The Mixed Blessing of FDI: Two-Way Capital Flows and Growth

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Abstract

The elusive growth effects of FDI in developing countries are still subject to hot debates. This paper theoretically links inflows of FDI to concurrent financial outflows via a credit market channel. This theory can explain both, the nuanced growth effects of FDI, which the empirical literature has stressed, and the actual pattern of two-way capital flows between the global North and South that can be observed in the data. In a model of neoclassical growth with imperfect capital markets, inflowing FDI exacerbates credit constraints for domestic entrepreneurs by increasing competition. This leads to reduced domestic demand for credit and consequently to reverse flows of financial capital. It shows that FDI initially increases income – as in static models –, but by inhibiting the emergence of an entrepreneurial class reduces national income in the long run. In a dynamic perspective, developing countries could hence develop more slowly, but more sustainably without inflows of FDI.

Keywords: FDI, financial market globalization, welfare effects, open-economy growth, middle income trap, two-way capital flows
JEL: F21, F43, F54, F62, O16

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1 Introduction

From most known theoretical considerations, financial globalization should promote capital flows to developing countries and this should increase welfare and growth. However, in aggregate the amount of North-South capital flows remains to be rather small and the growth effects of financial liberalization to be mixed at best (Kose et al. (2009)). What can be observed are net flows of FDI into developing economies, which is likely to be linked to the availability of cheap labor in these countries. However, at the same time, financial capital is flowing into the opposite direction – from developing and emerging economies into industrial countries – in almost equal amount.

This pattern is illustrated in Figure 1. It depicts disaggregated net capital flows by type for the group of High Income OECD countries ("North") and the group of non-High-Income OECD countries ("South") for the period from 1980-2012, computed from data by the International Monetary Fund (IMF). For both groups, it once shows the net aggregate outflow of foreign direct investment (FDI), and once net aggregate outflows of all other types of capital ('financial' capital). The latter includes portfolio investment, financial derivatives, other investment and reserve assets, as defined by the IMF. FDI thus captures only that investment, where direct control over production is retained. By construction, flows between countries within a group net out, and the graph shows the outward (or inward) flows of the whole group of each type of capital, both as a share of worldwide GDP.[1] Positive values imply net capital outflows of FDI / financial capital, negative values imply inflows. The two-way pattern of capital flows is quite stable over time and accentuating with the general surge of capital market globalization.

This paper offers a simple coherent theoretical grounding for this observation and analyzes the growth effects of this structure. I include a simple capital market imperfection into a standard neoclassical (open-economy) model of growth to explain the flows of FDI from capital abundant to capital scarce countries and the opposing flow of financial capital as two sides to the same mechanism. This goes along with a nuanced perspective on the growth implications of FDI, which shows to be a mixed blessing for the receiving countries.

The model can thereby explain a couple of stylized facts on the effects of FDI in developing

[1] The flows between the two groups do not net out to zero, because the data covers only 169 countries, excluding particularly tax havens, as Zucman (2013) points out. He estimates that in fact the countries of the North would be a net creditor if their holdings in tax havens were included. In the official data shown here, both groups would be net debtors.

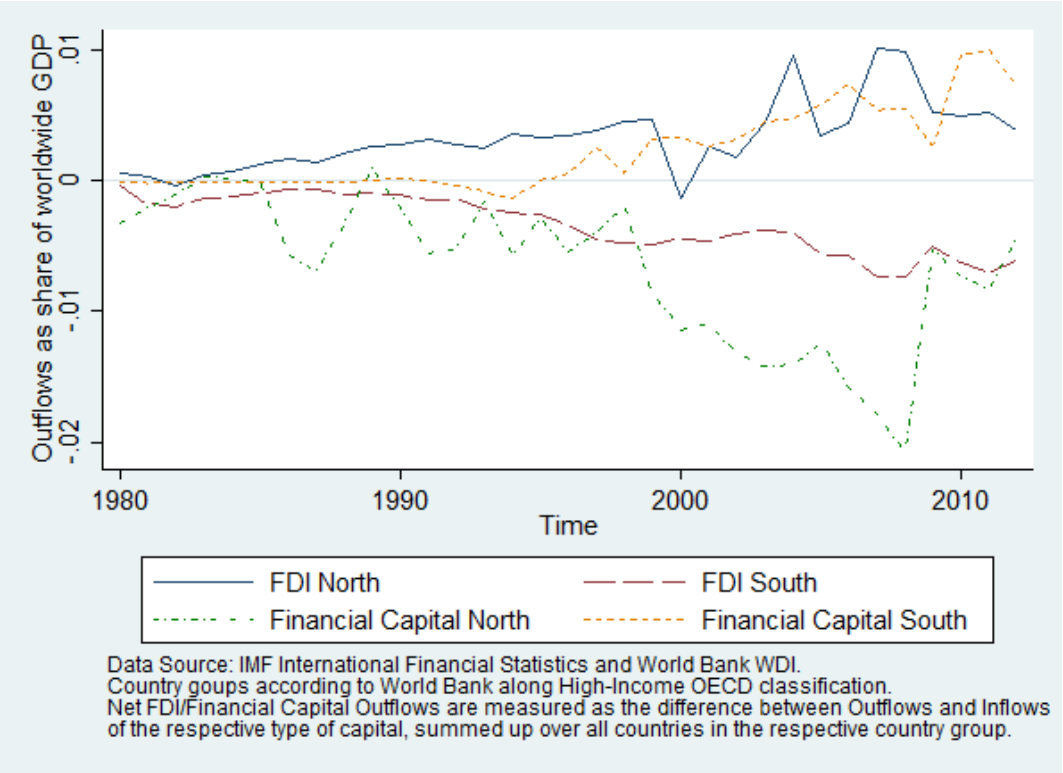

Figure 1: Net Capital Flows by type and country group as share of worldwide GDP

countries. It is known that an inflow of productive capital has an immediate positive effect on a developing country's economy (see e.g. de Mello (1997)). However, the long-term growth effects seem to be rather limited, if not negative (Carkovic and Levine (2002), de Vita and Kyaw (2009), Herzer (2012), also concluded in Kose et al. (2009) for financial globalization as a whole). The few available evidence also shows that FDI tends to crowd out domestic investment (Agosin and Machado (2005)). These facts are hardly explained by existing theories of full capital market integration. By taking a dynamic growth perspective, this paper relates these effects to the structure of capital flows, and particularly to the effect that FDI has on both, overall income, and domestic entrepreneurial activity in developing countries. The increased incomes translate into savings, but reduced credit demand by domestic entrepreneurs implies that these funds leave the country.

In the model, investment is freely pursued around the globe. Capital ownership is initially concentrated rich countries but the productive capital itself need not be. Whereas international direct investment is not subject to frictions, the market for financial credit is imperfect.

As a consequence, wealth plays a role for the possibility to obtain credit needed to conduct new investment. Therefore, the individual accumulation of assets is crucial for the further development of the worldwide distribution of (profitable) investment ownership and hence incomes. This is close to the analysis of international interaction on only an imperfect credit market by Matsuyama (2004), as will become clear below. Because credit eligibility here does not only depend on wealth, but also on the profitability of the prospective investment, then, in addition, inflowing FDI has a direct impact on domestic entrepreneurial activity: By raising the wage rate and reducing the scarcity of capital, it decreases the marginal product of capital and hence of individual investments. Although the immediate raise in wage income also increases domestic income and hence pledgeability, the former effect dominates the latter: eventual entrepreneurs in poorer countries generally then face the same global investment opportunities, but due to their lower accumulated income, they are still not the ones who can pursue this investment, due to the structure of the capital market. There, potential investors of higher income are preferred to pursue the basically same investment. On a fully integrated capital market, domestic entrepreneurial activity in developing countries is thus hindered by foreign direct investment.

This contrasts to an autarkic growth process, where at initially high marginal products to capital, and wage incomes that rise accordingly, an entrepreneurial class can emerge. Capital only builds up slowly by reinvested domestic savings, but thereby, with incomes increasing and marginal returns decreasing in pace, growth trickles down the economy by the chance to take investment opportunities. Integrating into international capital market interrupts this growth process. Income initially increases as capital rushes in but investment income is foregone in the long run. This argument relates the real world observation of countries being stuck in a so-called 'middle income trap' (e.g. Eichengreen et al. (2013)), i.e. growth slowdowns of emerging markets that experienced massive periods of growth prior to that, usually going hand in hand with their integration into world capital markets.

The mechanism described then also also explains the accompanying structure of two-way capital flows that is observed: Because the immediate rise in income and thus savings that is incurred by FDI is contrasted by a falling demand for credit by domestic agents, financial capital flows out of poorer countries into richer ones. This credit is hence used partly to in turn finance direct investment by Northern entrepreneurs in the South. The endogeneous wedge between the two types of capital income is what shows responsible for lost out incomes in the long run in developing countries, despite the initial gains that the inflow of FDI

incurs. By dampening domestic investment and hence credit demand, but raising income and savings, FDI hence is the driving force behind the concurrent financial capital outflows. In the baseline model, countries only differ in their income levels due to a different progress in the growth process. Even though we will take the perspective of a developing country throughout most of the analysis, the effects on incomes in richer countries are just the mirror image: An outflow of capital initially harms domestic workers, but investment around the world and the access to credit for it increase national income in the long run.
The model is very stylized and attempts to explain in one single mechanism some unexplained facts about the pattern of capital flows and growth the effects of FDI as a coherent phenomenon. It therefore in its simplest form abstracts from other potential mechanisms often said to be involved with FDI. It can easily be extended to include these and the discussion will briefly touch on a few directions for elaboration of the basic mechanism.
The remainder of the paper is organized as follows: The next section discusses in more detail some related literature. Section 3 sets up the model and section 4 lays out how the growth and trickle down process in this economy emerges in autarky. Section 5 shows how this process is interrupted by the opening up of the economy to world capital markets and section 6 discusses the resulting structure of capital flows. Some extensions are briefly presented in section 7: Section 7.1 lays out the two-country setting and 7.2 shows how the result is magnified when differences in total factor productivity between countries are accounted for. Section 8 concludes.

2 Related Literature

In the standard static neoclassical setting of capital flows, the increase in wage incomes exceeds the loss of capital incomes by domestic capital owners if capital flows into a capital scarce country. In a dynamic setting with perfect capital markets, this also leads to increased savings and surge in domestic capital ownership. There is neither room nor need to differentiate between borrowing and investing on the one hand, or lending on the hand, as both yield the same return. Integration of capital markets should hence lead to an accelerated convergence between countries. When Lucas (1990) put up the puzzle that capital is not flowing from North to South in close to the amounts predicted by theory, the literature following up on this argued that this is probable because of actually lower marginal returns to capital in developing countries, mainly due to lower accumulated (immobile) human capital

(Mankiw et al. (1992)). If only the buildup of physical, but not that of human capital can be financed via international capital markets, this may explain low inflows of capital into developing and emerging economies (Barro et al. (1995)). Gourinchas and Jeanne (2006) also find that an opening up to international capital markets with this type of distortions only marginally increases growth performances. This literature can well explain why capital doesn't flow in the amounts predicted, and why the marginal product for foreign investment remains low even at low levels of capital stocks. This would however not explain why we actually do observe net FDI flows into developing countries, as presented in figure 1. Neither can it explain why at the same time, other types of capital are actually flowing in the reverse direction on net.

There is another extensive strand of literature that discusses how upstream flows of financial capital can be explained by an imperfect credit market, starting with the partial-equilibrium framework of Gertler and Rogoff (1990). Matsuyama (2004) shows in general equilibrium that this may lead to endogenous inequality between countries when capital flows to where capital already is. The analysis undertaken here has a lot in common with (and actually borrows from) his work. It extends the analysis only to more precisely model intertemporal links in the growth process, and to allow for FDI, defined as someone with a certain credit eligibility being able to undertake a productive investment in another than his home country. This is excluded in Matsuyama (2004), which concentrates only on the effect of competition on credit markets, generating aggregate financial capital flows from South to North to finance domestic investment there.

In the same line and closely related to our paper are the works by Song et al. (2011) and Buera and Shin (2009). They look at how an economic transition will lead to outflows of financial capital when credit markets are imperfect. Whereas Buera and Shin (2009) concentrate on the supply side of credit as a driving force because entrepreneurs need to save in order to make investments, Song et al. (2011) show to regard the case of China that the reallocation from financing-intensive state owned enterprises to more restricted private firms affects the demand side for credit, leading to a current account surplus during the transition period. All of these papers also do not consider the effects of FDI.

The first and only work to explicitly jointly account for the observations of Figure 1 is Ju and Wei (2010). To explain the structure of two-way capital flows, they provide a static model where capital flows are driven by differences in institutional quality between countries. The quality of financial institutions determines where financial capital goes and the

level of property rights protection and the capital scarcity determine where FDI flows to. However, both types of capital flows are not directly linked in their model. To generate the pattern shown in Figure 1, they therefore concentrate on a narrow group of countries that have good property rights protection but at the same time a weakly developed financial market. This is different to the analysis undertaken here insofar as we do not look at differences in institutional quality, but analyze this pattern as a result of interaction in one imperfect capital market of agents of different inital positions.[2] In contrast to Ju and Wei (2010), our analysis then considers the dynamic effects of FDI on domestic investment opportunities and income and thereby directly relates the inflows of FDI to financing opportunities for domestic entrepreneurs and concurrent financial capital outflows.[3]

By theoretically underpinning the empricial finding of Agosin and Machado (2005) on the crowding out effect of FDI on domestic investment, my paper is related to the works of Grossman (1984) and Reis (2001), who also comment on how FDI might slow down domestic entrepreneurial activity. Both results complement the argument made here, but stress different mechanisms. The former argues that possible entrepreneurs in developing countries prefer to leave the risk of investment to foreign investors and instead work in foreign companies for lower, but safe wage income. Risk sharing is no objective in my model, which implies that agents would prefer, but are prevented from becoming entrepreneurs. The resulting welfare losses in the economy opening up are thus absent in Grossman (1984). Reis (2001) on the other hand shows in a model of endogenous growth that the exogenous technological advantage of foreign firms may crowd out domestic research activities in partial equilibrium, so that the profits that accrue to these activities and that escape the country by repatriation may mirror domestic welfare losses. However, in her model, the countries differ in their technological characteristics and the capital market is restricted to direct investment.

I show the effect of a reduction of domestic entrepreneurial activity in a general equilibrium model of complete – and same – market interaction that deliberately stays as close to neoclassical growth theory as possible. I thereby deliver a tractable way to identify why – in contrast to conventional arguments – there is a short-run long-run tradeoff involved with FDI and it could be disadvantegeaous for developing countries in the long run to have substantial

[2]Also, because the analysis undertaken here takes into account the role of individual agents, we do not have to assume convex costs of investment to obtain an interior solution.

[3]To be specific, The appendix of Ju and Wei (2010) extends their setting to a dynamic one. Still, feedback effects between investment and credit market interaction are cut. Consequently, short term effects are simply magnified in the long run.

shares of GDP leave the country as foreign factor payments such that GNI is lower than the domestic value of production. This pattern holds true for almost all developing countries.
I do not consider other effects of FDI than the increase in the domestic capital stock which are often attributed to it, such as technological or competition-induced spillover effects (see e.g. de Mello (1997) for an overview). The reason is twofold: First, a metastudy by Harrison and Rodriguez-Clare (2010) concludes the empirical evidence on these two be negligable at best. Second, and more importantly, I want to highlight one specific effect of FDI, abstracting from everything else that may well be considered additionally. Even if positive effects may be present, the mechanism presented here should help answering the question why especially FDI doesn't have the expected overall positive effect on welfare in developing countries. Whereas most literature focuses on country-specific reasons, my model offers a systemic explanation for this.

3 The model

The model is based on that of growth under imperfect capital markets from Matsuyama (2004), but alters the basic framework to analyse the effects of FDI in particular instead of only looking at the effect of competition for credit.[4]
Consider an economy that is made up by a homogeneous population of unit mass. Individual agents are indexed by $i \in [0,1]$ and each supplies one unit of labor inelastically in each period. Agents are infinitely lived. There is only one good produced, used for consumption and investment. Production follows standard neoclassical patterns: $Y_t = F(K_t, L_t)$, where K_t and L_t are aggregate supplies of capital and labor in period t. F is a constant returns to scale production function and $L = 1$ such that production equals per capita production and can be expressed as $y_t = f(k_t)$, lower case notation indicating per capita variables. Furthermore, $f'(k) > 0 > f''(k)$. Inada conditions hold. However, since we will have to make a statement about the characteristics of growth over history, suppose that $f(0) = \epsilon$, with ϵ small, but greater zero.
The labor market is competetive and labor is paid its marginal product, $w_t(k_t) = \frac{\partial F(K_t,1)}{\partial L}$. Invested capital receives the residual of production, which is, per invested unit of capital,

[4]The central results in the autarky case therefore resemble the one in Matsuyama (2004). The situation under open markets, however, looks fundamentally different here compared to the one in his setting.

$\rho_t = \frac{f(k_t)-w_t(k_t)}{k_t} = f'(k_t)$. $f'(k) > 0 > f''(k)$ implies that a greater capital stock decreases per unit capital returns and increases wages.

For simplicity, capital depreciates fully after one period.[5] Agents save – in a Solow-type way – a constant fraction s of their income.[6] They can transfer their savings to the next period by either lending it on the competetive market for credit, earning the gross return of r_{t+1}, or by investing it into physical capital. Investment in physical capital only becomes effective the next period. If investing, each agent can run exactly one investment project by investing exactly 1 unit of capital into the joint production process. This restricts in both directions: First of all, investment is indivisible, i.e. there is a threshold of funds that have to be brought into each single investment. This will lead to competition on the market for credit in the first place. Secondly, this is the most extreme, but also most tractable form of individually diminishing returns to investment. If they weren't, the richest individual would always be able to attract all credit, as we will see. Both, indivisibility and diminishing returns, are in their extreme form a simplification and only introduced as such for tractability, but both in general are essential for the mechanism to be at work.

If an individual i wants to invest, but her funds – which equal her savings – are not sufficient to ensure investment, she has to borrow the remaining share, $1 - sI_t^i$, on the credit market in order to invest one unit in physical capital in $t+1$. She then earns the return on her investment in $t+1$, has to repay her credit taken (if any), and also receives the wage payment on her labor supplied. An entrepreneur's income in period $t+1$ then reads:

$$^{E}I_{t+1}^i = f'(k_{t+1}) - r_{t+1}(1 - sI_t^i) + w(k_{t+1}) \tag{1}$$

If she instead lends her savings, she receives the credit market return on this loan and earns her wage, and her income is given by:

$$^{L}I_{t+1}^i = r_{t+1}sI_t^i + w(k_{t+1}) \tag{2}$$

[5]This emphasizes the fact that some investment is not just èarlier' when it comes to competition for investment, but that investment takes place constantly and investment opportunities are distributed structurally.

[6]This could easily be motivated by an OLG-Model with log-preferences and 'warm-glow' bequests or simply as a dynasty-model as in Matsuyama (2011). Both modifications to the interpretation would not change the results qualitatively.

To compare the two, (1) can be rearranged to:

$$^{E}I^i_{t+1} = f'(k_{t+1}) - r_{t+1} + r_{t+1}sI^i_t + w(k_{t+1}) = (f'(k_{t+1}) - r_{t+1}) + {}^{L}I^i_{t+1} \tag{3}$$

Thus, an individual will always be willing to invest if

$$f'(k_{t+1}) \geq r_{t+1} \tag{4}$$

Because this does not depend on individual characteristics, this is also the condition for any investment to take place. We refer to this as the Profitability Constraint (PC). All individuals additionally underlie a borowing constraint (BC), however. This takes the form:

$$\lambda f'(k_{t+1}) \geq r_{t+1}(1 - sI^i_t) \tag{5}$$

This capital market imperfection lies at the heart of our analysis. It says that an individual with income I^i_t can only pledge a share $\lambda < 1$ of the prospective return to her investment (LHS) on her payback (RHS).[7] This has two implications: First, ceteris paribus, an individual with a lower income has less collateral to bring in the investment, thus has to raise more credit and consequently finds it harder to warrant for the high repayment by the return to investment, i.e. have the condition satisfied. Secondly, a higher aggregate capital stock decreases the prospective returns and thus the probability of everyone to be eligable for credit. λ is a measure of credit market imperfection.

If (4) holds with inequality, i.e. if physical investment is more profitable than lending, everyone would like to invest rather than lend on the credit market. As long as agents can do so, this investment decreases the left hand side of both, (4) and (5). Therefore, for any given r_{t+1}, either one will bind to 'stop' investment activity. The equilibrium interest rate r_{t+1} will be determined by supply and demand in the credit market, as spelled out below. The borrowing constraint will be binding as long as $\frac{1-sI^i_t}{\lambda} \geq 1$ for some individual i.[8]

We will restrict ourselves in what follows to the case that this holds, which is equivalent to saying that the borrowing constraint (5) is always binding for some agents and the profitabil-

[7] This reduced form of the borrowing constraint is e.g. directly derived from a moral hazard story a la **?**. Matsuyama (2004), p.860f, argues that it stands in line with most microfoundations of capital market imperfections that can be found in the literature.

[8] To be exact, it has to bind for the critical agent as defined below. This will in equilibrium be equal to the lowest income, making the two statements equivalent.

ity constraint (4) holds with inequality, i.e. investment is strictly profitable.[9] Those agents (we will introduce the reason for ex post income heterogeneity later) which have to borrow only so little that investment can guarantee repayment, will borrow on the credit market and invest their savings and credit in physical capital and become entrepreneurs. All others will lend their savings as credit. If an entrepreneur has so many own funds, that these suffice for investment alone, she will make the investment and lend the remaining savings on the credit market, which also results in an entrepreneur's income given by (3).[10]

W.l.o.g., order the agents increasing in their income, such that I_t^i is increasing in i. Now, we define $\tilde{i}_t$ as the agent which can just pledge investment, i.e. for whom the borrowing constraint (5) is exactly binding, for a given r_{t+1}. Denote her critical income $\tilde{I}_t$, which is the income that just suffices such that (5) holds with equality:

$$\tilde{I}_t = \frac{r_{t+1} - \lambda f'(k_{t+1})}{s r_{t+1}} \tag{6}$$

All agents $i < \tilde{i}_t$ cannot invest, all agents $i \geq \tilde{i}_t$ can. It means that agents with a lower income and hence less collateral lend their savings, all those who in contrast can self-finance a larger share of investment will be able to invest.

The exact equilibrium values of k_t, k_{t+1}, and r_{t+1} will depend on the whether an economy is closed or integrated into international markets. But equilibrium on the credit market is always determined by equalizing respective credit supply and demand. From (6) we see that for a given k_{t+1}, more and more lower income agents will be able to borrow with a decreasing interest rate. They will invest their own savings and borrow the remainder on the credit market. Hence, investment is also decreasing in the interest rate r_{t+1}. However, for a fixed savings rate s, and given current period incomes, aggregate savings are fully determined and fixed in a given period. These savings can either be invested by the saver herself, or be lent on the credit market to be invested by someone else. Savings must hence equal investment and the interest rate is determined such as to equalize the two, as depicted in Figure 2. For a higher interest rate, there would be excess credit supply and vice versa. If able to demand credit (and not by constraint forced to supply), an agent will do so, such the borrowing

[9] Note, that this is different to Matsuyama (2004)'s analysis where an interior solution can only exist if the Profitability Constraint is binding in the richer countries. By cutting intertemporal links in individual incomes, he does not account for ex post heterogeneity between agents within countries, which changes the interpretation.

[10] We will still refer to such an agent as 'entrepreneur' rather than 'lender'.

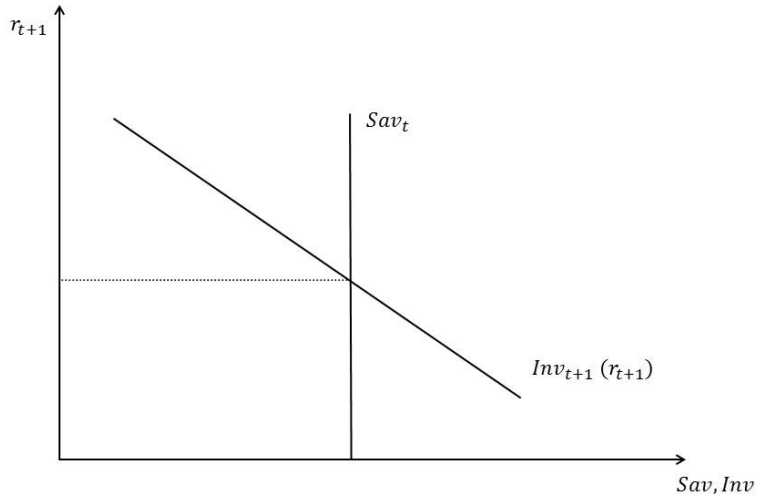

Figure 2: Credit market equilibrium

constraint regulates who can invest. Because all agents can run only 1 investment project, the amount of investment is also equal to the number of agents who invest. In equilibrium, the interest rate will hence to adjust such that exactly the fixed amount of savings can be invested by the same number of agents, including their own savings, and from the amount they borrow. The richest agents will be preferred to obtain credit, because they can pay the highest interest rates, but all borrowers pay the same interest rate, namely that which allows just enough agents to invest all savings. Equilibrium on the credit market is thus indirectly determined by $\tilde{I}_t$, which is the income of agent $\tilde{i}_t$, defined by

$$Sav_t = Inv_{t+1}(r_{t+1}) = 1 - \tilde{i}_t(r_{t+1}) \tag{7}$$

The amount of savings determines how many agents will be investors, and the lowest income of these hence determines the interest rate. This is then from (6) given by

$$r^*_{t+1} = f'(k_{t+1})\frac{\lambda}{1 - s\tilde{I}_t} \tag{8}$$

As we will see in what follows, the income distribution may have flat parts, i.e. more agents may have the exact same income. If this is the case at $\tilde{i}_t$, some agents of those of equal income are credit rationed.
Also, from (8), we see that the credit market imperfection implies that there is a wedge between the equilibrium interest rate and the return to physical investment, the latter being greater by $\frac{1-s\tilde{I}_t}{\lambda}$, as long as the borrowing constraint is binding.

4 Autarky

Dynamics

It follows from the above analysis that in autarky all domestic savings in period t are invested in physical capital, i.e. $sf(k_t) = k_{t+1}$ – either directly by the saver or via lending. This determines $f'(k_{t+1})$. The interest rate r_{t+1} will adjust such that all savings find an investor. Because also own savings are invested, savings and credit supply, as well as investment and credit demand, are not perfectly identical concepts. We will here look at supply and demand, even though this closely resembles the logic from section 3. Credit supply is given by the current incomes of only lenders and credit demand by the additionally needed funds of those agents that are eligible to borrow and invest. Credit supply is hence given by $s\int_0^{\tilde{i}_t} I_t^i di$ and credit demand is given by $(1-\tilde{i}_t) - s\int_{\tilde{i}_t}^1 I_t^i di$. Whereas the former is strictly increasing, the latter is strictly decreasing in in $\tilde{i}$. Equality of the two again determines $\tilde{i}_t$. This is illustrated in Figure 3. The income of agent $\tilde{i}_t$, i.e. $\tilde{I}_t$, determines the interest rate r_{t+1} by (8) in any period, such that aggregate savings can be invested in every period.
Thus, for the aggregate economy, capital builds up and standard neoclassical growth emerges, irrespective of the capital market imperfection. Figure 4 illustrates the dynamics.

Because Inada conditions hold, the capital stock is increasing over time. The share of entrepreneurs in each period $t+1$ is also given by k_{t+1}, and hence is increasing.
From (3), the income of an agent who becomes an entrepreneur will exceed that of an agent of same period-before income by exactly the excess profits of physical investment on her invested one unit of capital. She earns the wedge on what she borrows and and receives the higher returns on her own savings. If she can fully self-finance her investment, one unit of her savings is paid off with the higher return and the remainder is lent on the credit market. Since only the highest income (and thus highest savings) individuals are able to borrow and

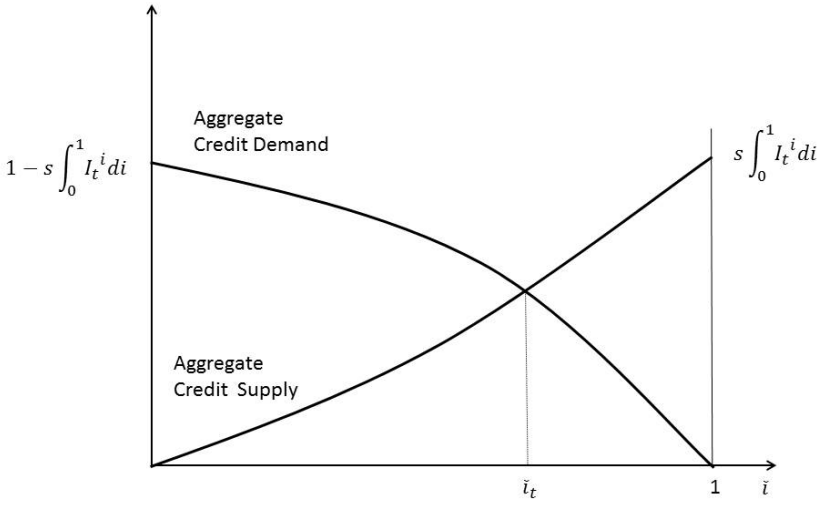

Figure 3: Autarky credit market equilibrium

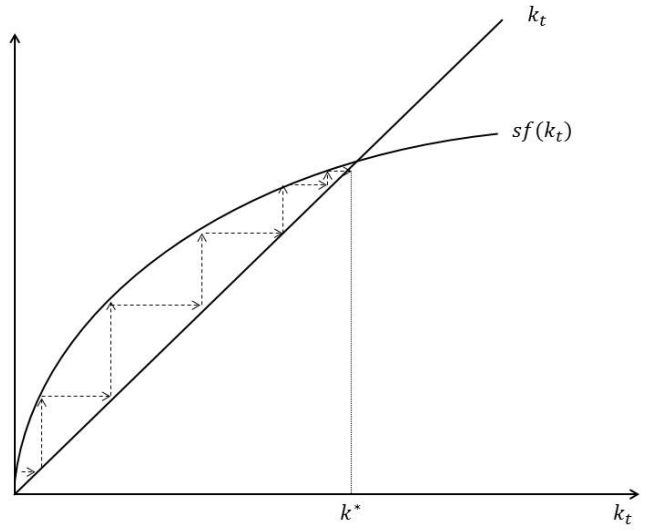

Figure 4: Autarky Dynamics

invest, they must have had a higher income in the period before also and so on. Thus, as long as the aggregate capital stock is increasing - and thus the share of entrepreneurs - an agent who was an entrepreneur the period before will be an entrepreneur in all succeeding periods as well.[11] (2) and (3) imply that the ordering of agents according to their income does not change, due to the deterministic path-dependence of incomes. However, an increasing capital stock implies that in each period additional agents must become entrepreneurs. These must then have been lenders the period before and all periods before that. Figure 5 illustrates the transition and the resulting income distribution.

The critical income $\tilde{I}_t$ is hence the income of an agent who has been a lender throughout

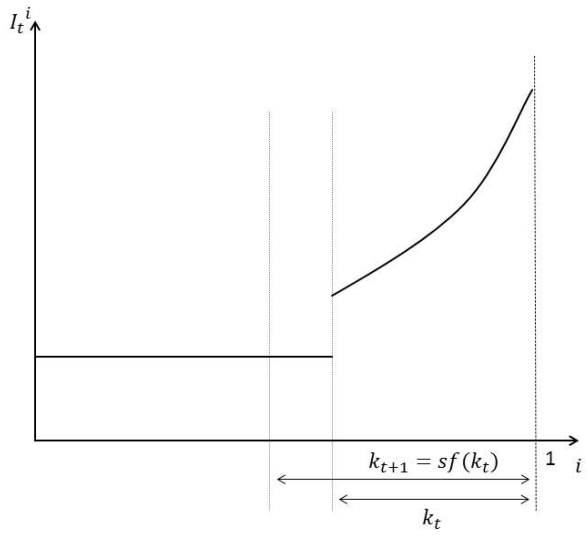

Figure 5: Autarky Transition

from the beginnning of the growth process. Having only received wage income and saved part of that for all periods since then, by iterating (2), this income is given by:

$$^{L}I_t^i = w(k_t) + \sum_{i=0}^{t-1} w(k_i) s^{t-i} \prod_{j=0}^{t-i-1} r_{t-j} = \tilde{I}_t \tag{9}$$

[11] Obviously, there is heterogeneity within the group of entrepreneurs, depending on the time that they have been investors and have received the respective income.

This critical income determines the equilibrium interest rate, given by (8). In each period, the income of the next 'new' entrepreneur fixes the interest rate which in turn determines next period's incomes and so on. With an increasing capital stock, also the wage rate increases with economic growth.
The movement of the interest rate is ambiguous. Because the interest rate changes over time and part of a lender's income is also given by the return on her savings, the increasing wage income does technically not necessarily imply a rising overall income. We will, however, assume that this is always the case and the income of pure workers increases with their wage income, which is in line with the empirical evidence.[12]

Assumption 1 *The income of pure lenders is increasing over time, i.e.* $\frac{\partial^L I_t^i}{\partial t} > 0$.
This derives from the increase of the wage income, which is rising with the increase in the capital stock. The increase in wage therefore must always offset possible losses in interest income on savings. For the necessary restrictions on the production function, see Appendix A.

Assumption 1 always holds for reasonable parameter values.
The capital income of the individual investor on the other hand decreases over time, but they benefit from the increase in the wage rate as well. The result on their overall income is ambiguous. However, more and more agents become entrepreneurs, yielding the higher income compared to that of the lenders.
Aggregate GNI in autarky, GNI_t^a, must be equal to $GDP_t^a = f(k_t)$. We can now also rewrite this in terms of aggregated individual incomes. This is given by

$$\begin{aligned} GNI_t^a = k_t(f'(k_t) - r_t) + \sum_{i=1}^{t-1} k_{t-i}(f'(k_{t-i}) - r_{t-i}) s^i \prod_{j=0}^{i-1} r_{t-j} \\ + w(k_t) + \sum_{i=0}^{t-1} w(k_i) s^{t-i} \prod_{j=1}^{t-i} r_{t-j+1} \end{aligned}$$

This representation emphasizes the fact that in each period the share of entrepreneurs receives an additional income on their invested capital (the terms in the first line), and all agents get a wage income (second line). All either get return on their saved incomes or need to repay them less, which is why all income is discounted through with the respective interest

[12] See e.g. Chen and Ravallion (2010).

rate of all relevant periods.
The overall dynamics of the aggregate capital stock, described by $sf(k_t) = k_{t+1}$, as already seen, are not affected by the capital market imperfection.

Steady State

The dynamics implicitly define the steady state to which the autarky economy converges to, as depicted in figure 4:

$$sf(k^*) = k^* \tag{10}$$

In the steady state, the share of entrepreneurs is exactly k^*. The respective incomes of each type of agent converge to:

$$^{E}I^* = \frac{f'(k^*) - r^* + w^*}{1 - r^*s} \tag{11}$$

$$^{L}I^* = \frac{w^*}{1 - r^*s} \tag{12}$$

Where again the steady state interest rate is determined by the most recent entrepreneur's last income, which is just given by (12).[13] It will adjust such that all savings can be invested by someone who is able to do so. The steady state level of investment is also unaffected by the effectiveness of the credit market imperfection.
Note, that in the steady state, the savings of entrepreneurs cannot alone suffice to afford investment, i.e. $s\frac{f'(k^*)-r^*+w^*}{1-r^*s} < 1$. If they didn't demand credit, savings would be invested by new entrepreneurs.
GNI in the steady state is again equal to GDP, $f(k^*)$, and can be expressed as

$$GNI^{a*} = k^*\frac{f'(k^*) - r^*}{1 - r^*s} + \frac{w^*}{1 - r^*s} = \frac{k^*(f'(k^*) - r^*) + w^*}{1 - r^*s} \tag{13}$$

[13] An alternative way to look at it would be that 'in' the steady state, no new entrepreneur will emerge and $\tilde{I}_t$ is the income of the 'last' entrepreneur. Considering instead that we always only approach the steady state, marginal shares of the population will become new entrepreneurs and the critical income is given by the income of the lenders. I prefer looking at it the latter way, even though it makes no difference for the analysis undertaken here.

5 Open Capital Markets

Now, consider a small open economy in the South, which is fully described by the above characteristics, that opens up to the world market. To focus on the structural mechanism, assume that all other countries in the world (the North) are of the exactly same type. Especially, the level of capital market imperfection λ is equal in all countries, implying that differences in the competitiveness on the credit market arise from differences in incomes solely.[14] The difference is given only by that they are already more progressed (higher t), whereas the opening economy is behind in the process of development (lower t). This implies that the world is relatively less capital scarce than the domestic country. Denote the period of opening up by T. Then the domestic capital ratio $k_T < k_T^W$ (the world capital ratio). For convenience, we will henceforth assume that the world is already in its steady state, such that $k_T^W = k^*$. This is not crucial, the analysis holds for all cases where a less developed country opens up to a more progressed world in terms of the development process described in section 4.

Opening up now implies two things: First, investors can freely invest in physical capital around the world. The only restriction is that each investor can only make one indivisible investment and needs to decide where to do so. Secondly, agents can freely lend and borrow at the world market for financial capital, only restricted by the borrowing constraint. Lenders receive the world market return $r^W = r^*$ on their savings. Potential borrowers face this credit cost and the borrowing constraint, which is dependent on their individiual incomes and on the prospective return of their investment. Hence, borrowing source and investment location are disentangled from each other in the open economy.

In period T, all savings incomes are determined by the history of incomes in the closed economy, and wage incomes by the capital installed, because foreign investment becomes only effective in the next period. With unrestricted investment, Northern investors will for the next period invest in the South and capital will flow into the domestic country until returns are equalized, such that $k_{T+1} = k_{T+1}^W = k^*$. The returns for all investors equalize around the world. Particularly, next period's returns for domestic investors drop due to the inflow of foreign capital, as $f'(k^*) < f'(k_T)$.

Now consider what this implies for the market for credit. The world market return to

[14] Loosening this assumption would magnify our results while making the weaker point that institutional differences account for differences in development. The abstraction made here shall distinguish a different feature of same market interaction.

financial capital is given by r^*. Agent i is in period T able to pledge investment for period $T+1$ iff

$$\lambda f'(k^*) \geq r^*(1 - sI_T^i) \quad \Leftrightarrow \quad I_T^i \geq \frac{r^* - \lambda f'(k^*)}{sr^*} \tag{14}$$

This is exactly equivalent to the critical income for borrowing in the steady state. However, by Assumption 1, the incomes of current domestic lenders in T are lower than this, and they will not be able to borrow and invest. For current domestic entrepreneurs, it is not clear whether their income exceeds the critical income. Denote the share of domestic agents who can in period T pledge payback and hence invest for the next period by $\tilde{k}_{T+1}$. Then, Proposition 1 holds.

Proposition 1 *The share of entrepreneurs after opening up will at most be all those agents that have been entrepreneurs before opening up, i.e.* $\tilde{k}_{T+1} \leq k_T$.

Proof. The world interest rate r^* is determined exactly such that for a lender with steady state income, given by (12), condition (14) is satisfied with equality, i.e. $\tilde{I}_T = {}^L I^* = \frac{w^*}{1-r^*s}$. Agents in South thus can borrow on international markets if their income exceeds that of a steady state lender. For those that are already entrepreneurs in the moment of opening up, it is not clear whether this holds, i.e. whether ${}^E I_T^i > \tilde{I}_T$. It may hold for all, for only some, or for none of those that had already invested. For lenders, by Assumption 1, their income in T is strictly lower than in the steady state, ${}^L I_T < {}^L I^* = \tilde{I}_T$. Thus, these agents cannot pledge investment for $T+1$ at world market conditions. ■

The statement in Proposition 1 holds with equality if all past entrepreneurs can become entrpreneurs in the open economy.[15] Note that the timing of investment in the model is not crucial for the result of Proposition 1.

What happens in the following periods? In period $T+1$, foreign investment becomes effective and the physical capital stock in the economy is given by k^* (which may – and does – differ from $\tilde{k}_{T+1}$). The increase in the capital stock raises the wage rate in $T+1$ to w^*. This is an immediate gain for the entire population and increases the balance sheet for pledging investment for the subsequent periods.

[15] Because returns and thus investors' incomes are higher the lower the capital stock is, it is more likely that it holds for some or even all past entrepreneurs, the more backward the country is when opening up.

The income of a lender from period T to period $T+1$ in South is thus given by:

$$^{LS}I_{T+1} = w^* + sr^* \cdot {}^{LS}I_T \tag{15}$$

However, the income that would be just sufficient to obtain credit is still given by $\tilde{I}_{T+1} = \frac{r^* - \lambda f'(k^*)}{sr^*}$ and hence determined by steady state world market conditions, because foreign investment also rules domestic investment returns for all subsequent periods. From the fact that the income just sufficient for pledging investment can be expressed as the wage income in steady state plus the savings on previous income, the critical income in period $T+1$ can be rewritten as:

$$\tilde{I}_{T+1} = w^* + sr^* \frac{w^*}{1 - r^* s} \tag{16}$$

Comparing (15) and (16) shows that a lender's income is still not sufficient to pledge investment. This is summarized in Proposition 2.

Proposition 2 *In an economy opening up to international investment, the share of entrepreneurs will not expand over time from the period after opening up, $T+1$ and it is fixed at $\tilde{k}_{T+1} \equiv \tilde{k}$ for all subsequent periods.*

Proof. The income of a lender in period $T+1$, given by (15) is lower than the critical income sufficient to pledge investment, given by (16), because $^{LS}I_T < \frac{w^*}{1-r^*s} = {}^{L}I^* = \tilde{I}_T$, which was the condition to be a lender in period T. The same wage rate combines with lower historical savings at same credit and investment market conditions. This argument holds for all subsequent periods. ■

Who is once not wealthy enough to be eligible for borrowing after opening up will not be in $T+1$, $T+2$, and so on. When competing with world market investors for investment and credit, Southern entrepreneurs fall behind, because they have a lower historical income. The trickle-down mechanism is disrupted when the economy opens up to world capital markets. This is illustrated in figure 6 (for the case of all past entrepreneurs being able to borrow internationally).

Especially for low levels of development, the capital inflow and concurring increase in the wage rate implies an immediate gain in individual incomes. But what is happening at the same time is that, due to FDI, the prospective returns for capital decrease so much that the agents in South still cannot pledge investment despite their risen income.

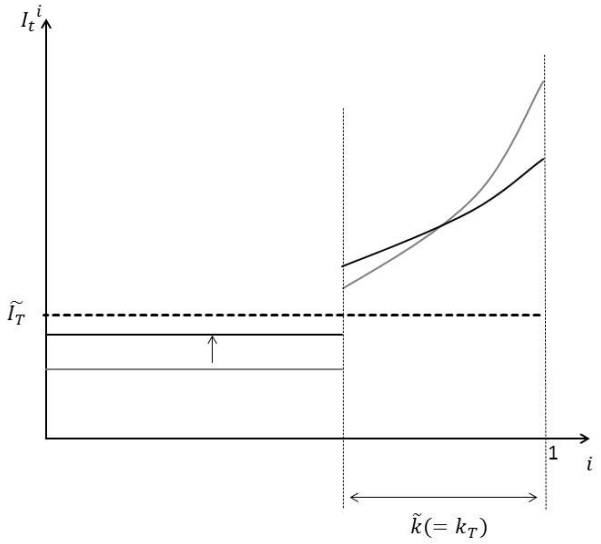

Figure 6: An Economy opening up

GNI thus also initially increases due to the inflow of FDI. It now doesn't have to equal GDP, which immediately jumps to $GDP_t^o = f(k^*)$ for $t > T$.
GNI, in contrast, is given by

$$GNI_t^o = \tilde{k}(f'(k^*) - r^*) \sum_{i=0}^{t-T-1} (sr^*)^i$$
$$+w(k^*) \sum_{i=0}^{t-T-1} (sr^*)^i + f(k_T)(sr^*)^{t-T}$$

which is the constant capital income of the constant share of investors plus the constant wage payments, each transferred at the same rate throughout time from period T on, plus the remaining savings on income in period T. Figure 7 illustrates the time dynamics of this and contrasts it to the situation in autarky. In autarky, capital would build up slowly, but the share of entrepreneurs would expand, who would then reap the surplus profits on physical investment. When opening up, capital rushes into the country, but domestic agents who cannot in the moment of opening up will never be able to become entrepreneurs and benefit from the gains of capital ownership.

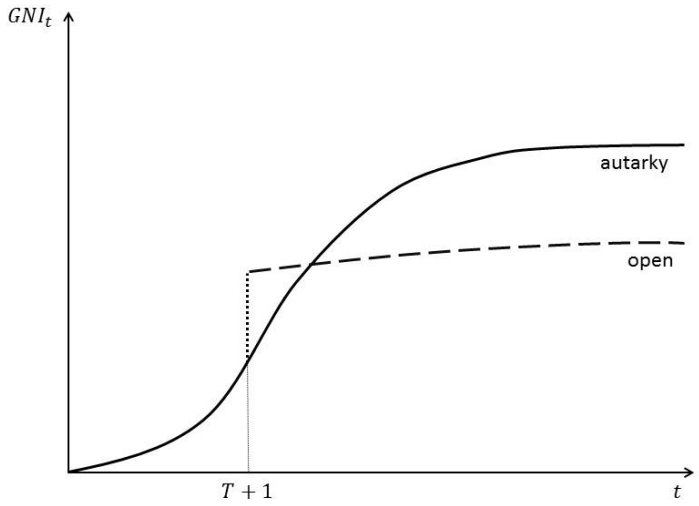

Figure 7: Timepath of GNI

GNI in each regime converges to the following steady state values:

$$GNI^{a*} = k^* \frac{f'(k^*) - r^*}{1 - r^* s} + \frac{w^*}{1 - r^* s}$$

$$GNI^{o*} = \tilde{k} \frac{f'(k^*) - r^*}{1 - r^* s} + \frac{w^*}{1 - r^* s}$$

Because $\tilde{k} \leq k_T < k^*$, steady state national income will always be lower when the country has opened up to international markets in the process of development. In the long run, labor income would have been the same. But, in autarky, capital ownership and the concurring profits would be in domestic hands, which they are not if a country integrates into international capital markets. The standard neoclassical result of initial gains due to capital inflows is bought at the expense of a disruption in the trickle-down process.

6 The Structure of Capital Flows

The resulting structure of capital flows in and out of the country is straightforwardly analyzed, concentrating on the steady state for exposition.[16] Since the share of domestic investors who each invest 1 unit of capital is lower than the overall capital stock, FDI into the country is positive and given by the difference of the two:

$$FDI^* = k^* - \tilde{k} > 0 \tag{17}$$

The outflow of financial capital is given by the difference in overall savings by domestic agents and what of savings is invested by domestic agents. The latter is just given by $\tilde{k} = k^* - (k^* - \tilde{k})$. Savings are the same as in autarky, where they would just constitute steady state capital stock, lowered by the not occuring savings on the missed out returns to physical capital, i.e. by ${}^{S}Sav^{o} = k^* - s(k^* - \tilde{k})\frac{f'(k^*)-r^*}{1-r^*s}$.
Financial capital outflow as the difference of these two is thus given by

$$\begin{aligned} FC^* &= k^* - (k^* - \tilde{k})s\frac{f'(k^*) - r^*}{1 - r^*s} - [k^* - (k^* - \tilde{k})] \\ &= (k^* - \tilde{k})\left(1 - s\frac{f'(k^*) - r^*}{1 - r^*s}\right) > 0 \end{aligned} \tag{18}$$

where the last inequality derives from the fact that savings on capital income in the steady state must be smaller than 1, as shown above. Compared to the autarky steady state, the reduction in savings is not as high as the difference in investment by domestic agents that is crowded out by foreign investment. These excess savings flow out of the country via the credit market, to flow back as direct investment.
The structure of two-way capital flows is exactly what we see in Figure 1. The outflow of financial capital is a direct result of the inflow of FDI. The difference in returns between the two types of investment that an imperfect capital market creates and the outflow of factor incomes show responsible for lost out welfare in the long run. The aggregate financial account

[16] I here talk about 'net' flows in the sense of net for each type of capital flow - financial and direct investment. In the absence of costs to international investment, all domestic investors could invest abroad and all domestic capital could be FDI. We simply assume that an investor first invests at home as long as this yields the same return.

is given by the difference between the outflow of financial capital (18) and FDI-inflow (17)

$$FA^* = (k^* - \tilde{k}) \left(-s \frac{f'(k^*) - r^*}{1 - r^* s} \right) < 0 \tag{19}$$

This implies a net flow of capital from North to South, such that the flows of FDI are not entirely met by the opposing flow of financial capital. In official statistics, both groups of countries appear to be net debtors, which obviously cannot be true. Following the literature, the predicted aggregate, although reduced, flow of capital from North to South from the model, is indeed rather what is likely to be actually happening, when capital holdings of Northern countries in tax havens are added to official numbers (see Zucman (2013)).

7 Extensions

The basic setting considered so far was a simple and tractable way to isolate the effect of how FDI crowds out domestic investment in developing countries and leads to. As that, the equilibrium described has some features that we would not expect to see in the world. That is for example, that with otherwise identical countries, the productive capital stock (although not owned) in the developing country is the same as in more developed countries after opening up, and immediately so. As a result, in the steady state, income of lenders approaches the critical income, thus technically bringing them close to become entrepreneurs themselves when in a 'large' rest of the world, an infinite amount of investment projects is potentially realizable. Also, we will be interested how this structure of capital flows and ownership affects agents in the northern countries. Therefore, in the following, we will look at how the presented mechanism interacts with other differences that are observable in reality. The result is, that the income diverging effect of FDI is even magnified by these differences.

We will first extend the analysis to a two-country-setting and then look at the interaction when the developing country does not only lag behind in capital endowment but also exhibits a lower total factor productivity. Both extensions should hold as a robustness check for the validity of the theory, as well as an elaboration of its predictions.

7.1 Two Country Setting

The two country setting follows straightfoward from the analysis in section 5. Consider, country 'South', as before in period T, integrates its capital markets with 'North', which is now of same size. Both countries have grown as in section 4, only that $k_T^N > k_T^S$. Free movement of investment equalizes capital stocks from period $T+1$ on. The capital stock in each country is given by half of aggregate world savings, i.e. $k_{T+1}^S = k_{T+1}^N = \frac{1}{2}s(f(k_T^N) + f(k_T^S)) \equiv \bar{k}_{T+1}$. The capital stock in North is smaller as compared to autarky when opening up, by exactly the amount that it is increased in South. The dynamics of national capital stocks then follow Solow-type growth for both countries parallelly: $\bar{k}_{t+1} = \frac{1}{2}s2f(\bar{k}_t) = sf(\bar{k}_t), \ \forall t > T$.
However, income dynamics are disparate between the countries after opening up. As before, the credit market imperfection defines the critical income as given in (6), being the same for agents in both countries. Comparing incomes analogous to (15) now reads

$$ {}^L I_{t+1}^S = w(\bar{k}_{t+1}) + sr_{t+1}{}^L I_t^S < w(\bar{k}_{t+1}) + sr_{t+1}{}^L I_t^N = {}^L I_{t+1}^N \tag{20} $$

$\forall t \geq T$. Because ${}^L I_T^S < {}^L I_T^N$, all new capital will be invested by northern agents. Define the share of entrepreneurs in South who could pledge for borrowing in T as $\tilde{k}^S \in [0, k_T^S]$. This share will again not expand. In contrast, the share of entrepreneurs in North is given by $\tilde{k}_t^N = 2\bar{k}_t - \tilde{k}^S$, which is increasing as long as the world economy is growing. GNI in country j is analogously given by

$$ \begin{aligned} GNI_t^j = \tilde{k}_t^j(f'(\bar{k}_t) - r_t) + \sum_{i=1}^{t-T-1} \tilde{k}_{t-i}^j(f'(\bar{k}_{t-i}) - r_{t-i})s^i \prod_{h=0}^{i-1} r_{t-h} \\ + w(\bar{k}_t) + \sum_{i=1}^{t-T-1} w(\bar{k}_i)s^i \prod_{h=0}^{i-1} r_{t-h} + f(k_t^j)s^{t-T} \prod_{h=0}^{t-T-1} r_{t-h} \end{aligned} $$

National income will increase for both countries with an increasing capital stock. However, South does not expand its share of entrepreneurs, whereas North does, by investing in both countries. South does – after an initial gain due to capital inflows – not only grow slower than North in terms of income, it does so also more slowly than it would have under autarky at that level.

Steady State national incomes are given by:

$$GNI^{j*} = \tilde{k}^j \frac{f'(k^*) - r^*}{1 - r^* s} + \frac{w^*}{1 - r^* s}$$

where $\tilde{k^N} = 2k_t^* - \tilde{k}^S$. National income in South is strictly lower than in North and, in the long run, again also lower than it would have been under autarky. South hence unambiguously loses by integrating its capital market with a more advanced country. North, in turn gains in the long run, even though workers initially lose due to the outflow of productive capital.[17]

The two-country equilibrium is even more stable than the small open economy case. Even though the income of a lender in South approaches that of a Northern lender and thus the critical income for investment in the steady state, this does not create investment chances on a large scale. The reason is, that all entrepreneurs' income is still higher than that of lenders all over the world and the historical entrepreneurs will also in steady state re-take investment chances, not leaving much room for 'new' investment. The time dimension does enter here – not in that investment is taken, but in that incomes are distributed which determine borrowing, and thus investment possibilities.

7.2 TFP-Differences

It is widely argued that capital flows to South are reduced because human capital, infrastructure, etc. in developing countries are not comparable to those in developed economies. By affecting the incentives for FDI, this will obviously interact with the mechanism described here.

Consider South exhibits lower total factor productivity than North, such that

$$f^S(k) = \delta f(k) \qquad \delta < 1$$

Consequently, $f'^S(k) = \delta f'(k)$ and $w^S(k) = \delta w(k)$.

In autarky, South would converge to a steady state given by $s\delta f(k^{*S,a}) = k^{*S,a} \Leftrightarrow \frac{f(k^*)^{S,a}}{k^{*S,a}} = \frac{1}{s\delta}$. Because the LHS is decreasing in k, $k^{*S,a}$ is lower than in the autarky steady state with

[17] The structure of capital flows is analogolous to the analysis in section 6. Capital inflows in South are now capital outflows in North and vice versa.

higher TFP and thus lower than that in North.
If the two countries integrate their capital markets in T, capital returns from T+1 are equalized. Suppose $f'^S(k_T^S) > f'(k_T^N)$, such that some FDI will still take place in South, as empirically relevant. From T+1, relative capital stocks are implicitly determined by $f'^S(k_t^S) = \delta f'(k_t^S) = f'(k_t^N) \equiv \bar{f}'_t$. Consequently, $k_t^N > k_t^S$ holds $\forall t > T$. The capital stock, and with it GDP, is increased in South, but still lower than in North after opening up.
Again, the critical income to just pledge investment is given by $\tilde{I}_t = \frac{r_{t+1} - \lambda \bar{f}'_t}{r_{t+1} s}$, which is equal for agents in both countries. Lenders' income in South is equivalently given by

$$^L I_{t+1}^S = \delta w(k_{t+1}^S) + s r_{t+1} {}^L I_t^S < w(k_{t+1}^N) + s r_{t+1} {}^L I_t^N = {}^L I_{t+1}^N$$

It is thus again not sufficient to pledge borrowing in open markets for southern agents. Note, that the difference is even greater than with equal TFP, because a lower capital stock and lower overall productivity reduce wage income in comparison to lenders in North, in addition to the lower historical income. Consequently, as for identical countries, all investment after opening up will be pursued by northern agents, such that $\tilde{k}_t^S = \tilde{k}_{T+1} \leq k_T^S$.
Steady state amounts of capital stocks are equal to autarky steady state amounts, $k^{*S,o} = k^{*S,a}$ and $k^{*N,o} = k^*$.[18] GNI in either country j in the steady state read

$$GNI^{j*} = \tilde{k}^j \frac{f'(k^{*j}) - r^*}{1 - r^* s} + \frac{w^{*j}}{1 - r^* s}$$

where $\tilde{k}^N = k^* + k^{*S} - \tilde{k}^S > k^*$.
Because as before, $\tilde{k}_t^S < k^{*S}$ holds, income in South is reduced by missed out investment returns $(k^{*S} - \tilde{k}^S) \frac{f'(k^{*S}) - r^*}{1 - r^* s}$, and analogously increased in North as an outcome of globalization in the long run. The result of diverging incomes (and disparate growth) induced by FDI still holds in this setting when countries are not identical and capital stocks installed do not equalize. It holds even stronger, because incomes are then diverging and chances on investment further reduced for Southern agents. The underlying mechanism is not driven by the simplifying assumptions made earlier.

[18] This is a direct result from that world savings has to equal world investment - as in autarky - and Jensen's Inequality. Throughout the growth process, by the same argument, capital stocks installed evolve as in autarky from their values at period T+1 on.

8 Conclusion and Outlook

We have included a standard capital market imperfection into a simple neoclassical model of growth to give a more nuanced view on the effects of FDI. This at the same time can systematically explain the observed structure of two-way capital flows between developed and developing countries.

Due to the credit market imperfection, there is an endogenous wedge between lending and entrpreneurial income, and individual incomes determine the distribution of credit eligibility and hence investment possibilities. The natural trickle-down process that autarky growth entails is disrupted when an economy opens up to international markets with more progressed countries. The reason is that FDI flows in, which raises the capital stock but at the same time reduces its marginal product and thus possibilities to invest. Because the poorer country's agents cannot compete on the market for credit given this new conditions, the share of entrepreneurs will not expand anymore, despite an initially risen income due to the capital inflow. In the long run, the missed out returns on investment lower national income in comparison to the autarky steady state. Hence, there is a trade off between short and long run effects involved with opening up for international capital markets for developing countries. Our model also gives a theoretical underpinning for the empirical findings that countries that self-finance themselves experience better growth experiences in the aftermath (Aizenman et al. (2007)).

Extending the model to a two-country analysis yields a pattern of parallel, but disparate growth. The story thus concurrently shows motives for richer countries to push poorer countries into integration to international markets even though this might be harmful for them: Obviously, the losses of the poor countries in the steady state are mirrored by gains for foreign investors (whereas the initial inflow is the well known win-win situation of a static analysis).

It shows that the structure of capital flows and incomes of countries are mutually interdependent. This is different from saying that each type of capital flows has different idiosyncratic reasons to flow in either direction. Instead, an inflow of FDI, outflow of financial capital, and underdevelopment are different sides of the same story here.

To emphasize this basic mechanism, we have first abstracted from any other differences between countries other than the capital stock. This assumption is strong and hints at the possibility, that countries that lag behind could have developed in the same way as developed

countries if they wouldn't have integrated their capital markets and let FDI flow into the country. This perspective has not been widespread in formal theories of economic growth so far.

However, the assumption can be relaxed without altering the model's qualitative predictions. The structure of capital flows and growth effects from integration also occur as prediction from the model when productivity in the developing country is lower and hence the inflow of FDI. In this case, the split is even clearer, because agents in South would never be able to invest neither at home nor abroad in an international capital market. They would still have built up some capital slowly with a closed financial account, but received entrepreneurial income from it.

Still, even when accounting for productivity differences, in the model, GDP is the same in the long run as it would be in autarky. It even jumps initially to that level. This is obviously simplifying. Following the previous literature, the reason for lower productivity could well be differences in human capital of poorer countries' working force. In the spirit of Galor and Zeira (1993), this is even more probable if credit markets are imperfect, such that poorer agents cannot borrow to invest in schooling. Because FDI is unlikely to reduce returns to investment in human capital, an initial inflow of capital could on the contrary rather loosen these constraints and increase incentives to invest in schooling or public goods. Thus, the story could have two sides to it, depending on how the initial income gain is used. This might well be an explanation for the quite distinct experiences with capital market integration for developing economies. The short-run vs. long-run trade-off may hence be exacerbated when considering the role of domestic income for development prospects.

Another reason for a reduced capital inflow could be that also foreign direct investment were subject to frictions. If it were costly to repatriate the profits from FDI, returns would have to be accordingly higher, thus invested capital (and GDP) lower. This has two effects: First, wage income is lower. Second, the return to investment of domestic agents is higher. Both work in opposite directions regarding chances on the market for credit. Depending on which effect dominates, trade costs might either safeguard poor countries against harmful FDI but jump-start growth, or might even worsen the effect of opening up by making producing for foreign countries even less profitable. This would depend on the relative importance of wage and entrepreneurial income and hence on properties of the production and the point in time in the growth process when opening up. If an equilibrium with two-way capital flows still emerges when FDI is costly, then the effect proposed in this paper is still dominating, and

the world as a whole would lose due to the dislocation of production from consumption sites. From a policy perspective, both possible further extensions – human capital and costly FDI – interact with the time dimension of the model described in the way that it may contribute to the decision about when to open best in the process of development.

The theory presented here is very stylized. By abstracting from many other mechanisms that are involved with international capital market integration, it does not claim that these are not at work. It is only to point out an additional aspect to be taken into consideration, both, from a theoretical point of view and from policy perspective. In the first place, it draws the attention to the fact that the observed structure of two-way capital flows may be both result of and reason for income disparities between countries. As hinted at, it may in many ways interact with well-known results regarding capital market integration. It thus does add a novel argument by introducing a new dimension to the discussion about the welfare effects of globalization.

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A Conditions on Assumption 1

We want to show under which conditions the income of lenders, ${}^{L}I^{i}_{t+1} = r_{t+1}sI^{i}_{t} + w(k_{t+1})$, is increasing over time.
Dropping the individual index for readability, this condition is given by $w_t + r_t s I_{t-1} > I_{t-1} \forall t$. Inserting (8) and rearranging yields:

$$I^2_{t-1} - \frac{1 + sw_t - s\lambda f'(k_t)}{s} I_{t-1} + \frac{w_t}{s} > 0 \tag{21}$$

The LHS is an upward opened parabola. Solving for its zeros yields

$$I_{t-1;1,2} = \frac{1 + sw_t - s\lambda f'(k_t)}{2s} \pm \sqrt{\left(\frac{1 + sw_t - s\lambda f'(k_t)}{2s}\right)^2 - \frac{w_t}{s}} \tag{22}$$

Now, we have to make some case distinctions:
a) For $\left(\frac{1+sw_t-s\lambda f'(k_t)}{2s}\right)^2 < \frac{w_t}{s}$, this has no solutions. Therefore for all I_{t-1}, The LHS of (21) is positive and income is unambiguously increasing.
b) If $\left(\frac{1+sw_t-s\lambda f'(k_t)}{2s}\right)^2 > \frac{w_t}{s}$ holds, such that (22) has two solutions, two cases may occur:
i)$1 + sw_t - s\lambda f'(k_t) < 0$. This is the case if the marginal product of capital is high and the wage rate rather low, i.e. especially likely in the beginning of the growth process. Because $\frac{w_t}{s} > 0$, both are in the negative range of I_{t-1}. Therefore, for all positive values of I_{t-1}, condition (21) still holds, and income is further increasing (Note, that first period income is always positive). ii)If $1 + sw_t - s\lambda f'(k_t) > 0$, the zeros are in the positive range of I_{t-1}, such that for some incomes in between, we may have a decreasing income. Note, that this is the case only if the wage rate is sufficiently high compared to the return to physical capital, i.e. this would in any case only occur towards the end of the growth process.
We can see that, with the evolution of the return to capital throughout the growth process, the likelihood runs from case b)i) to case a) to case b)ii). Note also, that even in the last case, if income is already sufficiently high (i.e. greater than the solutions to (22), it will further increase anyway. However, to avoid taxonomical exposition, we can easily assume that even in the steady state, where (21) is most likely not to hold, it will still hold, i.e. we assume:
If

$$1 + sw^* - s\lambda f'(k^*) > 0$$

then

$$\left(\frac{1+sw^*-s\lambda f'(k^*)}{2s}\right)^2 < \frac{w^*}{s}$$

In words, this is equivalent to assuming that the return to investment in physical capital is still sufficiently high throughout the growth process up to the steady state.