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**Keywords:** Foreign direct investment, Economic growth, Uneven development, North-South relations, Balance-of-Payments constraint, Functional distribution of income.

**JEL Codes:** F21, E12, O11, F14.

# Foreign Direct Investment and Growth Convergence in a North-South Framework

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March 10, 2020

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This paper develops a general extended version of the balance-of-payments constrained growth model that takes into consideration some often ignored aspects of growth in open economies - namely, the importance of capital flows in the long run, terms of trade changes and trade and payments interdependence among regions. Furthermore, this paper incorporates Thirlwall's analysis into a North-South model that takes into account four intrinsically connected channels through which FDI inflows can affect the productive structure of Southern region - capital accumulation, balance-of-payments components, technological change and income distribution - finding that it still explains uneven development, although reducing the distance between regions by easing the external restriction, that is indicate a more even development path. In addition, this article presents an empirical exercise that, although not conclusive when considering the income elasticities of import ratio, points to a quite relevant result: the non-consideration of income distribution effects in the import functions represents not only the omission of a relevant variable on econometric estimations but, mainly, the omission of an important theoretical channel to understand growth in open economies.

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# 1 Introduction

The gap in per capita income levels between the rich and poor countries of the world is enormous. As is well-known, a large empirical literature suggests that this disparity is increasing over time. Jones (2016), using data from The Penn World Table for a sample of 100 countries, finds that between 1960 and the late-1990s there was a widening of the world income distribution (in the last decades this pattern seems to have stabilized). For instance, the standard deviation of the log of per capita income levels of countries in the sample increased steadily from 1 in 1960 to approximately 1.5 in 2000, whilst the ratio of GDP per person between the 5th richest and 5th poorest countries in the sample went from 0.5 in 1960 to 1.12 in 2000.[1] In summary, whilst the very poorest countries seem to be falling further behind, the rich countries seem to be converging (within the group) in a general way.[2]

Although the evidences are clear, some analysts as Lucas (2000) argue that these unequalizing trends are likely to be reversed in the very long-run. Following Quah (1993), Jones (1997) used a method of transitional matrices to calculate the long-run distribution of world incomes, finding evidence of convergence. However, in a more recent exercise, Jones (2016) finds evidence of a greater concentration of countries in the bottom bin, with less than 5 percent of the U.S. income level, as well as a smaller top bin in relation to the earlier simulation.

In view of this, the question that arises is whether this gap will close or widen over time. The answer, however, depends on a large number of factors, some internal to the country's economic dynamics and others related to the interaction between rich and poor countries, or in a stylized way, North and South. Deepening our analysis in the latter, the study of the consequences of interaction between the North and South has drawn attention to a large number of mechanisms through which these relations tend to produce convergence, on one hand, or uneven development, on the other. Dutt (2003) presented a summary of these mechanisms, including those that rely on the effects of changes in demand composition and

[1] A similar analysis is developed by Sala-i-Martin (1996), which finds that the dispersion of the GDP per capita (measured by the standard deviation) increased from 0.89 in 1960 to 1.12 in 1990.

[2] One example of this phenomenon is the catch-up process within OECD economies. See Barro (2012) for a discussion of convergence in smaller samples of countries.

in technology on North-South terms of trade and growth (Prebisch, 1949; Singer, 1950; Dutt, 1990, 1996); and on the role of international capital flows (Dutt, 1990, 1997). Following in the latter, it is note worthy that the last decades have been marked by a strong expansion of economic relations between rich and poor countries and one of the most important aspects of this process was the expansion of capital flows, both speculative and physical.

In particular, Foreign Direct Investment (FDI) has played a prominent role as the main component of capital flows to developing countries. While in the mid-1990s FDI flows to developing economies were around US$ 150 billion (per year), by 2017 these flows reached US$ 671 billion (almost 43 percent of the world's total amount), of which US$ 151 billion were directed to Latin American and Caribbean countries (UNCTAD, 1999, 2018). Alongside these increases in FDI inflows, the literature on the impacts of FDI on economic development has grown significantly (especially in the mid-1990s and 2000s), although it still offers theoretical and empirical results not always conclusive (Duttaray, Dutt and Mukhopadhyay, 2008). Although the questions of interest and the methods utilized could possibly modify the results, it is possible to synthesize these results as follows: research at the firm-level since 1990 usually shows that spillover effects are non-significant or even negative, whilst the results on aggregate-level point to a positive effect of FDI inflows on economic growth of developing countries under certain circumstances (Herzer, 2012).

In order to analyze in a systematic manner the effects of FDI inflows in the so called "global South", a first effort to be done is an analytical review of a theoretical and empirical literature on the channels through which FDI can affect the economic growth of developing countries. In a simplified way, the main channels identified are: i) capital accumulation; ii) balance-of-payments components; iii) technological change; iv) industrial structure and v) sectoral composition of product and employment (income distribution)(Duttaray, Dutt and Mukhopadhyay, 2008; Herzer, 2012; Herzer, Hühne and Nunnekamp, 2014). It is worth saying that the mechanisms underlying each one of these channels are strongly interconnected, a characteristic that needs to be considered in the subsequent theoretical-formal modeling.

As we are going to take four of these channels into consideration in the next sections, namely capital accumulation, balance-of-payments components, technological change and income distribution, let us deepen the analysis on those. First, in the capital accumulation

channel, the mechanisms concern the role of FDI inflows in increasing savings and aggregate investment in the host country, with a major effect on low domestic savings economies with lack of governmental action to promote domestic investment (the general case of the South). Theoretically, these investments would also be less volatile, which would serve to stabilize higher long-term savings and investment rates. The insight behind this effect, as De Mello (1997) and Nair-Reichert and Weinhold (2001) point out, derives directly from "neoclassical" growth models, as this increase in investment volume and/or its efficiency would bring effects both on income level and on long-run growth rates. On the other hand, foreign capital inflows can have long-term negative effects on developing countries' savings and investment, either because profit remittances are consistently higher than new FDI inflows (so it may decrease aggregate savings) or because a crowding out effect of domestic investment may occur with entry of multinational firms, especially if there is direct competition with domestic firms in the recipient country for skilled labor and if foreign firms finance themselves in the host country (leading to a possible rise in interest rates due to increased credit demand).

Second, in the balance-of-payments components channel, the first and simplest analysis concerns the improvement in balance-of-payments results via the financial account in the period of inflow (as FDI is an important component). The increase in capital inflows could then be related to sustaining larger current account deficits and, therefore, to greater foreign savings. Apart from this short-term effect, a possibility pointed out in the literature is a decrease in imports coming from domestic production of final and intermediate goods by foreign companies in the country and an increase in exports due to the expansion of trade relations with the countries of origin of capital flows (market opening argument). As pointed out by Duttaray, Dutt and Mukhopadhyay (2008), these results could then increase the long-run equilibrium growth rate determined by the external constraint (or the balance-of-payments constraint). In addition to the balance-of-payments issue, contact with foreign markets can generate positive externalities from exporting sectors to the rest of the economy, since, theoretically, access to such markets would be related to better trade practices and to managerial and technological innovations. On the other hand, foreign exchange outflows through profit remittances may, as briefly argued in the previous channel, represent a structural deficit on the income balance, which could be related to an aggregate

negative effect on current account and, therefore, indicate the need for greater external financing, representing a certain "vicious cycle" within the external constraint that would be associated with greater vulnerability of developing economies. Another possible effect of the entry of foreign firms is that of increased imports of capital and intermediate goods (if the domestic market is not competitive or does not exist in these sectors) which, coupled with a delay in significantly improving exports (due to the existence of institutional constraints) may actually lead to a negative aggregate balance-of-payments result and thus intensify the external constraint of developing economies (Jenkins, 2013). It is important to highlight that the mechanisms through which this channel works in the long run may be directly related to the impacts of FDI on income elasticities of trade, an extremely relevant issue that will be addressed later on this paper. The aggregate result on the balance-of-payments may, then, depend on the impacts of FDI inflows on the recipient country's productive structure (structural competitiveness), especially if it significantly alters the composition of imports and exports.[3]

Third, the technological change channel is directly related to the possibility of technological transfers from developed to developing countries, either directly or indirectly. Directly, capital flows from a developed country, theoretically a technology developer and with high R&D investment, would tend to increase the average productivity of the sector in which it operates in the South. In this same context, but indirectly, the literature points to several possibilities of spillover effects, cases of positive externalities derived from the establishment of foreign firms in the receiving country. The main spillover mechanisms would be: workers' learning process (training of labor and dissemination (accumulation) of "human capital" in the South); a "push" given to domestic firms to improve production and management in the face of direct competition from multinationals or to meet their demands within the so-called backward linkages (Javorcik, 2004). It is important to point out that a key issue for the relationship of this channel with a positive effect on growth is largely based on endogenous growth models, especially with regard to technology diffusion and human capital enhancement as engines of economic development (Blömstrom and Kokko, 1998; Borensztein, De Gregorio and Lee, 1998; Liu, 2008; Woo, 2009; Segupta and Puri, 2018). On the other

[3]This discussion is largely based on Thirlwall (1979) and the vast subsequent literature on balance-of-payments constrained growth.

hand, as negative effects analyzed in this channel it is pointed out a possible transfer of obsolete technology to the South (keeping the technological difference between developed and developing economies); transfer of technologies that would be relatively inefficient in the recipient country (such as labor saving technologies in economies with extensive labor supply, that is "industrial reserve army"); structural deficit in the absorption of new technologies, as the observed transfer is that of technological development results and innovations from outside, with no long-term counterpart in technology development internally in the South, representing the maintenance of a lower technological level compared to the North (Bertella and Lima, 2005; Duttaray, Dutt and Mukhopadhyay, 2008). Furthermore, another possible negative effect in this channel is related to environmental questions and its impacts on productivity. For instance, if foreign firms perform their polluting activities abroad, namely in recipient countries with more lenient regulation, the higher pollution levels associated with their production may negatively impact labor productivity[4] and, therefore, represent an aggregate negative technological transfer to the recipient country (Ben-David, Kleimeier and Viehs, 2018).

Lastly, in the distribution channel the arguments generally point to the higher wages paid by foreign firms in developing countries (given that their productivity tends to be higher). The aggregate positive effect on income distribution can be derived from a theoretical analysis based on a basic framework of international economics, the Heckscher-Ohlin model, with incoming FDI flows resembling a trade liberalization in which the production factor relatively abundant is favored, that is, low-skilled labor remuneration (which is the case for the Southern region) tends to improve, thus improving the overall income distribution. As argued by Herzer, Hühne and Nunnekamp (2014), theoretical predictions become more complex and, of course, ambiguous when a certain sequence of qualification intensities are considered. Although FDI flows from developed economies to developing economies are part of the process of fragmentation of production and thus would benefit from the comparative advantages of each country, the entry of foreign firms into emerging countries may diminish wages and prospects of low-skilled workers, although it pays well a small privileged share of highly skilled workers, representing an inequalizing process regarding wages (Feenstra and

[4]In this point see, for instance, Graff Zivin and Neidell (2012) for interesting evidence of the impact of ozone concentration on labor productivity.

Hanson, 1997). These "islands" of high-wage workers and managers can, according to Duttaray, Dutt and Mukhopadhyay (2008), generate a certain consumption pattern that, by altering the productive structure in the country (seeking to meet such demand), alters employment composition and the pattern of income distribution in the long-run.[5] In addition, the theoretical arguments suggest that the relationship between FDI inflows and inequality is not linear and may change over time, given workers' learning and skills improvement in the transition to new technologies. In the short run, skill premium would increase as the slow learning process resulted in high demand for skills *vis-a-vis* a scarce supply of such skills. In the long run, however, the learning process would narrow this wage differential and eventually increase the economy's average wages (thus impacting the income distribution) by pointing to the absorption of labor from less skilled sectors.[6]

Having that in mind, the theoretical and formal front of this paper aims to develop a North-South model, largely based on Dutt (2002). Deepening the description, the relations between two structurally different regions give support to incorporation of hypotheses typically left aside in derivations of models related to Thirlwall (1979) - such as real fluctuations in terms of trade and balance of payments positions, among them, physical capital flows. Nevertheless the crucial analysis continues to come from the differences between income elasticities of foreign trade, explaining uneven patterns of development in which, in the long run, the North grows faster than the South. This paper will seek to contribute to the theoretical literature by expanding the scope of this model, including physical capital flows in the relations between the North and South. Although the simple inclusion of FDI flows, subject to a credit restriction that is feasible for the South, may not alter the qualitative results derived in Dutt (2002), the introduction and consideration of those channels through which these capital flows could affect the host economy may represent a meaningful gain of interpretation and, possibly, point to different results both in terms of uneven development and in the relationship between these capital flows and the foreign trade income elasticities

[5]In this point, see the discussion of circular causation chain and development patterns in Furtado (1966, 1975) and Pinto (1976).

[6]The argument of a transitory inequalizing process coming from technology diffusion can be found, for instance, in Aghion and Howitt (1998), where skill premia and the distributive pattern remember Kuznets' inverse U-shaped curve.

ratio.

In addition this paper also aims to contribute to the literature in its empirical-econometric front, by testing the validity of functional forms and hypotheses present in Dutt's model and maintained here. In particular, the econometric exercise will be based on the estimation of the role that variations in the functional distribution of income have on import demand, both in developed and underdeveloped countries.

The rest of this article proceeds as following. Section 2 presents the baseline model structure, as well as its short-run and long-run behavior, exploring some of the implications of trade income elasticities (and, thus, of balance-of-payments restriction) to the development paths. In Section 3, an empirical-econometric exercise is presented, analyzing the role of income distribution in commercial flows and testing the validity of the income elasticities differential hypothesis. Lastly, Section 4 presents our conclusions and will shed light on some interesting questions that could be analyzed in further work.

# 2 The baseline model

## 2.1 Theoretical-formal structure

Following Dutt (2002), we will develop in this section a model which simultaneously determines Southern and Northern growth rates and the dynamics of the North-South terms of trade. We shall begin with some structuralist assumptions based on Taylor (1981, 1983). First, we assume that the North grows with excess capacity with firms determining their price through a mark-up rule. With this specification, the Northern output is determined by demand, in a structure that Dutt called "Kalecki-Keynes". On the other hand, the Southern market is perfectly competitive, so the producers will always fully utilize their capacity and the good price is flexible. Nevertheless, the South has structurally unemployed labor that could lead to a fixed real wage, so that it has a "Marx-Lewis" structure. It is worth noting that capital is the binding constraint in the South. For both regions, we assume a fixed coefficient technology in the production of goods, using labor and capital as factors. Let us begin now with the price-setting mechanism in the North, determined by a typical mark-up

equation:

$$P_N = (1+z)\frac{W_N}{a_N} \tag{1}$$

where $z$ is the exogenous (and constant) mark-up, representing the degree of monopoly in the Northern good market, $W_N$ is the fixed money wage in the North, and $a_N$ is the labor productivity for the Northern good. In the South, with full capacity utilization, we have:

$$Y_S = Min[v_S K_S; a_S L_S] \tag{2}$$

where $v_S$ is the output-capital ratio (or the capital "productivity"), $K_S$ is the Southern capital stock and $L_S$ is the stock of labor employed in the South.

As we are interested in the effects of capital flows from the North to the South, we should consider the composition of capital stock in the South. Therefore, let us define $K_S = K_{SS} + K_{SN}$, where $K_{ij}$ is the stock of capital in region i that is property of capitalist from region j. Let us assume, for simplicity, that the output-capital ratios associated with both types of capital are the same and equal to unity, that is the same as assuming technological homogeneity between the capital stock in the South detained by Northern capitalists and by Southern capitalists. Similarly, the stock of labor employed in the South can be understood as $L_S = L_{SN} + L_{SS}$, where $L_{ij}$ is the stock of labor employed in region i by capitalist of region j. Once more, we assume that the labor productivity is the same for both types of stock. However, the productivity of labor may vary over time and capital stock composition in the Southern region (we will return to this point later, in the discussion of the long-run equilibrium), so $a_S$ is not constant.[7]

If we turn our attention to the distribution of output in both regions, we will assume that there are two income groups: workers who receive wage income and capitalist who receive profit income. In the North, it is easy to see from the mark-up equation, that the profit-share is $\frac{z}{1+z}$ and, therefore, the wage-share is $\frac{1}{1+z}$. In the South, workers receive a real wage defined as:

$$\frac{W_{Sj}}{P_S} = \omega_{Sj} \tag{3}$$

[7]Some possibilities that could be considered later on: i) skilled and unskilled labor in the South, a structure that may enlighten some of the ambiguous questions underlying the functioning of income distribution channel (especially wage inequality); ii) FDI increasing average skill formation in the South, a question that can be tested empirically on the other front of our thesis.

Therefore, we can determine the South output by the income approach as:

$$Y_S = \omega_{SS} L_{SS} + \omega_{SN} L_{SN} + r_{SS} K_{SS} + r_{SN} K_{SN} \tag{4}$$

where $r_{Sj}$ represents the profit rate associated with the capital stock detained by capitalists of region j in the South. If we normalize (4) by the Southern output, we can obtain:

$$\pi_{SS} + \pi_{SN} = 1 - \frac{\omega_{SN}}{a_S} - \frac{\omega_{SS}}{a_S} \tag{5}$$

where $\pi_{ij}$ is the profit-share of capitalists of region j in region i. It is straightforward to see that wage-shares in the South, $\psi_{SN}$ and $\psi_{SS}$, are defined respectively by $\frac{\omega_{SN}}{a_S}$ and $\frac{\omega_{SS}}{a_S}$.

Northern capitalists save fractions $s_{NN}$ and $s_{SN}$ of their income while workers consume all their income. Both classes at the North spend a fraction $\alpha$ of their consumption expenditure on the Southern good and the rest on the Northern one. The fraction is defined, following Dutt (2002, 2003), as:

$$\alpha = \alpha_0 Y_N^{\varepsilon_N - 1} P^{1-\mu_N} \tag{6}$$

where $\varepsilon_N > 0$ is the income elasticity of Northern imports, $\mu_N > 0$ is the price elasticity of Northern imports and $P$ is the relative price (given by $\frac{P_S E}{P_N}$, where $E$ is the exchange rate). This formulation is compatible, as Dutt argues, to a great variety of assumptions of income and price elasticities of demand for both goods.

On the other hand, in the South workers spend their entire income consuming only the Southern good and capitalists save a fraction $s_S$ and consume the rest of their income, expending a fraction $\beta$ of their consumption in the Northern good and the rest on the Southern. Similarly, we assume that the fraction is defined:

$$\beta = \beta_0 (\pi_S Y_S)^{\varepsilon_S - 1} P^{1-\mu_S} \tag{7}$$

where $\pi_S$ is the total profit share of the South.

Furthermore, as we assumed a “Keynes-Kalecki" structure in the North, the firms have an independent investment function (normalized by the stock of capital) given by:

$$\frac{I_N}{K_N} = \gamma_0 + \gamma_1 \left( \frac{Y_N}{K_N} \right) \tag{8}$$

where $K_N$ is the capital stock in the North, and $\gamma_i$ are positive constants. Note that the Northern investment rate depends on the rate of capacity utilization, measured by $\frac{Y_N}{K_N} = u_N$

(that is, assuming that the capital-potential output ratio equals unity), because higher $u_N$ implies higher profits and more buoyant markets.[8] In the North, only the Northern good can be used as an investment good. However, in the South both goods can be used as investment goods, and for simplicity we assume that the same fraction $\beta$ of total investment is spent on the Northern good and the rest on the Southern good. Also for simplicity, we assume that capital stocks in neither region depreciate.

Before we move forward to the behavior of the model in the short run, let us turn our attention, once more, to the capital flows from the North to the South. The FDI flows, normalized by the stock of capital in the South which is property of Northern capitalists, can be determined as[9]:

$$\frac{I_{SN}}{K_{SN}} = \delta\pi_{SN}(Y_S/K_{SN}) + F\left(r_S - r_N;\ g_S\right) \tag{9}$$

where $\delta \in [0,1]$ is a constant representing the fraction of profits received by Northern capitalists in the South that is reinvested in the Southern region, $F$ is a positive function (i.e $F \geq 0$) and can be understood as "new" capital flows, or FDI inflows to the Southern region, $g_S$ is the Southern output growth rate, $r_S$ and $r_N$ are Southern and Northern profit rates, respectively, and $F'(r_S - r_N) \geq 0$, $F''(r_S - r_N) \leq 0$, $F'(g_S) \geq 0$ and $F''(g_S) \leq 0$. Note that these new capital flows depends positively on the differential of profit rates between the Northern and Southern region, a reasonable simplification. Furthermore, we consider the possibility of an accelerator effect of the Southern growth rate on capital inflows, an empirically observed assumption. It is important to say that each capitalist (Northern or Southern) can detain only one type of capital stock in the South, that is $K_{SN}$ and $K_{SS}$ are composed only by foreign and domestic firms respectively. For simplicity in a first approach, we assume that all Northern capitalists profits in the South are reinvested, so they do not consume neither of the goods (as consumption goods) and $\delta = 1$. Furthermore, we assume that $F(r_S - r_N;\ g_S) = 0$, so there aren't any new inflows of FDI to the Southern region.[10]

[8]Note that we could use a investment function that consider the dual effects of capacity utilization on investment rate, adding a term related to the profit rate directly. The choice here was for simplicity, especially because the qualitative results are similar.

[9]Equation (9) is still very simplified and, later on, will need to take into consideration any relative profitability measure between the North and the South.

[10]The case analyzed here consider FDI inflows as basically reinvestment of profits. A first advance to

The assumptions made so far imply that the value of Northern imports from the South, that is, in this model, of Southern exports, is determined as:

$$P_S X_S = \alpha \left\{ \frac{[1 + (1 - s_{NN})z]}{(1 + z)} \right\} P_N Y_N \tag{10}$$

which can be simplified to:

$$X_S = \Theta_S P^{-\mu_N} Y_N^{\varepsilon_N} \tag{11}$$

where $\Theta_S = \alpha_0 \left\{ \frac{[1+(1-s_{NN})z]}{(1+z)} \right\}$ and $P = \frac{P_S}{P_N}$ (considering that $E = 1$). It is worth noting that Equation (11) is very similar to export (and import) functions generally used in balance-of-payments constraint growth models, following Thirlwall's tradition. Northern exports, which is the same as the value of Southern imports from the North, is given by:

$$P_N X_N = \beta \pi_S P_S Y_S \tag{12}$$

once more, we can write (12) as:

$$X_N = \Theta_N (1/P)^{-\mu_S} Y_S^{\varepsilon_S} \tag{13}$$

where $\Theta_N = \beta_0 \pi_S^{\varepsilon_S}$.[11] After describing the general structure of the North-South model, we now advance to analyze it. With this in mind, we divide the exposure into two temporalities: short run and long run. In the short run, the stocks of capital in the two regions, $K_{ij}$, are given, as well as FDI inflows (which means that capital stock composition in the Southern region is given) and the markets for both goods clear through changes in relative prices in the South, $P$ (for simplicity, we assume that the nominal exchange rate is fixed in unity, as well as $P_N$), and changes in Northern output. In the long run, we shall consider that the conditions for short-run equilibrium always hold, and that capital stocks change due to investment in both regions.

be made is to generalize the model considering $\delta > 0$ and $F(.) > 0$, thus the case herein developed would become a particular one.

[11] An interesting point to note is that both export functions depend on the functional distribution of income. This relation motivates the empirical exercise present in this paper.

## 2.2 Short-run behavior

In the short run, a positive excess demand for the Southern good will result in an increase in the relative price of this good, that is, a raise in $P$. The excess demand for the Southern good can be described as:

$$ED_S = C_{SS} + I_{SS} + X_S - Y_S \tag{14}$$

where $C_{ij}$ and $I_{ij}$ represent, repectively, the consumption demand and the investment demand for good i in region j. We shall remember that Southern income can be spent on buying domestic goods or imports (that is, the income that wasn't saved) and, futhermore, we assumed that Northern capitalists' profits are totally reinvested in the South (which, in our case, represents FDI inflows), in a way that all savings generated in the South become investment in the same region. That said, then we have $Y_S = C_{SS} + I_{SS} + M_S$, where $M_i$ are the imports of region i in units of good i. As we stated before, the value of imports from the South is equal to the exports of the Northern region so that $M_S = X_N/P$. Now we can rewrite Equation (14) as:

$$ED_S = X_S - (1/P)X_N \tag{15}$$

In the North, on the other hand, we assume that a positive excess of demand for the Northern good results in an increase in the rate of capacity utilization, $u_N$. The excess demand for the Northern good is given by:

$$ED_N = C_{NN} + I_N + X_N - Y_N \tag{16}$$

Once more, we shall remember that Northern income can be used for consuming the Northern good, for imports and for savings, so we have: $Y_N = C_{NN} + S_N + M_N$. Since $M_N = PX_S$, Equation (16) can be rewritten as:

$$ED_N = I_N - S_N + X_N - PX_S \tag{17}$$

Short-run equilibrium, in which $u$ and $P$ do not change, given the stock of capital in both regions and the FDI flows, requires $ED_i = 0$. Imposing this condition into Equations (15) and (17), and using the export functions represented in Equations (11) and (13), we can solve for the short-run equilibrium values of the variables that we are interested: the terms

of trade and the Northern rate of capacity utilization. After some calculations, we have:

$$P^* = [(\Theta_S/\Theta_N)(u_N^* K_N)^{\varepsilon_N}/(K_S v_S)^{\varepsilon_S}]^{\frac{1}{(\mu_N+\mu_S-1)}} \tag{18}$$

$$u_N^* = \frac{\gamma_0}{(s_N \pi_N - \gamma_1)} \tag{19}$$

since $\pi_N = \frac{z}{1+z}$, if we substitute Equation (19) in (18) we can find the equilibrium value for the terms of trade:

$$P^* = \left[(\Theta_S/\Theta_N)\left(\frac{\gamma_0(1+z)}{s_n z - \gamma_1} K_N\right)^{\varepsilon_N}/(K_S v_S)^{\varepsilon_S}\right]^{\frac{1}{(\mu_N+\mu_S-1)}} \tag{20}$$

In order to obtain an economically meaningful equilibrium value of $u_N$, we assume that $s_N \pi_N > \gamma_1$, that is, the responsiveness of savings to changes in ouput exceeds the responsiveness of investment to similar changes (the Keynesian stability condition). As presented by Dutt (2002), the local stability of this equilibrium requires that $\frac{\partial(ED_S)}{\partial P} < 0$ around the short-run equilibrium (i.e in the neighborhood). If we differentiate Equation (14), with respect to P, and using our export functions (Equations (11) and (13)) as well as $Y_S$, we find that the stability condition for the short-run equilibrium is given by:

$$\mu_N + \mu_S > 1 \tag{21}$$

It is clear that (21) represents the Marshall-Lerner condition, that is, the sum of export and import price elasticities being greater than unity.

Therefore, we presented in this section the general structure of the model as well as the characterization of the short-run equilibrium. An interesting question that emerged from the later point is that the stability condition regarding the short-run equilibrium is a well-known inequality, which can be understood as a not so restrictive assumption in this model. That said, we now turn our attention to the long-run behavior of the model.

## 2.3 Long-run dynamics

In the long run, capital stocks grow according to the rates of capital accumulation, which in our model includes FDI flows, in the two regions. These growth rates are given by: $g_i = I_i/Ki$.

The accumulation in the Northern region can be derived from (8) and the short-run equilibrium rate of capacity utilization (19):

$$g_N = \gamma_0 + \gamma_0\gamma_1/[s_N\pi_N - \gamma_1] = \frac{\gamma_0 s_N \pi_N}{s_N\pi_N - \gamma_1} \tag{22}$$

In the South, we have aggregate savings (and thus, the investment):

$$S_S = S_{SS} + S_{SN} = s_S\pi_{SS}K_{SS} + \pi_{SN}K_{SN} \tag{23}$$

where $S_S$ is Southern savings in terms of the Southern good. As investment in the South is made in the form of both goods[12], we assume that investment will depend on the relative prices in a direct way, given by:

$$I_S = P^{\xi}\ S_S \tag{24}$$

where $\xi < 1$. Combining both equations and since we assumed technological homogeneity between $K_{SN}$ and $K_{SS}$, we have:

$$g_S = P^{\xi}\ (s_S\pi_{SS} + \pi_{SN}) \tag{25}$$

Besides that, our major interest at this point is to consider how FDI inflows from the Northern region to the South can affect the productive structure of both regions in the long run. It is important to say that we use capital stock composition in the South as the major variable associated with those capital flows, which is defined as: $k = \frac{K_{SN}}{K_{SS}}$. In a first approach, it is clear from Equation (25) that FDI inflows have direct (positive) impact on Southern growth rate. Going further, this point means that the capital accumulation channel is acting in an aggregate positive way: since we consider only good mechanisms (that is, we assumed that there are no profit remittances nor crowding out effects) through which FDI inflows could affect Southern savings, those capital flows boost capital accumulation in the South, that is, it relieve the production factor restriction (because $K_S$ is the binding constraint in the South). Furthermore, let us initially focus our attention on three other channels that

[12]It is not clear yet if a simplification could be better here. An interesting possibility to consider is that only Northern capitalists reinvestment in Southern region is made by imports of Northern good. This could show in a clear way that this reinvestment has a negative impact on Southern growth rate (balance-of-payments constraint).

were analyzed in the first section: technological change, income distribution and balance-of-payments components.

Therefore, let us continue our long run analysis by looking at technological change. We will consider one mechanism underlying the functioning of this channel: changes in labor productivity, given by the coefficient associated with $L_S$ in equation (2). We assume that the average labor productivity in the South will be positively affected by the composition of capital stock between foreign and domestic firms in the Southern region. It is worth noting that this positive effect on productivity can emerge directly or indirectly, as we discussed on the first section of this paper. Whilst the entry of foreign firms could increase labor and capital productivity directly through the use of new technologies, on the other hand it can trigger positive spillover effects, especially those related to intersectoral backward linkages (see Javorcik (2004) empirical findings) but also secondary effects related to domestic firms "imitating" the productive models and management of foreign firms (Hanousek, Kocenda and Maurel, 2011). Therefore, we will summarize these mechanisms as:

$$a_S = f_1(k) \tag{26}$$

with $a_S \geq 0$, $f_1'(k) \geq 0$, $f_1''(k) \leq 0$. The effects captured in Equation (26) may represent considerable changes in Southern productive structure, as it alters labor productivity. For instance, these improvements on productivity may have impact on Southern price competitiveness that, in turn, could indicate an alternative structural competitiveness pattern for recipient countries - say with greater value added to the Southern product - a pattern that resembles the Northern one. It is worth noting that, once more, this effect may be strongly related to variations on income elasticities of trade.

Similarly, for the income distribution channel, we assume that the average real wage in the South (in terms of the Southern good) will be related to the capital stock composition. Empirical evidence suggests that foreign firms tend to pay higher wages than domestic counterparts (see Görg, Strobl and Walsh, 2007; Huang and Zhang, 2017; Setzler and Tintelnot, 2019) and that foreign wage premium unambiguously benefits workers in foreign firms, particularly high-skilled labor (Anwar and Sun, 2012; Setzler and Tintelnot, 2019). As discussed earlier in this paper, it is not clear however if the workers in domestic firms will be better-off

with the presence of FDI firms.[13] On this point, Nguyen, Sun and Beg (2019) found that besides paying much higher wages than domestic counterparts, an increase in the presence of FDI firms in Vietnam also put downward pressure on domestic firms' wages, i.e. cause negative wage spillovers. The authors argue that if domestic firms are positively affected by FDI via productivity spillovers (which tends to increase the marginal product of labor), it lowers the cut-off capability and, subsequently, firms that previously could not survive will now enter the industry, lowering the firms' expected average wages. Thus, if the indirect effect (cut-off capability) is greater than the direct effect (productivity spillover), an aggregate negative wage spillover will be observed. On the other hand, Setzler and Tintelnot (2019) find positive and sizable local indirect effects on domestic firms' wages for the US. With that in mind, we assume a positive relation between $k$ and the average real wage in the South. In a general way, we have:

$$\Omega = \frac{\omega_{SN}}{\omega_{SS}} = f_2(k) \tag{27}$$

where $\Omega \geq 0$, $f_2'(k) \geq 0$ and $f_2''(k) \leq 0$. Furthermore, as the presence of FDI firms can put a downward pressure on domestic firms' wages (especially because the South herein analyzed has more to do with Vietnam, whilst the US is closer to our North), we will assume that the relation presented in Equation (27) is stronger that the one of Equation (26). In other words, it means that foreign firms will pay a higher real wage in relation to its labor productivity than domestic firms, which can be synthesized by the condition $f_1'(k) < f_2'(k)$, that is the same as saying that the wage-share of foreign firms' workers has a stonger positive relation with FDI inflows (captured here by the capital stock composition) than the wage-share of domestic firms' workers (since $\psi_{Sj} = \frac{\omega_{Sj}}{a_S}$).

Moreover, for the balance-of-payments components channel, it is interesting to analyze a crucial question regarding the income elasticities of trade: the possibility of changes over time. Dutt (2003) finds evidence that income elasticity of imports may have varied in the last decades, while the coefficient associated with income elasticity of exports indicate a constant behavior in the same period. Although the evidence is not clear, it is direct to argue, for instance, that changes in the commodity composition of Southern exports are likely to imply

[13]This discussion related to wage inequality may be a promising path to follow in our empirical-econometrical front, looking at Brazil and/or other countries.

changes on income elasticities and thus it can affect the pattern of development in the long-run (as well as the dynamics of Southern terms of trade).[14] Having that in mind, let us extend the model to incorporate changes in income elasticities coming from FDI inflows, especially since we consider that those capital flows imply in productivity increases (labor) and in faster capital accumulation in the South. In a stylized manner, we assume that commodity composition of Southern exports will be affected by FDI inflows, as technology transfers affect commodities produced in the South as well as the value added in their production. The relation can be synthesized as:

$$\varepsilon_N = f_3(k) \tag{28}$$

where $\varepsilon \geq 0$, $f_3'(k) \geq 0$ and $f_3''(k) \leq 0$.

Considering those channels, it is clear that the evolution of capital stock composition in the South is an important feature in the long run. That said, we should look at the dynamics of $k$ in order to characterize the long-run equilibrium. In the long run, we need that $\hat{k} = 0$ which, by definition, is equal to $\hat{K}_{SN} - \hat{K}_{SS} = 0$. From Equations (23) and (25) it is clear that $\hat{k}$ is related to the distribution of output in the Southern region. In a more specific way, the dynamics of capital stock composition is positively related to profit-shares of Northern capitalists and negatively related to those of Southern capitalists in the South, so we have $\hat{k} = f_4(\pi_{Sj})$. However, from Equations (26) and (27) we also know that wage-shares in Southern region are positively related to the composition of capital stock. Thus, we can represent $\psi_{Sj} = f(k), f' > 0$. Once again by definition, we can rewrite $\pi_{Sj} = (1 - \psi_{Sj})$, so that we have a negative (positive) relation between $\hat{k}$ and $\psi_{SN}$ ($\psi_{SS}$), and considering the relations so far established we have that the dynamics of capital stock composition is a function of the composition itself, which can be synthesized as:

$$\hat{k} = f_4(k) \tag{29}$$

where $f_4'(k) < 0$.

[14] However, Dutt (2003) findings suggests that increasing globalization due to trade liberalization may have strengthened the force of this uneven development mechanism as it has increased South's income elasticity of imports from the North, besides it did not indicate an increase in the Northern income elasticity of Southern exports.

For now, let us make a brief review of the path followed so far to characterize the long-run equilibrium in this model. As we considered some channels through which FDI inflows can affect the economic structure of the Southern region, we begin our analysis from the relations expressed in Equations (26), (27) and (28) clearly leading us to consider an important dynamic equation in the long run: $\hat{k} = 0$. Nevertheless, the assumptions made so far (summarized in Equation (29)) allow us to indicate the existence and stability of a long-run equilibrium value for the capital stock composition in the South (that is, a value of $k^*$ that corresponds to $\hat{k} = 0$). A simplified representation of Equation (29) and the existence and stability of long-run equilibrium is provided by Figure 1, in which we assume a linear relation between $\hat{k}$ and $k$. With the equilibrium value, we can go back to Equations (27)

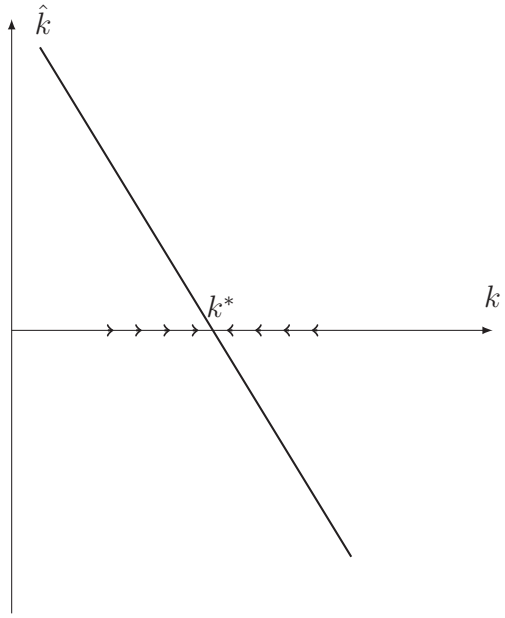


Figure 1: Dynamics of capital composition

and (29) which direct us to long-run equilibrium values for the wage-shares in the South and, consequently, for profit-shares. From Equation (25) and using $\pi^*_{Sj}$ we can now find a long-run equilibrium relation to $g_S$.

Furthermore, we shall turn our attention to the missing part of our long-run analysis: the dynamics of the terms of trade. Equation (18) implies, noting that $z, \gamma_i$ and $s_N$ are

independent of $K_{ij}$[15], that the rate of change in relative prices, $p$, is given by:

$$\hat{P} = p = [1/(\mu_N + \mu_S - 1)](\varepsilon_N g_N - \varepsilon_S g_S) \tag{30}$$

which shows that changes in $P$ depends on the gap between $\varepsilon_N g_N$ and $\varepsilon_S g_S$. In order to present the long-run dynamics of the model in a clear way, Figure 2 summarizes the behavior of growth rates and terms of trade.

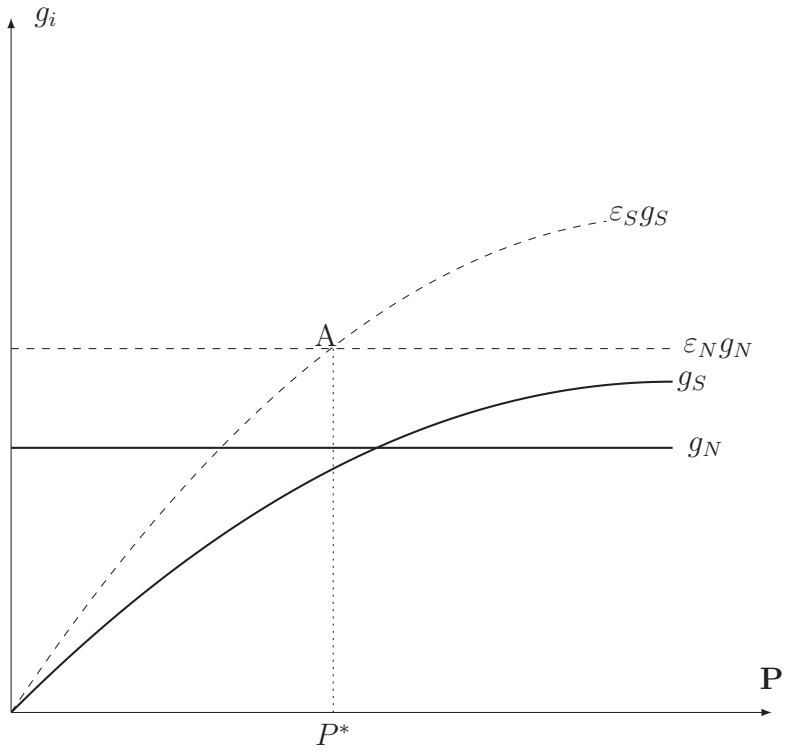


Figure 2: Long-run dynamics of growth and terms of trade

Note that we present, in Figure 2, the case in which $\varepsilon_S > \varepsilon_N > 1$, however it is worth saying that the qualitative results will be valid whenever $\varepsilon_S > \varepsilon_N$. In the case herein addressed, the curve $g_N$ will lie below the curve $\varepsilon_N g_N$ and the same occur to $g_S$ curves. Given the values of $K_{ij}$, we know that $u_N$ and $P$ will be determined in the short run,

[15]In this point, one could argue that there are some relevant direct channels through which the capital composition may be direct related to $P$. For instance, one interesting extension is to consider that Northern consumers will only import Southern good if it is produced by firms owned by Northern capitalists. This mechanism could improve our understanding about the balance-of-payments components channel.

nevertheless the curves $\varepsilon_S g_S$ and $\varepsilon_N g_N$ show how $P$ behaves over time. For any initial short-run equilibrium value of terms of trade, say $P'$, if $P' > P^*$, we have $\varepsilon_S g_S > \varepsilon_N g_N$, so that $P$ falls over time until it reaches the long-run equilibrium value $P^*$, in which we have from equation (30) that $p = 0$. Thus, the "global" economy will pass through a declining $P$ and $g_S$ phase, with the North still growing at a constant rate $g_N$, until it reaches the point A. On the other hand, if $P^* > P'$ we will have a rise on terms of trade until it reaches $P^*$, i.e. the global economy will experience a rise in the terms of trade as well as for the Southern growth rate.

The equilibrium analyzed above is a long-run one in the sense that $k$, $g_S$, $g_N$ and $p$ become stationary. Nevertheless, we have an equilibrium characterized by the persistence of uneven development, that is $g_N > g_S$ in the long run. Note that even if we started from a point in which $g_S > g_N$, the deterioration of the Southern terms of trade will reduce $g_S$ until we have, once more, uneven development. That said, it is worth to analyze some of the structural determinants of the relation between these growth rates, that is $g_N/g_S$. Dutt (2002) presented a stylized relation derived from Thirlwall's Law, considering a division of the world into two regions (North and South, as in this paper), that can be simplified as:

$$\frac{y_N}{y_S} = \frac{\varepsilon_S}{\varepsilon_N} \tag{31}$$

where $y_i$ is the rate of growth of output of region i. As we discussed early on this paper, the relation synthesized in Equation (31) is derived on the basis of a number of stringent assumptions, such as that the terms of trade are constant and trade is balanced. In the model herein developed, one that simultaneously determines the rate of growth of the North and the South and the evolution of the terms of trade, a similar relation can be presented as:

$$\frac{g_N}{g_S} = \frac{s_N \pi_N \gamma_0}{P^{\xi}(s_N \pi_N - \gamma_1)(s_S \pi_{SS} + \pi_{SN})} \tag{32}$$

from the short-run equilibrium for the terms of trade, represented in Equation (20), and remembering that $\pi_N = \frac{z}{1+z}$, we can rewrite:

$$\frac{g_N}{g_S} = \frac{(s_N \gamma_0 z)/(1+z)}{\left[(\Theta_S/\Theta_N)\left(\frac{\gamma_0(1+z)}{s_n z - \gamma_1} K_N\right)^{\varepsilon_N} / (K_S v_S)^{\varepsilon_S}\right]^{\frac{\xi}{(\mu_N + \mu_S - 1)}} ((s_N z)/(1+z) - \gamma_1)(s_S \pi_{SS} + \pi_{SN})} \tag{33}$$

Equation (33) shows that the relation between Northern and Southern growth rate depends on several factors besides the income elasticities of trade. It is important to note that the relation between the regions' growth rates is determined by the functional distribution of income of both regions, with unambiguously negative effect of variations on Southern profit rates (as Southern growth rate is savings-driven).

By way of conclusion, let us turn our attention to two questions related to the model. First, since we assumed that $\varepsilon_S > \varepsilon_N$, that is the income elasticity of import of the South is greater than the Northern one, the model implies that in the long-run equilibrium the Northern capital and output grow at a faster rate that the Southern. Even if we consider a short run in which the South grows faster, the outcome in the long run will still be one of uneven development. It is worth noting that the model implies that the global economy in the long run will grow according to the Northern growth, which is determined by demand. If we consider, as an exercise of comparative statics, that Northern demand has autonomously increased, say by consequence of an increase in $\gamma_0$, then from Equation (22) we have an upward shift in $g_N$ curve as well as in the $\varepsilon_N g_N$ curve. The long-run equilibrium now presents a higher Southern terms of trade and Southern growth would also be higher. Nevertheless, uneven development persists (in equilibrium we still have $g_N > g_S$) and we can see from Equation (20) that the relative income of the North to the South would be higher.

Second, the model herein developed has considered North-South capital flows and so far analyzed four channels through which FDI could affect the economic productive structure, especially in the Southern region. Although the qualitative results obtained for the long-run equilibrium are similar to those derived in Dutt (2002), the introduction of capital flows from the North to the South allowed us to analyze a new set of interesting questions and results that came formally from the capital stock composition in the Southern region. In addition, it is important to note, again, that this persistence of the results obtained serves as a robustness test. As we assumed that profits from Northern capitalists in the South are completely reinvested in the region, unambiguously we have an increase in savings and therefore in investment which, *ceteris paribus*, leads to an accelerated growth rate in the South (determined by $\hat{K}_S$), a positive mechanism underlying the capital accumulation channel. Moreover, the inclusion of effects of FDI inflows on average labor productivity in the Southern region, pos-

itive mechanisms through which the technological change channel functions, could indicate a different path of global development in the long-run, in this case a more even development trajectory. Nevertheless the effects of capital inflows on wage gaps in the Southern region, a mechanism underlying the income distribution channel, point to an increase in income inequality between workers (although it may indicate a greater "aggregate" wage-share in the South). This effect plays a major role in the long-run dynamics: as the capital stock composition raises, the wage-share of labor employed by Northern capitalists goes up which leads to a fall on profits and reinvestiment, thus slowing down capital accumulation by Northern capitalist in the South until it reaches an equilibrium, thus it works as a mechanism that stabilizes the dynamics of $k$ (ruling out the possibility of indefinite growth of capital stock composition) and ensures that the Southern growth rate will not have a explosive trajectory, a behavior that is not observed in the global economy.

In summary, the introduction of FDI inflows in the model did not indicate an even development trajectory between regions, but rather gave rise to a less uneven one - with a long-run equilibrium characterized by higher income growth rate and greater income level in the South but, all else constant, with further terms of trade deterioration. It is important to note that the consideration of those four channels through which these capital flows can affect the productive structure of the South - namely, capital accumulation, technology transfer, balance-of-payments components and income distribution - did not reverse Dutt's result, which is especially relevant given that we mostly assume positive mechanisms for their functioning, that is we consider the "good part" of FDI inflows. Even disregarding profit remittances and assuming that all profits of foreign capitalists are saved and therefore reinvested in the South (which boosts capital accumulation); assuming that capital flows directly and indirectly affect labor and capital productivity in a positive way (which represents a fruitful transfer of technology); and considering that wages of domestic firms may actually decrease on average as foreign capital increases in the South (capital stock composition), which would imply a decline in domestic workers' wage-share and thus benefit Southern growth rate (as the South has a savings-driven growth regime), in the long-run equilibrium the North still grows faster than the South and the pattern of development continues to be uneven (although a less uneven one).

That said, we move forward to the next section of this article, where a first empirical-econometric exercise is presented, analyzing both the role of income distribution on commercial flows as well as the validity of the the income elasticites differential hypothesis.

# 3 Empirical-econometric exercise

Having presented the basic theoretical-formal model of this work, as well as its preliminary long-run closure, let us now proceed to a first advance in an important path pointed out in the last section - the empirical field. In particular, this research focused on two theoretical issues directly derived from the structure of the model presented earlier: i) the differential of income elasticities of imports between regions and ii) the role of functional income distribution in the import and export functions.[16]

With regard to the first point, it is clear from last section that the uneven development results are derived under the validity of the income elasticities differential hypothesis. Nevertheless, it is often argued that poorer countries in general have higher income elasticities of import demand than richer countries, specially because they produce relatively income inelastic goods such as primary products and basic manufactured goods. Although this argument is quite reasonable, an important question may arise from the modern experience: do today's underdeveloped countries, with the great heterogeneity that characterizes them, fit into this situation?

In order to address this question, Dutt (2003) proposed an aggregate exercise to estimate North and South import and export functions. In his motivation, Dutt argues that, although most of the available evidence regarding import elasticities is for developed countries, there are numerous studies that also include underdeveloped countries[17], however this large literature does not allow us to draw solid conclusions about income elasticities of demand for import and export for rich and poor countries, since the estimates do not follow a consistent pattern as well as it suffer from a number of problems, such as aggregation, simultaneity and misspecification problems. Despite not overcoming the problems mentioned, Dutt's analy-

[16] Although such questions are not directly related to the main theme of this article, FDI flows, this exercise is closely related to the theoretical model and, mainly, presents relevant results for the literature.

[17] For instance, see Bahmani-Oskooee (1986), Faini, Pritchett and Clavijo (1992) and Bairam (1997).

sis addressed the North-South dimension of the estimation, finding preliminary results that suggest that the income elasticity of imports of the Southern region is greater that that of the Northern one, so that the elasticity condition under which uneven development occurs, both in Dutt (2002) and in the model presented in this paper, is likely to be empirically verified. Moreover, Dutt's exercise analyzed the possibility of changes in income elasticities over time, as it could be argued that commodity composition of Southern exports had significantly changed over the last decades.

Seeking to continue the discussions about the validity of the income elasticities differential hypothesis, this article will also seek to estimate income elasticities of import demand for two groups of countries, developed and underdeveloped, in a certain way "updating" Dutt's exercise, even though in a less aggregated way and with more robust econometric techniques.

Furthermore, with regard to the second point, this article seek to explore an interesting and majorly unexplored channel to understand the determinants of commercial flows between regions: the functional distribution of income. As previously discussed, the import and export functions derived in our model from the behavior of the different classes - capitalists and workers - in both the North and the South can be represented by the generalized way, as is Equations (11) and (13), that is widely used in open macroeconomics and, specially, in balance-of-payments constrained growth models, following Thirlwall's analysis. In order to present the question formally, let us take the "intercept" coefficients of such export (and, in this structure, import) functions. From the Southern exports, which in this case is the same as the Northern imports, we have:

$$\Theta_S = \alpha_0 \left\{ \frac{[1 + (1 - s_{NN})z]}{(1 + z)} \right\} \tag{34}$$

We can rearrange Equation (34) in order to make explicit the relation between the Northern functional income distribution and the coefficient $\Theta_S$. Remembering that the Northern wage-share and profit-share are given by the exogenous mark-up, $z$, we can rewrite:

$$\Theta_S = \alpha_0[\psi_N + (1 - s_{NN})\pi_N] \tag{35}$$

On the other hand, if we turn our attention to the Northern exports, which in this case is the same as the Southern imports, we have:

$$\Theta_N = \beta_0 \pi_S^{\varepsilon_S} \tag{36}$$

Therefore, from Equations (35) and (36) we can calculate the partial effects of variations in the functional distribution of income on the import functions in a simplified way through the effects on the coefficients $\Theta$. In particular, we have (remembering that $\psi_N = (1 - \pi_N)$):

$$\frac{\partial \Theta_S}{\partial \pi_N} = -\alpha_0 s_{NN} < 0 \tag{37}$$

Thus, from Equation (37) it is clear that a variation on functional income distribution to the capitalists will negatively affect the intercept of the Northern import function, representing a downward pressure on the import demand of the Northern region. It is direct to see that, if we look to the other side, a variation on income distribution towards the Northern workers (an increase in $\psi_N$) will have a positive impact on the intercept of the import function and, therefore, represents a upward pressure on the Northern import demand. A possible explanation for this result is that an eventual increase in the share of the income collected by workers in the North leaks abroad through the demand for imports, especially through a mechanism of search for variety of consumption goods (a "love of variety" kind of argument). This, in fact, may be the case in developed countries (North), especially if we consider that the mass of workers in that region already has a consumption level higher than the subsistence one within the domestic market itself.

Looking now for the Southern imports, we can similarly derive the partial effect of variations in income distribution from:

$$\frac{\partial \Theta_N}{\partial \pi_S} = \beta_0 \varepsilon_S \pi_S^{(\varepsilon_S - 1)} > 0 \tag{38}$$

Equation (38) explicit an interesting relation between the Southern imports and variations on the functional income distribution in the South: the Southern profit share is positively related to the intercept of the import demand function for the South. This result can be interpreted in a direct way. As the demand for imports in the South comes only, in this model, from the capitalists, a relative increase in the share of Southern income received by this group would have to be related, *ceteris paribus*, to an increase in the volume of Southern imports. Although the theoretical explanation is direct, the possible implications

of such result are broad and, curiously, little explored in the literature. Therefore, in the next sections of this article we will develop an econometric exercise to verify the empirical validity of that result, as well as its implications for the North and South regions, or in other words, the developed and underdeveloped countries.

## 3.1 The role of functional income distribution

Initially, we will focus our attention on the role of functional income distribution in the import functions of developed and underdeveloped countries. First, it is important to briefly present a theoretical framework that motivates and directs this part of our empirical exercise.

One important literature that is intrinsically related to our empirical question is that of growth regimes, that is the theoretical and empirical works on wage led and profit led growth regimes in open economies. According to Blecker (1989), while a rise in the wage share boosts aggregate consumption (as the workers marginal propensity to consume is higher than capitalist's) it may reduce the profitability that is expected by capitalists (if the economy is domestically profit led) as well as it negatively affects the price competitiveness of domestic goods in foreign trade (as it raises the labor unit costs), and so adversely affects investment and net exports. If this is the case, even if the economy has a wage-led growth regime, in might turn to a profit-led "overall" regime when one take into consideration the open economy effects. Nevertheless, Ribeiro, McCombie and Lima (2019) discussed that there is a large literature, both theoretical and empirical, showing that rising wages may result in an incentive to labor-saving technological progress, which can result in capital deepening and so increase labor productivity (Rowthorn 1999; Storm and Naastepad, 2011). That said, the overall effect of a raise in wages, or in our case, in the share of the national income that is received by workers, on price competitiveness in open economies appear to be an important empirical question.

Furthermore, there is also another channel through which variations in functional income distribution may affect commercial flows (as well as GDP growth): the country's non-price competitiveness. As presented in Ribeiro, McCombie and Lima (2019), international trade can be greatly influenced by within-country income inequality, specially if one consider the impacts of this inequality in consumption patterns. In this point, Latin American struc-

turalists claimed that high levels of income inequality in underdeveloped countries led to important differences in consumption patterns between classes: the upper classes, with surplus income, tend to imitate the consumption pattern of foreign elite with imports of superfluous goods and highly technological products, which would lead to a leakage of domestic savings to maintain the trade deficit and, thus, slowing down investment and economic growth[18]. The consequences of this demonstration effect can also be analyzed within a framework *à la* Thirlwall. If we consider that those underdeveloped countries generally export low value-added goods (from primary goods to low-tech goods) with low income elasticities, and if a large portion of national income is detained by the upper classes, which bases its consumption on imports of luxury products and highly technological goods, with high income elasticities, it is clear that the balance-of-payments constraint will quickly tighten and thus the "feasible" long-run growth rate will be relatively low. Moreover, a more recent literature shows a similar consumption pattern effect: if we consider the existence of non-homothetic preferences, countries that are characterized by higher income inequality tend to export goods with income elasticity of demand less than unity (necessity goods) and import more luxury goods (with income elasticity of demand greater than unity) (Bohman and Nilsson, 2006; Hummels and Lee, 2018).

## 3.2 Methodology and data description

Having those points in mind, in order to capture the effects obtained by the theoretical model and, in particular, to verify the empirical validity of such results, we departure from the general functions given by the Equations (11) and (13) and, taking the log of the variables, we have a simplified form:

$$\ln M_i = \delta_0 + \mu_i \ln P + \varepsilon_i \ln Y_i + \delta_1 \ln \psi_i \tag{39}$$

[18]This effect is discussed in Duesenberry (1949) and was incorporated in the following decades on structuralist developments, especially in the works of Celso Furtado (after an interesting series of debates with Ragnar Nurkse - as can be seen, for instance, in Nurkse (1951)) and other authors related to ECLAC (Economic Comission for Latin America and the Caribbean). See Rodríguez (1993).

where $i \in \{N, S\}$, $\delta_0$ is a constant, $\mu_i$ and $\varepsilon_i$ are respectively the price and income elasticity of import demand for region i (as in the model) and $\delta_1$ is the coefficient associated with the functional income distribution variable (which could be either positive or negative, depending on the region analyzed).

It is clear that Equation (39) already presents a possible way to estimate the relations that interest us in order to answer both questions posed in this empirical section. Nevertheless, the availability of data as well as the quality of it poses an initial barrier to such an effort. In order to design a feasible and, at the same time, econometrically robust exercise, some changes will be made in the form presented by the previous equation. A first important change with respect to the theoretical-formal model presented earlier and to Dutt's estimates is that we will start with a less aggregated specification, that is, we will not deal with only two countries (or regions), but with two broad groups: developed and underdeveloped countries. The choice for a lower level of aggregation is mainly due to the greater malleability of the estimates as well as the possibility of capturing heterogeneous effects for the different countries that compose each of the groups analyzed.

Furthermore, it is worth saying that the empirical analysis of this article is based on a sample of several countries over several periods of time. Moreover, we follow a well-established empirical literature by describing a country's exports and imports as a function of economic variables, such as measures of income and relative price. In this case, the sample consists of 124 countries and covers a period of seventeen years, from 2001 to 2017 (see the list of countries in the sample as well as the description of the variables and it sources in the Appendix). For the econometric estimates, all the variables were transformed into natural logarithms.

There are several variables that can be used to explain import and export flows. In order to maintain this work consistent and comparable with the existing empirical literature, we will take into consideration some of the most commonly used variables in previous related studies. In general, we will use variables related to the real product, relative prices and income distribution to estimate the import function. In particular, the variables of greatest interest in this exercise will be: the import volume (a clean measure of import flows); the real GDP, as a measure of output; the import unit price, as a measure of relative price

(complemented by control variables); and wage share as a measure of the functional income distribution. It is important to discuss that we chose to use the wage share as the measure of income inequality not only for the clear and direct relation to the theoretical model developed in this paper but also as it is the usual variable used in the vast post-Keynesian theoretical and empirical literature on growth and distribution.

In addition, we will also consider as explanatory variables: the terms of trade (calculated from the import and export prices already discounting the exchange rate effect) and the exchange rate as complementary variables for a better specification of the relative prices; the capital stock at constant prices, introduced in order to capture supply side effects, trying to consider a channel often omitted in the balance-of-payments constrained growth empirical literature as Razmi (2016) argues; and the share of gross capital formation and of government consumption at current PPPs (% of real GDP), in order to incorporate further supply side and institutional effects that may impact import demand[19]. The list of control variables is conditioned to consider enough potentially explanatory variable and to have a good amount of developed and underdeveloped countries in our sample. The period considered was also chose based on the same principle[20].

Moreover, in order to capture a persistence effect of past import flows, we will include two lags of the import volume as independent variables. This way, we will also be controlling possible temporal heterogeneous effects related to the model's explanatory variables. That said, we propose a general specification of the form below:

$$\ln M_{i,t} = \beta_0 + \beta_1 \ln M_{i,t-1} + \beta_2 \ln \ln M_{i,t-2} + \beta_3 \ln P_{i,t} + \beta_4 \ln Y_{i,t} + \beta_5 \ln \psi_{i,t} + \beta_6 X_{i,t} + \lambda_i + \delta_t + u_{i,t} \quad (40)$$

where $\beta_0$, $\beta_1$, $\beta_2$, $\beta_3$, $\beta_4$, $\beta_5$ and $\beta_6$ are parameters (the expected signs are: $\beta_0 \lesseqgtr 0$, $\beta_1 > 0$, $\beta_2 \lesseqgtr 0$, $\beta_3 < 0$, $\beta_4 > 0$, $\beta_5 \lesseqgtr 0$ and $\beta_6 \lesseqgtr 0$), $\ln M_{i,t-j}$ denotes the log of import volume

[19]In regard to the government spending, Ribeiro, McCombie and Lima (2019) discussed the incorporation of this variable in mainstream growth models as a proxy for government burden (distortion for market signals), although a positive effect could be considered if one take into consideration the importance of public investments on health, education and security to promote economic development.

[20]For the complete description of variables, see the Appendix. For further notes on Penn World Table variables computation, see Feenstra, Inklaar and Timmer (2015).

and is considered an independent variable in the first and second lags, $\ln P_{i,t}$ denotes the log of import unit price, $\ln \psi_{i,t}$ is the log of the wage share of income, $X_{i,t}$ is a set of control regressors consisting of economic and political variables (all in log), $\lambda_i$ represent unobserved country-specific effect, $\delta_t$ is a period-specific effect, and $u_{i,t}$ is the regression residual.

## 3.3 Estimation strategy

In this subsection we outline the econometric techniques used to estimate the general structure given by Equation (40). First, it is important to say that the import regression exposed above presents numerous challenges as it deals with the presence of both time and country-specific unobserved effects. However, the methods used to account for these specific effects, such as fixed-effects and first difference equations, tend not to be appropriate for the estimation, specially due to the dynamic nature of the regression (Wooldridge, 2010; Pesaran, 2015). Furthermore, it is direct to argue that most of the independent variables used in our estimation tend to be endogenous to import flows, thus simultaneity must be properly controlled for.

Having those complications in mind, we will try to deal with these problems following the dynamic estimations proposed by Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998), through the usage of the Generalized Method of Moments (GMM) to estimate the parameters of the model. Ribeiro, McCombie and Lima (2019) discuss that these estimators are based on difference regressions and instruments to control for unobserved country and period-specific effects. Besides that, they also use previous observations of dependent and independent variables as instruments. There are two main types of GMM estimation techniques: the difference GMM and the system GMM.

The first method, the difference GMM, represents a clear improvement with respect to fixed-effects and first difference estimators. The estimator first design by Arellano and Bond (1991) seeks to eliminate country-specific effects and also uses lagged observations of the independent variables as instruments. Nevertheless, this method has its disadvantages: if the variables of interest have a certain degree of persistence over time within a country (which is the case for some of the variables of our regression), this implies that most of the variables variation is eliminated when the first differences are taken, in a manner that

the lagged observations of the independent variables tend to be weak instruments for the variables in difference, thus resulting in weak estimators.

The second method, the system GMM, is a way to solve this problem. The estimators proposed by Arellano and Bover (1995) and Blundell and Bond (1998) create a system of regression in difference and in level. The regressions' instruments in first difference remain the same as in the difference GMM. The instruments used in the regression in level are the lagged differences of the independent variables. Admittedly, in this estimation technique, the independent variables can still be correlated with the country-specific effects, although the difference of these variables presents no correlation with these country-specific effects.

In both cases, the validity of the GMM estimators greatly depends upon the exogeneity of the instruments used in the baseline model. The exogeneity of the instruments can be tested through the commonly used Hansen test, analyzing its J statistics. The null hypothesis of this test implies the joint validity of the instruments. Thus, if we reject the null hypothesis, there is a strong indicative that the instruments are not exogenous and hence the GMM estimator is not consistent. Ribeiro, McCombie and Lima (2019), following Roodman (2009b) advise, discussed that researchers should not be comfort with a Hansen test p-value below 0.1. Furthermore, another important test is the Arellano-Bond test for residual correlation in first difference, called the AR(2) test. The null hypothesis of the test examines if the residual of the regression in difference is second-order serially correlated. If the model is correctly specified, we should expect a first-order serial correlation in the residuals but not a second-order one. Thus, a rejection of the null hypothesis suggests that the instruments used are inappropriate and higher-order lags of the instrumental variables are required. Moreover, another important issue to be concerned is the number of instruments used in the regressions. Although there is not a clear recommendation in the literature, it is well known that a large number of instruments is likely to overfit the endogenous variables and may distort the J statistic of Hansen test. Roodman (2009a) suggests that instruments should not outnumber the individual groups in the panel. In our estimations, we tried to keep the number of instrumental variables close to the number of countries in the panel, choosing minimum lag orders of the endogenous variables and using the "collapse" function in order to limit the proliferation of instruments.

Finally, it is worth to say that the estimations were done using 17 periods of time, a rather different procedure than the 4 or 5-years average usually used in panel data analysis. As our number of groups is way higher than the number of periods, we initially discard any possible effects caused by the existence of unit roots. Moreover, we treat almost all variables as endogenous in our estimations, with only period dummies and the exchange rate as exogenous. That said, we can now move forward to the estimations results as well as their interpretation.

## 3.4 Preliminary results and implications

Initially, it is worth pointing out that we present the estimations of Equation (40) for different groups of countries: developed, underdeveloped and for the entire sample. To begin with, we estimate the import function for a group of developed countries (according to IMF's definition - see the list of countries in the Appendix). These results are reported in Table 1.

The first column shows the results of the fixed-effect (within OLS or Linear Squares Dummy Variables regression) estimator without considering the control variables, the lagged values of import volume and time-specific effects. The second column presents the pooled OLS estimator (considering controls and time-specific effects) and the third column presents the within OLS estimator considering both specific effects and including the control variables. As previously mentioned, these methods are inconsistent in dynamic panel models. The fourth and fifth columns presents, respectively, the results of the GMM difference and system. Thus, we will focus our analysis in the last two columns.

In this first result, although the log of wage share has a positive and statistically significant effect on the import volume, when we look to both the fourth and fifth columns, the coefficients associated to the growth rate of wage share are negative but they are not statistically significant. If we look back to Equation (37), our model predicted that the signal associated to this coefficient should be positive, as a variation in the wage share would boost import demand through composition effects (the Northern workers have a greater propensity to consume than the capitalists). Once again, this result could also be interpreted as a love of variety kind of argument, with the workers looking for varied goods to consume in the foreign market. Nevertheless, these estimations indicate that the functional distribution of income

does not impact significantly the import of developed countries. The coefficients associated with the log of real GDP and the import unit price also do not appear to be relevant and the signs are mainly different than those expected. Furthermore, although the Hansen test p-values indicate to not rejecting the null hypothesis in both cases, the AR(2) test p-values indicate that both estimations are not correctly specified, and more lags of the explanatory variables are needed as instruments. The problem, in this case, is that we have only a few developed countries and a specification with a great variety of explanatory variables, in a way that the number of instruments is already greater than the number of groups. Thus, these results do not appear to be conclusive and, in fact, they are not statistically robust. For the case of developed countries, then, another identification strategy must be followed, either with individual regressions for each country, considering different components of each sector of the production chain and the determinants of trade flows, or within a time series framework (since, for most of these countries, data is available for a long period of time).

On the other hand, Table 2 presents the case for the underdeveloped countries (which include emerging and LDC countries). From Equation (38), our model predict that the signal of the coefficient associated with the wage share should be negative. This result is empirically observed in our estimations, as the coefficients associated to the log of wage share are negative and statistically significant for both GMM estimations. For the GMM difference (system), the coefficient can be interpreted as follows: a 10% increase in the growth rate of wage share has a negative 3.1% (3.4%) impact on the growth rate of import volume. Furthermore, the coefficient associated with the log of real GDP and the log of import price have the expected signs, although the income elasticity is not statistically significant for the GMM system. In both GMM estimations, the AR(2) test p-values indicate to the not rejection of the null hypothesis, thus the residual term is not serially correlated (second-order). The results for the Hansen test are similar, with the null hypothesis not being rejected for both estimations, although the difference GMM presents a p-value for the test lower than 0.1. Nevertheless, the results indicate to the joint validity of the instruments utilized on the estimations.

Before discussing in more depth the implications of this result, let's look at the estimates for the entire sample, that is, for all the countries present in our database. Table 3 presents these results. When we take into consideration both developed and underdeveloped

| | LSDV | Pooled OLS | Fixed Effect | Diff GMM | System GMM |
|---|---|---|---|---|---|
| Log of import unit price | 0.201*** | -0.023 | -0.397*** | 0.490 | -0.022 |
| | (0.06) | (0.04) | (0.06) | (0.34) | (0.10) |
| Log of real GDP | 1.287*** | 0.010 | 0.524*** | -1.514 | -0.098 |
| | (0.08) | (0.01) | (0.08) | (2.66) | (0.11) |
| Log of wage share | 0.851*** | -0.085* | 0.088 | -0.789 | -0.198 |
| | (0.15) | (0.04) | (0.07) | (1.04) | (0.13) |
| Log of import volume, lag 1 | | 1.254*** | 0.681*** | 1.343* | 1.190*** |
| | | (0.05) | (0.06) | (0.68) | (0.09) |
| Log of import volume, lag 2 | | -0.277*** | -0.118** | -0.313* | -0.262** |
| | | (0.05) | (0.04) | (0.14) | (0.07) |
| Country-specific effects | Yes | No | Yes | Yes | Yes |
| Time-specific effects | No | Yes | Yes | Yes | Yes |
| Control variables | No | Yes | Yes | Yes | Yes |
| Constant | -15.867*** | 0.484* | 1.949 | | 0.368 |
| | (0.864) | (0.22) | (1.04) | | (0.76) |
| Adjusted $R^2$ | 0.672 | 0.972 | 0.924 | | |
| AR(2) test - p value | | | | 0.029 | 0.001 |
| Hansen "J" test - p value | | | | 0.266 | 0.221 |
| Instruments | | | | 29 | 37 |
| Observations | 442 | 390 | 390 | 364 | 390 |
| Groups | 26 | 26 | 26 | 26 | 26 |

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard errors in parentheses.

Table 1: Estimations for developed countries

| | LSDV | Pooled OLS | Fixed Effect | Diff GMM | System GMM |
|---|---|---|---|---|---|
| Log of import price | -0.261*** | -0.100*** | -0.365*** | -0.457*** | -0.193** |
| | (0.03) | (0.02) | (0.04) | (0.09) | (0.06) |
| Log of real GDP | 1.446*** | 0.065*** | 0.426*** | 0.816*** | 0.051 |
| | (0.03) | (0.01) | (0.04) | (0.13) | (0.07) |
| Log of wage share | -0.152* | 0.009 | 0.027 | -0.315* | -0.341* |
| | (0.07) | (0.01) | (0.05) | (0.10) | (0.15) |
| Log of import volume, lag 1 | | 0.975*** | 0.646*** | 0.655*** | 0.939*** |
| | | (0.03) | (0.03) | (0.03) | (0.08) |
| Log of import volume, lag 2 | | -0.031 | -0.036 | -0.076*** | -0.055 |
| | | (0.03) | (0.02) | (0.01) | (0.06) |
| Country-specific effects | Yes | No | Yes | Yes | Yes |
| Time-specific effects | No | Yes | Yes | Yes | Yes |
| Control variables | No | Yes | Yes | Yes | Yes |
| Constant | -9.711*** | 0.849*** | 0.312 | | |
| | (0.27) | (0.12) | (0.43) | | |
| Adjusted $R^2$ | 0.664 | 0.938 | 0.867 | | |
| AR(2) test - p value | | | | 0.864 | 0.576 |
| Hansen "J" test - p value | | | | 0.083 | 0.155 |
| Instruments | | | | 71 | 79 |
| Observations | 1666 | 1469 | 1469 | 1371 | 1469 |
| Groups | 98 | 98 | 98 | 98 | 98 |

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard errors in parentheses.

Table 2: Estimations for underdeveloped countries

| | LSDV | Pooled OLS | Fixed Effect | Diff GMM | System GMM |
|---|---|---|---|---|---|
| Log of import price | -0.208*** | -0.079*** | -0.337*** | -0.672*** | -0.092 |
| | (0.03) | (0.02) | (0.03) | (0.03) | (0.07) |
| Log of real GDP | 1.444*** | 0.052*** | 0.464*** | 1.121*** | 0.053 |
| | (0.03) | (0.01) | (0.04) | (0.04) | (0.08) |
| Log of wage share | -0.082 | -0.006 | 0.017 | -0.307*** | -0.368** |
| | (0.06) | (0.01) | (0.04) | (0.05) | (0.12) |
| Log of import volume, lag 1 | | 1.005*** | 0.651*** | 0.528*** | 0.967*** |
| | | (0.02) | (0.02) | (0.02) | (0.08) |
| Log of import volume, lag 2 | | -0.040 | -0.043* | -0.076*** | -0.062 |
| | | (0.02) | (0.02) | (0.00) | (0.06) |
| Country-specific effects | Yes | No | Yes | Yes | Yes |
| Time-specific effects | No | Yes | Yes | Yes | Yes |
| Control variables | No | Yes | Yes | Yes | Yes |
| Constant | -10.449*** | 0.710*** | -0.431 | | 0.020 |
| | (0.26) | (0.10) | (0.35) | | (0.73) |
| Adjusted $R^2$ | 0.778 | 0.940 | 0.866 | | |
| AR(2) test - p value | | | | 0.824 | 0.387 |
| Hansen "J" test - p value | | | | 0.121 | 0.116 |
| Instruments | | | | 113 | 121 |
| Observations | 2108 | 1859 | 1859 | 1735 | 1859 |
| Groups | 124 | 124 | 124 | 124 | 124 |

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard errors in parentheses.

Table 3: Estimations for the entire sample

countries, the coefficients associated with the log of wage share have negative signs and are statistically significant for both GMM regressions. Thus, a variation in income distribution in the benefit of workers negatively impact the volume of imports for the representative sample of countries considered in our database. Furthermore, the coefficient associated with the log of real GDP and the log of import price have the expected signs, although there are not statistically significant in the GMM system. In both GMM estimations, we do not reject the null hypothesis for the AR(2) test and the Hansen test, thus indicating that the residuals are not serially correlated and the instruments utilized are jointly valid. Once again, note that the number of instruments were kept under the number of groups, an indicative that we may not incur in problems of over-identification, which could "pollute" the J statistics.

After presenting the preliminary results for both groups of countries and for the entire sample, it now remains to discuss the theoretical and empirical implications of the results and how they relate to the questions initially posed in this section.

Focusing our attention, at this moment, on the other empirical question proposed in this article, it is direct to note that the estimates presented above already give us an indication of the validity of the elasticity differential hypothesis. First, it is worth noting that the coefficients of the regressions that include the lagged terms of import volume as explanatory variables present a possible long-term interpretation: the aggregate effect of income or variations in wage share on the volume of imports over time depends, of course, on the autoregressive nature of such variable. With that in mind, let us first determine how these effects, named here as long-run effects, can be calculated from Equation (39). For instance, if one is interested in the long-run income elasticity of demand import, $\eta$, a simple way to calculate it is:

$$\eta = \frac{\beta_4}{1 - \beta_1 - \beta_2} \tag{41}$$

The calculated long-run income elasticities of import are presented in Table 4. We compute these long-run coefficients for the developed countries (North) and underdeveloped countries (South) for all five econometric estimations. Moreover, we present also the ratio of Southern and Northern income elasticities of import, as it make easier to analyze the possible relative growth paths (according to the simple stylized relation derived from Thirlwall's Law and the one presented in Equation (33)) of the regions and, of course, the validity of the

hypothesis (we expect a ratio greater than unity, that is $\frac{\varepsilon_S}{\varepsilon_N} > 1$).

| | LSDV | Pooled OLS | Fixed Effect | Diff GMM | System GMM |
|---|---|---|---|---|---|
| Long-run $\varepsilon_N$ | 1.287 | 0.4347 | 0.524 | 50.466 | -1.361 |
| Long-run $\varepsilon_S$ | 1.446 | 1.160 | 1.092 | 1.938 | 0.439 |
| Ratio $\frac{\varepsilon_S}{\varepsilon_N}$ | 1.123 | 2.668 | 2.0839 | 0.038 | -0.322 |

Note: Short-run elasticites for the first column.

Table 4: Long-run income elasticities of import comparison

For the first three estimations, the ratio of income elasticities of import demand have the expected value. That is, the uneven development trajectory presented in our theoretical-formal model is likely to be observed. Nevertheless, this result does not hold when we consider the GMM estimations, as we have seen that the coefficients for the developed countries are not easily understandable and, more than that, the AR(2) test and the Hansen test place serious restrictions on the validity of these regressions. Therefore, in the same way that we argued for the effect of income distribution, more empirical work should be done considering the developed countries, especially with the usage of other econometric techniques, so that the results can be reliable and comparable. Notwithstanding, the results indicate to a preliminary corroboration of Dutt's findings, that is, the elasticities differential hypothesis seems to be observed even when we consider recent periods of time and "emergent" economies. In addition, although the results are not extremely robust, it is important to note that we took into consideration several variables as controls, including those regarding supply side and time-specific factors.

| | LSDV | Pooled OLS | Fixed Effect | Diff GMM | System GMM |
|---|---|---|---|---|---|
| Developed | 0.851 | -3.965 | 0.201 | 26.300 | -2.750 |
| Underdeveloped | -0.152 | 0.160 | 0.069 | -0.748 | -2.938 |
| World | -0.082 | -0.171 | 0.043 | -0.560 | -3.873 |

Note: Short-run effects for the first column.

Table 5: Long-run distributional effects

Furthermore, it is also interesting to calculate the long-run impacts of functional income

distribution variations on the import volume. Table 5 presents the results for all the estimation methods. As expected, the long-run effects are stronger than the short-term ones. Again, the results of the first line, referring to developed countries, are not very illuminating: even for the most robust estimates, those using GMM estimators, the coefficients are not statistically different from zero. Thus, more empirical work should be done for this group of countries in order to present a solid answer for the empirical question presented in this paper. Despite this, the results for underdeveloped countries and for the entire sample are quite relevant and, when considering the possible long-run effects, the implications of omitting this effect on the estimates of import functions are even more serious.

By way of conclusion, it is worth discussing in detail the implications associated with the main empirical result of this work. First, the statistical significance of the coefficients associated with the measure of functional distribution in the estimates for underdeveloped countries and for the entire sample indicate that, in the end, the non-inclusion of such measure represents the omission of a relevant variable and, therefore, puts in doubt the consistency of the estimators.

Second, it is worth pointing out that this result contributes to the empirical and theoretical discussions on the effect that variations in the functional income distribution have in the context of economies' price competitiveness, especially in the case of underdeveloped countries. If we consider that an increase in the wage share directly impacts the unit cost of labor, the result we obtained in the estimates indicates that, although such a price effect may deteriorate the competitive conditions of domestic goods (theoretically reducing net exports), the effect of such distributional variation on imports is, in fact, negative. This implies that, depending on the strength of each of the components, the variation in income distribution in favor of workers may, in fact, improve the country's trade balance and, thus, alleviate the external constraint (balance-of-payments constraint).

Third, it is also relevant to highlight the impact of our results in view of the country's non-price competitiveness. The negative effect that an increase in wage share has on the import volume of countries may be directly related to a composition effect of the demand for foreign goods. This composition effect can be understood both within the framework of Latin American structuralists and in more recent literature based on non-homothetic

preferences. Anyway, the explanation is simple: in countries marked by income inequality, an increase in the share of income held by capitalists (thus a decrease in the wage share), in addition to increasing the volume of imports, tends to increase the import of luxury goods to the detriment of more necessity goods (which, it is worth saying, are mainly exported by underdeveloped countries). Moreover, another plausible explanation for this result is that workers tend to import less than capitalists, especially since in many countries these workers will consume all their surplus income in meeting basic needs, which implies decreases in volume of imports (in addition to the composition) after distributional variations.

Finally, it is worth reiterating that this empirical result, with the implications analyzed above, seems to be relevant to a wide literature that encompasses (but is not restricted to) both theoretical-formal models and empirical-econometric estimates of: i) wage-led and profit-led growth regimes; ii) balance-of-payments constrained growth and iii) the role of the real exchange rate (RER) misalignment for economic growth[21].

For the first two themes, the analysis made so far already makes explicit the interrelation with such specific literature. Focusing on the last point, the result of this empirical exercise presents further evidence that the impacts of currency undervaluation on income distribution should be taken into consideration in order to correctly analyze the possible benefits of such policy. The explanation is quite simple: when we consider the distributional effects of currency undervaluation, that is, that it raises income inequality (as it negatively impact real wages and, therefore, the wage share), our results show that this variation will positively impact the import volume and, thus, may deepen the balance-of-payments constraint (even if we consider the positive effect on exports when the Marshall-Lerner condition holds). Furthermore, even if the economy might be "overall" profit-led and this distributional impact may boosts the economic growth, in the long-run an increase in the profit share will limit the possible growth path as it diminish the balance-of-payments equilibrium growth rate.

In fact, not considering the effects of variations in income distribution on imports does not just indicate an omission of a relevant variable. As Lima and Porcile (2013) and, more recently, Ribeiro, McCombie and Lima (2019) argue, this corresponds to the omission of an important channel that can represent, in the limit, a change in a wide range of results,

[21]In this discussion see, for instance, Rodrik (2008), Razmi, Rapetti and Skott (2012) and Ribeiro, McCombie and Lima (2019).

both in theoretical-formal scope as well as in empirical-econometric one and, of course, has important policy implications, especially with regard to the design of industrial policies.

# 4 Conclusion remarks

This paper has examined a different application of Thirlwall's analysis: one that addresses the issue of uneven development between rich and poor countries, in other words, divergence, a question that has been widely discussed in the literature. Furthermore, this paper has also made a contribution to the empirical and theoretical literature regarding the role of income distribution in open economies, especially considering the balance-of-payments constraint.

We have developed a theoretical-formal model of North-South trade, including capital flows from the North to South and taking into consideration some channels through which these FDI inflows can affect Southern long-run growth rate and its productive structure. The model shows how Thirlwall's analysis can be incorporated into North-South models to explain uneven development in a broad manner, in which the North grows faster than the South in the long-run equilibrium. Following Dutt (2002), this model overcomes some of the objections to the existing applications of Thirlwall's analysis, since it does not assume the terms of trade are fixed nor assume a trade balance from start and because it makes explicit the internal structures of regions and hence the determinants of growth in rich and poor countries. Thus, similar to Dutt (2002) and others such as Vera (2006), our effort can be seen as a further step in understanding how Thirlwall's analysis can be incorporated into North-South models. In summary, the model shows once more that if the income elasticity of imports for the South is higher than of the North, the world economy will come to a long-run equilibrium characterized by uneven development, that is with North growing faster than the South, so that the gap between Northern and Southern income will grow indefinitely.

In a more specific way, we considered four channels though which capital flows could affect Southern growth rates: capital accumulation, balance-of-payments components, technological change and income distribution. Although the qualitative results are similar to those of Dutt, the introduction of the described channels and, consequently, the mechanisms by which they work has enabled a better understanding of the effects of capital flows from rich to poor countries. Technological changes caused by FDI flows, in the model captured by

the average labor productivity in the South, have somewhat altered the productive structure in the region, which altered Southern commodities composition of exports and, consequently, affected Northern income elasticity of imports. Both of this interconnected effects increased Southern growth rate. In addition, as the Southern region has a profit-led growth regime, FDI inflows caused a greater capital accumulation in the South, a result that was enhanced by the assumption of no profit remittances, which lead in the long run to an equilibrium with faster growth rate for the South that, despite not representing an overcoming of the uneven development pattern, indicates a new path of development: a less unequal one. Furthermore, the effects of FDI inflows on income distribution played a major role on the model: since foreign firms pay much higher wages and, as could be considered, put a downward pressure on domestic firms' wages, the increase in foreign firms' workers wage-share (proportionally greater than the wage-share of domestic firms' workers) lead to a decrease in reinvestment and, consequently, to the stabilization of capital stock composition. It is worth saying that the long-run equilibrium may show an income distribution between capitalists and workers that is rather different than the starting one.

In addition, this article presents an empirical contribution that dialogues, in particular, with a wide literature of growth regimes in open economies, balance-of-payments restrained growth and the role of RER misalignment in economic growth. When indicating the importance of the functional distribution of income for the determination of imports, this effort pointed out not only the omission of a relevant variable in much of the empirical literature that estimates this trade flows, but also the omission of a relevant channel in the discussions of real exchange rate undervaluation and its impacts, external constraint and economic growth.

By way of conclusion, it is important to shed light on some possible extensions of the model presented here as well as further empirical exercises. One extension that often appears as a suggestion within models in Thirlwall's tradition (and was partially considered in the model herein developed) is to allow the income elasticities of imports to vary over time. An interesting way of approaching the question is to establish a relation between the income elasticities of imports and income distribution in the regions, especially the profit-share in the South. For instance, we can consider that an increase in Southern profit-share will alter

the composition of imports through the demonstration effect, i.e. Southern capitalists will mimetize Northern capitalists' consumption pattern, altering the composition of Southern imports, which could increase the Northern income elasticity of imports over time. Furthermore, there are some interesting analysis for direct FDI impact on employment and wages that could be extended on our empirical-econometrical front. Figini and Gölg (2011) find evidence that the effect of FDI on wage inequality differs according to the level of development of the recipient country: for developing countries (in their analysis, non-OECD economies) the results suggest the presence of a non linear effect, with wage inequality increasing with FDI inward stock but this effect diminishes with further increases in FDI (an evidence clearly related to the inverse U-shaped curve discussed earlier on this paper), whilst for developed countries wage inequality decreases with FDI inward stock. For the Brazilian economy, Fajnzylber and Fernandes (2009), find that both the use of imported inputs and FDI by firms have a positive effect on skilled labor demand, although the effect of exports (that is, firms that export their production) in that same labor demand is ambiguous.

Finally, it is worth pointing out that the path to be followed in both theoretical-formal and empirical-econometric fields looks promising. In particular, it is important to emphasize that new empirical studies must be done for better treatment of developed countries, aiming at obtaining econometrically robust and comparable results with those presented in this work. In addition, it is interesting to indicate that a natural empirical advance, within the specifications close to that used in our empirical exercise, is to introduce FDI flows into the import functions, in particular looking for the cross-relation of these flows with the income elasticities of import demand. In addition to presenting a relevant empirical question, this extension also points to a promising path to endogenize the income elasticities of trade in theoretical works.

# Appendix

| Variable | Definition | Source |
|---|---|---|
| Real GDP (rgdpna) | Real GDP at constant 2011 national prices (in million 2011 USD) | PWT |
| Exchange Rate | Exchange rate, national currency/USD (market and estimated) | PWT |
| Wage share | Share of labour compensation in GDP at current national prices | PWT |
| Government spending (%GDP) | Share of government consumption at current PPPs | PWT |
| Investment share (% GDP) | Share of gross capital formation at current PPPs | PWT |
| Capital stock (rnna) | Capital stock at constant 2011 national prices (in million 2011 USD) | PWT |
| PL_X | Price level of exports (price level of USA GDPo in 2011 = 1) | PWT |
| PL_M | Price level of imports (price level of USA GDPo in 2011 = 1) | PWT |
| Terms of trade | PL_X/PL_M | Author's calculation |
| Import Volume | Import volume index (2000 = 100) | UNCTAD; WB |
| Import Unit Price | Import unit value index (2000 = 100) | UNCTAD; WB |

Table 6: List of variables

| | | |
|---|---|---|
| Australia | Iceland | Norway |
| Austria | Ireland | Portugal |
| Canada | Israel | Slovakia |
| Czech Republic | Italy | Slovenia |
| Denmark | Japan | Spain |
| Estonia | Latvia | Sweden |
| Finland | Lithuania | United Kingdom |
| France | Netherlands | United States |
| Germany | New Zealand | |

Table 7: List of developed countries

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Angola | Bolivia | Chile | Eswatini | Jamaica | Malaysia | Niger | Rwanda | Thailand |
| Argentina | Bosnia and Herzegovina | China | Fiji | Jordan | Malta | Nigeria | Saudi Arabia | Togo |
| Armenia | Botswana | Colombia | Gabon | Kazakhstan | Mauritania | Oman | Senegal | Trinidad and Tobago |
| Aruba | Brazil | Costa Rica | Georgia | Kenya | Mauritius | Panama | Sierra Leone | Tunisia |
| Azerbaijan | Bulgaria | Croatia | Guatemala | South Korea | Mexico | Paraguay | Singapore | Turkey |
| Bahamas | Burkina Faso | Cyprus | Honduras | Kuwait | Moldova | Peru | South Africa | Ukraine |
| Bahrain | Cabo Verde | Côte d'Ivoire | Hong Kong | Kyrgyzstan | Mongolia | Philippines | Sri Lanka | Uruguay |
| Barbados | Cameroon | Djibouti | Hungary | PDR Lao | Morocco | Poland | Sudan | Venezuela |
| Belarus | Cayman Islands | Dominican Republic | India | Lebanon | Mozambique | Qatar | Suriname | Virgin Islands |
| Benin | Central African Republic | Ecuador | Iran | Lesotho | Namibia | Romania | Tajikistan | Zimbabwe |
| Bermuda | Chad | Egypt | Iraq | Macao | Nicaragua | Russian | Tanzania | |

Table 8: List of underdeveloped countries

| Variable | | Mean | Std. Dev. | Min | Max | Observations |
|---|---|---|---|---|---|---|
| Log of import volume | overall | 5.198951 | .5445626 | 2.805297 | 6.934744 | 2108 |
| | between | . | .4068561 | 3.824909 | 6.072995 | 124 |
| | within | . | .3636943 | 3.577109 | 6.321222 | 17 |
| Log of import unit price | overall | 4.893803 | .2813292 | 4.016017 | 6.070382 | 2108 |
| | between | . | .1882152 | 4.276662 | 5.645819 | 124 |
| | within | . | .2097384 | 3.869314 | 5.447408 | 17 |
| Log of real GDP | overall | 11.50054 | 2.0194 | 6.538409 | 16.75882 | 2108 |
| | between | . | 2.015008 | 6.643605 | 16.54247 | 124 |
| | within | . | .2203372 | 10.56138 | 12.1107 | 17 |
| Log of wage share | overall | -.7318605 | .2874918 | -2.004699 | -.2154216 | 2108 |
| | between | . | .2790317 | -1.704647 | -.2154216 | 124 |
| | within | . | .073376 | -1.356108 | -.4010686 | 17 |
| Log of exchange rate | overall | 2.592472 | 2.693221 | -1.973281 | 10.4111 | 2108 |
| | between | . | 2.690838 | -1.235829 | 9.427673 | 124 |
| | within | . | .2604067 | .6911919 | 8.062319 | 17 |
| Log of the terms of trade | overall | .380173 | .1189459 | -.4168094 | 1.62104 | 2108 |
| | between | . | .998709 | -.2435098 | .2830558 | 124 |
| | within | . | .0651895 | -.3228111 | 1.773649 | 17 |
| Log of investment share of GDP | overall | -1.523148 | .3923465 | -3.759232 | .7784234 | 2106 |
| | between | . | .3234929 | -2.559852 | -.8846853 | 124 |
| | within | . | .2237205 | -2.894968 | .513263 | 16.98387 |
| Log of gov. cons. share of GDP | overall | -1.786669 | .368249 | -4.101109 | .864169 | 2106 |
| | between | . | .3237314 | -2.731814 | -1.051796 | 124 |
| | within | . | .1781771 | -3.222268 | .3563735 | 16.98387 |

Table 9: Descriptive Statistics

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