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Lionel Artige
Laurent Cavenaile

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4000 Liège Belgium

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A Growth Model of Global Imbalances

Lionel Artige*
HEC - University of Liège

Laurent Cavenaile †
New York University

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Abstract

Recent empirical evidence shows that gross official capital transactions flow upstream in the international financial markets due to government policy objectives and that they account for the current account surpluses observed in the last decade in the fast-growing emerging economies. Following the Asian financial crisis, the governments of these countries have used national wealth to create a financial buffer to stave off or to confront new balance-of-payments crises by accumulating foreign reserves. We argue that government intervention in the capital market has led to forced saving in these countries generating large global imbalances. This paper builds a two-country neoclassical growth model, which takes public saving into account. Calibrated on IMF data and forecasts between 1981 and 2016, the model rightly predicts the reversal and the size of current account balances observed between the advanced economies and other countries from 1998 onwards. Contrary to the recent theoretical literature on global imbalances, our results support the explanatory and predictive power of the neoclassical growth model when it focuses on national saving and not only on private saving.

Keywords: Balance of payments, Forced saving, Global imbalances, Neoclassical growth, Overlapping generations
JEL Classification: E20, F21, F43, O16, O41

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†Corresponding author: New York University, Economics Department, laurent.cavenaile@nyu.edu

1 Introduction

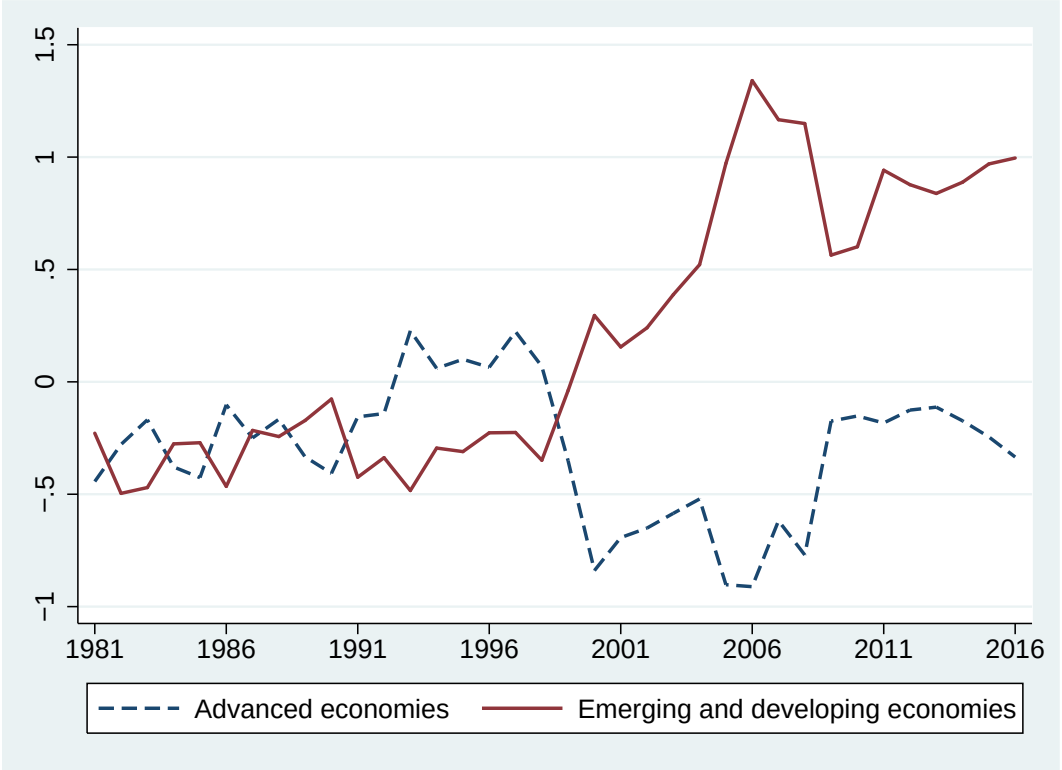
The large and persistent current account imbalances observed in the world in the last decade have been a cause for concern in relation to the stability of the global economy. Some authors have argued that global imbalances are one of the factors that have led to the current financial crisis.[1] Figure 1 shows the current account balances as a percentage of world GDP of the advanced economies and the emerging and developing economies since the beginning of the 1980s. This figure highlights three facts: (1) the current account differential between the two groups of countries was small and stable until the end of the 1990s and then widened very rapidly until the height of the financial crisis[2]; (2) The current accounts of the emerging and developing countries, which had been constantly in deficit since 1990, suddenly reversed as from 1998; (3) From 1998 onwards capital has been flowing uphill from the fast-growing emerging and other developing economies to the slow-growing advanced economies, in contradiction to the predictions of the neoclassical growth theory.[3]

There have been several attempts to explain these three facts. One influential explanation was proposed by Bernanke (2005), who challenged the common view, held at the time, that the large U.S. current account deficit was due to the U.S. economic policies responsible for the low domestic saving and the frenzied consumption of foreign goods. Instead, he highlighted the emergence of a "global saving glut" at the end the 1990s, allowing the cheap financing of the U.S. current account deficit and accounting for both the widening of global imbalances and the low level of real interest rates. Bernanke puts forward several reasons to explain the reversal in the current account positions. First, many developing and emerging economies modified their economic policies after the series of financial crises in the 1990s so as to yield current account surpluses and build foreign exchange reserves in order to reduce the financial liquidity risk in case of a sudden change in foreign investors' behaviour. Second, other countries, such as China, maintained their export-led growth policy by preventing their currency from appreciating. Third, the rise in oil prices during the last decade inflated the income of oil-exporting countries and, hence, increased their level of saving. Finally, the deep and liquid U.S. financial markets provided a highly attractive haven for this foreign saving glut. All these factors have contributed to increasing saving at the world level and have enabled the U.S. and other industrial countries to live on credit.

[1] This question is controversial. For instance, Bernanke (2009), BIS (2009), Obstfeld and Rogoff (2009) and Portes (2009) argue that global imbalances played a major role in the recent financial crisis. Blanchard and Milesi-Ferretti (2010) believe that the failures of the financial system were the trigger for the financial crisis and contributed to the widening of global imbalances. Laibson and Mollerstrom (2010) and Whelan (2010) challenge the link between global imbalances and the financial crisis.

[2] Blanchard and Milesi-Ferretti (2010) show that the ratio of the absolute value of the world current account balances to the world GDP was stable from 1970 to 1996 but that it started to increase sharply from then on.

[3] Lucas (1990) points out that rich countries did not invest in poor countries as much as the neoclassical growth model would predict (Lucas Paradox). Twenty years on, this paradox has become a contradiction.

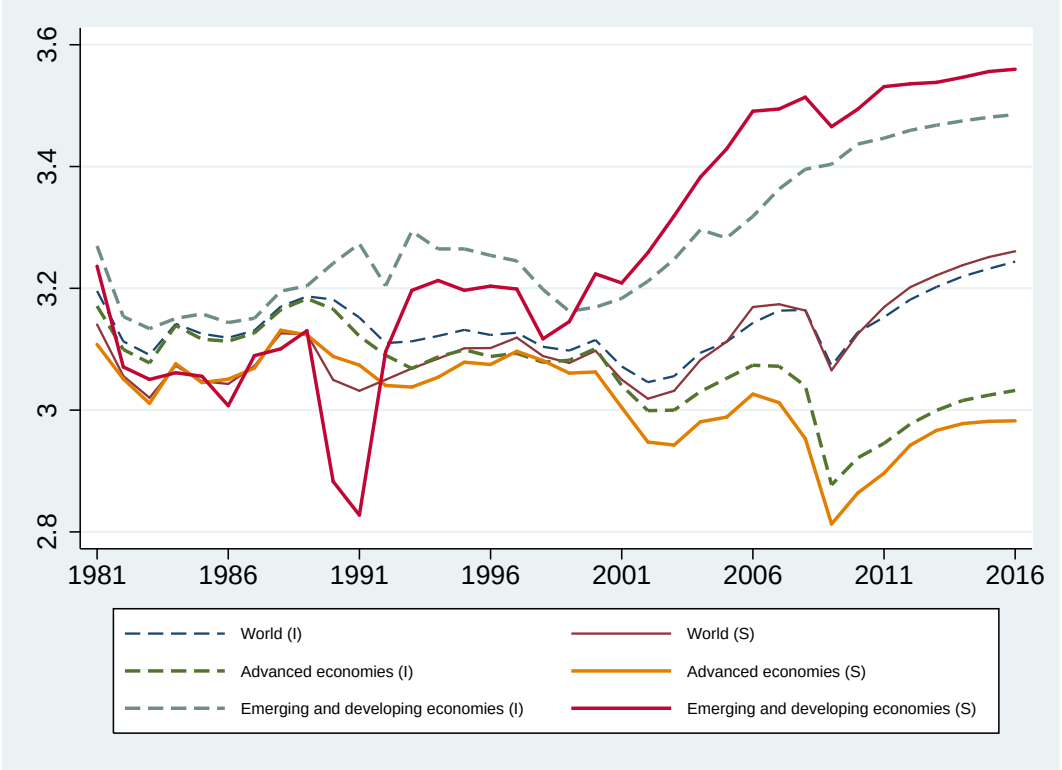


Source: IMF, World Economic Outlook, April 2011
Country groups information: see IMF 2011 WEO database.
IMF estimates for data after 2010.

Figure 1: Current account balance as a percentage of world output (1981-2016)

The "global saving glut" hypothesis has been questioned by a number of authors stressing the fact that there has been little evidence of excess saving supply at the world level at the time of the reversal in the current account positions (IMF (2005) and Taylor (2009)). Figure 2 shows that world saving as a percentage of world GDP did increase substantially but not before 2002. Nevertheless, the upward trend in the saving rate in the emerging and developing economies did start at the end of the 1990s. Chinn and Ito (2007) find little empirical evidence supporting the view that excess national saving in East Asia accounts for global imbalances, but they do identify the balance budget (public saving or dissaving) as the main determinant of the current accounts, especially in advanced economies but also in less developed countries. Based on a similar approach, (Gruber and Kamin 2007) tend to be more supportive of Bernanke's hypothesis and find that financial crises are systematically associated with higher global imbalances.

Fact (3) has driven the recent literature to focus on the international capital market imperfections to account for global imbalances that cannot be explained by the standard open-macroeconomic models. For instance, Caballero, Farhi, and Gourinchas (2008) con-



Source: IMF, World Economic Outlook, April 2011
Country groups information: see IMF 2011 WEO database.
IMF estimates for data after 2010.

Figure 2: Gross national saving and investment as a percentage of GDP (1981-2016) [Logarithmic scale; (S): saving and (I): investment]

sider that increasing private saving in emerging countries faces an incomplete supply of local stores of value and, therefore, a rising proportion of saving flows to the perceived better U.S. financial markets. In cases of a productivity or a financial shock in these countries, the demand for U.S. assets soars. Thus, the widening of the U.S. current account deficit, the decline in world interest rates and the increase in U.S. assets within global portfolios are not an anomaly but rather a global equilibrium resulting from incomplete asset markets in emerging countries. Along the same lines, Mendoza, Quadrini, and Ríos-Rull (2009) add uncertainty to incomplete capital markets in emerging countries to show that the international integration of capital markets results in higher saving in these countries and allows their risk-averse agents to self-insure in deeper foreign financial markets against idiosyncratic risks. The resulting global imbalances are a gradual rather than a sudden process.[4]

[4]Other papers based on capital market imperfections include, among others, Dooley, Folkerts-Landau, and Garber (2004), Bacchetta and Benhima (2010) and Aguiar and Amador (2011).

All these theoretical hypotheses have been suggested based on data for net capital flows without precise information on gross flows.[5] Alfaro, Kalemli-Ozcan, and Volosovych (2011) fill the gap by providing empirical evidence on international private and public capital gross flows.[6] Their analysis shows that net total capital flows are shaped by public capital flows, private capital flows downhill from rich to poor countries, as predicted by the neoclassical growth model, and public capital (aid, public debt, reserve accumulation) flows uphill, reflecting differences between government motivations and market incentives.[7] The results reported by these authors, which hold for all their sample periods including the 2000s, imply that domestic capital market imperfections may be useful to account for the Lucas Paradox but that they cannot be the main determinant of global imbalances. How could these imperfections induce the allocation of private flows in one direction and public flows in another? Rather than blaming the low development of their local financial markets, these results reveal policy choices made by the governments of the less developed countries to optimize the costs and benefits of the integration of international capital markets.[8][9]

It remains to be seen whether the neoclassical growth model is able to replicate the above facts (2) and (3) with reasonable accuracy when calibrated with real data. This is the main objective of this paper which reconsiders the neoclassical growth model in light of the findings of Alfaro, Kalemli-Ozcan, and Volosovych (2011). Assuming that the saving-investment locus relies only on private saving makes sense in a closed economy, but this assumption is no longer appropriate in an open economy, in which official capital transactions are sizeable and flow upstream. Therefore, we add public saving to the model and assume that any increase in public saving is the result of an exogenous government intervention to manage the balance of payments. This increase in public saving can be considered for the entire economy as forced saving, since it is not a response to market incentives. However, it affects the market rate of return of capital.

The paper's key hypothesis is that global imbalances are the result of a sudden and prolonged increase in the saving rate in the emerging and developing countries due to government intervention in the capital market. This increase is observed in the data right after the financial crises in some emerging countries and the implementation of tough IMF rescue programmes in the second half of the 1990s. These crises seem to have durably

[5]The size and the volatility of gross capital flows have increased significantly since the mid-1990s and their movements can no longer be proxied by net flows (Forbes and Warnock 2011).

[6]The authors' paper is thus more informative than that of Gourinchas and Jeanne (2009) who only look at net capital flows and find a negative correlation with productivity growth for non-OECD countries.

[7]The authors stress that only five Asian highly productive countries (China, Korea, Malaysia, Singapore and Hong Kong) export capital but that their current account surpluses make up a big share of the total surplus of developing countries.

[8]Gagnon (2012) also argues that official flows are mainly responsible for the large observed global imbalances.

[9]The financial crises of the 1990s constitute major setbacks in the process of the international financial integration, and led the governments of developing countries to reassess the costs and benefits of integration. The evidence of welfare gains from the international financial integration in developing countries has been thin (see (Edison et al. 2002) and (Gourinchas and Jeanne 2006) among others).

changed the behaviour of the governments in many emerging and developing countries (IMF 2000), which have used national wealth to accumulate foreign reserves by using public saving or channeling private saving to foreign capital through the sterilization market and non-market operations. The accumulation of international reserves in these countries, which started to increase in the mid-1990s, accelerated sharply in the aftermath of the Asian financial crisis (Lane and Milesi-Ferretti (2007) and de Beaufort Wijnholds and Søndergaard (2007)). Foreign assets are mainly seen as a self-insurance against the risk of sudden stops in capital inflows (Aizenman and Lee (2007), Wyplosz (2009)). An increasing share of public saving in national saving can be observed in many emerging countries after 1998, for instance, in Malaysia (Ang 2011), in South Korea (Ha, Lee, and Sumulong 2010) and, particularly, in China (Ma and Yi 2010). As a result, public debt has diminished in these countries. According to IMF data, the gross public debt-to-GDP ratio in the emerging and developing economies decreased sharply from 48% to 32% between 2000 and 2008 reflecting an increase in public saving. We believe that these government interventions for precautionary motives have led to forced saving in this group of countries taken globally and to the emergence of global imbalances.

To test our hypothesis, we build a two-country overlapping generations (OLG) model with forced saving in the emerging economy. After deriving the theoretical properties and predictions of the model, we calibrate it on IMF data and forecasts for the group of advanced economies and the group of emerging and developing economies between 1981 and 2016. This neoclassical growth model performs well and gives credit to the hypothesis of government intervention in the capital market as the main source of global imbalances in the 2000s.

To summarize our main results, we find that (i) it is always possible for a government to generate a current account surplus by forcing saving; (ii) contrary to the recent literature on global imbalances, our results support the explanatory and predictive power of the neoclassical growth model when it focuses on national saving and not only on private saving; (iii) global imbalances are likely to reduce over time as the emerging and developing economies catch up with the slow-growing advanced economies.

The paper is organized as follows. Section 2 defines the two-country overlapping generations model, introduces the concept of forced saving and presents the dynamic equilibrium in an open economy. Section 3 analyses the steady-state current account balances when average propensities to save and the population growth rates differ across countries. Section 4 introduces global imbalances into the two-country model, and studies the existence of an intertemporal equilibrium, the impact on the world interest rate and transition growth. The results of the calibrated model are presented and discussed in Section 5. Finally, section 6 concludes.

2 A Two-Country Model

2.1 Setup

We consider a discrete-time deterministic model of an economy consisting of two countries, A and B, producing the same good under perfect competition from date $t = 0$ to infinity. The model builds on (Buiter 1981) and thus assumes that there is no trade in the consumption goods.[10]. Each country is populated by overlapping generations living for two periods. When young, individuals supply inelastically one unit of labour to the firms, receive a wage and allocate this income between consumption and saving. When old, they retire and consume the return on their saving. The labour market is perfectly competitive within the national borders while physical capital moves freely across countries from date $t = 1$ onwards. We also assume that the real exchange rate is equal to one at each period, i.e. purchasing power parity holds at all times. The representative firm in each country produces a single aggregate good using a Cobb-Douglas technology of the form

$$Y_{i,t} = A_i K_{i,t}^{\alpha} L_{i,t}^{1-\alpha}, \quad i = A, B, \tag{1}$$

where $K_{i,t} > 0$ is the stock of capital, $L_{i,t} > 0$ is the labour input, and $A_i > 0$ is a technological parameter of country i at time t. We assume that physical capital fully depreciates after one period. At time t, the representative firm of country i has an installed stock of capital $K_{i,t}$, chooses the labour input paid at the competitive wage $w_{i,t}$, equal to the marginal product of labour, and maximizes its profits

$$\pi_{i,t} = A_i k_{i,t}^{\alpha} - w_{i,t}, \tag{2}$$

where $\pi_{i,t} = R_{i,t} k_{i,t}$ are the profits per worker distributed to the owners of the capital stock, the interest factor $R_{i,t}$ is equal to the marginal product of capital, and $k_{i,t} \equiv K_{i,t}/L_{i,t}$ is the capital-labour ratio.

The representative agent of country i maximizes a logarithmic additively separable utility function

$$U_i = \ln c_{i,t} + \beta_i \ln d_{i,t+1} \tag{3}$$

subject to budget constraints

$$c_{i,t} + s_{i,t} = w_{i,t} \tag{4}$$

$$d_{i,t+1} = R_{i,t+1} s_{i,t}, \tag{5}$$

where $c_{i,t}$ is consumption when young and $s_{i,t}$ is individual saving at time t. When old, the individuals consume $d_{i,t+1}$. Parameter $\beta_i > 0$ is the psychological discount factor in

[10] The balance of payments in this model is reduced to the financial balance only, which is the symmetric account of the current account.

country i. We assume that this parameter may have different values across countries. The maximization of (3) with respect to (4) and to (5) yields the optimal level of individual saving:

$$s_{i,t} = \frac{\beta_i}{1+\beta_i}(1-\alpha)A_i k_{i,t}^{\alpha}. \tag{6}$$

Individual saving depends only on the marginal product of labour and the average propensity to save $\frac{\beta_i}{1+\beta_i}$.

2.2 Forced Saving

The change in the average propensity to save can be caused by a change in consumer preferences or by government interventions in the allocation of national resources towards saving. In the latter case, government policy can generate public saving and contribute to the accumulation of physical capital. The sharp decrease in the public debt of the emerging and developing economies in the 2000s reflects an increase in public saving in these countries. Further evidence of public intervention in the capital markets lies in the massive accumulation of foreign reserves in the less developed countries.[11] The purchase of foreign assets with public saving and/or the offsetting of inflows of foreign reserves by sterilization market and non-market operations result in forced purchase of assets through public intermediation. This policy might even cause corporate saving to rise as national saving is diverted to foreign investment. In this section, we show that saving forced by government intervention is equivalent to a higher average propensity to save.

We assume that the government of country i, uses tax revenue to buy assets. The budget constraint of the individual in country i becomes:

$$c_{i,t} + s_{i,t} = w_{i,t} - a_{i,t} \tag{7}$$

$$d_{i,t+1} = R_{i,t+1}\left[s_{i,t} + \left(1 + \frac{L_{i,t-1}}{L_{i,t}}\right)a_{i,t}\right] - a_{i,t+1} \tag{8}$$

where $a_{i,t}$ is public saving per young individual at time t and $0 \leqslant a_{i,t} < w_{i,t}$ for any t. To ensure that $d_{i,t+1} > 0$, we impose $a_{i,t+1} < R_{i,t+1}\left[s_{i,t} + \left(1 + \frac{L_{i,t-1}}{L_{i,t}}\right)a_{i,t}\right]$. The government levies a lump-sum tax on every generation at each period t to buy assets. The tax policy is determined exogenously by the public authorities. The old generation, except the first, benefits from the return on public saving. The individual private saving function becomes

[11] Lavigne (2008) finds that emerging Asian countries accumulated over $1.3 trillion in reserves from 2000 to 2006 (almost 40% of regional GDP) and offset about 75% of this amount with sterilization market and non-market operations.

$$s_{i,t} = \frac{\beta_i}{1+\beta_i} w_{i,t} - \left(1 + \frac{L_{i,t-1}}{L_{i,t}(1+\beta_i)}\right) a_{i,t} + \frac{a_{i,t+1}}{(1+\beta_i)R_{i,t+1}}. \tag{9}$$

Individual saving now depends on the lump-sum taxes and the return on public saving. The national saving function per worker is defined by $z_{i,t} \equiv s_{i,t} + \left(1 + \frac{L_{i,t-1}}{L_{i,t}}\right) a_{i,t}$, i.e.,

$$z_{i,t} = \frac{\beta_i}{1+\beta_i} \left(w_{i,t} + \frac{L_{i,t-1} a_{i,t}}{L_{i,t}} + \frac{a_{i,t+1}}{\beta_i R_{i,t+1}} \right) > 0, \tag{10}$$

where (10) is clearly higher than (6) whenever $a_{i,t} > 0$ or/and $a_{i,t+1} > 0$. Thus, public saving, which is a function of consumer income, increases the level of saving in the economy and, hence, the level of the capital stock that is accumulated. Since this increase is not induced by the market, we call it "forced saving". In fact, this increase in saving due to public saving is equivalent to an increase in the average propensity to save, $\frac{\beta_i}{1+\beta_i}$, of the income of a representative individual. When the government generates public saving it does so from consumer income. Therefore, the individual saving function (6) can be written as:

$$z_{i,t} = \frac{\beta_i'}{1+\beta_i'} w_{i,t}, \tag{11}$$

where

$$\frac{\beta_i'}{1+\beta_i'} = \frac{\beta_i}{1+\beta_i} + \frac{\beta_i}{(1+\beta_i)w_{i,t}} \left(\frac{L_{i,t-1} a_{i,t}}{L_{i,t}} + \frac{a_{i,t+1}}{\beta_i R_{i,t+1}} \right). \tag{12}$$

Thus $\beta_i' > \beta_i$ and (11) is equal to (10). The individual saving function now encompasses a free choice of saving and forced saving. This equivalence allows us to derive a direct mapping from national saving data to the actual values of β_i in the calibration exercise.[12] In the remainder of the paper, we will continue the study focusing on the national average propensity to save $\frac{\beta_i'}{1+\beta_i'}$ of country i.[13] Any change in this propensity can be the result of the effect of public saving or of a change in the representative consumer's preference.

2.3 The Open-Economy Equilibrium

It is assumed that the owners of the capital stock at date $t = 0$ in both countries cannot move this stock from one country to the other. From date $t = 1$ onwards, capital moves

[12] This equivalence holds for the saving-investment locus but not for the welfare analysis, since forced saving involves a transfer from the old to the young individuals.

[13] It is evident from Equation (12) that the national average propensity to save is equal to agents' propensity to save when there is no government intervention through taxes.

freely across countries in a frictionless international capital market while labour is immobile. The equilibrium in the national labour market is thus given by the equality between the national supply and demand for labour. Since the labour supply is inelastic and the production function exhibits constant returns to scale, the national equilibrium wage is equal to the marginal product of labour. The equilibrium in the world goods market at period t is given by the world income accounts identity:

$$Y_{A,t} + Y_{B,t} = L_{A,t}c_{A,t} + L_{A,t-1}d_{A,t} + L_{B,t}c_{B,t} + L_{B,t-1}d_{B,t} + I_{A,t} + I_{B,t}, \tag{13}$$

where the world output is equal to the aggregate consumption of the young and the old generations and the aggregate investment in both countries A and B. Full depreciation of the current capital stock in each country implies $I_{A,t} = K_{A,t+1}$ and $I_{B,t} = K_{B,t+1}$.

The integration of capital markets thus occurs at date $t = 1$. The equilibrium in the international capital market, once capital is mobile across countries, derives from (13) and yields:

$$K_{A,t+1} + K_{B,t+1} = L_{A,t}z_{A,t} + L_{B,t}z_{B,t}. \tag{14}$$

The perfect mobility on the international capital market makes domestic and foreign assets perfect substitutes. At the world level, total investment must equal total saving. The equilibrium in the capital market requires that the returns to capital are equal in both countries:

$$\frac{k_{A,t+1}}{k_{Bt+1}} = \left(\frac{A_A}{A_B}\right)^{\frac{1}{1-\alpha}}. \tag{15}$$

By using Equations (6), (14) and (15), we can compute the intertemporal equilibrium with perfect foresight in each country:

$$k_{A,t+1} = \frac{1-\alpha}{\phi}\left(\frac{A_A}{A_B}\right)^{\frac{1}{1-\alpha}}\left(\frac{\beta'_A L_{A,t}A_A k_{A,t}^{\alpha}}{1+\beta'_A} + \frac{\beta'_B L_{B,t}A_B k_{B,t}^{\alpha}}{1+\beta'_B}\right) \tag{16}$$

$$k_{B,t+1} = \frac{1-\alpha}{\phi}\left(\frac{\beta'_A L_{A,t}A_A k_{A,t}^{\alpha}}{1+\beta'_A} + \frac{\beta'_B L_{B,t}A_B k_{B,t}^{\alpha}}{1+\beta'_B}\right), \tag{17}$$

where $\phi = \left(L_{A,t+1}\left(\frac{A_A}{A_B}\right)^{\frac{1}{1-\alpha}} + L_{B,t+1}\right)$.

The two-country intertemporal equilibrium admits a unique globally stable interior steady state characterized by:

$$\bar{k}_A = \left[\frac{1-\alpha}{\phi}\left(\frac{A_A}{A_B}\right)^{\frac{1}{1-\alpha}}\left(\frac{\beta'_A L_{A,t}}{1+\beta'_A}A_A + \frac{\beta'_B L_{B,t}}{1+\beta'_B}A_B\left(\frac{A_B}{A_A}\right)^{\frac{\alpha}{1-\alpha}}\right)\right]^{\frac{1}{1-\alpha}} \tag{18}$$

$$\bar{k}_B = \left[\frac{1-\alpha}{\phi}\left(\frac{\beta'_A L_{A,t}}{1+\beta'_A}A_A\left(\frac{A_A}{A_B}\right)^{\frac{\alpha}{1-\alpha}} + \frac{\beta'_B L_{B,t}}{1+\beta'_B}A_B\right)\right]^{\frac{1}{1-\alpha}} \tag{19}$$

At the steady state, the capital stock per worker and hence the income per capita remain constant.

3 The Balance of Payments

In an open two-country world, a country can finance domestic investment by foreign saving. The difference between domestic investment and domestic saving is equal to the current account balance. In other words, a country can spend more or less than it produces. The national income accounts identity of country i in this two-country economy is

$$Y_{i,t} + R_t(L_{i,t-1}z_{i,t-1} - K_{i,t}) = L_{i,t}c_{i,t} + L_{i,t-1}d_{i,t} + K_{i,t+1} + G_{i,t}, \tag{20}$$

where $Y_{i,t}$ and $R_t(L_{i,t}z_{i,t} - K_{i,t+1})$ are the Gross Domestic Product (GDP) and the net factor income from abroad respectively, and the sum of the two is the Gross National Income (GNI) of country i at time t. On the right hand side of the identity, $G_{i,t}$ is the difference between domestic spending on foreign capital and foreign spending on domestic capital. In this model of one single good, where there is no trade in consumption goods and there are no unilateral transfers, $G_{i,t}$ is the current account balance of country i at time t. This is simply the difference between the factor income from abroad and the factor income payments to the foreign country. In intensive form, taking into account the fact that $y_{i,t} = w_{i,t} + R_t k_{i,t}$, the current account balance is equal to

$$g_{i,t} = w_{i,t} + \frac{L_{i,t-1}}{L_{i,t}}R_t z_{i,t-1} - c_{i,t} - \frac{L_{i,t-1}}{L_{i,t}}d_{i,t} - \frac{L_{i,t+1}}{L_{i,t}}k_{i,t+1}, \tag{21}$$

or, equivalently, since $d_{i,t} = R_t z_{i,t-1} - a_t$,

$$g_{i,t} = z_{i,t} - \frac{L_{i,t+1}}{L_{i,t}}k_{i,t+1}. \tag{22}$$

Without loss of generality, we focus on country A. The conditions on the current account balance per worker are as follows:

$$g_{A,t} \gtreqless 0 \quad \texttt{if} \quad \frac{k_{A,t}}{k_{B,t}} \gtreqless \left[\frac{L_{A,t+1}L_{B,t}}{L_{A,t}L_{B,t+1}} \left(\frac{A_A}{A_B} \right)^{\frac{\alpha}{1-\alpha}} \frac{\beta'_B(1+\beta'_A)}{\beta'_A(1+\beta'_B)} \right]^{\frac{1}{\alpha}}. \tag{23}$$

The current account balance of country A is an increasing function of $k_{A,t}$, β_A, and the population growth rate of country B, and a decreasing function of $k_{B,t}$, β_B and the population growth rate of country A. When capital is free to move from one country to another,

$$g_{A,t} \gtreqless 0 \quad \texttt{if} \quad \left(\frac{L_{A,t}}{L_{A,t+1}} \right) \left(\frac{\beta'_A}{1+\beta'_A} \right) \gtreqless \left(\frac{L_{B,t}}{L_{B,t+1}} \right) \left(\frac{\beta'_B}{1+\beta'_B} \right). \tag{24}$$

Condition (24) is also the condition for $g_A \gtreqless 0$ at the steady state.

Proposition 1 *In a two-country model with overlapping generations living for two periods, a country, say country A, experiences a current account deficit once capital market is integrated if:*

$$\frac{L_{A,t+1}}{L_{A,t}} > \frac{\beta'_A(1+\beta'_B)L_{B,t+1}}{\beta'_B(1+\beta'_A)L_{B,t}}. \tag{25}$$

Proof: This result derives easily from condition (24).

Assuming that two countries are identical in all respects except in the average propensity to save, a country populated with more impatient consumers (lower β') will have a lower $\bar{k}$ and a higher steady-state capital return than the country populated with more patient consumers. If capital markets are integrated, the country with impatient consumers will attract foreign investment owing to a higher capital return up to the point where capital returns are equal. Therefore, this country will have a current account deficit.

On the other hand, assuming that two countries are identical in all respects except in their demographic patterns, a country with a fast-growing population will have a lower $\bar{k}$ and a higher steady-state capital return than the country with a slow-growing population. If capital markets are integrated, the country with the higher population growth will attract foreign investment up to the point where capital returns are equal. Therefore, the country with the fast-growing population will record a current account deficit.[14]

As a consequence, even in a country with thrifty consumers, the level of the average propensity to save may not be sufficiently high to compensate for the negative effect of a higher population growth rate on its current account. The higher the differential in population growth rates across countries, the higher the differential in the average propensities to save must be.

[14]Empirical studies find that countries with low dependency ratios tend to experience current account surpluses and countries with high fertility rates and young populations tend to experience current account deficits ((Taylor 1994), (Higgins 1998), (IMF 2004) and (Lane and Milesi-Ferretti 2002)).

4 A Two-Country Model with Global Imbalances

In this section, we consider a two-country world in which country A is a developing economy (capital-scarce) and country B is an advanced economy (capital-abundant). We allow the countries to differ in average propensity to save, in initial levels of development and population growth rate. The development gap is captured by the technological parameter and the initial capital stocks per worker (before capital market integration): $A_A < A_B$ and $k_{A,0} < k_{B,0}$. We will also assume that the government of country A intervenes by increasing public saving whenever the market outcome yields a current account deficit. The government's policy can be interpreted as forced saving since it is not induced by tastes or prices. This section is organized as follows. First, we define an intertemporal equilibrium with global imbalances. Second, the conditions for country A's government intervention are established. Third, we study the existence of an intertemporal equilibrium with global imbalances. Fourth, we examine the level of global saving and the real interest rate when there is government intervention. We end this section with the examination of transition dynamics and assess the effect of government intervention on growth.

4.1 Intertemporal Equilibrium with Global Imbalances: Definition

Given $A_A < A_B$ or/and $k_{A,0} < k_{B,0}$, an intertemporal equilibrium with global imbalances is a sequence of temporary equilibria that satisfies $g_{A,t} \geqslant 0$ for all $t \geqslant 0$.

4.2 Country A's Government Intervention

From Equations (23) and (24), we can identify nine potential trajectories for g_A, the current account balance per worker in the developing economy. Assuming that international capital integration is achieved at $t = 1$, Table 1 displays these nine potential trajectories as well as the conditions under which they arise. By assumption, the government of country A intervenes whenever the current account balance is negative. Three cases (7, 8 and 9) are mainly of interest since the government of country A can intervene at the initial date to avoid the current account deficit yielded by the market. In cases 7 and 8, the government can intervene only at $t = 0$, since the current account balance is nonnegative for $t > 0$. Cases 7 and 8 can thus be grouped together. In case 9, the government can intervene at all times. Cases 3 and 6 can be omitted as they match case 9 when the international integration of capital markets is achieved.

Table 1: Current account potential trajectories and conditions for country A

	$g_{A,0}$	$g_{A,1}$	$g_{A,2}$	$\cdots$	$g_{A,\infty}$	Condition
Case 1	0	0	0	0	0	if $\frac{k_{A,0}}{k_{B,0}} = \left[\frac{L_{A,1}L_{B,0}}{L_{A,0}L_{B,1}}\left(\frac{A_A}{A_B}\right)^{\frac{\alpha}{1-\alpha}}\frac{\beta'_B(1+\beta'_A)}{\beta'_A(1+\beta'_B)}\right]^{\frac{1}{\alpha}}$ *and* $\left(\frac{L_{A,t}}{L_{A,t+1}}\right)\left(\frac{\beta'_A}{1+\beta'_A}\right) = \left(\frac{L_{B,t}}{L_{B,t+1}}\right)\left(\frac{\beta'_B}{1+\beta'_B}\right)$
Case 2	0	+	+	+	+	if $\frac{k_{A,0}}{k_{B,0}} = \left[\frac{L_{A,1}L_{B,0}}{L_{A,0}L_{B,1}}\left(\frac{A_A}{A_B}\right)^{\frac{\alpha}{1-\alpha}}\frac{\beta'_B(1+\beta'_A)}{\beta'_A(1+\beta'_B)}\right]^{\frac{1}{\alpha}}$ *and* $\left(\frac{L_{A,t}}{L_{A,t+1}}\right)\left(\frac{\beta'_A}{1+\beta'_A}\right) > \left(\frac{L_{B,t}}{L_{B,t+1}}\right)\left(\frac{\beta'_B}{1+\beta'_B}\right)$
Case 3	0	-	-	-	-	if $\frac{k_{A,0}}{k_{B,0}} = \left[\frac{L_{A,1}L_{B,0}}{L_{A,0}L_{B,1}}\left(\frac{A_A}{A_B}\right)^{\frac{\alpha}{1-\alpha}}\frac{\beta'_B(1+\beta'_A)}{\beta'_A(1+\beta'_B)}\right]^{\frac{1}{\alpha}}$ *and* $\left(\frac{L_{A,t}}{L_{A,t+1}}\right)\left(\frac{\beta'_A}{1+\beta'_A}\right) < \left(\frac{L_{B,t}}{L_{B,t+1}}\right)\left(\frac{\beta'_B}{1+\beta'_B}\right)$
Case 4	+	0	0	0	0	if $\frac{k_{A,0}}{k_{B,0}} > \left[\frac{L_{A,1}L_{B,0}}{L_{A,0}L_{B,1}}\left(\frac{A_A}{A_B}\right)^{\frac{\alpha}{1-\alpha}}\frac{\beta'_B(1+\beta'_A)}{\beta'_A(1+\beta'_B)}\right]^{\frac{1}{\alpha}}$ *and* $\left(\frac{L_{A,t}}{L_{A,t+1}}\right)\left(\frac{\beta'_A}{1+\beta'_A}\right) = \left(\frac{L_{B,t}}{L_{B,t+1}}\right)\left(\frac{\beta'_B}{1+\beta'_B}\right)$
Case 5	+	+	+	+	+	if $\frac{k_{A,0}}{k_{B,0}} > \left[\frac{L_{A,1}L_{B,0}}{L_{A,0}L_{B,1}}\left(\frac{A_A}{A_B}\right)^{\frac{\alpha}{1-\alpha}}\frac{\beta'_B(1+\beta'_A)}{\beta'_A(1+\beta'_B)}\right]^{\frac{1}{\alpha}}$ *and* $\left(\frac{L_{A,t}}{L_{A,t+1}}\right)\left(\frac{\beta'_A}{1+\beta'_A}\right) > \left(\frac{L_{B,t}}{L_{B,t+1}}\right)\left(\frac{\beta'_B}{1+\beta'_B}\right)$
Case 6	+	-	-	-	-	if $\frac{k_{A,0}}{k_{B,0}} > \left[\frac{L_{A,1}L_{B,0}}{L_{A,0}L_{B,1}}\left(\frac{A_A}{A_B}\right)^{\frac{\alpha}{1-\alpha}}\frac{\beta'_B(1+\beta'_A)}{\beta'_A(1+\beta'_B)}\right]^{\frac{1}{\alpha}}$ *and* $\left(\frac{L_{A,t}}{L_{A,t+1}}\right)\left(\frac{\beta'_A}{1+\beta'_A}\right) < \left(\frac{L_{B,t}}{L_{B,t+1}}\right)\left(\frac{\beta'_B}{1+\beta'_B}\right)$
Case 7	-	0	0	0	0	if $\frac{k_{A,0}}{k_{B,0}} < \left[\frac{L_{A,1}L_{B,0}}{L_{A,0}L_{B,1}}\left(\frac{A_A}{A_B}\right)^{\frac{\alpha}{1-\alpha}}\frac{\beta'_B(1+\beta'_A)}{\beta'_A(1+\beta'_B)}\right]^{\frac{1}{\alpha}}$ *and* $\left(\frac{L_{A,t}}{L_{A,t+1}}\right)\left(\frac{\beta'_A}{1+\beta'_A}\right) = \left(\frac{L_{B,t}}{L_{B,t+1}}\right)\left(\frac{\beta'_B}{1+\beta'_B}\right)$
Case 8	-	+	+	+	+	if $\frac{k_{A,0}}{k_{B,0}} < \left[\frac{L_{A,1}L_{B,0}}{L_{A,0}L_{B,1}}\left(\frac{A_A}{A_B}\right)^{\frac{\alpha}{1-\alpha}}\frac{\beta'_B(1+\beta'_A)}{\beta'_A(1+\beta'_B)}\right]^{\frac{1}{\alpha}}$ *and* $\left(\frac{L_{A,t}}{L_{A,t+1}}\right)\left(\frac{\beta'_A}{1+\beta'_A}\right) > \left(\frac{L_{B,t}}{L_{B,t+1}}\right)\left(\frac{\beta'_B}{1+\beta'_B}\right)$
Case 9	-	-	-	-	-	if $\frac{k_{A,0}}{k_{B,0}} < \left[\frac{L_{A,1}L_{B,0}}{L_{A,0}L_{B,1}}\left(\frac{A_A}{A_B}\right)^{\frac{\alpha}{1-\alpha}}\frac{\beta'_B(1+\beta'_A)}{\beta'_A(1+\beta'_B)}\right]^{\frac{1}{\alpha}}$ *and* $\left(\frac{L_{A,t}}{L_{A,t+1}}\right)\left(\frac{\beta'_A}{1+\beta'_A}\right) < \left(\frac{L_{B,t}}{L_{B,t+1}}\right)\left(\frac{\beta'_B}{1+\beta'_B}\right)$

4.3 Existence of an Intertemporal Equilibrium with Global Imbalances

After identifying the conditions under which the government of country A intervenes to guarantee nonnegative current account balances, we can now address the question of whether an intertemporal equilibrium with global imbalances exists. As already mentioned, we define an intertemporal equilibrium with global imbalances by a sequence of temporary equilibria in which the current account balance of country A is never negative. We study the existence condition and determine the policy response of the government to ensure nonnegative current account balances. The model is identical to the one defined in Section 2 with an integrated international capital market except for country A's consumer optimization programme. If $g_{A,t} \geqslant 0$ is verified at each period, then the decision to save by the individuals is given by (6) and the government does not intervene. If $g_{A,t} < 0$, the government acts in the capital market to guarantee $g_{A,t} \geqslant 0$, which leads to a higher propensity to save. As a consequence, focusing on the three cases of interest defined in Section 4.2, the government intervenes at $t = 0$ only for cases 7 and 8 and at each period for case 9.

Proposition 2 *In a two-country model with overlapping generations living for two periods, an intertemporal equilibrium with global imbalances exists if and only if, for all* $t \geqslant 0$,

$$\beta'_A \geqslant \left[\left(\frac{k_{A,t}}{k_{B,t}} \right)^{\alpha} \frac{L_{A,t} L_{B,t+1}}{L_{A,t+1} L_{B,t}} \left(\frac{A_B}{A_A} \right)^{\frac{\alpha}{1-\alpha}} \frac{1+\beta'_B}{\beta'_B} - 1 \right]^{-1}. \tag{26}$$

Proof: $g_{A,t} \geqslant 0$ for all $t \geqslant 0$ if condition (23) is verified. The necessary value for β'_A derives from this condition.

If the expression in square brackets is positive, then the threshold given by condition (26) increases with the increase in the population growth rate of country A. If condition (26) is not satisfied by the average propensity to save of country A's representative consumer, then country A's government intervenes leading to a higher value for β'_A that satisfies this condition.

Proposition 2 establishes that, with a perfect integrated capital market, the global imbalances are an equilibrium result when the fast-growing economy displays a sufficiently higher average propensity to save than the slow-growing economy. The larger the difference between the average propensities to save across countries, the larger the global imbalances. This higher average propensity to save in the fast-growing economy may result in our specification either from the consumer preferences or from forced saving imposed by government policies. In the former case, the equilibrium is a pure market outcome. The lack of social insurance or the lack of easy access to credit can explain why the propensity to save is higher in emerging countries. If this is caused by forced saving, global imbalances

are the result of government intervention. Self-insurance against disruptive adjustments in the balance of payments is generally put forward to account for such a public policy. IMF data shows that the saving rate declined in advanced economies and increased in emerging and oil-producing economies at the end of the 1990s, yielding a reversal in current account balances in emerging economies and leading to large global imbalances. This reversal can be explained by government intervention in emerging economies after the Asian financial crisis.

4.4 Global Saving and the Interest Rate

The increase in the average propensity to save in country A leads to a rise in world saving ceteris paribus. The variation in saving is matched by that of investment, since both quantities ought to be equal at the world equilibrium. The world (gross) interest rate R_t is nevertheless affected by an increase in global saving through diminishing returns to capital accumulation. Therefore, if β'_A does not satisfy condition (26), the government intervenes, β'_A increases and the new interest rate is lower.[15]

Proposition 3 *In a two-country model with overlapping generations living for two periods, the interest rate of the integrated capital market decreases, ceteris paribus, when country A's government intervenes to satisfy condition (26).*

Proof: If β'_A does not satisfy condition (26), the government intervenes, β'_A increases and so does the capital stock per worker, $k_{A,t+1}$. Therefore, due to the diminishing returns to capital, the rental rate of capital of country A decreases. Country B's capital becomes more attractive and consumers of country A invest in country B up to the point where the equality $R_{A,t+1} = R_{B,t+1}$ is restored. Ultimately, the interest rate is lower than before country A's government intervention.

Real interest rates have gradually declined in the world over the last two decades to levels not seen since the 1970s. A number of variables such as the weak labour force growth in rich countries and demographic changes in the world can account for this evolution (Desroches and Francis 2010). In the neoclassical growth model, the emergence of global imbalances due to an increase in global saving observed after 2002 is also a possible explanation for the observed low levels of the world real interest rates.

4.5 Transition Dynamics and Comparative Statics

The transition dynamics in the two countries are governed by the following equations:

[15]Due to the assumption of logarithmic utility, the interest rate has no effect on saving. Therefore, there is no ambiguity in a variation in β'_A on global saving. Figure 2 shows clearly that the decline in world real interest rates did not provoke a decrease in world saving.

$$dk_{A,t+1} = \frac{\alpha(1-\alpha)}{\phi}\left(\frac{A_A}{A_B}\right)^{\frac{1}{1-\alpha}}\left[\left(\frac{\beta'_A L_{A,t}A_A}{(1+\beta'_A)k_{A,t}^{1-\alpha}}\right)dk_{A,t} + \left(\frac{\beta'_B L_{B,t}A_B}{(1+\beta'_B)k_{B,t}^{1-\alpha}}\right)dk_{B,t}\right] \quad (27)$$

$$dk_{B,t+1} = \frac{\alpha(1-\alpha)}{\phi}\left[\left(\frac{\beta'_A L_{A,t}A_A}{(1+\beta'_A)k_{A,t}^{1-\alpha}}\right)dk_{A,t} + \left(\frac{\beta'_B L_{B,t}A_B}{(1+\beta'_B)k_{B,t}^{1-\alpha}}\right)dk_{B,t}\right]. \quad (28)$$

The capital stock per worker in both countries at time $t+1$ is a positive function of $k_{A,t}$ and $k_{B,t}$. At the steady state, the growth rate of the capital stock per worker is zero in both countries. If country A's government has to intervene in period t to satisfy condition (26), this affects either the growth rate or the steady state level of the capital stock per worker in both countries.

Proposition 4 *In a two-country model with overlapping generations living for two periods, country A's government intervention in period t to satisfy condition (26) implies, ceteris paribus, a higher growth rate of the capital stock per capita in both countries.*

Proof: The transition dynamics in the two countries are governed by Equation (27) for country A and Equation (28) for country B. It is straightforward to show that, if the average propensity to save of country A increases in period t, the growth rate of the capital stock per worker (and hence of the income per worker) between the generations t and $t+1$ increases, ceteris paribus, in both countries along their transition path to the steady state.

5 Calibration

In this section, we calibrate our model with real-world data for the group of advanced economies and the group of emerging and developing economies as defined by the IMF. Data on GDP in purchasing-power parity (PPP) (Y), gross national saving as a percentage of GDP (s/y), current account balances as a percentage of GDP (g/y) and population levels (L) are retrieved from the IMF World Economic Outlook of April 2011 and cover the period from 1981 to 2016 (forecasts from 2011 onwards) for both groups of countries. We first rewrite Equations (6) and (22) so as to obtain saving and current account balances as a percentage of GDP. Starting with saving, we obtain:

$$\frac{\beta'_{i,t}}{1+\beta'_{i,t}} = \frac{1}{1-\alpha}\frac{z_{i,t}}{y_{i,t}}. \quad (29)$$

Regarding the current account balance, it is straightforward to show, using Equation (22), that:

$$\frac{g_{i,t}}{y_{i,t}} = (1-\alpha)\frac{\beta'_{i,t}}{1+\beta'_{i,t}} - \frac{L_{i,t+1}}{L_{i,t}}\frac{k_{i,t+1}}{A_{i,t}k_{i,t}^{\alpha}}. \tag{30}$$

Assuming that capital markets are integrated and using Equation (16), we find:

$$\frac{g_{A,t}}{y_{A,t}} = (1-\alpha)\frac{\beta'_{A,t}}{1+\beta'_{A,t}} - \frac{(1-\alpha)L_{A,t+1}}{L_{A,t+1} + L_{B,t+1}\left(\frac{A_{B,t+1}}{A_{A,t+1}}\right)^{\frac{1}{1-\alpha}}}\left(\frac{\beta'_{A,t}}{1+\beta'_{A,t}} + \frac{\beta'_{B,t}}{1+\beta'_{B,t}}\frac{Y_{B,t}}{Y_{A,t}}\right). \tag{31}$$

In our calibration exercise, we split the period 1981-2016 into two subperiods of 18 annual observations, as 1998 marks the start of a sharp and durable increase in the saving rate of the group of emerging economies. Table 2 shows the data and the assumptions made. We use the average gross national saving as a percentage of GDP for both groups of countries over both subperiods in Equation (29) to estimate the values for β'_A and β'_B. We rename these estimates as $\beta'_{EE} \equiv \beta'_A$ and $\beta'_{AE} \equiv \beta'_B$ (where AE and EE respectively stand for advanced and emerging and developing economies). Following the same approach, we use average values for GDP in PPP and population levels to estimate the current account balance of emerging countries in Equation (31) and rename them accordingly. The unknown population levels at the future subperiod, which are needed in the calculation of the current account balance during the second subperiod, are computed assuming the same growth rate as between the first and the second subperiod. The capital share in output α is assumed to be the same for both groups and to be equal to 0.3.

Before examining the performance of the calibrated model, it is important to emphasize the possible results of an increase in the average propensity to save in the emerging and developing countries. In each of these countries, the additional saving could finance domestic investment, investment in other emerging economies or investment in advanced countries. The "saving glut" hypothesis assumes that a large part of this additional saving is used to buy assets in advanced economies, and this is reflected in the size of the global imbalances between developed and developing countries. This is precisely the hypothesis we want to test in this calibrated model. Using data on saving, we can run the model to calculate the quantitative effect of the actual increase in the average propensity to save on the current account balance. The figure we obtain for the current account balance per unit of GDP is necessarily the aggregate result of four dynamic forces at work in our model: the growth of the relative population size, the relative speed of capital accumulation, the growth of the relative efficiency ratio and the international capital mobility.

First, we assign a value for the ratio $\frac{A_{AE}}{A_{EE}}$ such that the calibrated current account balance of the group of emerging countries in subperiod 1 matches its actual value, i.e. -1.58% of GDP. Although a ratio lower than one can also yield a negative current account balance for emerging countries, we can observe that the calibrated ratio is higher than 1, which is consistent with the fact that this group of countries is less developed than the group

of advanced economies. The objective is then to assess the performance of the model for the second subperiod when we use the actual values for L and Y and the estimated β of both groups in subperiod 2 (1999-2016). We estimate the value of $\frac{g_{EE,2}}{y_{EE,2}}$, assuming that the variation in the ratio $\frac{A_{AE}}{A_{EE}}$ is equal to the growth rate of the relative income[16] between 1999 and 2016, and compare it to the actual value of the current account balance of the group of emerging countries. The calibrated model yields a positive current account balance for the emerging countries, which means that condition (24) is satisfied. However, the model slightly underestimates the magnitude of the surplus as it predicts a current account balance per GDP of 1.87% instead of an actual value of 2.36% (Table 3). Despite its simplicity and the strong assumption of perfect capital mobility, this calibrated model rightly predicts the sign of the current account balance actually observed and stresses the effect of an increase in the average propensity to save in the group of emerging economies. Even though it tends to underestimate the magnitude of the current account balance, the performance of our model gives credit to the hypothesis that an increase in saving in emerging and developing countries has flowed to the advanced economies. Finally, this result supports the explanatory and predictive power of the neoclassical growth model when focusing on national saving.

Our last exercise consists of running the model in order to see whether global imbalances will keep on increasing or disappear in the next period (2017-2034). We assume that the saving rates, population growth rates and income growth rates will remain the same as for the period 1998-2016. The evolution of the efficiency ratio is assumed to be identical to that of the income ratio as before. The model predicts that the group of emerging countries will experience an average current account balance of -0.4% of GDP, which implies that global imbalances will disappear over this period.

For all our predictions, the results are sensitive to the efficiency ratio $\frac{A_{AE}}{A_{EE}}$ only, as this is the unique parameter for which we have no real data or available estimates for such a large group of countries. The slower the catching-up of the emerging economies in terms of efficiency, the bigger the global imbalances in the second and subsequent periods and the more slowly global imbalances will disappear.

6 Conclusion

Since the end of the 1990s, the world economy has been characterized by large global imbalances, i.e. a situation in which the fast-growing economies of the developing world finance the current account deficits of the slow-growing advanced economies. The objective of this paper was not to dismiss the theoretical explanations proposed by the recent literature based on capital market imperfections but rather to reconsider the explanatory and predictive power of the neoclassical growth model when focusing on government intervention in the capital market and not only on private saving behaviour. Capital

[16]This assumption is justified by the fact that the growth rate of A_i is the standard Solow residual, which generally accounts, to a very large extent, for the income growth rate.

Table 2: Calibration

	Emerging economies			Advanced economies		
	1981-1998	1999-2016	$2017-2034^*$	1981-1998	1999-2016	$2017-2034^*$
Data (IMF 2011)						
$z_{i,t}/y_{i,t}$	22.24%	31.06%		21.60%	19.47%	
$L_{i,t}$ (in billions)	4.07	5.61		0.88	1.00	
$\Delta L_{i,t}/L_{i,t}$		37.92%			14.21%	
$Y_{i,t}/Y_{j,t}$	0.52	0.86		1.92	1.16	
Assumptions						
$\alpha_{i,t}$	0.3	0.3	0.3	0.3	0.3	0.3
$\Delta L_{i,t}/L_{i,t}$			37.92%			14.21%
$A_{i,t+1}/A_{j,t+1}$	0.11	0.18	0.29	9.34	5.67	3.44
$Y_{i,t}/Y_{j,t}$			1.42			0.70
$\widehat{\beta'}_{i,t}$	0.47	0.80	0.80	0.45	0.39	0.39

* All the values in the column 2017-2034 are assumed to be the same for all subsequent periods.

Table 3: Calibration results

	1981-1998		1999-2016		2017-2034
	Prediction	IMF data	Prediction	IMF data	Prediction
$g_{EE,t}/y_{EE,t}$	-1.58%	-1.58%	1.87%	2.36%	-0.44%

market imperfections are certainly a factor in the emergence of global imbalances but the empirical work of Alfaro, Kalemli-Ozcan, and Volosovych (2011) shows that, despite these imperfections, gross private capital still flows downhill as expected. Therefore, the current account surpluses of the fast-growing emerging and developing countries can only be explained by official flows.

This paper aims to build and calibrate a two-country growth model with overlapping generations to investigate the effect of government intervention in the capital markets on the current account balance of the developed and developing economies. A number of results are obtained. Proposition 1 derives the conditions for steady-state current account deficits (surplus) when two economies differ in their average propensities to save, in their population growth rates, or both. Proposition 2 gives the condition for an intertemporal equilibrium with global imbalances to exist. Proposition 3 shows that a government's intervention in the fast-growing economy to avoid current account deficits implies a decrease in the world interest rate, while its effect on the transition growth rate is positive (Proposition 4).

We calibrated this model with averaged IMF data over two periods of 18 annual observations. While the simplicity of the model allows us to make only one assumption regarding parameter values (the efficiency ratio $\frac{A_{AE}}{A_{EE}}$), it correctly predicts the reversal of the current account balance of emerging countries during the period 1999-2016. In addition, the model predicts that global imbalances will disappear during the period 2017-2034.

We are convinced that further research on global imbalances should focus on government intervention in the capital market, as in Carroll and Jeanne (2009) for instance. An

interesting extension would be to study the effect of fixed exchange rate policy on domestic saving and investment and, hence, on the current account.

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