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Capital flows and growth across developing countries ☆

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ABSTRACT

Foreign direct investment inflows are positively related to economic growth across developing countries—but so are savings in excess of investment. This paper develops an explanation for these known empirical findings by focusing on the limited availability of consumer credit in developing countries, together with general equilibrium effects. In the model, fast-growing developing countries scale up their holdings of debt assets, which creates net capital outflows—despite inflows of foreign direct investment—and reduces the world interest rate. Slow-growing developing countries reduce their holdings of debt assets in response, which creates net capital inflows despite outflows of foreign direct investment.

1. Introduction

Global imbalances are accompanied by capital flows across developing countries that are related to differences in economic growth.[1] Foreign direct investment (FDI) is positively related to growth across developing countries (Alfaro et al., 2014), but so are overall capital outflows (Prasad et al., 2007; Gourinchas and Jeanne, 2013). This paper shows how these two stylized facts can arise jointly as the equilibrium outcome of growth differences across developing countries against the backdrop of global imbalances between developing and developed countries.

The paper builds on the literature that explains global imbalances between developing and developed countries with financial frictions that are relatively more severe in developing countries (Caballero et al., 2008; Mendoza et al., 2009; Angeletos and Panousi, 2011; Chien and Naknoi, 2015; Wang et al., 2016; Maggiori, 2017). The model in this paper follows Mendoza et al. (2009), who decompose external positions into FDI and debt, and, in addition, allows for (i) physical capital accumulation, (ii) production technologies that have constant returns to scale in physical capital and labor, and (iii) financial frictions that can be more or less severe for consumers relative to producers within a country.

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[1] China has experienced fast growth and is on net lending to other developing countries (The Wall Street Journal, 2019).

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Developed countries enjoy a version of the ‘‘exorbitant privilege” (e.g., Gourinchas et al., 2010; Maggiori et al., 2020) in Mendoza et al. (2009), and in this paper, even though there is no aggregate risk. The reason is that consumers and producers face idiosyncratic risk, respectively, from labor and investment income. The difference in financial frictions implies that consumers in developing countries choose higher precautionary savings, while producers in developed countries choose higher leverage. Thus, some producers in developed countries find it profitable to borrow from consumers in developing countries to fund their productive investment in developing countries.

In a stationary equilibrium, developing countries have external positions that are negative in FDI, positive in debt assets and positive on net. These external positions obtain when both the pledgeability of physical capital and consumer borrowing limits are lower in developing relative to developed countries and when the difference is more pronounced in the case of consumer borrowing limits. Because of constant returns to scale production technologies, in a stationary equilibrium individual decision functions normalized by domestic wages are the same across developing countries for given equilibrium prices. To a first order, therefore, differences in external positions depend linearly on differences in domestic total factor productivity (TFP) across developing countries.

The main result of the paper is a comparative static. Two stationary equilibriums are compared where some developing countries partially catch up relative to the world productivity frontier across these equilibriums. The residents of developing countries that caught up accumulate more debt assets in aggregate as their holdings of debt assets get scaled up by the increase in TFP. The world interest rate falls, as a result, and the remaining developing countries reduce their holdings of debt assets. Capital is flowing, on net, from fast-growing to slow-growing developing countries—despite net FDI flows in the opposite direction—even though TFP advancements are the only differences between those countries. The contribution of the paper is twofold. First, an explanation is offered for the positive relationships across developing countries between growth and *both* FDI inflows and overall capital outflows. This explanation does not require differences across developing countries other than TFP catch-up. In particular, it is not necessary to assume differences in financial frictions across developing countries. Second, because the explanation emphasizes the role of consumer financial frictions in generating these relationships it also emphasizes their role in generating global imbalances.

The literature highlights the importance of financial frictions faced by entrepreneurs for explaining the positive relationship between growth and overall capital outflows across developing countries (Benhima, 2013; Sandri, 2014; Buera and Shin, 2017).[2] However, there is no role for FDI in that literature. This paper highlights the importance of financial frictions faced by *both* entrepreneurs and households for, together, explaining the positive relationship of growth with *both* overall capital outflows *and* FDI inflows across developing countries. Considering both kinds of financial frictions is key to generate FDI flows consistent with the data. The reason is that a fast-growing developing country where financial frictions primarily affect entrepreneurs, would experience overall capital inflows because of increased FDI by entrepreneurs from developed countries.

Allowing for capital accumulation in the model in Mendoza et al. (2009), as is done in the working paper version Mendoza et al. (2007), is not sufficient to obtain that, to a first order, changes in developing countries' external positions depend linearly on changes in their TFP. Production technologies with constant returns to scale are a necessary condition. With decreasing returns, as in Mendoza et al. (2007), there would be no such linearity and fast-growing developing countries could experience FDI inflows that exceed accumulation of additional debt assets, in contradiction to the main empirical finding in Gourinchas and Jeanne (2013). Therefore, while the model in this paper closely follows the one in Mendoza et al. (2007, 2009), the difference between models is crucial for explaining the positive relationship of growth with both overall capital outflows and FDI inflows across developing countries.

Gourinchas and Jeanne (2013) and Alfaro et al. (2014) show that foreign reserve accumulation by government agencies, such as central banks, plays an important role in shaping external positions of fast-growing developing countries. Foreign reserves are often held in the form of foreign government debt and sterilized with domestic bank reserves. A potential explanation for government-to-government, rather than citizen-to-citizen, international capital flows could be that governments are more likely than individual citizens to repay foreign creditors (Jeske, 2006), together with a preference of domestic savers to hold domestic bank deposits or bonds rather than potentially higher yielding foreign assets (French and Poterba, 1991; Maggiori et al., 2020). Thomas and Worral (1994) and Aguiar and Amador (2011) suggest that foreign reserves could be a means of alleviating fear of expropriation by owners of FDI in developing countries. However, reserves would have to increase more than one-for-one with FDI to be consistent with a positive relationship between growth and overall capital outflows (which is also not the objective of these papers). A similarity between their models and mine is that both generate FDI inflows that are positively related to growth, as in the data (Prasad et al., 2007; Alfaro et al., 2014; MacDonald, 2015).[3]

I do not study transitional dynamics. The reason is that assuming perfectly anticipated growth would imply implausibly large initial capital *imports* into emerging markets[4], while developing a theory of emerging market growth is beyond the scope of this paper. In particular, catch-up to the productivity frontier is typically related to political reforms that remove various

[2] Ohanian et al. (2018) conduct a capital flow accounting study—again focusing on overall capital flows—and find that labor market distortions are quantitatively important in explaining external balances of Asia and Latin America.

[3] Developing Asia, and especially China, receive significant FDI inflows (Dollar and Kraay, 2006; UNCTAD, 2015).

[4] See Hsieh (2003) for a recent empirical confirmation of the permanent income hypothesis.

types of factor misallocation (Young, 1995; Restuccia and Rogerson, 2008; Hsieh and Klenow, 2009; Restuccia and Rogerson, 2017; Tombe and Zhu, 2019), and it is not apparent how one might formulate a stochastic process driving such reforms.[5]

2. Model

Consider an infinite horizon economy with three regions. There is a "developing region" D, a "fast-growing developing region" E and a "developed region" U. Each region $j = D, E, U$ is populated by a continuum of households with mass μ^j. Households face uninsurable idiosyncratic labor and investment income risk. There is no aggregate risk. Households can employ physical capital in any region but can supply labor only in the region that they reside in. A one-period non-contingent bond is traded among households. Households can sell bonds up to their pledgeable labor income and physical capital holdings, respectively. The amounts that can be pledged depend on the region that the household resides in. Differences in financial frictions across regions generate non-zero external positions in bonds and capital across regions in a steady state. I compare two steady states. In the *initial* steady state developing regions D and E have the same total factor productivity (TFP) while in the *new* steady state developing region E has higher TFP. I then compare changes in developing regions' external positions across these two steady states.

Uncertainty and technology:

There is a consumption good that can be costlessly exchanged into a physical capital good and vice versa. Households are each endowed with a unit of labor that they supply inelastically. Labor productivity ξ is independent and identically distributed (i.i.d.) across households and its distribution is characterized by a symmetric two-state transition matrix P_ξ with support $\{\xi_L, \xi_H\}$ and unconditional mean of one. P_ξ is fully characterized by the probability of remaining in the current state ρ. Households have access to a production technology that uses labor and capital to produce the consumption good. Household investment productivity z is i.i.d. across households and its distribution is characterized by a two-state transition matrix P_z with support $\{z_L, z_H\}$. A household in any region who invests $k \geqslant 0$ units of the capital good in period t in region j and, after observing z, uses $n \geqslant 0$ units of labor in period $t+1$ in region j can produce $y = A^j z k^\alpha n^{1-\alpha} + (1-\delta)k$ units of the consumption good in period $t+1$, where $\delta \in (0,1)$ is the capital good depreciation rate, $\alpha \in (0,1)$ and A^j is TFP in region j. Let $z_L = 0 < z_H$. I assume that only households with investment productivity $z = z_H$ can produce.[6]

Markets:

There are markets for labor and bonds. Let w_t^j be the price of one (efficiency) unit of labor in period t in region j. A household in region j with idiosyncratic labor productivity shock ξ receives labor income of $w_t^j \xi$ in period t. Let q_{t+1} be the price of one unit of the consumption good in t to be delivered in $t+1$ in the market for bonds.

Household problem:

Households in region i choose consumption c, physical capital k, labor inputs n, bonds b and production sites $(\chi^{ij})_{j=D,E,U}$ to maximize their lifetime utility as follows:

$$\max E_0 \sum_{t=0}^{\infty} \beta^t \frac{c_t^{1-\sigma}}{1-\sigma}, \tag{1}$$

where $\beta \in (0,1)$ is a subjective discount factor and $\sigma > 1$ denotes constant relative risk aversion, subject to budget constraints

$$c_t + k_{t+1} + q_{t+1} b_{t+1} \leqslant a_t + w_t^i \xi_t, \quad t = 0, 1, 2, \ldots$$

with beginning-of-period net worth

$$a_t = \sum_{j=D,E,U} \chi_t^{ij} \left[A^j z_t k_t^\alpha n_t^{1-\alpha} - w_t^j n_t \right] + (1-\delta) k_t + b_t, \quad t = 1, 2, \ldots, \text{ with } a_0 \text{ given},$$

and subject to borrowing limits

[5] If arrival and permanence of reforms are unanticipated, then savings and investment rates in a developing country that experiences a productivity enhancing reform would not change much (for example,Zhu, 2012, documents that the Chinese growth experience was so transformative that it was likely not anticipated). Cozzi and Davenport (2017) formalize this argument. The argument is related to the one in Kraay and Ventura (2000) where a creditor country increases its foreign savings in response to a positive income shock when the shock is expected to be transitory. My steady state comparison reflects this argument because it relies on the fact that external positions scale in domestic productivity in steady state.

[6] Owing to decreasing returns in physical capital, households with investment productivity $z = z_L$ would have an incentive to invest at least a small amount. However, I fix household occupations exogenously: only households with productivity z_H may invest into physical capital. And since producing does not require them to forego labor income, they will produce independently of their net worth. This particular modelling choice is motivated by the wish to keep the model parsimonious; in fact, Hurst and Lusardi (2004) report that "[a]lthough we find no relationship between wealth and business entry over most of the wealth distribution, we do find that very wealthy households are much more likely to start a business." In Cagetti and De Nardi (2006), households face a non-trivial choice of whether or not to produce, since producers forego labor income and therefore only produce when their net worth is sufficiently high. As in their paper, I assume that labor and investment productivities are independent of each other. I motivate this assumption with the finding in Hamilton (2000) that "[t]he wage distribution of would-be entrepreneurs does not appear to be significantly different from that of paid employment stayers, except perhaps at the upper end."

$$b_{t+1} + \psi^i w^i_{t+1} + \eta^i k_{t+1} \geqslant 0, \quad t = 0, 1, 2, \ldots \tag{2}$$

with $k_{t+1} \geqslant 0$ if $z_t = z_H$ and zero else.[7] E_t denotes a household's expectations over future idiosyncratic labor and investment productivity shocks given the household's realized idiosyncratic shocks at time $t = 0, 1, 2, \ldots$. Production site choices are constrained to be such that $\chi^{ij}_{t+1} = 1$ if the household chooses to invest in region j and zero else, with $\sum_j \chi^{ij}_{t+1} \leqslant 1$.[8] The parameters $\psi^i \geqslant 0$ and $\eta^i \geqslant 0$ determine the extent to which households can sell bonds by pledging future labor income as well as physical capital investment. I assume $\psi^D = \psi^E$ and $\eta^D = \eta^E$ such that borrowing limits are the same across developing regions D and E.[9]

2.1. Equilibrium

For given sequences of bond prices $\{q_{t+1}\}$ and wages $\{(w^i_t)\}$, let $B^i_{t+1}(a, \xi, z), K^i_{t+1}(a, \xi, z)$ and $(\chi^{ij}_{t+1}(a, \xi, z))_{j=D,E,U}$ denote, respectively, optimal household choices for bond holdings, physical capital and production sites of a household in region i with net worth $a_t = a$, labor productivity $\xi_t = \xi$ and investment productivity $z_t = z$ in period $t = 0, 1, 2, \ldots$. Note that a household's choices in period t determine its net worth in period $t+1$.

Let $\phi^i_t(a, \xi, z)$ denote the joint distribution of net worth, labor productivity and investment productivity levels in the population of households in region i. The households' optimal transition for net worth together with the Markov processes for labor and investment productivity yields a transition probability for the individual states (a, ξ, z) in each region i. This transition probability determines the distribution ϕ^i_{t+1}, given the distribution ϕ^i_t. An equilibrium can now be defined as follows.

Definition 1. An equilibrium is (i) a sequence of bond prices $\{q_{t+1}\}$ and wages $\{(w^i)_t\}$, (ii) a sequence of household choices for bonds $\{B^i_{t+1}(a, \xi, z)\}$, physical capital $\{K^i_{t+1}(a, \xi, z)\}$ and production sites $\{(\chi^{ij}_{t+1}(a, \xi, z))_{j=D,E,U}\}$ in each region i, and (iii) a sequence of distributions for household net worth and labor and investment productivity levels $\{\phi^i_{t+1}\}$ in each region i such that, given the initial distributions (ϕ^i_0), initial wages $(w^i_0) > 0$:

1. household choices are optimal given $\{q_{t+1}\}$ and $\{(w^i_t)\}$,
2. (ϕ^i_{t+1}) are consistent with household choices,
3. the market for bonds clears,

$$\sum_i \mu^i \int B^i_{t+1}(a, \xi, z) d\phi^i_t(a, \xi, z) = 0,$$

4. the market for labor clears in each region j,

$$L^j_{t+1} \equiv \sum_i \mu^i \int \chi^{ij}_{t+1}(a, \xi, z) \left(\frac{(1-\alpha)A^j z_H}{w^j_{t+1}} \right)^{\frac{1}{\alpha}} K^i_{t+1}(a, \xi, z) P_z(z_H, z) d\phi^i_t(a, \xi, z) = \mu^j.$$

A household that invests k_{t+1} in period t must be indifferent between production sites in an equilibrium. As a result, wages in developing regions can be expressed in terms of the wage in the developed region as follows:

$$w^i_{t+1} = \left(\frac{A^i}{A^U} \right)^{\frac{1}{1-\alpha}} w^U_{t+1}, \quad i = D, E. \tag{3}$$

Note that, because households must be indifferent between production sites, the labor market clearing condition in Definition 1 can be replaced by the weaker but still sufficient condition $\sum_j L^j_{t+1} = \sum_j \mu^j$.

Lemma 1. Let Y^i denote current output of region $i = D, E, U$. Then current population and output shares are related to current total factor productivity as follows:

$$\frac{Y^i}{\sum_j Y^j} = \frac{A^{i\frac{1}{1-\alpha}} \mu^i}{\sum_j A^{j\frac{1}{1-\alpha}} \mu^j}, \quad i = D, E, U.$$

[7] Recall that only households with high investment productivity are assumed to have the ability to invest in physical capital. It is further assumed that households do not supply labor to themselves. Because there is no friction assumed in the labor market, this assumption is merely a normalization and without loss of generality.

[8] If production site choices were continuous, rather than binary, a household would invest the same total amount because its idiosyncratic investment productivity shock is the same at all sites.

[9] The role of stochastic investment productivity in the model is to limit self-financing (Moll, 2014) and not to generate a motive for self insurance (in contrast to Sandri, 2014, households that invest in physical capital tend to also have negative bond holdings).

Proof. The conditions for optimal labor demand can be used to obtain

$$\frac{Y^i}{\sum_j Y^j} = \frac{w^i \mu^i}{\sum_j w^j \mu^j}, \quad i = D, E, U.$$

The result then follows by substituting in the no-arbitrage condition (3).

Proposition 1. In a steady state equilibrium, the decision problem of households in region *i* scales in domestic wages. Specifically, the steady-state household problem in region *D* is the same as in region *E* after normalizing by respective domestic wages.

Proof. In region *i*, let w^i denote the steady state wage and define $\hat{c}_t = \frac{c_t}{w^i}, \hat{k}_{t+1} = \frac{k_{t+1}}{w^i}, \hat{b}_{t+1} = \frac{b_{t+1}}{w^i}$ and $\hat{a}_t = \frac{a_t}{w^i}$ for $t = 0, 1, 2 \ldots$An entrepreneur that chooses labor input optimally, for given physical capital and production site *j*, obtains output net of the wage bill and before depreciation of $r^K(z) \equiv \alpha \left(A^j z\right)^{\frac{1}{\alpha}} \left(\frac{1-\alpha}{w^j}\right)^{\frac{1-\alpha}{\alpha}}$ per unit of physical capital employed. Note that $r^K(z)$ does not depend on *j* by efeq:LMC. Also note that ${w^i}^{1-\sigma} \cdot E_0 \sum_{t=0}^{\infty} \beta^t \frac{\hat{c}_t^{1-\sigma}}{1-\sigma}$ represents the same preferences over normalized consumption paths $\{\hat{c}_t\}$ as $E_0 \sum_{t=0}^{\infty} \beta^t \frac{\hat{c}_t^{1-\sigma}}{1-\sigma}$. Let *q* denote the steady state bond price. The steady state household problem in region *i* can then be written as follows:

$$\max_{\{\hat{c}_t, \hat{k}_{t+1}, \hat{b}_{t+1}\}} E_0 \sum_{t=0}^{\infty} \beta^t \frac{\hat{c}_t^{1-\sigma}}{1-\sigma},$$

subject to

$$\begin{aligned} \hat{c}_t + \hat{k}_{t+1} + q\hat{b}_{t+1} &\leqslant \hat{a}_t + \xi_t, \quad t = 0, 1, 2, \ldots, \\ \hat{a}_t = r^K(z)\hat{k}_t + (1-\delta)\hat{k}_t + \hat{b}_t, \quad t = 1, 2, \ldots, &\text{ with } \hat{a}_0 \text{ given}, \\ \hat{b}_{t+1} + \psi^i + \eta^i \hat{k}_{t+1} &\geqslant 0, \quad t = 0, 1, 2, \ldots, \end{aligned}$$

and $\hat{k}_{t+1} \geqslant 0$ if $z_t = z_H$ and zero else. Because $\psi^D = \psi^E$ and $\eta^D = \eta^E$, the steady state household problem in region *D* is the same as in region *E* after normalizing by respective domestic wages. Note that steady state household problems also scale in GDP per capita because domestic wages and gross domestic product per capita are proportional.

2.2. Calibration

An analysis of the model requires numerical simulations. Therefore, values for the parameters used in the model need to be chosen. The mass of households in region i, μ^i, is set equal to the share of world population of countries represented by region *i*. Table 1 reports shares of world population and world output for each region in 2010. The data source is the World Bank. Region *E* represents emerging economies while region *U* represents high-income countries. All other countries are represented by region *D*. A list of countries represented by each region is given in. efappdata.[10]

The remaining parameter values are reported in Table 2. The time period is one year. For the coefficient of relative risk aversion, σ, I choose 2, which is within the range of values used in the literature. The capital share α is set to 0.35, and the depreciation rate is set to $\delta = 0.067$. The transition matrix for investment productivity P_z is chosen such that the fraction of entrepreneurs is $Prob(z = z_H) = 13$ percent and the exit rate of entrepreneurs is $Prob(z = z_L | z_H) = 23$ percent. Cagetti and De Nardi (2006) analyze the SCF and report that there is a business owner in 13.3 percent of households. Using data from the PSID Quadrini (2000) reports average exit rates of 24.2 percent for business owners.[11] Because conditional probabilities have to sum to one, those two numbers determine the transition matrix P_z. The value for high investment productivity is set to 1. I normalize TFP in region *D* to one, $A^D = 1$, and use Lemma 1 to obtain $A^E = 1.43$ and $A^U = 5.14$ as the levels of TFP consistent with output and population shares reported in Table 1.

The subjective discount factor of $\beta = 0.94$ is chosen to generate a capital-to-output ratio of 2.8 in region *U*. I choose targets for FDI and bond positions in region *U* of 2.5 and -10 percent of GDP, respectively. Those targets are within the ranges of the respective positions in the United States (see Fig. 2.8 in Lane and Milesi-Ferretti, 2007b). The difference in the borrowing parameters related to physical capital between developed and developing countries, $\eta^U - \eta^D$, is set to target a 2.5 percent of GDP net position with respect to physical capital investment in region *U*. Parameter η^U is set to 0.89 to target an annual real

[10] Developing Asia drives external positions of the group of countries represented by region *E*—in that sense, fast-growing developing countries such as Brazil and Turkey are outliers.

[11] Quadrini (2000) finds that exit rates are decreasing with entrepreneurial tenure (see also Evans and Leighton, 1989). In my model, there is no endogenous occupational choice and transitions in and out of entrepreneurship are exogenous.

Table 1
Shares in world population and world output in 2010.

	POPULATION SHARE	OUTPUT SHARE
D	0.45	0.15
E	0.40	0.23
U	0.15	0.62

Table 2
Calibration of model parameters.

PARAMETER	EXPLANATION	VALUE	TARGET
σ	CRRA coefficient	2	within range of literature
δ	depreciation rate	0.067	replacement investment
α	capital share	0.35	average capital income share
P_ξ	labor productivity process	$\begin{pmatrix} 0.95 & 0.05 \\ 0.05 & 0.95 \end{pmatrix}$	autocorrelation log earnings
ξ	values labor shock	$\begin{pmatrix} 0.71 & 1.29 \end{pmatrix}$	Std deviation log earnings
P_z	investment productivity process	$\begin{pmatrix} 0.97 & 0.23 \\ 0.03 & 0.77 \end{pmatrix}$	overall fraction and exit rate of entrepreneurs
z	values investment shock	$\begin{pmatrix} 0 & 1 \end{pmatrix}$	normalization
A^D	TFP region D	1	normalization
A^E	TFP region E	1.43	world output shares
A^U	TFP region U	5.14	world output shares
β	discount factor	0.94	capital-output ratio of 2.8
ψ^D	pledgeable wage regions D, E	0	net worth of poor in U
η^D	pledgeable capital regions D, E	0.88	net external physical capital U
ψ^U	pledgeable wage region U	0.41	net external bonds U
η^U	pledgeable capital region U	0.89	interest rate of 4 percent

interest rate of 4 percent. Similar, the difference in the borrowing parameters related to labor income between developed and developing countries, $\psi^U - \psi^D$, is set to target a net bond position of -10 percent of GDP in region U. I choose the parameter ψ^D to minimize the distance between the share of net worth of the least wealthy quintile in region U and the target, -0.7 percent (Survey of Consumer Finances, e.g., Díaz-Giménez and Pijoan-Mas, 2011), subject to $\psi^D \geqslant 0$. The resulting calibrated parameters are $\psi^D = 0$ and $\psi^U = 0.41$. Because the condition $\psi^D \geqslant 0$ binds, the target of -0.7 percent for the share of net worth of the least wealthy quintile in region U cannot be reached. All other calibration targets are reached exactly.[12]

The model generates differences in external positions between developed and developing regions with differences in financial intermediation effectiveness, as in Caballero et al. (2008) and Mendoza et al. (2009). $\psi^U - \psi^D > 0$ implies that financial intermediation in region U is relatively more effective, compared with regions D and E, in the sense of allocating more credit to consumers. The developing regions generate a "savings glut" (Bernanke, 2005) that is absorbed by the developed region. $\eta^U - \eta^D > 0$ is small in the calibration of the model in this paper, because the positive net position in FDI in region U is small in absolute terms compared with the negative net position in bonds. The greater emphasis that the model puts on differences in financial frictions affecting consumer borrowing therefore follows directly from the signs and relative magnitudes of positions in regions external portfolios.[13]

3. Capital flows across developing countries

This section uses the model to study capital flows that arise from growth differences across developing regions. Specifically, the steady state used to calibrate the model is compared with a counter-factual initial steady state in which TFP of region E is set to $A_0^E = 1$. All other model parameters are the same in the initial steady state. In particular, developing region E catches up partially in terms of TFP but not in terms of financial development.[14]

[12] It is worthwhile to ask how the calibrated access to consumer credit in developing countries compares to observed consumer lending. In particular, largely consistent with the calibrated parameter $\psi^D = 0$, outstanding consumer credit tended to be a very small fraction of overall loans in China during its time of rapid growth (see Graph 1 in Bingxi and Lijuan, 2009).

[13] The calibration puts little weight on differences in financial frictions related to the pledgeability of physical capital. Intuitively, with FDI flowing freely a large difference in those frictions would imply capital flowing on net *toward* fast-growing developing countries. Caballero et al. (2008) develop an extention of their model with FDI where the developed region still has a negative NFA position if the impediments to FDI are sufficient.

[14] Work in Chinn and Ito (2006) and Klein and Olivei (2008) suggests that developing countries face important institutional impediments to financial development even as they experience capital account liberalization and economic growth.

By comparing changes in foreign asset positions between these two steady states, bond and FDI flows are related to TFP improvement across developing regions. I focus on comparing steady states to follow the cross-sectional character of the empirical analysis in Gourinchas and Jeanne (2013) and Alfaro et al. (2014). Note that in a given steady state, NFA positions normalized by GDP are the same in regions *D* and *E* because household decision problems normalized by per-capita GDP are the same in regions *D* and *E* by Proposition 1.

Table 3 compares the initial steady state, or "old steady state," with the steady state used to calibrate the model, or "new steady state." Because developing regions account for a higher share of world output in the new steady state, due to higher TFP in region *E* compared with the old steady state, the demand for bonds increases. As a result, the return on bonds decreases and so does the return on physical capital investment.

Region *E* increases its lending to region *U*. The increase in physical capital that residents of region *U* invest in region *E* is small by comparison such that the net effect on the foreign asset position of region *U* is negative. On the other hand, the fast-growing developing region *E* experiences an increase in its net foreign asset position—i.e., an increase in (foreign) bond holdings that more than offsets the inflow of FDI. Capital, on net, flows out of the fast-growing developing region *E*.

The increased lending of region *E* to region *U* decreases the return on bonds such that region *D* reduces its holdings of bonds. The slow-growing developing region *D* also increases its investment in physical capital in the fast-growing developing region *E*. However, this FDI outflow is more than offset by the reduction in bond holdings. Capital, on net, flows into the slow-growing developing region *D*.

When region *E* enjoys TFP growth, then it experiences overall capital outflows into region *D* which did not enjoy any improvements in TFP. At the same time, FDI flows from region *D* toward region *E*. In the model, therefore, TFP growth is positively related to overall capital *outflows* as well as to FDI *inflows*. Therefore, the analysis in this paper shows that the empirical observations regarding changes in overall NFA (Gourinchas and Jeanne, 2013) and its components, debt and FDI, (Alfaro et al., 2014) can be explained by taking into account the fact that households in developing countries face greater difficulties in obtaining credit for the purpose of consumption compared with households in developed countries.

3.1. Discussion of the mechanism

The analysis in this paper studies capital flows across developing countries that result from differences in TFP catch-up against the backdrop of existing imbalances between developing and developed countries. Because household decision problems in regions *D* and *E*, after normalizing by respective domestic wages, are the same in any steady state, an increase in TFP in region *E* has the first-order effect of increasing its domestic wage and thus scaling up its bond and FDI positions. Existing imbalances imply that overall NFA positions are positive and FDI positions are negative in regions *D* and *E*. Scaling up the positions of region *E* further implies that region *E* exports, on net, additional capital as a result of its growth while experiencing an inflow of FDI. The increase in the demand for bonds from region *E* lowers the return on bonds such that region *D* reduces its overall NFA position. The decrease in the interest rate also increases physical capital investment of entrepreneurs in region *D* such that FDI is flowing out of region *D*, and some of it is flowing into region *E*. Therefore, 'South-South' flows arise from existing 'North–South' imbalances.

It is crucial for the mechanism that existing imbalances imply positive overall NFA positions in regions *D* and *E*—i.e., bond positions are large and positive while FDI positions are small and negative. In the model calibration this is reflected by consumer borrowing limits that are significantly tighter in developing compared to developed regions ($\psi^D = 0$ versus $\psi^U = 0.41$) and by entrepreneurial borrowing limits that are only somewhat tighter ($\eta^D = 0.88$ versus $\eta^U = 0.89$). Consider the opposite case where imbalances are such that developing regions' bond positions are small and positive and FDI positions large and negative. In this case differences in financial frictions faced by entrepreneurs would be more pronounced than differences in financial frictions faced by consumers. Growth catch-up by region *E* would result in growth being positively related to FDI inflows but, in contrast to empirical evidence, negatively to overall capital outflows across developing regions.

3.1.1. Further discussion

Yang (2012) argues that the financial system in China has only a limited ability to pass private savings on to borrowers in the form of consumer credit. The changes in net foreign asset positions of region *E* indicated in Table 3 are small compared with capital flows experienced by China. The reason is that China is only one of the countries represented by region *E*; for example, China's productivity possibly improved by more than 43 percent during recent decades.

Fast-growing developing countries may face challenging life-cycle changes (Song and Yang, 2010), public policy changes affecting the need of households to save (Chamon and Prasad, 2010), tighter borrowing constraints compared to slow-growing developing countries (Coeurdacier et al., 2015), or capital controls with respect to FDI (Song et al., 2011; Benhima, 2013; Sandri, 2014; Buera and Shin, 2017). The factors studies in these papers play important roles in explaining why growth and overall capital outflows can be positively related—however, these papers do not decompose capital flows into debt and FDI.[15] The analysis in this paper shows that a model in which consumer credit is relatively harder to come by in

[15] Mendoza et al. (2009) have an extension of their model in which residents of some developing countries are more impatient—interpreted as a constant growth differential—and also face greater idiosyncratic risk compared with residents in other developing countries. Overall capital is flowing from the former to the latter type of developing country even though FDI is flowing in the opposite direction.

Table 3
Capital flows across developing regions.

	OLD STEADY STATE			NEW STEADY STATE		
	D	*E*	*U*	*D*	*E*	*U*
Return on bonds		3.98			3.96	
Return on physical capital		5.92			5.91	
Net foreign asset positions	13.63	13.63	−6.23	12.31	12.31	−7.54
bonds	18.04	18.04	−8.23	16.36	16.36	−10.03
physical capital	-4.44	−4.44	2.01	−4.06	−4.06	2.49
Change in net foreign asset positions				−1.32	7.61	−1.33
bonds				−1.67	10.2	−1.79
physical capital				0.35	−2.59	0.47

Net foreign asset positions are in percent of gross domestic product for each steady state. Changes in net foreign asset positions are in percent of old steady state gross domestic product.

developing countries—compared with developed countries—can explain why growth can be positively related to both overall capital outflows and FDI inflows.

3.2. Autarky in initial steady state

The openness of countries' capital accounts tends to increase over time (Chinn and Ito, 2006) which can affect capital flows significantly (Mendoza et al., 2009). This section studies capital flows that occur when regions are in financial autarky in the old steady state. I find that the main model implications are robust to such an increase in financial openness over time.

Suppose regions cannot trade bonds among each other and, in addition, cannot invest physical capital in another region in the old steady state. Then the returns on bonds and physical capital investment are different in developing and developed regions in the old steady state. Table 4 compares the old steady state to the new steady state. Note that the new steady state is the same as in the benchmark version of the model. Capital is flowing from developing regions toward the developed region (as in Mendoza et al., 2009). However, more capital is flowing out of the fast-growing developing region E than out of the slow-growing developing region D. Overall capital outflows and FDI inflows are again positively related to growth across developing regions.

3.3. Comparison with observed changes in overall NFA positions

To compare capital flows generated by the model to observed capital flows I use data on NFA positions from Lane and Milesi-Ferretti (2007).[16] The changes in overall NFA positions between 1980 and 2010 are $11.7, 34.4$, and -8.3 percent of 1980 output in the groups of countries represented by regions D, E, and U respectively.[17] NFA positions for countries represented by region D are obtained as the residual of NFA positions in countries represented by regions E and U.[18]

Table 3 shows that capital flows generated by the model are small in magnitude compared to the ones observed in the data—i.e., $11.7, 34.4$, and -8.3 in the data compared to $-1.32, 7.61$, and -1.33 in the model. However, increased openness of the capital account likely contributes to international capital flows.

Indeed, comparing the old steady states in Table 3 and Table 4, respectively, shows that, for constant TPF, capital account opening creates sizeable changes in overall NFA (as in Mendoza et al., 2009. The changes in overall NFA positions are $13.63, 13.63$ and -6.23 in regions D, E and U, respectively. The changes for regions D and E are the same because the regions are identical in per-capita terms in the old steady state (i.e., before region E partially catches up in terms of TFP). Increasing openness does therefore not create capital flows across developing regions when there are no accompanying differences in growth between them.

Adding up the capital flows from opening the capital account and from growth catch-up in region E yields changes on overall NFA positions of $12.24, 21.12$ and -7.57, respectively, as shown in Table 4.[19] Therefore, the model, when starting in financial autarky and region E partially catching up in terms of TFP, generates capital flows of a similar magnitude than the ones observed in the data—i.e., $11.7, 34.4$, and -8.3 in the data compared to $12.24, 21.12$, and -7.57 in the model.

[16] The data, extended until 2011, can be found at `http://www.philiplane.org/EWN.html`.
[17] In the model I normalize both population growth and the TFP growth rate in region U to zero. To make empirical changes in NFA comparable to their model equivalents I divide empirical NFA positions of all countries in 2010 by cumulative TFP growth in countries represented by region U and by cumulative growth in world population between 1980 and 2010.
[18] This ignores the fact that there is a statistical discrepancy related to the measurement of NFA that is significant and also growing over time (see Section 4 for a related robustness exercise).
[19] While the changes in NFA positions add up exactly, their percentage changes as reported in Table 3 and Table 4 do not (e.g., $-1.32 + 13.63 = 12.31 \neq 12.24$). The reason for these small discrepancies is that changes are in percent of GDP in the old steady state which depends on whether the capital account is open or not.

Table 4
Capital flows across developing regions with autarky in old steady state. Net foreign asset positions are in percent of gross domestic product for each steady state. Changes in net foreign asset positions are in percent of old steady state gross domestic product.

	OLD STEADY STATE			NEW STEADY STATE		
	D	*E*	*U*	*D*	*E*	*U*
Return on bonds	3.78	3.78	4.06		3.96	
Return on physical capital	5.78	5.78	5.98		5.91	
Net foreign asset positions	0	0	0	12.31	12.31	−7.54
bonds	0	0	0	16.36	16.36	−10.03
physical capital	0	0	0	−4.06	−4.06	2.49
Change in net foreign asset positions				12.24	21.12	−7.57
bonds				16.28	28.08	−10.06
physical capital				−4.03	−6.96	2.49

4. Extension: Case of lower global imbalances

This section presents a robustness exercise that allows for the possibility of significantly lower indebtedness of high income countries than recorded in the official data. Specifically, Lane and Milesi-Ferretti (2007) document a large discrepancy in the data on NFA. Zucman (2013) argues that the discrepancy can be explained to a large extent by under-reporting of debt securities held by high income countries, especially countries of the Eurozone.[20] This section assumes the statistical discrepancy is entirely in terms of debt securities and attributes it to countries in proportion to their respective contribution to world GDP. This significantly lowers the NFA position of countries represented by region U, to -0.8 percent of GDP. The changes in NFA positions are now $-19, 43$, and -4 percent of 1980 GDP for countries represented by regions D, E, and U, respectively.

I recalibrate the benchmark model, changing only the target for the external bond position of U—from -10 to -3.5 percent of GDP. The much smaller global imbalances targeted in the calibration are reflected by smaller differences in the ability to borrow for consumption purposes, $\psi^D = 0.05$ versus $\psi^U = 0.16$, while the pledgeability of physical capital is largely unchanged at $\eta^D = 0.89$ and $\eta^U = 0.91$ respectively.

The capital flows shown in Table 5 are qualitatively similar than those in Table 3 but they are smaller by more than one order of magnitude. The analysis now understates global imbalances, together with NFA positions of developing countries, when attributing substantial additional savings to the Eurozone while ignoring the fact that the Eurozone might not have the same financial development as the United States. The division of countries into only two groups with respect to their financial development can be too coarse in the case where imbalances between developed and developing countries can be low. This issue can be addressed, for example, by letting the Eurozone be represented by region D instead, such that region D represents both developed countries with low financial development and slow-growing developing countries.

5. Conclusion

The empirical literature finds that overall capital outflows and FDI inflows are positively related to growth across developing countries. This paper develops an explanation that makes use of two well-established facts. First, households in developing countries tend to have worse access to credit compared to households in developed countries, and this gap in financial development persists even after improvements in economic development in a developing country have taken place. Second, the emergence of some developing countries as fast-growing developing countries significantly changes their contribution to world output and creates general equilibrium effects via a global savings glut.

In the model in this paper relatively tighter borrowing limits in developing countries imply that part of the income generated by an improvement in TFP ends up financing foreign rather than domestic consumption. The resulting lower world interest rate induces households in slow-growing developing countries to borrow more. Savings flows from fast-growing to slow-growing developing countries more than offset FDI flows in the opposite direction. Growth is related positively to both overall capital outflows and FDI inflows across developing countries in the model.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

[20] Another reason for over-estimating global imbalances can be under-reporting of the value of developed-country portfolio investment in emerging markets, especially in China (Gourinchas and Rey, 2013; Coppola et al., 2020).

Table 5
Capital flows across developing regions: case of lower external debt in *U*. Net foreign asset positions are in percent of gross domestic product for each steady state. Changes in net foreign asset positions are in percent of old steady state gross domestic product.

	OLD STEADY STATE			NEW STEADY STATE		
	D	*E*	*U*	*D*	*E*	*U*
Return on bonds		3.99			3.98	
Return on physical capital		5.92			5.91	
Net foreign asset positions	1.61	1.61	−1.00	1.89	1.89	−1.16
bonds	6.61	6.61	−3.02	5.99	5.99	−3.67
physical capital	-4.50	−4.50	2.05	−4.10	−4.10	2.51
Change in net foreign asset positions				−0.22	1.15	−0.19
bonds				−0.62	3.72	−0.65
physical capital				0.40	−2.58	0.46

Appendix A. Appendix

A.1. Country list

The list of fast-growing developing countries represented by region *E* is as follows: Argentina, Brazil, Chile, Colombia, China, Egypt, Hong Kong, India, Indonesia, Israel, Jordan, South Korea, Malaysia, Morocco, Pakistan, Peru, Philippines, Saudi Arabia, Singapore, South Africa, Thailand, and Turkey. This list is the same as the list of emerging economies in Mendoza et al. (2009) except that I remove Russia, Poland and the Czech Republic. I do not include Russia and Eastern and Central European countries in any of the regions because there tends to be no data on NFA positions for them in the 1980s, and I use these data in Section 4 and Appendix A.3.

The list of developed countries represented by region *U* is as follows: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Italy, Japan, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and the United States. This list consists of OECD countries except that I remove Eastern and Central European countries and those countries already represented by region *E*.

All remaining countries, excluding Russia and Eastern and Central European countries, are represented by region *D*.

A.2. Computational method

The presence of idiosyncratic labor income risk precludes solution techniques that rely on analytical aggregation via linear decision rules as in Angeletos and Calvet (2006),Angeletos and Panousi (2011) and Sandri (2014).

I solve for the steady state equilibrium of the model with standard value function iteration in an inner loop, and iteration over wages and interest rates in an outer loop. The computational procedure can be simplified by taking into account that the decision problem of agents in regions *D* and *E* is the same once normalized by domestic wages. I solve for the counter-factual steady state in the same fashion.

A.3. Extension: Allowing for differences in population growth and initial TPF

This section allows the size and TFP of all regions to change across steady states where the old steady state correspond to the year 1980. TFP in the old steady state is now implied by population and output shares given in Table 6 as $A_0^D = 1.33$ and $A_0^E = 0.85$, with the normalization $A_0^U = A^U = 5.14$. That is, region *U* is again at the world productivity frontier. Note that the contribution of developing regions to world output is higher in the new steady state compared to the old steady state, as in the benchmark version of the model. This increase in the contribution of developing region *E*, together with imbalances between developing and developed regions, is what generates capital flows in this paper. To further illustrate the robustness of this channel, this section considers imbalances that are smaller than the overall NFA position of region *U* of −7.5 percent of GDP in the benchmark version (see Section 2.2). Specifically, I target an overall NFA position in region *U* of −4.8 percent of GDP which is the overall NFA position for countries represented by region *U* in the data in 2010.

The model is recalibrated to target −4.8 percent of GDP as the NFA position in region *U* in the new steady state. In particular, bond and FDI positions are targeted to be −6.8 and 2 percent of GDP respectively. Consumer borrowing limits are now given by $\psi^D = 0$ and $\psi^U = 0.29$ while the pledgeabilities of physical capital are largely unchanged at $\eta^D = 0.89$ and $\eta^U = 0.90$ respectively.

Table 7 shows that capital flows generated by the model are around one order of magnitude below the ones observed in the data—i.e., $11.7, 34.4$, and -8.3 in the data compared to $-0.92, 3.6$, and -0.47 in the model. As mentioned in Section 3.2, increased financial liberalization at the time of growth catch-up by some developing countries likely contributes to international capital flows. Table 8 shows that the model—when starting from an old steady state in financial autarky—generates

Table 6
Shares in world population and world output in 1980.

	POPULATION SHARE	OUTPUT SHARE
D	0.27	0.14
E	0.54	0.13
U	0.19	0.73

Table 7
Capital flows across developing regions: accounting for measured population and TFP changes. Net foreign asset positions are in percent of gross domestic product for each steady state. Changes in net foreign asset positions are in percent of old steady state gross domestic product.

	OLD STEADY STATE			NEW STEADY STATE		
	D	*E*	*U*	*D*	*E*	*U*
Return on bonds		4.00			3.98	
Return on physical capital		5.91			5.89	
Net foreign asset positions	9.38	9.38	−3.33	7.88	7.88	−4.83
bonds	13.23	13.23	−4.71	11.20	11.20	−6.86
physical capital	-3.85	−3.85	1.37	−3.33	−3.33	2.04
Change in net foreign asset positions				−0.92	3.59	−0.47
bonds				−1.21	5.20	−0.71
physical capital				0.29	−1.62	0.24

Table 8
Capital flows across developing regions with financial autarky in old steady state: accounting for measured population and TFP changes. Net foreign asset positions are in percent of gross domestic product for each steady state. Changes in net foreign asset positions are in percent of old steady state gross domestic product.

	OLD STEADY STATE			NEW STEADY STATE		
	D	*E*	*U*	*D*	*E*	*U*
Return on bonds	3.85	3.85	4.04		3.98	
Return on physical capital	5.81	5.81	5.94		5.89	
Net foreign asset positions	0	0	0	7.88	7.88	−4.83
bonds	0	0	0	11.20	11.20	−6.86
physical capital	0	0	0	−3.33	−3.33	2.04
Change in net foreign asset positions				8.42	12.91	−3.82
bonds				11.97	18.35	−5.43
physical capital				−3.55	−5.44	1.61

capital flows of a similar magnitude than the ones in observed in the data—i.e., $11.7, 34.4$, and -8.3 in the data compared to $8.4, 12.9$, and -3.8 in the model.[21] Note that these flows are smaller in magnitude than those in Section 3.3 which is a direct consequence of the assumed smaller global imbalances, -4.8 versus -7.5, in this section.

Appendix B. Supplementary material

Supplementary data associated with this article can be found, in the online version, at https://doi.org/10.1016/j.jimonfin.2023.102904.

References

Aguiar, M., Amador, M., 2011. Growth in the shadow of expropriation. Q. J. Econ. 126, 651–697.
Alfaro, L., Kalemli-Özcan, S., Volosovych, V., 2014. Sovereigns, upstream capital flows, and global imbalances. J. Eur. Econ. Assoc. 12 (5), 1240–1284.
Angeletos, G.-M., Calvet, L.-E., 2006. Idiosyncratic production risk, growth and the business cycle. J. Monet. Econ. 53, 1095–1115.
Angeletos, G.-M., Panousi, V., 2011. Financial integration, entrepreneurial risk and global dynamics. J. Econ. Theory 146 (3), 863–896.
Benhima, K., 2013. A reappraisal of the allocation puzzle through the portfolio approach. J. Int. Econ. 89 (2), 331–346.
Bernanke, B., 2005. The global saving glut and the US current account deficit. Speech, Board of Governors of the Federal Reserve System (US).
Bingxi, S., Lijuan, Y., 2009. Development of consumer credit in China. Bank Int. Settlements working paper 46.
Buera, F.J., Shin, Y., 2017. Productivity growth and capital flows: the dynamics of reforms. Am. Econ. J.: Macroecon. 9 (3), 147–185.
Caballero, R., Farhi, E., Gourinchas, P.-O., 2008. An equilibrium model of global imbalances and low interest rates. Am. Econ. Rev. 1, 358–393.
Cagetti, M., De Nardi, M., 2006. Entrepreneurship, frictions, and wealth. J. Polit. Econ. 114 (5), 835–870.

[21] The exercise summarized in Table 8 uses the same TFP levels in the old steady state as the exercise summarized in Table 7. Note that TFP levels in regions *D* and *E* relative to TFP in region *U* have been calibrated under the assumption of financial integration (using Lemma 1 as in Section 2.2) in the exercise summarized in Table 7.

Chamon, M.D., Prasad, E.S., 2010. Why are saving rates of urban households in China rising? Am. Econ. J.: Macroecon. 2 (1), 93–130.
Chien, Y., Naknoi, K., 2015. The risk premium and long-run global imbalances. J. Monet. Econ. 76, 299–315.
Chinn, M.D., Ito, H., 2006. What matters for financial development? capital controls, institutions, and interactions. J. Develop. Econ. 81 (1), 163–192.
Coeurdacier, N., Guibaud, S., Jin, K., 2015. Credit constraints and growth in a global economy. Am. Econ. Rev. 105 (9), 2838–2881.
Coppola, A., Maggiori, M., Neiman, B., Schreger, J., 2020. Redrawing the map of global capital flows: The role of cross-border financing and tax havens. Technical report, National Bureau of Economic Research.
Cozzi, G., Davenport, M., 2017. Extrapolative expectations and capital flows during convergence. J. Int. Econ. 108, 169–190.
Díaz-Giménez, J., Pijoan-Mas, J., 2011. Flat tax reforms: Investment expensing and progressivity. Technical report, Working Papers wp2011-1101, CEMFI. URL http://ideas. repec. org/p/cmf/wpaper/wp2011_1101. html.
Dollar, D., Kraay, A., 2006. Neither a borrower nor a lender: does China's zero net foreign asset position make economic sense? J. Monet. Econ. 53 (5), 943–971.
Evans, D.S., Leighton, L.S., 1989. Some empirical aspects of entrepreneurship. Am. Econ. Rev. 79 (3), 519–535.
French, K.R., Poterba, J.M., 1991. Investor diversification and international equity markets. Am. Econ. Rev. 81 (2), 222–226.
Gourinchas, P.-O., Jeanne, O., 2013. Capital flows to developing countries: the allocation puzzle. Rev. Econ. Stud. rdt004.
Gourinchas, P.-O., Rey, H., 2013. External adjustment, global imbalances and valuation effects. Technical report, National Bureau of Economic Research.
Gourinchas, P.-O., Rey, H., Govillot, N., 2010. Exorbitant privilege and exorbitant duty. Technical report.
Hamilton, B.H., 2000. Does entrepreneurship pay? An empirical analysis of the returns of self-employment. J. Polit. Econ. 108 (3), 604–631.
Hsieh, C.-T., 2003. Do consumers react to anticipated income changes? evidence from the alaska permanent fund. Am. Econ. Rev. 93 (1), 397–405.
Hsieh, C.-T., Klenow, P.J., 2009. Misallocation and manufacturing tfp in China and India. Quart. J. Econ. 124 (4), 1403–1448.
Hurst, E., Lusardi, A., 2004. Liquidity constraints, household wealth, and entrepreneurship. J. Polit. Econ. 112 (2), 319–347.
Jeske, K., 2006. Private international debt with risk of repudiation. J. Polit. Econ. 114 (3), 576–593.
Klein, M.W., Olivei, G.P., 2008. Capital account liberalization, financial depth, and economic growth. J. Int. Money Finance 27 (6), 861–875.
Kraay, A., Ventura, J., 2000. Current accounts in debtor and creditor countries. Quart. J. Econ., 1137–1166.
Lane, P.R., Milesi-Ferretti, G.M., 2007. The external wealth of nations mark II: Revised and extended estimates of foreign assets and liabilities, 1970–2004. J. Int. Econ. 73 (2), 223–250.
Lane, P.R., Milesi-Ferretti, G.M., 2007b. A global perspective on external positions. In: G7 current account imbalances: sustainability and adjustment. University of Chicago Press, pp. 67–102.
MacDonald, M., 2015. Patterns of international capital flows and productivity growth: New evidence. Rev. Int. Econ. 23 (5), 846–872.
Maggiori, M., 2017. Financial intermediation, international risk sharing, and reserve currencies. Am. Econ. Rev. 107 (10), 3038–3071. October.
Maggiori, M., Neiman, B., Schreger, J., 2020. International currencies and capital allocation. J. Polit. Econ. 128 (6), 2019–2066.
Mendoza, E., Quadrini, V., Ríos-Rull, J., 2009. Financial integration, financial development, and global imbalances. J. Polit. Econ. 117 (3), 371–416.
Mendoza, E.G., Quadrini, V., Rios-Rull, J.-V., et al, 2007. Financial integration, financial deepness and global imbalances. National Bureau of Economic Research Inc.. Technical report.
Moll, B., 2014. Productivity losses from financial frictions: Can self-financing undo capital misallocation? Am. Econ. Rev. 104 (10), 3186–3221.
Ohanian, L.E., Restrepo-Echavarria, P., Wright, M.L., 2018. Bad investments and missed opportunities? postwar capital flows to asia and latin america. Am. Econ. Rev. 108 (12), 3541–3582.
Prasad, E., Rajan, R., Subramanian, A., 2007. Foreign capital and economic growth. Brooking Papers on Economic Activity (Spring), 153–230.
Quadrini, V., 2000. Entrepreneurship, saving, and social mobility. Rev. Econ. Dynam. 3 (1), 1–40.
Restuccia, D., Rogerson, R., 2008. Policy distortions and aggregate productivity with heterogeneous establishments. Rev. Econ. Dynam. 11 (4), 707–720.
Restuccia, D., Rogerson, R., 2017. The causes and costs of misallocation. J. Econ. Perspect. 31 (3), 151–174.
Sandri, D., 2014. Growth and capital flows with risky entrepreneurship. Am. Econ. J.: Macroecon. 6 (3), 102–123.
Song, M., Yang, D.T., 2010. Life cycle earnings and the household saving puzzle in a fast-growing economy. Chinese University of Hong Kong, Manuscript.
Song, Z., Storesletten, K., Zilibotti, F., 2011. Growing like China. Am. Econ. Rev. 101 (1), 196–233.
The Wall Street Journal (2019). Who's Afraid of the Belt and Road? June 9th.
Thomas, J., Worral, T., 1994. Foreign direct investment and the risk of expropriation. Rev. Econ. Stud. 61, 81–108.
Tombe, T., Zhu, X., 2019. Trade, migration, and productivity: A quantitative analysis of china. American Economic Review 109 (5), 1843–1872.
UNCTAD (2015). World investment report 2015. United Nations Conference on Trade and Development.
Wang, P., Wen, Y., Xu, Z., 2016. Two-way capital flows and global imbalances. Econ. J. 127 (599), 229–269.
Yang, D.T., 2012. Aggregate savings and external imbalances in China. The Journal of Economic Perspectives 26 (4), 125–146.
Young, A., 1995. The tyranny of numbers: confronting the statistical realities of the east asian growth experience. Quart. J. Econ.
Zhu, X., 2012. Understanding china's growth: Past, present, and future. Journal of Economic Perspectives 26 (4), 103–124.
Zucman, G., 2013. The missing wealth of nations: Are Europe and the US net debtors or net creditors? Q. J. Econ. 128 (3), 1321–1364.