent of its GDP in capital inflows each year, on average.

As we show in this paper, the pattern observed in Figure 1 is just one illustration of a range of results that point in the same direction. Capital flows from rich to poor countries

2. Net capital inflows are measured as the ratio of a country's current account deficit over its GDP, averaged over the period 1980-2000. The construction of the data is explained in more detail in section 3.

3. The regression line on figure 1 has a slope -0.72 (p-value of 0.1%).

Production

$$Y_t = K_t^\alpha (A_t L_t)^{1-\alpha}$$

Budget Constraint

$$C_t + I_t + R^* D_t = Y_t + D_{t+1}$$

$$I_t = K_{t+1} - (1-\delta)K_t$$

Optimality Conditions

$$1.) \tilde{k}_t = \frac{K_t}{A_t N_t} = \left(\frac{\alpha}{R^* + \delta - 1} \right)^{\frac{1}{1-\alpha}}$$

$$A_t \leq A_t^* = A_0 g^{*t}$$

$$2.) C_t^{-\gamma} = \beta R^* C_{t+1}^{-\gamma}$$

$$R^* \beta = g^{*\gamma}$$

Key Variable

$$\frac{\Delta D}{Y_0} = \frac{D_T - D_0}{Y_0}$$

Depends on:

1.) Initial Conditions (K_0, D_0, A_0)

2.) Productivity Catch-up (π)

Productivity Catch-Up

After time T , all countries have same prod. growth, g^*

Countries differ by: 1.) Initial level of prod.
2.) Steady-state level of prod.

Speed of convergence same for all countries

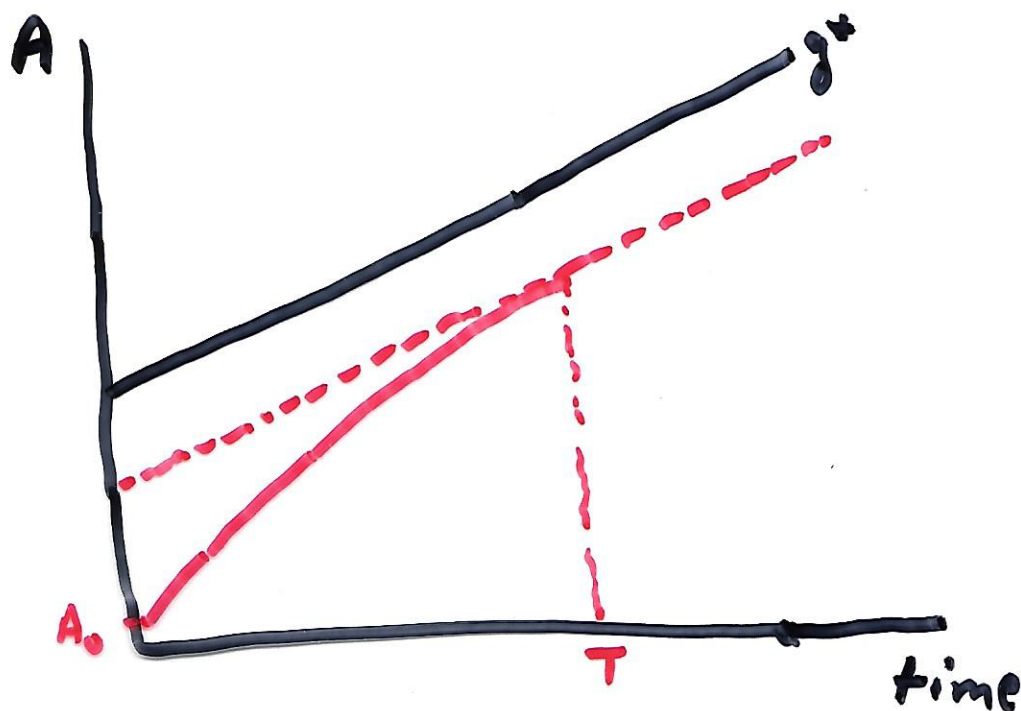
$$\pi_t = \frac{A_t - A_0 g^{*t}}{A_0 g^{*t}}$$

$$\pi = \lim_{t \rightarrow \infty} \pi_t$$

$\pi = 0 \Rightarrow$ Rel. prod. stays constant

$\pi > 0 \Rightarrow$ Catch-up

$\pi < 0 \Rightarrow$ Fall farther behind



Basic Decomposition

assumptions :

- 1.) Perfect Captl. Mkts.
- 2.) Perfect Foresight
- 3.) ∞ - horizon

$$\frac{\Delta D}{Y_0} = \frac{D_T - D_0}{Y_0} = \frac{\tilde{d}_T A_T N_T - \tilde{d}_0 A_0 N_0}{A_0 N_0 \tilde{y}_0} = \frac{\tilde{d}_T (g^* n)^T (1+\pi) - \tilde{d}_0}{\tilde{y}_0}$$

$$\tilde{d}_T = \tilde{k}^* + \frac{\tilde{w} - \tilde{c}_T}{R^* - ng^*}$$

$$\tilde{w} = (1-\alpha) \tilde{k}^*$$

$$\tilde{c}_T = \frac{c_T}{A_T} = \frac{c_0 g^{*T}}{(1+\pi) A_0 g^{*T}} = \frac{\tilde{c}_0}{1+\pi}$$

$$\tilde{c}_0 = (R^* - ng^*) \left[\frac{\tilde{w}}{R^*} \sum_{t=1}^{\infty} \left(\frac{ng^*}{R^*} \right)^t (1+\pi_t) + \tilde{k}_0 - \tilde{d}_0 \right]$$

$$\frac{\Delta D}{Y_0} = \frac{\tilde{k}^* - \tilde{k}_0}{\tilde{y}_0} (ng^*)^T + \frac{\tilde{d}_0}{\tilde{y}_0} [(ng^*)^T - 1] + \pi \frac{\tilde{k}^*}{\tilde{y}_0} (ng^*)^T + \pi \frac{\tilde{w}}{R^* \tilde{y}_0} (ng^*)^T \sum_{t=1}^{\infty} () (1+\pi_t)$$

✓
convergence

✓
trend

✓
investment

✓
saving

Calibration

$$\delta = .06$$

$$\alpha = 0.3$$

$$g^* = 1.017 \text{ (US\$)}$$

$$\gamma = 1$$

$$\beta = .96$$

$$f(t) = \min(t/T, 1)$$

$$\Rightarrow R^* = 1.059$$

common

D_0

A_0

γ_0

K_0

η

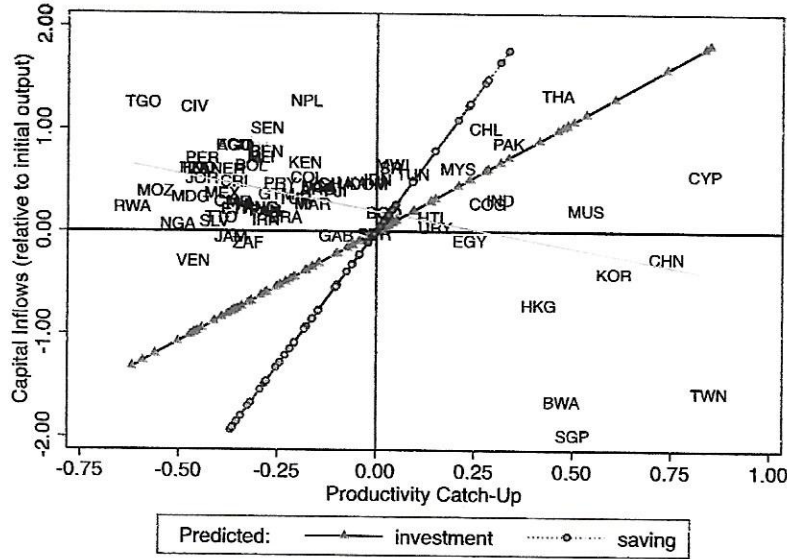
A_{2000}

π

country-specific

TABLE 1
Productivity Catch-Up and Capital Inflows between 1980 and 2000.
Group averages. 68 non-OECD countries.

	(1) Catch-up π	(2) Capital inflows $\Delta D/Y_0$	(3) Obs.
Non-OECD countries	-0.10	31.49	68
By income:			
Low Income	-0.22	56.49	26
Lower Middle Income	-0.15	37.02	23
Upper Middle Income	-0.06	12.94	13
High Income (Non-OECD)	0.54	-57.85	6
By region:			
Africa	-0.17	39.09	31
Latin-America	-0.24	36.89	20
Asia	0.19	11.28	17
China and India	0.53	3.21	2
All but China and India	-0.12	32.35	66
All but Africa	-0.04	25.12	37



FIGURE

Productivity catch-up (π) and change in external debt ($\Delta D/Y_0$) together with predicted investment ($\Delta D^I/Y_0$) and predicted saving ($\Delta D^S/Y_0$) terms. 1980-2000. 68 non-OECD countries.

growth framework. We observe that capital flows are not only negatively correlated with the model predictions but also tend to be smaller in absolute value. This is especially true if we look at the saving component, which implies that a one percentage point increase in the productivity catch-up variable π should raise capital inflows by 5.25 percent of initial output.²¹ For a country such as Korea, with a productivity catch up π equal to 0.61, the model predicts investment and saving components of net capital *inflows* each in excess of 130 percent of initial output. Conversely, for Madagascar, with a relative productivity decline π equal to -0.47, the model predicts investment and saving components of net capital *outflows* each in excess of 100 percent of initial output!

As noted at the end of section 2, the saving component is very responsive to growth in the model because of the assumption that consumers are infinitely-lived and can perfectly smooth consumption. Introducing financial frictions or assuming different preference structures could reduce significantly the importance of the saving component.²² By contrast, observed flows are of the same order of magnitude as the investment component of predicted flows. The ratio of the sum of the absolute value of the observed net inflows amounts to 76 percent of the model prediction based on the investment component. We conclude that the model is able to reproduce the magnitude of capital flows (the range

21. The slope of the investment term $\Delta D^I/Y_0$ is $(\bar{n}g^*)^{20} = 2.14$ while the slope of the saving term $\Delta D^S/Y_0$ is $(1 + (1 - \alpha)\bar{k}^{*}(\alpha - 1)/R^* \sum_{t=0}^{19} (\bar{n}g^*)^t (1 - t/20) (\bar{n}g^*)^{20}) = 5.25$.

22. In the limit case where households cannot access financial markets, the saving component would equal zero.

Wedges

Introduce distortions to I and S to make theory fit the data

Invest. Wedge : $(1 - \tau_k) R_t = R^*$

Saving Wedge : $C_t^* = \beta R^* (1 - \tau_c) C_{t+1}^*$

Revenue
related
lump-sum

Perfect Capital Mkts. \Rightarrow Fisherian Separation
 \Rightarrow Can study wedges separately

Results

- 1.) Richer/Faster Catch-Up countries have lower i wedges
 \Rightarrow Makes Allocation Puzzle worse
- 2.) Therefore, Allocation Puzzle driven by saving wedge
Rapid prod. growth countries implicitly subsidize
Saving
- 3.) Most of excess saving driven by public/govt. Saving

TABLE 3

Decomposition of Average Investment Rates between 1980 and 2000. Convergence: $(\tilde{k}^ - \tilde{k}_0)/(T\tilde{y}_0)$; Productivity: $\pi\tilde{k}^{*(1-\alpha)}g^*n/T$; Trend: $\tilde{k}^{*(1-\alpha)}(g^*n + \delta - 1)$. percent of GDP. Group averages.*

	(1) Total i_k	(2) Convergence	(3) Productivity	(4) Trend	(5) Capital Wedge τ_k	(6) Obs.
Average Investment Rate (percent of output)						
Non-OECD countries	13.52	0.11	-0.92	14.33	11.54	68
By Income Level:						
Low Income	8.49	-0.21	-1.56	10.26	18.92	26
Lower Middle Income	14.06	0.29	-1.64	15.42	8.84	23
Upper Middle Income	15.69	0.40	-1.35	16.64	6.13	13
High Income (Non-OECD)	28.52	0.17	5.54	22.82	1.55	6
By region:						
Africa	10.26	-0.74	-1.18	12.19	16.05	31
Latin-America	13.40	0.39	-2.67	15.69	8.50	20
Asia	19.59	1.32	1.62	16.65	6.88	17
China and India	15.76	0.40	3.02	12.34	10.35	2
All but China and India	13.45	0.10	-1.04	14.39	11.57	66
All but Africa	16.25	0.82	-0.70	16.13	7.76	37

TABLE 4

Decomposition of cumulated capital inflows relative to initial output between 1980 and 2000. $\Delta D/Y_0$ is the observed ratio. See appendix A for definition of the various components. Saving wedge τ_s calibrated to equate observed and predicted capital inflows. Group averages.

	(1) Observed $\Delta D/Y_0$	(2) Convergence $\Delta D^c/Y_0$	(3) Investment $\Delta D^i/Y_0$	(4) Saving $\Delta D^s/Y_0$	(5) Trend $\Delta D^t/Y_0$	(6) Wedge τ_s	(7) Obs.
Capital Flows (percent)							
Non-OECD countries	31.49	5.95	-28.18	21.97	31.75	1.07	68
By Income:							
Low Income	56.49	-14.55	-49.76	85.39	35.42	2.11	26
Lower Middle Income	37.02	17.38	-62.62	47.96	34.30	1.28	23
Upper Middle Income	12.94	22.85	-40.99	-15.93	47.00	0.68	13
High Income (Non-OECD)	-57.85	14.37	225.12	-270.35	-26.98	-3.43	6
By Region:							
Africa	39.09	-31.64	-41.53	78.20	34.06	1.79	31
Latin-America	36.89	20.96	-100.07	62.09	53.92	1.83	20
Asia	11.28	56.84	80.74	-127.75	1.44	-1.14	17
China and India	3.21	11.39	141.57	-132.15	-17.60	-2.53	2
All but China and India	32.35	5.79	-33.32	26.64	33.24	1.18	66
All but Africa	25.12	37.45	-16.99	-25.14	29.81	0.47	37

Potential Explanations

- 1.) Demographics / Life-Cycle Model
(Faster growth causes higher saving)
- 2.) Habit Persistence
(Consumption slow to catch-up with improving prod. & living standards)
- 3.) Mercantilism / Export-led Development
 - Undervalued currencies lead to trade surpluses
- 4.) Financial Frictions / Underdeveloped Domestic Financial M/Cts.
 - demand-side. Precautionary Saving (Lack of Insurance)
(Mendoza et. al.)
 - Supply-side. Inability to supply safe assets (Caballero et. al.)
 - Structural transformation