The Elusive Gains from International Financial Integration
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Introduction

- One of the main motivations behind the push towards the international financial integration of developing countries has been to accelerate their growth by attracting foreign capital.

- Flows from capital-abundant to capital-scarce countries raise welfare in the sending and receiving countries alike on the assumption that the marginal product of capital is higher in the latter than in the former.

- Welfare gains that capital-scarce countries receive from capital inflows have not been estimated in the literature. The main purpose of this paper is to fill this gap by providing benchmark estimates based on the calibration of standard neoclassical growth models.

- The approach used in this paper captures the different sources of cross-country inequality that have been discussed in the literature and combines them in the context of single optimizing framework in which the rates of factor accumulation are endogenous.
The Model

- Consider a small Ramsey-Cass-Koopmans economy that can accumulate physical capital using the savings of its residents and/or by attracting capital from abroad.

- The experiment taken over assesses the benefits of international financial integration for this economy by comparing two extreme cases: a state of *complete financial autarky* in which the country has to rely on domestic savings and a state of *perfect financial integration* in which the country can import or export at the (given) world interest rate.

- There is one homogenous good and a number of countries.

- Time is discrete and there is no uncertainty. The population $N_t$ grows at an exogenous rate $n$ that is country specific: $N_t = n^t N_0$.

- Labor supply is exogenous and proportional to population ($L_t = N_t$). Factor markets are perfectly competitive.
The Model

- The population of each country can be viewed as a large family that maximizes the welfare function: \( U_t = \sum_{s=0}^{\infty} \beta^s N_{t+s} u(c_{t+s}) \)

where \( c_t \) is consumption per capita, and \( u(c) \equiv c^{1-\gamma} / (1 - \gamma) \) is a constant relative risk aversion instantaneous utility function with coefficient \( \gamma > 0 \).

- The domestic economy produces the homogenous good according to the Cobb-Douglas production function \( Y_t = K_t^\alpha (A_t L_t)^{1-\alpha} \)

where \( K_t \) denotes the stock of domestic capital, \( L_t \) is the labor supply, and \( A_t \) is a labor-augmenting measure of productivity.

- Labor productivity grows at a gross rate \( g_t \equiv \frac{A_t}{A_{t-1}} \) may differ across countries in the short run but converges towards the same value for all countries: \( \lim_{t \to +\infty} g_t = g^* \).
The Model

- It follows from the Euler equation for consumption,
  \[ \tilde{c}_t = (\beta R_{t+1})^{-1/\gamma} g_{t+1} \tilde{c}_{t+1} \] so that in the long run the return on domestic saving is given by \( R^* = g^* \gamma / \beta \)

where \( R^* \) is the natural level of the gross rate of interest.

- The asymptotic level of productivity-adjusted capital is:
  \[ \lim_{t \to +\infty} \tilde{k}_t = \tilde{k}^* = \left( \frac{\alpha}{R^* + \delta_k - 1} \right)^{1/(1-\alpha)} \] which also is the same for all countries.

- Under the assumption that the rest of the world is composed of developed countries that have already achieved their steady state, the world interest rate is equal to the natural gross rate of interest, \( R^* \), and financial integration does not "tilt" permanently consumption profiles.

- The Euler equation \( c_t = (\beta R^*)^{-1/\gamma} c_{t+1} \) implies that domestic consumption per capita grows at rate \( g^* \) as soon as the country is financially integrated.
The Model

- Given the assumption that the world interest rate and the natural interest rate are the same, the long-run levels of capital and output *per capita* are the same under autarky and financial integration.
- Integration makes only one difference in the long-run: the level of consumption is lower under financial integration than under autarky because of the flow of interest payments to the rest of the world.
- The Hicksian equivalent variation, $\mu$, defined as the percentage increase in the country’s consumption that brings domestic welfare under autarky up to its level under integration is given by:

$$
\mu = \begin{cases} 
(\frac{U_{int}}{U_{aut}})^{1/(1-\gamma)} - 1 & \text{if } \gamma \neq 1, \\
\exp((1 - n\beta)(U_{int} - U_{aut})) - 1 & \text{if } \gamma = 1.
\end{cases}
$$
Calibration and results

- Productivity is assumed to grow at the long-run rate $g^*$ from year 0 onwards. The calibration values are as follows: $\beta = 0.96$, $\gamma = 1$, $\alpha = 0.3$, $\delta_k = 0.06$, $g^* = 1.012$, $n = 1.0074$

![Equivalence between variation](image)

- Since the curve is very flat around $k^*/y^*$, a country must have a very low or a very high capital-output ratio to significantly benefit from international financial integration.
- The capital-output ratio must fall below 1.29 or exceed 4.38 for the gains from integration to exceed 2% of annual consumption.
Calibration and results

This welfare gain is of the same order of magnitude as the quantitative estimates of the benefits of international financial integration in terms of risk sharing.

The large increase in output growth at a one-year horizon reflects the absence of any friction in the capital market. At the five-year horizon the gain in output growth can be substantial, in excess of 2.7% per year on average for capital-output ratios below 1.4.

<table>
<thead>
<tr>
<th>Capital–output ratio</th>
<th>Horizon (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1.0</td>
<td>42.60</td>
</tr>
<tr>
<td>1.4</td>
<td>27.65</td>
</tr>
<tr>
<td>2.1</td>
<td>10.18</td>
</tr>
</tbody>
</table>

The table reports the change in domestic output growth following financial integration (per cent, per annum).
Robustness

- The lower values of EIS are associated with higher equilibrium interest rates and smaller capital gaps.
- Making capital and labor less substitutable increases the welfare gains from international capital flows. This effect is larger at lower initial capital-output ratios. The welfare gains are roughly one-third smaller as population growth dilutes the gains from capital accumulation.
- Adopting a larger share of capital gives much larger estimates in terms of welfare. This is because a higher $\alpha$ is associated with a much lower capital ratio $k/k^*$.
Extending the basic model

- Differences in educational attainment or schooling rates translate into a more or less productive labor force and they have long been described as a key element in cross-country income differences.
- Human capital makes the transition dynamics more realistic, both under financial integration, where the dynamics are no longer trivial and under autarky, where the accumulation of human capital slows down the convergence towards the steady state.
- Human-capital accumulation is a channel through which domestic labor productivity is endogenous to the capital account regime.
- The motivation for introducing distortions in the accumulation of physical and human capital is to give a better account of observed cross-country differences in investment rates.
The Model

- The previous model had assumed that differences between countries were due to differences in initial level of productivity $A_0$ and the growth rate of population $n$.
- Labor is assumed to be employed in production $L_t$ is homogenous and has been trained with $E_t$ years of schooling.
- The domestic economy produces according to a Macro-Mincer Cobb-Douglas production function: $Y_t = K_t^\alpha (A_t H_t)^{1-\alpha}$ where $A_t$ reflects the exogenous, non-human-capital related determinants of productivity.
- The amount of human capital augmented labor used in production is $H_t = e^{\phi(E_t)} L_t$ where $\phi(E)$ represents the marginal return to schooling.
- Human capital accumulation depends upon the fraction of time devoted to education, $s_t$, according to $E_{t+1} = (1 - \delta_e)E_t + \theta f(s_t)$ where $\theta$ captures the efficiency of the domestic schooling technology and accounts for steady-state cross-country differences in educational attainment.
The Model

- Investment in domestic capital is implicitly distorted at rate $\tau$ so that the private return to domestic capital is $(1 - \tau)R_t$. $\tau$ is called the *capital wedge*.
- The normalized flow budget constraint of the household is:
  \[ ng_{t+1}(\tilde{k}_{t+1} + \tilde{b}_{t+1}) + \tilde{c}_{t+1} = R^*\tilde{b}_t + (1 - \tau)R_t\tilde{k}_t + w_t h_t + \tilde{z}_t \]
  where $w_t$ denotes the normalized wage per efficiency unit of labor $h_t = H_t / N_t = (1 - s_t)e^{\phi(E_t)}$ and $b_t$ denotes net foreign assets when the capital account is open.
- Whether the capital account is open or closed, the economy converges towards the same steady growth path with a constant level of human capital per capita and a level of physical capital per capita that grows at rate $g^*$. 
The Model

- Under financial integration, the domestic after-tax return on physical capital equates the world interest rate $R^*$. 
- This pins down the ratio of physical capital to human-capital augmented labor input $\tilde{k}_t = wh_t$ and the production function becomes linear in $h$: $\tilde{y}_t = w^\alpha h$
- Convergence in $h$ and hence in $k$ is not instantaneous, since human capital can only be accumulated domestically by sacrificing labor.
The Model

- The below figure reports the convergence paths to the steady state for education, consumption, and physical and human capital, for an economy calibrated to the U.S. when \( k_0 = 0.5k^* \), \( E_0 = 0.6E^* \), and \( f(s) = \min(s, 0.5) \).
Calibration and results

- The marginal return to time invested in education is assumed to be constant up to a country-specific critical threshold $\bar{s} : f(s) = \min(s, \bar{s})$
- The threshold $\bar{s}$ is calibrated as a function of the long-run level of human-capital investment $\bar{s} = \kappa s^*$.
- The welfare gains of financial integration for 65 non-OECD countries are estimated using annual data in 1995.
- The country levels of productivity and capital are calibrated in the same way as in the development accounting literature. The rates of distortion $\tau$ and $\theta$ are calibrated by matching average investment rates in physical and human capital to their steady-state equivalent.
- $n$ is measured as the average rate of growth of the working age population between 1985 and 1995, where working age is defined as everyone from 15 to 64 years old.
Calibration and results

- A measure of total educational attainment for people over age 25 is constructed using data on durations and educational attainment rates of primary, secondary, and higher schooling. This provides a measure of $E_t$ every five years from 1960 to 2000.

- To find a calibration result of schooling efficiency, $\theta$, for each country the long-run educational attainment of each country, $E^*$, is constructed by projecting forward the schooling enrolment rates observed in the latest data available. And then solving for the value of $\theta$ given $E^*$: 

$$
\theta = \delta_e E^* + \frac{R^*/ng^*+\delta_e-1}{\phi(E^*)}
$$

- Given this value of $\theta$ and the Barro-Lee measures of educational achievement ($E_t$), the path ($s_t$), the long-run level $s^*$, and the implied level of human capital per capita $h^* = (1 - s^*)e^{\phi(E^*)}$ are obtained.

- Initial capital stock, $k_0$, is calibrated using investment rates from the literature.
The table above reports the estimates of $E_0/E^*$, a measure of the country’s abundance in human capital relative to the long run, as well as the projected steady-state attainment level $E^*$ and the efficiency relative to the U.S.
Table 5 reports the estimates of the capital ratio \( \frac{k_0}{k^*_0} \), a measure of the country’s capital abundance conditional on human capital being at its long-run level \( (E_0 = E^*) \), together with the estimated capital wedge \( \tau \).
Calibration and results

Non-OECD economies benefit, on average, to the tune of 1.24% of consumption from a switch from complete financial autarky to complete financial integration with world capital markets.

This gain is larger than in the simple model without human capital, which would predict a gain of 0.39% of consumption for a capital ratio of 0.67. Integration reduces the sacrifice in terms of current consumption required to accumulate human capital.

<table>
<thead>
<tr>
<th>Equivalent variation, ( \mu ) (%)</th>
<th>Mean</th>
<th>S.D.</th>
<th>Obs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-OECD countries</td>
<td>1.24</td>
<td>0.67</td>
<td>65</td>
</tr>
<tr>
<td>Low income</td>
<td>1.37</td>
<td>0.52</td>
<td>24</td>
</tr>
<tr>
<td>Lower middle income</td>
<td>1.27</td>
<td>0.60</td>
<td>23</td>
</tr>
<tr>
<td>Upper middle income</td>
<td>0.92</td>
<td>0.74</td>
<td>13</td>
</tr>
<tr>
<td>High income (non-OECD)</td>
<td>-1.19</td>
<td>0.93</td>
<td>5</td>
</tr>
<tr>
<td>Africa</td>
<td>0.66</td>
<td>0.95</td>
<td>27</td>
</tr>
<tr>
<td>Asia</td>
<td>1.38</td>
<td>0.56</td>
<td>16</td>
</tr>
<tr>
<td>Latin America</td>
<td>0.82</td>
<td>0.71</td>
<td>22</td>
</tr>
<tr>
<td>Except China and India</td>
<td>0.88</td>
<td>0.91</td>
<td>63</td>
</tr>
<tr>
<td>China and India</td>
<td>1.50</td>
<td>0.01</td>
<td>2</td>
</tr>
</tbody>
</table>

The table reports the population-weighted average of the equivalent variation \( \mu \). Year is 1995.
Is it large? Some comparisons

Table 7 reports the welfare gain from removing the distortions on physical and human capital accumulation that is, of setting \( \theta \) to \( \theta^{US} \) and \( \tau \) to 0.

Under autarky the gain amounts to 32% of permanent consumption in the average non-OECD country. The gain is larger in poorer countries, where the distortions are larger.

The gains from removing the distortions are even larger under financial integration.
Is it large? Some comparisons

<table>
<thead>
<tr>
<th>Regime</th>
<th>25</th>
<th>100</th>
<th>Obs.</th>
<th>$A'<em>{0}/A^{U.S.}</em>{0}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-OECD countries</td>
<td>61.2</td>
<td>52.1</td>
<td>242.6</td>
<td>192.4</td>
</tr>
<tr>
<td>Low income</td>
<td>74.2</td>
<td>62.9</td>
<td>292.7</td>
<td>232.9</td>
</tr>
<tr>
<td>Lower middle income</td>
<td>59.4</td>
<td>49.9</td>
<td>233.6</td>
<td>183</td>
</tr>
<tr>
<td>Upper middle income</td>
<td>25.9</td>
<td>22.6</td>
<td>100.7</td>
<td>86.4</td>
</tr>
<tr>
<td>High income</td>
<td>12.4</td>
<td>12.9</td>
<td>53.3</td>
<td>48.8</td>
</tr>
<tr>
<td>Africa</td>
<td>64.4</td>
<td>58.1</td>
<td>255.7</td>
<td>219.6</td>
</tr>
<tr>
<td>Asia</td>
<td>66.1</td>
<td>55.3</td>
<td>260.4</td>
<td>203.2</td>
</tr>
<tr>
<td>Latin America</td>
<td>30.4</td>
<td>26.8</td>
<td>119.0</td>
<td>102.1</td>
</tr>
<tr>
<td>Except China and India</td>
<td>51.2</td>
<td>45.0</td>
<td>202.1</td>
<td>169.5</td>
</tr>
<tr>
<td>China and India</td>
<td>69.2</td>
<td>57.3</td>
<td>272.3</td>
<td>209.2</td>
</tr>
</tbody>
</table>

The table reports the equivalent variation $\mu$ (%) resulting from a productivity catch-up for each country under integration ($I$) or autarky ($A$). $A'_{0}/A^{U.S.}_{0}$ denotes the productivity relative to the U.S. Year is 1995.

- Under financial autarky, a 25% reduction in the productivity gap yields welfare gains of 52% of annual consumption on average. These gains are even larger under financial integration, again because the catch-up increases the capital scarcity of the country (61% and 242% respectively).
International financial integration could accelerate convergence in GDP per capita by raising the stock of physical capital and by stimulating the accumulation of human capital in developing countries.

The small size of welfare gains suggests, however, that international financial integration does not significantly reduce the very large gaps between developing and developed countries.

The difference between industrialized and emerging economies is not that the latter start with a large capital deficit that can be filled by capital inflows but rather that they are converging towards a much lower level of income. Although the capital account opening can accelerate this convergence, the welfare benefit appears small when compared to the long-run inequality resulting from long-run cross-country differences in productivity or distortion levels.
Conclusion

- This paper’s main finding is that developing countries do not benefit greatly from international financial integration in a calibrated neoclassical growth model.
- Countries have much more to gain from upgrading their domestic engines of growth and development than from attracting larger quantiles of foreign capital per se.
- The main message of this paper is that if international financial integration has a large impact on the welfare of developing countries, this must be through channels that are not in the textbook model.
- The results show that the gains from international financial integration are dwarfed by the potential gains from policies that aim at reducing the domestic level of distortion or increasing the domestic productivity.