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# Functional distribution of income as a determinant of importing behavior: An empirical analysis

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# Abstract

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We examine the impact of the functional distribution of income on the demand for imports in developed and developing countries. Drawing upon a motivating accounting structure unveiling a potentially causal effect of the functional distribution of income in a general specification of the import function, we find robust empirical evidence that an increase in the wage share has a statistically significant negative (positive) impact on the volume of imports in developing (developed) countries. Therefore, the neglect of such income distribution effects in import demand functions represents the omission of both an empirically relevant variable and a theoretically significant channel through which the functional distribution of income affects output growth under conditions of balance-of-payments constraints and a competitive real exchange rate.

**Keywords**: Functional distribution of income; import demand; aggregate demand regimes; balance-of-payments-constrained growth.

**JEL codes**: F14; D33; E25; F43.

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# 1 Introduction

The last few decades have been marked by significant income distribution changes, both on personal and functional levels. In effect, top incomes have risen to unprecedented levels since the *Belle Époque*, especially in the US (Alvaredo et al., 2017; Piketty, 2014; Piketty & Saez, 2003), whereas the wage share has been falling substantially (although heterogeneously) since the 1980s across most OECD countries and developing countries. Although changes in the former have had more prominence, as noted in Atkinson et al. (2011) and Stockhammer (2017), there has been an increasing interest in the behavior of the functional distribution of income and the macroeconomic implications of the falling trend in the wage share.

In a more in-depth empirical analysis of the recent trajectory of the functional distribution of income in several countries, Stockhammer (2017) shows that the adjusted wage share has fallen in the advanced economies, on average, from around 73 percent in 1980 to 64 percent in 2007. These changes in the functional distribution of income have taken different forms in different countries, with a moderate decline in the wage share in Anglo-Saxon countries (although accompanied by a sharp polarization of personal income distribution) and a more prominent shift in the wage share in continental European countries.

However, for developing countries, data on the functional distribution of income is mainly available only for recent years, and the evidence appears to be ambiguous (ILO, 2015). Nevertheless, Stockhammer (2017) shows that several groups of developing countries (grouped by the date when each available series begins) present a pronounced decline in the adjusted wage shares since 1990. Also, ILO (2015) presents evidence that the decline in the labor income share in many developing countries is even more pronounced than in advanced economies. However, it should be highlighted that some of the countries in these groups have presented a quite different path for the wage share, with increases in the share of income received by workers - a phenomenon that is also associated with an improvement (on average) in the personal distribution of income.[1]

[1]For the Brazilian economy, Bastos (2012) presents evidence of increasing wage share from the beginning of the 2000s. Carvalho and Rugitsky (2015) and Rugitsky (2017) discuss the relationship between such trend and government policy, as well as the one between the personal income distribution and the latter (especially minimum-wage increase policies) and its macroeconomic implications (and limitations). Regarding the personal income distribution see, for instance, Gobetti, Orair, et al. (2015), Medeiros et al. (2015), and Souto

In short, the existing empirical literature regarding the effects of the functional distribution of income on aggregate demand is divided into those who follow an aggregative approach - by directly estimating the relation between the rate of capacity utilization and the wage share - and those who follow a structural approach, separately estimating the effects of wage share on each component of aggregate demand (Blecker et al., 2020; Stockhammer & Wildauer, 2015). The former literature usually finds evidence of profit-led demand (that is, a rise in the profit share exerts a positive impact on aggregate demand) and a profit-squeeze in distribution in the short-run (Barbosa-Filho & Taylor, 2006; Carvalho & Rezai, 2016; Kiefer & Rada, 2014). Meanwhile, the latter approach usually finds evidence of wage-led demand (that is, an increase in the wage share exerts a positive impact on aggregate demand) in large and relatively more closed economies, whilst the results for smaller countries and more open economies tend to indicate a profit-led demand regime (Hein & Vogel, 2007; Lavoie & Stockhammer, 2013; Onaran, 2011; Onaran & Galanis, 2012; Onaran & Obst, 2016; Stockhammer et al., 2008; Stockhammer & Wildauer, 2015).

One of the main channels through which the functional distribution of income can affect aggregate demand is the trade balance. The existing empirical evidence regarding this relationship is mostly related to price competitiveness. In general, the results indicate that an increase in the wage share (or unit labor cost (ULC)) negatively impact on the trade balance (net exports) in developed and developing countries (Blecker et al., 2020; Hein & Vogel, 2007; Naastepad & Storm, 2006; Onaran & Galanis, 2012; Stockhammer et al., 2008; Stockhammer & Wildauer, 2015). However, considerably much less attention has been given in the literature to non-price factors and whether and how the functional distribution of income can directly affect exports and imports. With the notable possible exception of Latin American structuralists and Arestis and Driver (1987), the investigation of this channel has been almost restricted to a specific literature examining the effects of income inequality given the existence of non-homothetic preferences - in general, the more unequal the country (in terms of personal income distribution), the greater its expenditure in luxury goods (Bohman & Nilsson, 2006; Dalgin et al., 2008; Francois & Kaplan, 1996). Therefore, a timely issue in need of empirical addressing is whether international trade flows are affected by both the level and the functional distribution of aggregate income.

(2015) and Medeiros and de Castro (2018).

Given the prominent global declining trend in wage shares and such a noticeable gap in the literature, the main purpose of this paper is to empirically explore the impact of a change in the functional distribution of income on a specific component of aggregate demand in two different groups of countries, namely, imports. More precisely, the paper explores the potentially distinct effects of a change in the wage share on imports in two heterogeneous groups of countries: developed and developing ones. In summary, we find robust empirical evidence that an increase in the wage share has a statistically significant negative impact on the volume of imports in developing countries (and for the entire sample), and a positive impact on the volume of imports in developed countries. This evidence points to a quite relevant result: the neglect of such income distribution effects in import demand functions represents the omission of both an empirically relevant variable and a theoretically significant channel through which the functional distribution of income affects output growth under conditions of balance-of-payments constraints and a competitive real exchange rate. Moreover, the different effects that a change in the functional distribution of income has on the volume of imports in different groups of countries indicate that the structural specificities of developed and developing countries do matter for the macroeconomic implications of the recent global declining trend in national wage shares.

The sequence of this paper proceeds as follows. Section 2 presents a brief analytical review of the related literature, seeking a better understanding of the determinants of the decreasing tendency of the national wage shares and the potential macroeconomic implications of this trend. In Section 3, we set forth a basic accounting structure showing that a general specification (vastly used in the open macroeconomics literature) of the import demand function features an income composition effect in addition to the usual income quantity effect, which highlights the importance of the functional distribution of income. Section 4 reports and discusses the results of an empirical exercise estimating the general import functions motivated by that accounting structure, focusing on the role of the functional distribution of income in developed and developing countries and its implications for the existing literature. Lastly, Section 5 summarizes the main conclusions derived along the way and pinpoints some specific issues and questions worthy of future research.

# 2 Declining trend of the labor share: determinants and consequences

We now proceed to an analytical review of the related literature motivating this paper. In order to clearly review and briefly discuss the main arguments presented in such literature, we will divide this section into two subsections: i) the first, in which we will discuss the determinants of the downward trend in the wage shares, and; ii) the second, in which we will examine the possible macroeconomic implications of these variations in the functional distribution of income.

## 2.1 Determinants of wage share variations

Even though this paper's focus is on the functional distribution of income, it should be pointed out that there is a relationship between the functional and personal income distribution (Behringer & Van Treeck, 2018). Atkinson (2009) and Bengtsson and Waldenström (2018) analyze this relationship and argue that the profit share and the personal income inequality can be expected to be positively correlated (for plausible distributions of personal income and levels of profit share). Regarding the connection between capital share and income inequality, Piketty (2014) indicates that capital income tends to be more unequally distributed than labor income, so a transfer from labor to capital income is very likely to increase inequality. Nevertheless, the relationship between factor shares and personal distribution becomes more complicated when economic agents derive their earnings from several different sources (ILO, 2015). Although not demonstrating causality, ILO (2015) presents simple correlation evidence suggesting that the decline in the wage share tends to evolve in the same direction as the widening of market-income inequalities.

Karabarbounis and Neiman (2014) argue that labor shares have long been considered stable, and this stability is a key foundation in macroeconomic models. Therefore, it is not surprising that the recent global trend of decline in the wage shares has caught academic research attention. According to Stockhammer (2017), the literature dealing with the determinants of such variations in the functional distribution of income falls into four relatively independent groups. Nevertheless, we prefer to review the theoretical and empirical argu-

ments provided in the literature in terms of five different determinants of the decline in the wage shares (why may, of course, be related to each other and probably operate at the same time): i) technological change; ii) globalization (trade theory approach); iii) welfare state retrenchment; iv) financialization and v) market structure.

Regarding the first determinant, Stockhammer (2017, p. 7) recalls that the core idea of the neoclassical theory of income distribution is that technological change is the major determinant of distribution changes. The main argument put forward in the literature is that, since the early 1980s, technological change has become capital augmenting rather than labor augmenting and, consequently, wage shares have fallen. In fact, the literature often reports significant effects of technological change on income distribution in developed countries.[2] For instance, empirical studies reported in the International Monetary Fund's "World Economic Outlook" and the European Commission's "Employment in Europe" (EC, 2007; IMF, 2007) provide evidence that technological progress made the largest contribution to the fall in aggregate labor income share. Although there are certain difficulties in defining a suitable measure of technological change in developing countries, the empirical evidence provided in this literature suggests that technological change has contributed a great deal to the fall in the wage share. Another theoretical argument put forward in the literature is that average labor productivity may have grown faster than the real factor remuneration (i.e., average real wages), which would indicate a fall in the relative participation of the factor on aggregate output (or income).[3] In fact, ILO (2015) provides evidence that in most developed countries, the aggregate growth of real wages was significantly slower than that of aggregate productivity (even taking into consideration the dynamics of relative prices), which explains the decline in the wage share. Meanwhile, Karabarbounis and Neiman (2014) argues that

[2]Regarding personal income distribution, there is a considerable literature on the skill-biased nature of technological change in the last decades and its consequences on the observed increase in income inequality. See, for instance, Acemoglu (1998, 2002) and Berman et al. (1998). A detailed analytical review of this literature is offered in Acemoglu and Autor (2011).

[3]This argument can be valid even considering the documented labor productivity slowdown experienced by many advanced economies in recent years. Nevertheless, it should be noted that decreases in the wage shares might be related to this labor productivity slowdown. In fact, Tridico and Pariboni (2018) provide evidence that weak GDP growth, wage share decreases, increases in financialization, and inequality negatively affect the dynamics of labor productivity.

the decrease in the relative prices of investment goods explains a major part of the observed decline in the labor share in income, with capital augmenting technologies being the second most important determinant of such a declining tendency.

Second, regarding the role of globalization, the two main approaches suggested in the literature are related to trade theory. Following the Stolper and Samuelson (1941) theorem, we expect that the abundant factor will gain (in relative remuneration terms) from international trade. As argued in Stockhammer (2017), this abundant factor is capital for the developed countries, whilst developing countries tend to be labor abundant. Therefore, globalization would be associated with improvements in the remuneration of capital in developed economies and labor in developing ones.[4] However, the empirical evidence supports only about half of such theoretical predictions: while workers in developed countries have indeed lost out, those in developing countries also seem to have lost relative remuneration in comparison to capital. Meanwhile, the "Political Economy of globalization" approach (Stockhammer, 2017, p. 8) argues that the main effect of trade on income distribution is through the bargaining position of labor and capital and not via relative prices (Onaran, 2011; Rodrik, 1998b). Given the possibility of production relocation, trade liberalization tends to benefit the more mobile factor, which is typically capital (Rodrik, 2008). Thus, globalization tends to benefit capital (and therefore would be associated with a fall in the wage share) in both developed and developing economies or, to put differently, in the North and the South. IMF (2007) provides evidence showing that globalization is, in fact, one of the several factors that have acted to reduce the labor share in income in developed economies. Considering both developed and developing economies, Rodrik (1998a), Harrison (2005) and Jayadev (2007) find that globalization (measured by increased trade) has a negative effect on the wage share.

Third, regarding the analysis of welfare states, the suggested arguments are mainly related to the bargaining power of labor. Stockhammer (2017, pp .9-10) points out that, while aggregate social expenditures may be historically high, there has been a substantial reduction in welfare state generosity. Within a power resources theory framework, Bengtsson

[4]The discussion regarding the limitations of the Stolper-Samuelson theorem is beyond the scope of this paper. Nevertheless, it should be mentioned that the result is derived under hypotheses such as perfect competition, full employment, and absence of factor mobility and trade costs.

and Waldenström (2018) and Kristal (2010) argue that income distribution is mostly determined by the relative power positions of labor and capital. These relative power positions are related to variables such as union density, strike activity, government civilian spending, unemployment benefits generosity, employment protection legislation, and government ideology. The empirical evidence provided in the related literature is mainly based on developed countries. For instance, Kristal (2010) finds that union density and unemployment benefits play critical roles in determining the bargaining power of labor and are positively related to it. Therefore, the welfare state retrenchment can, in fact, be related to decreases in the bargaining power of labor and a declining tendency of the labor share in income.

As regards the fourth determinant, Stockhammer (2017, pp. 10-11) reports that the literature suggests four main channels through which financialization may affect income distribution.[5] First, firms can invest in financial assets besides real assets, a possibility that increases firms' exit options and, therefore, makes them less likely to negotiate labor agreements since an increasing fraction of their profits comes from financial activities. Besides, financialization has led to gains in shareholder and rentier power, who manage to extract most of the corporate profits in the form of interest and dividends payments, which may represent a downward pressure on wages (and, therefore, on the relative remuneration of the factor). Financialization may have also increased commutative pressures on capital markets and established a market for corporate control, which may have altered the firms' priority to profitability (and share value) rather than expansion and growth. This shift in priorities has led firms to adopt a "downsize and distribute" strategy, with adverse effects on the labor share in income (Pariboni & Tridico, 2019; Stockhammer, 2017). Moreover, this increased role of households' financial activity may have eroded working-class identities and, therefore, undermined organized labor's strength, reducing the bargaining power of labor. Kim et al. (2019) explore the possibility that household indebtedness is an important cause of rising income inequality. If workers experience rising debt burdens, their cost of job loss may rise if

[5]The several discussions on the origins and suitable definition of financialization are beyond the scope of this paper. Here we understand financialization as a set of changes in economy and society in the last decades characterized by "an increased role of financial activity and rising prominence of financial institutions"(Stockhammer, 2017, p. 10). For detailed elaborations on this topic, see, for instance, Stockhammer (2004), Epstein (2005), Lapavitsas (2011) and Palley (2013).

they need labor-market income to continue borrowing and servicing existing debt. This, in turn, will reduce their bargaining power and increase income inequality. Dünhaupt (2013) finds evidence that financialization and globalization are important variables to understand the recent trajectory in the wage share. Stockhammer (2017), in turn, finds that financialization has had the largest contribution to the decline in the wage share (considering the four main determinants discussed here), although globalization has also had substantial effects in both developed and developing economies. Meanwhile, Pariboni and Tridico (2019) find that the labor share in income is negatively affected by financialization, dividend distribution, and globalization, while Kohler et al. (2019) conclude that international financial openness and financial payments of firms have the strongest (negative) effects on the wage share.

Lastly, recent research indicates the critical role played by the market structure in explaining the declining trend in the wage share (Autor et al., 2020; De Loecker & Eeckhout, 2018; De Loecker et al., 2020). De Loecker et al. (2020) find that the average mark-ups in large US firms have increased significantly in the last decades and that this tendency has contributed to the decreasing labor share in the country. Furthermore, Autor et al. (2020) find that the falling labor share in the US has been driven by increasing industrial concentration.

As intimated earlier, it should be noted that these five determinants seem to operate concurrently and in a very interconnected manner. In particular, this interconnection seems to be more evident in the relationship between financialization, globalization and decreases in labor bargaining power.

## 2.2 Macroeconomic implications

Having discussed the declining global trend in wage shares and the main explanations provided in the literature for such a trend, an important question arises: what are the macroeconomic implications of this variation in the functional distribution of income? In fact, if labor share stability is considered a critical foundation in macroeconomic models, the effects of this recent trend are very likely to be quite relevant.

The existing empirical literature is divided (with results that align with the methodologies employed) into those studies which follow an aggregative approach (by directly estimating

the relation between the rate of capacity utilization and the wage share) and those which follow a structural approach (by separately estimating the effects of wage share on each component of aggregate demand) (Blecker et al., 2020; Stockhammer & Wildauer, 2015). The former approach usually finds evidence of profit-led demand and a profit-squeeze in distribution in the short-run (Barbosa-Filho & Taylor, 2006; Carvalho & Rezai, 2016; Kiefer & Rada, 2014). As the main focus of this paper is on the role of the functional distribution of income on imports, we will discuss the literature that addresses the components separately in more detail.

To better understand these effects, we focus our attention on the components of aggregate demand - consumption (C), investment (I), government expenditure (G), and net exports (NX). In a general formulation, consumption, investment, government expenditure, and net exports are written as functions of income, the functional distribution of this income, and some other control variables. For simplicity, let us assume that these control variables ($\omega$) are independent from output and distribution.[6] Thus, aggregate demand and, from the expenditure approach, income can be determined by:[7]

$$AD = Y = C(Y, \sigma, \omega_C) + I(Y, \sigma, \omega_I) + G(Y, \sigma, \omega_G) + NX(Y, \sigma, \omega_{NX}) \tag{1}$$

where $\sigma$ is the wage share and $\omega_C$, $\omega_I$, $\omega_G$, $\omega_{NX}$ are, respectively, the set of control variables related to the aggregate consumption, investment, government expenditure and net exports.

That said, let us first look at consumption and investment. In classic "stagnationist" (Neo-)Kaleckian models, changes in the functional distribution of income have particular effects on the output growth rate in the long-run equilibrium. In particular, given that workers have a greater propensity to consume than capitalists, any variation in the functional

[6] It should be recalled that the literature following what Blecker et al. (2020) identifies as the "structural approach" usually treats the wage share as exogenous, an assumption that could bring identification problems. Skott (2017) argues that the profit share is not an exogenous variable, and the correlations between factor shares and economic growth can be positive for some exogenous shocks but negative for others. Moreover, Barrales and von Arnim (2017) find evidence of bi-directional causality (in the sense of Granger (1969)) between the rate of capacity utilization and the wage share, indicating that effects of output on wage share should not be neglected.

[7] A similar general formulation is presented in Stockhammer et al. (2008), Onaran and Galanis (2012) and Blecker (2016).

distribution to the benefit of workers, that is, an increase in the wage share raises aggregate consumption and, thus, results in higher capacity utilization. Furthermore, this effect would also be associated with higher capital accumulation, output growth, and even higher profit rate (assuming a strong accelerator effect in the investment function) (Amadeo, 1986; Dutt, 1984, 1987; Rowthorn, 1981; Taylor, 1983, 1985). However, as argued in Blecker (2002, p. 131), several authors have shown later that "stagnationism" is not a necessary outcome in more general Kaleckian models, even considering oligopolistic firms with mark-up pricing and excess capacity. In particular, the contributions by Bhaduri and Marglin (Bhaduri & Marglin, 1990; Marglin & Bhaduri, 1990) presented the "exhilarationism" case, in which a higher profit share stimulates aggregate demand and raises capacity utilization. In summary, this result is the outcome of an independent investment function that considers the profitability effects related directly to the profit share (and not through the profit rate). Thus, even though the effect of an increase in the wage share on consumption is positive, it may also reduce aggregate demand depending on the impact of lower profit margins on investment. Moreover, Taylor (1990) has shown that an "exhilarationist" result can also emerge within a "stagnationist" framework, for if workers also save a relevant fraction of their income, this reduces the consumption-stimulating effect of an increase in the wage share.[8]

Naastepad and Storm (2006), and Stockhammer et al. (2008) provide empirical evidence supporting the positive effect of an increase in the wage share on aggregate consumption (the hypothesis of a lower propensity to consume out of profits than out of wages is confirmed), and a negative effect of such distributional variations on aggregate investment in developed countries (although this second effect is frequently small or even statistically non-significant). Nevertheless, in contradiction to these results, Hein and Vogel (2007) find evidence of a (non-significant) positive effect of changes in the wage share on investment for certain OECD countries. Considering some G20 developing countries (such as Mexico, Argentina, India, China, and South Africa), Onaran and Galanis (2012) find similar evidence that the aggregate consumption is positively affected by an increase in the wage share and investment is negatively affected by such an increase. However, the latter effect seems to

[8]For a synthetic theoretical-formal treatment of the various specifications of the investment function, combinations of parameters (such as the propensities to save) and their macroeconomic implications, see Blecker (2002) and Lavoie (2014).

overcome the former in most of those economies (that is, they are likely to be domestically profit-led).

Moreover, the effects of income taxation, especially when effective tax rates differ between labor and capital income, might also impact on the effects of changes in the functional distribution of income on aggregate demand. Blecker (2002, p. 140) shows that income taxes also constitute a source of "leakages" from income-expenditure flows and, moreover, personal income tax rates can be quite larger than workers savings rates. In fact, Blecker (2002) shows that a more regressive tax system makes, *ceteris paribus*, the economy more likely to be "exhilarationist", whilst a more progressive tax system makes the economy more likely to be "stagnationist". Even in the second case, higher taxation of wages relative to profits makes the economy more likely to have a profit-led demand regime.[9] Also, another component of the fiscal policy may be affected by the functional distribution of income: the government expenditure. Just as a more restrictive fiscal policy, with lower social spending, can reduce the relative remuneration of workers (by reducing their bargaining power in comparison to capital), it is plausible to argue that variations in the wage share can direct the focus of fiscal policy (and monetary policy) towards a relative improvement in capital remuneration, whether to maintain the *status quo* in the context of the distributive conflict (a bargaining power "equilibrium") or for other specific purposes.[10]

Lastly, in order to understand the net effect of changes in the functional distribution of income on aggregate demand, we need to consider both the domestic and open-economy effects of such changes. In several contributions, Robert Blecker analyzes how international competition may play a major role in determining the impact of wage share variations on net exports and, therefore, aggregate demand (Blecker, 1989, 2002, 2011, 2016). A usual argument is that an increase in real wages (or unit labor costs) may harm the trade

[9]Unfortunately, however, this important connection between the functional distribution of income and economic growth, as mediated by the structure of the tax system, has not been examined in the empirical literature. This is certainly a pending issue in need of empirical addressing.

[10]Regarding this point, the possibility of a bi-directional causality between the functional distribution of income and economic policies (in this case, government expenditure) is clear. In fact, this possibility is somewhat related to the arguments put forward Palley (2014) and Skott (2017) that an approach which treats the coefficient on the profit share (or wage share) as a policy invariant parameter may be subject to a kind of "Lucas critique" (for the original argument, see Lucas (1976)).

balance. If increased nominal wages are, to some extent, passed through into higher goods prices, domestic production may become less competitive in international markets and, thus, the trade balance may be negatively affected. Moreover, if we consider that international competitive pressures might prevent firms from fully passing through such wage increases into higher prices, this would lead to a reduction in profit margins (a profit squeeze) and, thus, may reduce the variety (and quantity) of exported goods. Thus, a redistribution of income towards wages may represent a downward pressure on aggregate demand via the trade balance.[11]

Considering this channel, the existent empirical evidence is mostly related to price competitiveness; that is, it captures the effects of changes in the wage share (or ULC) through changes in relative prices. Moreover, this literature can be divided into empirical studies estimating the effects of changes in the functional distribution of income on the net exports and export and import volumes separately. Regarding the former, Naastepad and Storm (2006) find that changes in the profit share have a small positive effect on aggregate demand in developed economies. Hein and Vogel (2007), in turn, find a strong positive effect of such variations in some developed countries, not finding significant effects on other OECD economies, however. On the latter, Stockhammer et al. (2008), Onaran and Galanis (2012), Onaran and Obst (2016) and Stockhammer and Wildauer (2015) find that, for developed countries, changes in the wage share have a negative impact on exports and a positive effect on imports (although relatively smaller), with a negative net effect on net exports. Moreover, looking at some of those G20 developing economies, Onaran and Galanis (2012) find similar evidence; however, the net impact on net exports is more substantial in these countries than in developed economies. Furthermore, although looking to the current account as a whole, Behringer and Van Treeck (2018), in a recent study for G7 economies and China, find that trends in the distribution of income, both in terms of personal income inequality and factor shares, can explain a substantial fraction of the current account imbalances observed in

[11] Furthermore, if we consider capital mobility (in special FDI flows), Blecker (2002, p. 142) argues that if increased wages lead to a reduction in profit margins, investment in the home country will become less attractive compared with investment in foreign countries, which may lead to lower domestic investment and, thus, even lower aggregate demand. We are leaving an empirical investigation of this important specific effect on domestic investment for future research - for which we invite readers to stay tuned.

recent periods (especially prior to the Great Recession). In summary, the authors find that increases in the top 1% and 5% income shares and the private sector wage share negatively impact on the current account balance. Applying system GMM methods to estimate structural models of demand and distribution (thus controlling for simultaneity bias) for the US economy, Blecker et al. (2020) find that rises in ULC definitely worsen net exports. However, decreases in firms' monopoly power have no negative impact on net exports.[12]

Meanwhile, the literature has been showing relatively little interest in non-price factors and in how functional distribution can affect exports and imports through them. In an early comment in that regard, Arestis and Driver (1987) argue that the composition of imports in consumer expenditure, in terms of the characteristics of the goods imported, compared to domestically produced consumer goods and services, may be influenced by income distribution. Francois and Kaplan (1996) examined that, given the existence of non-homothetic preferences, the more unequal the country (in terms of its personal income distribution), the greater its expenditure on luxury goods. More recently, Bohman and Nilsson (2006) and Dalgin et al. (2008) analyzed the implications of increasing income inequality for foreign trade, and reach similar conclusions when considering non-homothetic preferences.[13] On the other hand, considering homothetic preferences within a trade model framework with vertically differentiated products, Adam et al. (2012) present evidence that personal income inequality has a large influence on the demand for imports, with a positive influence for high-income countries and a negative one for low-income countries. In short, in countries that mostly produce and export high quality varieties of vertically differentiated products (developed economies), increases in income inequality tend to increase the import demand, whereas similar distributional changes tend to decrease the import demand of countries that produce and export low-quality varieties of vertically differentiated products (general developing country case). Following this interpretation, Katsimi and Moutos (2011) find evidence that increases in personal income inequality positively impacted on the import demand in the US for the period between 1948 and 2007.

[12]Note that both variations are positively related to the wage share; that is, they are different sources of distributional shifts towards workers. Thus, it is essential to consider those possibilities of wage share variations in further empirical-econometric and theoretical-formal studies.

[13]For a brief review of this literature, see Ribeiro et al. (2016).

Moreover, it can be argued (following some Latin American structuralists such as Furtado (1966, 1969)) that, especially in developing countries, wage workers have their consumption restricted to basic needs (or even subsistence consumption) due to low-income levels. This consumption is usually met by local production and, therefore, these workers do not consume imported goods. On the other hand, high-income classes (such as managerial or land-owning classes) spend a fraction of their consumption expenditure on foreign goods and, in particular, may import luxury goods in order to imitate the consumption pattern of developed countries' high-income classes - a possibility called "demonstration effect".[14] Thus, any income distribution variation in favor of high-income classes in these countries may be related to balance-of-payments difficulties (that is, a tightening of the external constraint).

Nevertheless, in developed economies, this rationale may not apply, given that workers tend to have a greater propensity to spend their marginal income on imported commodities. On this issue, Arestis and Driver (1987, p. 85) argue that the recipients of unearned income and the self-employed in these developed economies tend to spend more of their marginal income items such as land, second homes, art objects, and luxury services and, thus, most certainly spend less of their consumption expenditure on imports compared to low-wage and salary recipients. In fact, Arestis and Driver (1987), using data for the United Kingdom, find evidence that increases in wages and salaries relative to other sources of incomes have a positive and significant effect on imports. In a recent study, Stockhammer and Wildauer (2015) estimate, using panel data for 18 OECD countries, separate equations for exports and imports, including the wage share directly in both equations. Controlling for several factors, including the nominal effective exchange rate, they find evidence that variations in the wage share have a negative impact on exports and non-significant effects on imports.

In this context, two other questions arise: is this result regarding the effect the functional distribution of income on imports and exports observed for a wide range of developed countries and in more recent periods? Furthermore, is the effect in developing countries

[14] This effect is discussed in Duesenberry (1949) and was incorporated in the following decades into 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 Commission for Latin America and the Caribbean), as Tavares and Serra (1972). See Rodrıéguez (1993).

substantially different from that in developed economies? The apparent lack of answers to such questions indicates a gap in the literature, and one primarily related to an integrated treatment of price and non-price factors through which a change in the wage share can affect international trade flows.

In fact, a timely issue in need of empirical addressing is whether international trade flows are affected by both the level and the functional distribution of aggregate income. Given the prominent declining trend in national wage shares and such a noticeable gap in the literature, the main purpose of this paper is to empirically explore the impact of a change in the functional distribution of income on a specific component of aggregate demand, namely, imports. More precisely, this paper explores the potentially distinct effects of a change in the wage share on imports in two heterogeneous groups of countries: developed and developing ones.

# 3 Functional distribution of income and international trade

After presenting a brief analytical review of the literature and the purpose of this paper, let us focus our attention on developing a realistic accounting framework that highlights the role of the functional distribution of income in import and export functions widely used in the literature on international trade. For such a purpose, we draw upon the accounting structure presented in Dutt (2002), where it is assumed a general division of the world in two regions (the North and the South) that, in a simplified manner, represent, respectively, the two groups of countries analyzed in our empirical exercises: developed and developing ones.[15] It is worth mentioning that both groups of countries feature significant heterogeneity, which is even more prominent for developing countries. Nevertheless, to sharpen our analytical focus, we will deal solely with heterogeneity between groups.

[15] In fact, the accounting structure presented in this section is an extended version of the one set forth in Dutt (2002), in that we make fewer assumptions about the consumption and investment behavior of workers and capitalists in each region. This is in keeping with our purpose of deriving a reasonable reduced-form equation for the import demand to be submitted to empirical testing. In Dutt (2002), meanwhile, such an accounting structure composes only some of several building blocks of a fully specified and worked out dynamic macroeconomic model dealing with issues related to uneven development between the North and the South within a balance-of-payments-constrained growth framework.

### 3.1 Capitalists and workers behavior

In the North, capitalists save a fraction $s_N$ of their profit income and consume the remaining fraction, (1-$s_N$), while workers consume all of their wage income. Such an assumption that Northern workers as a class do no saving does not, of course, rule out the possibility that individual Northern workers might save. The assumption is that for Northern workers as a class, the saving of some of them is matched by the dissaving of others. Northern capitalists allocate a fraction $\alpha$ of their consumption expenditure to the Southern good and the remaining fraction, $(1-\alpha)$, to the Northern good. Furthermore, Northern capitalists allocate a fraction $\beta$ of their investment expenditure to the Southern good, and the remaining fraction, $(1-\beta)$, to the Northern good. The rationale is that Northern firms may use the Southern good as an intermediate product or as raw material for their output production. Northern workers allocate a fraction $\delta$ of their consumption expenditure to the Southern good, and the remaining fraction, $(1-\delta)$, to the Northern good. Therefore, we can determine the demand for the Southern good in the North (or the Northern import demand) as follows:

$$M_N = \alpha(1-s_N)\pi_N Y_N + \beta s_{\pi N}\pi_N Y_N + \delta\sigma_N Y_N \tag{2}$$

where $\pi_N$ is the profit share in the North, $\sigma_N$ is the wage share in the North, and $Y_N$ is the Northern domestic output or income.

In the South, capitalists save a fraction $s_S$ of their profit income and consume the remaining fraction, (1-$s_S$), devoting a fraction $\lambda$ of their consumption expenditure to the Northern good and $(1-\lambda)$ to the Southern one. Also, Southern capitalists allocate a fraction $\eta$ of their investment expenditure in the Northern good, and the remaining fraction, $(1-\eta)$, is allocated to the good produced domestically. We assume that Southern workers do not save and spend a fraction $\kappa$ of their wage income on the Northern good and the remaining fraction of it, $(1-\kappa)$, is spent on the Southern good. As in the case of our earlier assumption regarding the consumption behavior of Northern workers, such an assumption that Southern workers as a class do no saving either does not, of course, rule out the possibility that individual Southern workers might save. In fact, the assumption is that for Southern workers as a class, the saving of some is matched by others' dissaving. Therefore, we can determine the demand for the Northern good in the South (or the Southern import demand) as follows:

$$M_S = \lambda(1-s_S)\pi_S Y_S + \eta s_S\pi_S Y_S + \kappa\sigma_S Y_S \tag{3}$$

where $\pi_S$ and $\sigma_S$ are, respectively, the profit share and the wage share in the Southern region, and $Y_S$ is the Southern domestic output or income.

We assume a quite general specification for the fraction of the consumption expenditure of the Northern capitalists which is allocated to the Southern good:

$$\alpha = \alpha_0(\pi_N Y_N)^{\varepsilon_N - 1} P^{1-\mu_N} \tag{4}$$

where $\alpha_0 > 0$ is a constant, $\varepsilon_N > 0$ is the income elasticity of demand for imports in the Northern region, $\mu_N > 0$ is the absolute value of the price elasticity of demand for imports in the Northern region and $P = \frac{P_S E}{P_N}$ denote the terms of trade, where $P_i$ is the price level in region's i (with $i \in \{N, S\}$) and $E$ is the nominal exchange rate, which is defined as the price of the Northern currency in units of the Southern currency.

As argued in Dutt (2002), this formulation is compatible with a large variety of assumptions of price and income elasticities of the demand for the goods produced in both regions. For instance, if $\varepsilon_N = \mu_N = 1$, the shares of consumption expenditure allocated to the two goods are constant (and equal to the intercept $\alpha_0$ and $1 - \alpha_0$). If $\mu_N < 1$, the share of the Northern consumption expenditure on the Southern good rises when $P$ rises, despite the increase in the terms of trade, implying a price inelastic demand for the Southern good. If $\mu_N > 1$, we have a price elastic demand for the Southern good. Moreover, if $\varepsilon_N < 1$, an increase in the profit income of Northern capitalists results in a lower proportion of consumption expenditure being allocated to the Southern good, meaning that the Southern good is income inelastic, and conversely if $\varepsilon_N > 1$. It should be pointed out that such a share of consumption expenditure depends not only on the Northern income, but also on the functional composition of such an income: the functional distribution of income in the North. That said, note that, depending on the magnitude of $\varepsilon_N$, a rise in the Northern profit share will result in a higher ($\varepsilon_N > 1$) or lower ($\varepsilon_N < 1$) fraction $\alpha$, even if the Northern aggregate income remains constant.

We can define the other fractions of the expenditure of Northern capitalists and workers in a similar manner. Thus, the fraction of investment expenditure of Northern capitalists allocated to the Southern good is given by:

$$\beta = \beta_0(\pi_N Y_N)^{\varepsilon_N - 1} P^{1-\mu_N} \tag{5}$$

where $\beta_0 > 0$ is a constant. Note that, for the fraction $\beta$, the same elasticity analysis developed above (for the fraction $\alpha$) applies, as they share the same logic of determination.

Similarly, considering the consumption behavior of Northern workers, the fraction of their consumption expenditure that is allocated to the Southern good is given by:

$$\delta = \delta_0(\sigma_N Y_N)^{\varepsilon_N - 1} P^{1-\mu_N} \tag{6}$$

where $\delta_0 > 0$ is a constant and $\sigma_N Y_N$ is the flow of Northern income accruing to Northern workers. Therefore, the fraction of the consumption expenditure of Northern workers allocated to the Southern good depends both on the level and the functional distribution of the Northern aggregate income.

Similarly, the fraction of the consumption expenditure of the Southern capitalists allocated to the Northern good is specified as:

$$\lambda = \lambda_0(\pi_S Y_S)^{\varepsilon_S - 1}(1/P)^{1-\mu_S} \tag{7}$$

where $\lambda_0 > 0$ is a constant, $\varepsilon_S > 0$ is the income elasticity of demand for imports in the Southern region, $\mu_S > 0$ is the absolute value of the price elasticity of demand for imports in the Southern region, and $\pi_S Y_S$ is the flow of Southern income accruing to Southern capitalists as profits. Note that this fraction's definition also follows the general form proposed by Dutt (2002), which allows a variety of combinations of income as price elasticities. For instance, if $\varepsilon_S = \mu_S = 1$, the shares of consumption expenditure allocated to the two goods are constant. Moreover, if $\varepsilon_S < 1$, an increase in the profit income of Southern capitalists will result in a lower proportion of consumption expenditure being allocated to the Northern good, meaning that the Northern good is income inelastic, and conversely if $\varepsilon_S > 1$. Note that this fraction depends on both the level and the functional distribution of the Southern income. Moreover, if $\mu_S < 1$, the share of Southern consumption expenditure on the Northern good falls when $P$ rises, despite the increase in the terms of trade (which, *ceteris paribus*, represents a positive effect for the South), meaning a price inelastic demand for the Northern good. If $\mu_S > 1$, we have a price elastic demand for the Northern good.

We can specify the other expenditure fractions of Southern capitalists and workers in a similar manner. Thus, the fraction of the investment expenditure of the Southern capitalists

allocated to the Northern good is given by:

$$\eta = \eta_0(\pi_S Y_S)^{\varepsilon_S - 1}(1/P)^{1-\mu_S} \tag{8}$$

where $\eta_0 > 0$ is a constant. Note that, for the fraction $\eta$, the same elasticity analysis developed above for the fraction $\lambda$ applies, given that such fractions share the same logic of determination.

Similarly, the fraction of the consumption expenditure of Southern workers which is allocated to the Northern good is specified as:

$$\kappa = \kappa_0(\sigma_S Y_S)^{\varepsilon_S - 1}(1/P)^{1-\mu_S} \tag{9}$$

where $\kappa_0 > 0$ is a constant and $\sigma_S Y_S$ is the flow of Southern income accruing to workers as wages.

## 3.2 Import and export functions

Our earlier assumptions imply that the value of the Northern imports from the South (and therefore the Southern exports to the North) is given by:

$$P_S X_S = P_N(\alpha(1 - s_N)\pi_N Y_N + \beta s_N \pi_N Y_N + \delta \sigma_N Y_N) \tag{10}$$

which, using Equations (4), (5), and (6), can be written as:

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

where $\Theta_S = \pi_N^{\varepsilon_N}[\alpha_0(1 - s_N) + \beta_0 s_N] + \sigma_N^{\varepsilon_N}\delta_0$.

Meanwhile, the value of Southern imports from the North (and therefore the Northern exports to the South) is given by:

$$P_N X_N = P_S(\lambda(1 - s_S)\pi_S Y_S + \eta s_S \pi_S Y_S + \kappa \sigma_S Y_S) \tag{12}$$

which, using Equations (7), (8) and (9), can be written as:

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

where $\Theta_N = \pi_S^{\varepsilon_S}[\lambda_0(1 - s_S) + \eta_0 s_S] + \sigma_S^{\varepsilon_S}\kappa_0$.

Note that both import (and, consequently, export) functions in Equations (11) and (13) are quite similar to those typically used in balance-of-payments-constrained growth models (but not restricted to these models), following the Kaldor-Thirlwall tradition.[16] However, it should be highlighted that the "intercept" terms of these expressions, $\Theta_S$ and $\Theta_N$, depend on the functional distribution of income in both regions in addition to parameters. Thus, both import demand functions are determined by a quantity measure of income (or output) and a composition measure of the region's income, namely, the functional distribution of such an income.

That said, it is interesting to examine how variations in each one of the components of these import and export functions impact on the volume of trade between the regions. As usual, it is immediate to see that an increase in the Southern and Northern income positively impact on their respective import demand volume (the magnitude of these effects depends on the value of the region's income elasticity of import demand). Moreover, variations in the terms of trade or relative prices positively impact on the import demand in the Southern region and negatively impact on the volume of Northern imports.

Nevertheless, it is not direct to see how variations in the functional distribution of income, both in the North and the South, impact on the volume of import and export demand in both regions. First, if we look at the Northern imports, from Equation (11) we get:[17]

$$\frac{\partial \Theta_S}{\partial \sigma_N} = \varepsilon_N \left\{ \sigma_N^{\varepsilon_N - 1} \delta_0 - \pi_N^{\varepsilon_N - 1} [\alpha_0 (1 - s_N) + \beta_0 s_N] \right\} \tag{14}$$

Therefore, the sign of Equation (14) is ambiguous and depends on the relative size of the parameters $\delta_0$, $\alpha_0$, $\beta_0$, the propensity to save of Northern capitalists, and the wage share and profit share in the North. It should be noted that this ambiguity results from the consideration of several channels through which the functional distribution of income can impact on the importing behavior of the region. Strictly speaking, a positive feature of this accounting structure is that it embodies only a few theoretical assumptions, so that we can proceed with an agnostic approach regarding the net effect of a change in the functional distribution of income on the importing behavior of the regions until the empirical exercise

[16] For a general analytical view of the vast literature following the seminal contribution in Thirlwall (1979) see, for instance, Thirlwall (2012) and Setterfield (2012).

[17] Here we use the definition that $\pi_i = (1 - \sigma_i)$, with $i \in \{N, S\}$.

presents robust evidence.

Meanwhile, if we look at the Southern import demand, from Equation (13) we get:

$$\frac{\partial \Theta_N}{\partial \sigma_S} = \varepsilon_S \left\{ \sigma_S^{\varepsilon_S - 1} \kappa_0 - \pi_S^{\varepsilon_S - 1} [\lambda_0 (1 - s_S) + \eta_0 s_S] \right\} \tag{15}$$

Similarly to the Northern case, the sign of Equation (15) is ambiguous and depends on the relative size of the parameters $\kappa_0$, $\lambda_0$, $\eta_0$, the Southern capitalists' propensity to save, and the factor shares of income in the South.

Although these specifications for import demand functions are quite general and reasonable, there is a gap in the literature regarding the consideration of this income composition effect on international trade functions. New models for estimating trade flows have recently been developed, giving particular focus to different economic activity measures and the key role that accounting for distinct components of aggregate demand plays in understanding trade dynamics. Bussière et al. (2013) propose a new empirical model of international trade flows, based on an import intensity-adjusted measure of aggregate demand (henceforth, IAD), while standard empirical trade models typically use GDP (or domestic demand) as a measure of aggregate demand. The authors argue that there is a value-added in giving different weights to the GDP components, which typically have very different import intensities (their results suggest that the recent decline in developed countries imports was mainly caused by falls in investment and exports). Giansoldati and Gregori (2017) report the results of an econometric exercise that compares six alternative methods of computing the import demand functions and argue that the preferred models take into account the separate effects of each final demand component. Their results (based on a panel including developed and developing countries) show that private consumption exerts the most considerable effect in shaping imports. Furthermore, in another comparative exercise, Gregori and Giansoldati (2020) indicate that the most appropriate economic activity variable to assess import demand should encompass intermediate goods, as suggested by the recent literature on global supply chains.

Nevertheless, the consideration of different aggregate demand components is not accompanied by equal attention to the critical role that the functional distribution of income plays on such components, as discussed in Section 2.2. In short, the recent literature seems to have focused on one aspect of the composition of income (the disaggregation of aggregate demand

in several components), but not on a distinct and key facet of this composition highlighted in this section: the functional distribution of income.

After showing how this effect can actually be present in quite usual import functions, in our case in the "intercept", we will seek to fill this gap by estimating these import functions. We will explore whether, in fact, this composition effect is empirically observed, that is, whether the functional distribution of income is relevant to determine the import volume of a large sample of countries. Besides, as we can see in Equations (14) and (15), the sign of the relation between the functional distribution of income and the volume of imports (exports) is not clear, given that the signs of the partial derivatives are, *a priori*, ambiguous. Thus, we will also seek to examine what are the signs of these relations and analyze the possible implications of the results.

Having that in mind, in the next section, we will develop an econometric exercise to verify the empirical validity of those import functions and the sign of the relation between the functional distribution of income and import demand, as well as its implications for the North and the South, which in our case are, respectively, the developed and developing countries.

# 4 Imports and functional distribution of income

Having presented the motivating accounting structure of this paper, let us now proceed with the empirical analysis. In particular, this paper focuses on one feature directly derived from the accounting structure presented earlier. This paper explores an interesting and majorly unexplored channel to underlying the determinants of trade flows between countries: the functional distribution of income. As discussed earlier, the import and export functions derived from the simple accounting relations presented in this paper can be represented in a generalized way as in Equations (11) and (13), which are widely used in open macroeconomics models. Nevertheless, the "intercept" of both functions indicate that, in addition to an aggregate income level effect, there is also an income composition effect that should be considered. In the next subsection, we briefly discuss this relationship in light of the existing literature.

## 4.1 The role of the functional distribution of income

Initially, we will focus our attention on the role of the functional distribution of income in the import functions in developed and developing countries.[18] First, it is important to briefly present a theoretical framework that motivates and orientates this part of our empirical exercise. In the last sections of this paper, we presented an analytical review of the related literature, but it is worth highlighting and summarizing some of the arguments that are related to the two channels through which changes in the functional distribution of income may affect trade flows: the country's (or region's) price and non-price competitiveness.

One important literature that is intrinsically related to our empirical question is that of demand-led growth regimes, that is, the theoretical and empirical contributions 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 capitalists'), 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 unit labor costs), and so adversely affects investment and net exports. If this is the case, even if the economy has a wage-led growth regime, it might turn to a profit-led "overall" regime when considering the open economy effects. Nevertheless, Ribeiro et al. (2020, p. 3) discuss that there is an extensive 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 & Naastepad, 2011). That said, the overall effect of a rise in wages, or in our case, in the share of the national income received by workers, on price competitiveness in open economies appears to be an essential empirical question.

[18] It is important to say that, although it would be interesting to consider export functions as well, there are several limitations regarding data availability, especially for such a large sample of less developed and developing countries. For instance, it is not easy to compute a robust measure for the functional distribution of income of each of the countries' main trading partners in the sample. However, it is worth noting that the sample used in this econometric exercise is quite representative in terms of the percentage of global income and international trade, so that we can approximately interpret the demand for imports of one group of countries as the demand for exports of the other group.

Furthermore, there is another channel through which changes in the functional distribution of income may affect trade flows (as well as output growth): the country's non-price competitiveness. As presented in Ribeiro et al. (2020, p. 3), international trade can be greatly influenced by within-country income inequality, especially if one considers the impact of this inequality on consumption patterns.[19] On this point, Latin American structuralists claimed that high levels of income inequality in developing countries led to important differences in consumption patterns across classes: the upper classes, with surplus income, tend to imitate the consumption pattern of the 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 (Furtado, 1966, 1969; Tavares & Serra, 1972).[20]

The implications of this demonstration effect can also be analyzed within a balance-of-payments-constrained growth framework *à la* Kaldor-Thirlwall. If we consider that developing countries usually 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, whose consumption is greatly based on imports of luxury products and highly technological goods, with high income elasticities, the balance-of-payments constraint will tighten and thus the "feasible" long-run growth rate will be lower.

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 & Nilsson, 2006; Dalgin et al., 2008; Hummels & Lee, 2018).

[19] In fact, Behringer and Van Treeck (2018) find evidence that income inequality, regarding both the personal distribution of income and the factor shares, impacts on the current account balance of developed countries.

[20] However, the case seems to be the opposite of that in developed countries, as presented by Arestis and Driver (1987).

## 4.2 Methodology and data description

In order to capture the effects described in the accounting structure and, in particular, to verify the empirical validity of such results, we draw upon the substance of the general functions given by Equations (11) and (13) to present a simplified form for the import demand equation in which aggregate income matters in two dimensions: level and functional composition. In short, we are considering that to different functional forms of income correspond different patterns of demand for imports. This simplified form can be represented as follows:

$$\ln M_i = \psi_0 + \mu_i \ln P + \varepsilon_i \ln Y_i + \psi_1 \ln \sigma_i \tag{16}$$

where $i \in \{N, S\}$, $\psi_0$ is a constant, $\mu_i$ and $\varepsilon_i$ are respectively the price and income elasticity of import demand in region i (as in the accounting relations presented earlier) and $\psi_1$ is the coefficient associated with the functional distribution of income variable (which could be either positive or negative, depending on the combination of parameters for the region under consideration, as can be seen from the partial derivatives presented in Equations (14) and (15).

It is clear that Equation (16) already presents a possible way to estimate the relations that interest us in order to answer the question 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. 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 necessary change concerning the accounting structure presented earlier 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 developing countries. The choice of a lower level of aggregation is mainly due to the greater malleability of the estimates and the possibility of treating for the heterogeneous effects of different countries that compose each of the groups analyzed in this paper.

Furthermore, the empirical analysis carried out in this paper is based on a sample of several countries over several periods. More precisely, our sample consists of 124 countries (98 developing and 26 developed ones) and covers seventeen years, from 2001 to 2017 (see the list of countries in the sample and the description of the variables and its sources in

the Appendix). In order to not incur in potential problems with the treatment of a long panel, we built two-year time windows (using the average of the years treated) to determine each period. Thus, we deal with eight periods between 2001 and 2016 and another period represented by the year 2017 alone - so we are considering nine periods of time in our sample. For the econometric estimates, all the variables were transformed into natural logarithms.

Several variables can be used to explain import and export flows. To maintain this study consistent and comparable with the well-established empirical literature, we will consider some of the most commonly used variables in previous related studies. In general, we will use variables related to the real output, relative prices, and income distribution to estimate the import function. In particular, the variables of most significant interest in this exercise will be the imported volume (a clean measure of import flows); the real GDP, as a measure of output and income; the import unit price, as a measure of the relative price (complemented by control variables); and the wage share as a measure of the functional distribution of income. We chose to use the wage share to measure income inequality mainly due to its precise and direct relation to the accounting structure presented in this paper.

Besides, we will also consider as (control) 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, which is incorporated in order to capture supply-side effects, trying to consider a channel often omitted in the balance-of-payments constrained growth empirical literature as argued in Razmi (2016); 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 on import demand.[21] The list of control variables is constrained by the need to incorporate a sufficient number of potentially explanatory variables and to have a fair amount of developed and developing countries in our sample. The period considered was also chosen based on the same principle.[22]

[21] In regard to the government spending, Ribeiro et al. (2020) discuss 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 takes into account the importance of public investments in health, education, and security to promote economic development.

[22] For the complete description of variables and a synthetic table of descriptive statistics, see the Appendix. For further notes on Penn World Table variables computation, see Feenstra et al. (2015).

Moreover, in order to capture a persistence effect of past imports flows, we will include one or two lags of the import volume as independent variables (depending on the estimated model).[23] We chose this number of lags to be able to calculate long-term effects and at the same time to control for a certain persistence of the dependent variable of the model, without unnecessarily increasing the number of explanatory variables (and, therefore, of instruments in the GMM estimates). This way we will also be controlling for possible temporal heterogeneous effects related to the model's explanatory variables. That said, we propose a general specification of the form below:

$$\ln M_{i,t} = \beta_0 + \beta_1 \ln M_{i,t-1} + \beta_2 \ln \ln M_{i,t-2} + \beta_3 \ln P_{i,t} + \beta_4 \ln Y_{i,t} + \beta_5 \ln \sigma_{i,t} + \beta_6 X_{i,t} + \lambda_i + \delta_t + u_{i,t} \quad (17)$$

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

Before discussing the estimation strategy, it is worth pointing out that, in our econometric analysis, we will deal with three models that are represented by Equation (17). First, our baseline model will deal with a simplified version of the equation, in which we consider only a lag of the dependent variable and exclude the control variables from the estimation; that is, $\beta_2 = 0$ and $\beta_6 = 0$ in Equation (17). Then, we will include the set of control variables but remain with only one lag of the dependent variable (so, the only restriction in Equation (17) is $\beta_2 = 0$). Finally, we will deal with a complete model, in which we consider two lags of $M_i$ and the whole set of control variables available in our sample.

[23] In a analytical review of the literature, Goldstein and Khan (1985) indicate that most of the estimations for imports demand used from 1 to 3 lags of the variable.

## 4.3 Estimation strategy

In this subsection, we outline the econometric techniques used to estimate the general structure given by Equation (17). First, it is important to say that the import regression described 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, especially due to the regression's dynamic nature (Pesaran, 2015; Wooldridge, 2010). Furthermore, 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 deal with these problems following the dynamic estimations proposed by Arellano and Bond (1991) and 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 et al. (2020, p. 5) 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 compared to fixed-effects and first difference estimators. The estimator first designed 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 significant degree of persistence over time within a country, this implies that most of the variation of the variables 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 regressions in difference and in level. The regressions' instruments in the 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 these variables' difference presents no correlation with these country-specific effects.

In both cases, the validity of the the GMM estimators greatly depends on the exogeneity of the instruments of 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 indication that the instruments are not exogenous, and hence the GMM estimator is not consistent.

Furthermore, another critical test is the Arellano-Bond test for residual correlation in the first difference, called the AR(2) test. The test's null hypothesis 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 essential issue to be concerned about 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 the Hansen test. Roodman (2009a, 2009b) 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 reiterating that the estimations were carried out using nine periods of time, using two-year time windows for each period except for the last one, which only considers the year of 2017. 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 results of the estimations as well as their interpretation.

## 4.4 Results and implications

We present the estimations of Equation (17) for different groups of countries: developed, developing, 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).[24] These results are reported in Table 1.

| | Baseline model | | Intermediate model | | Complete model | |
|---|---|---|---|---|---|---|
| | Diff GMM | System GMM | Diff GMM | System GMM | Diff GMM | System GMM |
| Log of import volume, lag 1 | 0.218*** | 0.975*** | 0.335*** | 1.054*** | 0.191*** | 1.157*** |
| | (0.05) | (0.05) | (0.09) | (0.07) | (0.06) | (0.09) |
| Log of import volume, lag 2 | | | | | 0.037 | -0.109 |
| | | | | | (0.04) | (0.06) |
| Log of import price | -0.469*** | -0.181 | -1.138*** | -0.196 | -1.211*** | -0.042 |
| | (0.09) | (0.18) | (0.15) | (0.13) | (0.20) | (0.10) |
| Log of real GDP | 1.001*** | -0.018 | 0.820 | -0.084 | 0.625 | -0.056 |
| | (0.09) | (0.02) | (0.52) | (0.15) | (0.34) | (0.08) |
| Log of wage share | 0.719*** | -0.040 | 0.609*** | -0.515** | 0.755*** | -0.291 |
| | (0.08) | (0.20) | (0.15) | (0.18) | (0.20) | (0.20) |
| Constant | | | | | | -0.387 |
| | | | | | | (0.84) |
| Time-specific effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Control variables | No | No | Yes | Yes | Yes | Yes |
| Number of lags (instruments) | 4 | 4 | 2 | 2 | 2 | 2 |
| AR(2) test - p value | 0.020 | 0.285 | 0.142 | 0.239 | 0.003 | 0.073 |
| Hansen "J" test - p value | 0.036 | 0.201 | 0.096 | 0.266 | 0.008 | 0.314 |
| Instruments | 24 | 29 | 24 | 33 | 23 | 32 |
| Observations | 182 | 208 | 182 | 208 | 156 | 182 |
| Groups | 26 | 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

The first two columns show the results of both GMM estimations for the baseline model, considering only one lag of the dependent variable and without control variables. The third and fourth columns present the GMM estimations (that is, the difference GMM and the

[24] It is essential to emphasize that, in this paper, we consider all the other countries in the sample to be developing (both less developed countries (LDCs) and emerging ones).

system GMM, respectively) for the model that considers the set of control variables and one lag of the explained variable. The fifth and sixth columns present, respectively, the results of the GMM difference and system for the complete model, considering two lags of the import volume and the set of control variables.

Although the log of the wage share has a statistically significant positive effect on the import volume in all difference GMM estimations, when we consider the columns representing the system GMM estimations, the coefficients associated with the wage share are negative, but only statistically significant in the "intermediate" model. Notwithstanding, the system GMM estimations for the three models suffer from problems due to a large number of instruments (compared to the number of cross-section groups). This proliferation of instruments is directly related to a certain "misleading" result of the rejection of the null hypothesis of both AR(2) and Hansen tests in those estimations. Also, the coefficients associated with the log of real GDP and log of import unit price do not seem to be relevant, and the signs of the coefficients representing the income elasticity of imports are different from the expected ones. Moreover, the difference GMM estimations for the baseline and the complete model suffer from problems related to the non-rejection of the null hypothesis of the AR(2) and Hansen test (as shown by the associated p-values). These results indicate that both estimations are not correctly specified, and more lags of the explanatory variables are needed as instruments. In this case, the problem is that we have only a few developed countries and not that many periods, so that the number of instruments is already quite near the number of groups. Thus, these results do not seem to be sufficiently conclusive and statistically robust.

Nevertheless, the difference GMM estimation for the intermediate model does not suffer from the previously discussed problems. This result seems to be statistically robust: the number of instruments used in the estimation is lower than the number of cross-section groups, and we can reject the null hypothesis of both the AR(2) and Hansen tests. The positive sign of the coefficient associated with the wage share and its statistical significance indicates a very interesting result: an increase in the wage share tends to boost the volume of imports in developed countries. Recall from Equation (14) that there is an ambiguity regarding the sign of the respective partial derivative. This first empirical result suggests that the observed sign of this partial derivative is positive and, more specifically, that a 1% increase in the growth rate of the wage share is related, *ceteris paribus*, to a 0.6% increase

in the growth rate of the import volume in developed countries.

Meanwhile, this result partially contradicts the findings in Stockhammer and Wildauer (2015) for a panel of 18 OECD countries covering the period 1980-2013. However, this result is similar to the findings in Arestis and Driver (1987) for the United Kingdom (one of the developed countries in our sample). A possible explanation for this result is that an increase in the wage share in developed countries leaks abroad through the demand for imports, primarily through a mechanism of search for variety of consumption goods (a "love of variety" kind of argument[25]). This, in fact, seems to be the case in developed countries, especially if we consider that the mass of workers in these countries already has a consumption level higher than the subsistence one in the domestic market.

In short, the results associated with the group of developed countries still seem to be generally inconclusive. Some of the problems associated with these estimations might be solved by following another identification strategy, 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 an extended period of time). Nevertheless, although the general results are not conclusive mainly due to problems related to a limited number of observations, one of the difference GMM estimations appears to be statistically robust and presents relevant results regarding the effects of the functional distribution of income on the imports in developed countries.

Meanwhile, Table 2 reports the results for the group of developing countries. From Equation (15), there is also an ambiguity regarding the sign of this partial derivative. However, our empirical results indicate that an increase in the wage share has a negative impact on the volume of import demand in developing countries, as the coefficients associated with the log of wage share are negative and statistically significant for almost all estimations and models. We can interpret this result by looking at the parameters in Equation (15). It is reasonable to argue that capitalists in developing countries allocate a more significant share of their consumption expenditure to foreign goods than workers, especially if we consider that workers in such countries almost exhaust their disposable income to achieve subsistence

[25]This argument appears, for instance, in two influential international trade models set forth in Krugman (1979) and Krugman (1980).

| | Baseline model | | Intermediate model | | Complete model | |
|---|---|---|---|---|---|---|
| | Diff GMM | System GMM | Diff GMM | System GMM | Diff GMM | System GMM |
| Log of import volume, lag 1 | 0.232* | 0.980*** | 0.286*** | 0.849*** | 0.466*** | 0.922*** |
| | (0.09) | (0.06) | (0.06) | (0.06) | (0.05) | (0.09) |
| Log of import volume, lag 2 | | | | | -0.034 | -0.094 |
| | | | | | (0.02) | (0.08) |
| Log of import price | -0.500*** | -0.075 | -0.677*** | -0.162 | -0.424*** | -0.186 |
| | (0.15) | (0.06) | (0.14) | (0.12) | (0.11) | (0.12) |
| Log of real GDP | 1.046*** | -0.002 | 1.039*** | 0.012 | 0.745*** | 0.068 |
| | (0.29) | (0.05) | (0.23) | (0.10) | (0.17) | (0.12) |
| Log of wage share | -0.059 | -0.365* | -0.922*** | -0.574* | -0.379** | -0.520 |
| | (0.31) | (0.18) | (0.24) | (0.23) | (0.14) | (0.27) |
| Constant | | 0.382 | | | | 1.060 |
| | | (0.56) | | | | (1.26) |
| Time-specific effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Control variables | No | No | Yes | Yes | Yes | Yes |
| Number of lags (instruments) | 8 | 8 | 5 | 5 | 7 | 7 |
| AR(2) test - p value | 0.663 | 0.529 | 0.316 | 0.597 | 0.294 | 0.121 |
| Hansen "J" test - p value | 0.029 | 0.061 | 0.083 | 0.269 | 0.192 | 0.047 |
| Instruments | 36 | 41 | 48 | 57 | 63 | 72 |
| Observations | 686 | 784 | 686 | 784 | 588 | 686 |
| Groups | 98 | 98 | 98 | 98 | 98 | 98 |

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

Table 2: Estimations for developing countries

consumption. Furthermore, as capitalists in developing countries also allocate a fraction of their investment expenditure in goods produced in developed countries, it is immediate to infer that the sign of that partial derivative is negative.

Moreover, regarding the statistical validity of these results, note that the AR(2) test p-values indicate the non-rejection of the null hypothesis for all estimations; thus, the residual term is not serially correlated (second-order). However, the results for the Hansen test indicate that the estimations presented in the first and last columns of Table 2 (that is, the difference GMM estimation for the baseline model and the system GMM estimation for the complete model) show a problem with the joint validity of the instruments utilized, as the null hypothesis of the test is rejected at the 5% level of significance. This is not the case

for the other four estimations, as we cannot reject the Hansen test's null hypothesis and, in most cases, with associated p-values higher than 0.1. Therefore, the results presented in columns 2 to 5 of Table 2 are statistically robust.

Moreover, the coefficients associated with the log of real GDP and the log of import price have the expected signs for almost all of these four "robust" estimations, although not significant for both system GMM estimations. Thus, considering the two difference GMM estimations (given that these results, besides being statistically robust, also present general economic significance), growth rate of the the wage share is negatively related to the growth rate of the volume of imports in developing countries. For the intermediate (complete) model, the coefficient can be interpreted as follows: a 1% increase in the growth rate of the wage share has, all else constant, a negative 0.92% (0.38%) impact on the growth rate of the volume of imports. Therefore, the results presented so far have shown that the functional distribution of income (in addition to being an important variable to describe the import volume of countries) has different effects on the import volume in developed and developing countries.

Before discussing the implications of these results in more depth, let us look at the estimates for the entire sample, that is, for all the countries that compose our database. Table 3 presents these results. When we consider both developed and developing countries, the coefficients associated with the log of wage share have negative signs and are statistically significant for the estimations represented by columns 2 to 5 in Table 3. Thus, similar to the analysis of the developing countries, an income redistribution towards workers negatively impact on the volume of imports for the representative sample of countries considered in our database, although the magnitude of the coefficients is slightly smaller in this case. It is important to highlight that these results were somewhat expected, as our sample is mainly composed of developing countries and our earlier results indicated a positive impact of a rise in the wage share on the volume of imports in developed countries and a negative one in the group of developing countries.

Besides, the coefficients associated with the log of real GDP and the log of import price have the expected signs (except the system GMM for the baseline model), although they are not statistically significant in the system GMM estimations. Regarding the statistical validity of the regressions, we do not reject the null hypothesis of the AR(2) test for any of

| | Baseline model | | Intermediate model | | Complete model | |
|---|---|---|---|---|---|---|
| | Diff GMM | System GMM | Diff GMM | System GMM | Diff GMM | System GMM |
| Log of import volume, lag 1 | 0.174 | 0.966*** | 0.212** | 0.914*** | 0.366*** | 1.011*** |
| | (0.09) | (0.04) | (0.07) | (0.05) | (0.05) | (0.08) |
| Log of import volume, lag 2 | | | | | -0.015 | -0.113 |
| | | | | | (0.02) | (0.07) |
| Log of import price | -0.473*** | -0.123 | -0.591*** | -0.112 | -0.549*** | -0.177* |
| | (0.11) | (0.09) | (0.13) | (0.09) | (0.09) | (0.07) |
| Log of real GDP | 0.851*** | -0.014 | 1.254*** | 0.015 | 0.950*** | 0.073 |
| | (0.19) | (0.05) | (0.21) | (0.09) | (0.17) | (0.10) |
| Log of wage share | -0.131 | -0.420** | -0.850*** | -0.457* | -0.311* | -0.363 |
| | (0.28) | (0.15) | (0.22) | (0.19) | (0.15) | (0.22) |
| Constant | | | | | | 1.230 |
| | | | | | | (0.83) |
| Time-specific effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Control variables | No | No | Yes | Yes | Yes | Yes |
| Number of lags (instruments) | 8 | 8 | 5 | 5 | 7 | 7 |
| AR(2) test - p value | 0.637 | 0.490 | 0.354 | 0.583 | 0.360 | 0.116 |
| Hansen "J" test - p value | 0.011 | 0.003 | 0.054 | 0.072 | 0.059 | 0.012 |
| Instruments | 36 | 41 | 48 | 57 | 63 | 72 |
| Observations | 868 | 992 | 868 | 992 | 744 | 868 |
| Groups | 124 | 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

the estimations (with associated p-values always higher than 0.1), thus indicating that the residuals are not serially correlated. However, we reject the null hypothesis of the Hansen test for both GMM estimations of the baseline model and the system GMM estimation of the complete model, indicating that the instruments utilized in these regressions are not jointly valid. Therefore, similarly to the estimations solely with developing countries, Table 3 shows that both the intermediate and the complete model difference GMM estimations are the most statistically robust results. For the intermediate (complete) model, the coefficient can be interpreted as follows: a 1% increase in the growth rate of the wage share has, all else constant, a negative 0.85% (0.31%) impact on the growth rate of the volume of imports. Note again that the number of instruments was kept below the number of groups (and the same

as for the developing countries estimations), an indication that we may not incur problems of over-identification, which could "pollute" the J statistics.

Furthermore, it is worth noting that the coefficients of the regressions present a possible long-run interpretation: how changes in aggregate income, given its functional distribution, or in the wage share, given the level of aggregate income, impacts on the volume of imports over time depends, of course, on the autoregressive nature of the latter variable. With that in mind, let us first determine how these effects, named here as long-run effects, can be calculated from Equation (17). For instance, if one is interested in the long-run effect of a change in the wage share, $\zeta$, a simple way to calculate it is the following:[26]

$$\zeta = \frac{\beta_5}{1 - \beta_1 - \beta_2} \tag{18}$$

Thus, it is also interesting to calculate the long-run effects of changes in the functional distribution of income on the import volume. Table 4 presents the results for all the estimation methods. As expected, the long-run effects are more substantial than the short-run ones. Again, the results in the first line, referring to developed countries, are not generally conclusive, especially if we consider that only the difference GMM estimation for the intermediate model presents statistically robust results. Nevertheless, it is worth highlighting that our results regarding this group of countries are different from those found in Stockhammer and Wildauer (2015): that the coefficient associated with the wage share (and, in their case, with the first lag of the wage share) in the estimation of the import demand is statistically non-significant. Moreover, to some extent our results corroborate the findings in Arestis and Driver (1987) that a redistribution of income towards workers tend to increase the imports of advanced economies (in their case, only the United Kingdom). Furthermore, the results for developing countries and the entire sample are quite robust in statistical terms (especially columns 3 and 5 in Table 4) and relevant, and, when considering the possible long-run effects, the implications of omitting this distributional effect on the estimates of import functions are even more severe.

By way of conclusion, after presenting the results for both groups of countries and the entire sample, it now remains to discuss the theoretical and empirical implications of these

[26] Note that, in the models that we only consider one lag of the dependent variable, the long-run effect is given simply by $\frac{\beta_5}{1-\beta_1}$.

| | Baseline model | | Intermediate model | | Complete model | |
|---|---|---|---|---|---|---|
| | Diff GMM | System GMM | Diff GMM | System GMM | Diff GMM | System GMM |
| Developed | 0.919*** | -1.600 | 0.915*** | 9.474 | 0.977*** | 6.031 |
| | (0.102) | (9.753) | (0.162) | (11.544) | (0.218) | (7.224) |
| Developing | -0.076 | -18.034 | -1.291*** | -3.806 | -0.667** | -3.016 |
| | (0.411) | (52.239) | (0.376) | (2.313) | (0.258) | (1.888) |
| Entire sample | -0.159 | -12.490 | -1.079*** | -5.297 | -0.479* | -3.551 |
| | (0.344) | (12.716) | (0.309) | (3.384) | (0.236) | (2.244) |

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

Table 4: Long-run distributional effects

results and how they relate to the questions initially posed in this paper. First, the statistical significance of the coefficients associated with the functional distribution of income in the estimates for developed and developing countries shows that the non-inclusion of such a distributional measure represents the omission of a relevant variable and, therefore, raises some doubt about the consistency of the estimators. Moreover, the different results for the group of developed and developing countries indicate that a more detailed treatment should be given to structurally different countries, since changes in the functional distribution of income have different effects on the import demand function of each group.

Second, our results contribute to the ongoing empirical and theoretical discussions on the effect that changes in the functional income distribution have in the context of the price competitiveness of different economies, and more so in the case of developing countries (the results for which are more consistent, as mentioned earlier). Considering that increases in the wage share are positively related to increases in the unit labor cost, our results indicate that, although such a price effect may deteriorate the competitive conditions of domestic goods abroad (possibly reducing net exports), the effect of such a distributional variation on the volume of imports is negative. This implies that, depending on the relative strength of these effects, a rise in the wage share may, in fact, improve the country's trade balance and thereby alleviate the balance-of-payments constraint on output growth. However, the result may be the opposite in developed countries: the effect of an increase in the wage share on the volume of imports seem to operate in the same direction as the likely deterioration of the

competitive conditions of exports due to the higher unit labor costs, which would tighten the balance-of-payments constraint on output growth.

Third, the negative or positive effect that an increase in the wage share has on the volume of imports of different countries is likely to be directly related to a composition effect in the demand for foreign goods. In countries featuring higher levels of income inequality, an increase in the profit share in income (and thus a decrease in the wage share), in addition to increasing the volume of imports, tends to increase the import of more luxurious goods to the detriment of more necessity (basic) goods (which, incidentally, are mainly exported by developing countries). Another plausible explanation is that the propensity to import out of wage income tends to be lower than out of profit income. This is especially the case in many developing countries, where workers typically consume all their surplus income in meeting relatively more basic needs, so that a fall in the volume of imports (in addition to the composition effect) occurs in response to an increase in the profit share in income. In fact, this seems to be mostly the case for our group of developing countries. Nevertheless, this rationale may not apply (or may apply much less) to developed economies, where workers tend to have a greater propensity to spend their marginal income on imported commodities. Following Arestis and Driver (1987), our results for a larger sample of developed countries and considering recent periods indicate that this behavior seems to be observed, as the volume of imports in this group of countries varies positively with the wage share.

Finally, by showing the importance of the functional distribution of income for the determination of the volume of imports, this paper offers an empirical contribution that speaks to a considerable (and sometimes overlapping) literature on demand-led growth regimes in open economies, balance-of-payments-constrained growth, and the growth-enhancing potential of a competitive real exchange rate.[27]

For the first two themes, the analysis made so far already makes explicit the interrelation with such specific literature. Focusing on the issue of the growth-enhancing potential of a competitive real exchange rate, our results provide further evidence that the effects of currency undervaluation on income distribution should be taken into consideration in order to properly evaluate the costs and benefits of such a policy. The explanation is quite simple.

[27] On the issue of the growth-enhancing potential of a competitive real exchange rate, see, for instance, Rodrik (2008), Razmi et al. (2012) and Ribeiro et al. (2020).

Recall that a currency devaluation typically lowers the wage share, while we found that such a fall in the wage share has a statistically significant positive impact on the volume of imports in developing countries. Therefore, our results imply that a currency devaluation, despite possibly boosting exports, may ultimately tighten the balance-of-payments constraint on output growth in developing countries by raising their volume of imports.

All in all, the neglect of functional income distribution effects in import demand functions represents not only the omission of an empirically relevant variable. As theoretically elaborated by means of a macrodynamic model in Lima and Porcile (2013) and empirically corroborated in Ribeiro et al. (2020), this also corresponds to the omission of a theoretically significant channel through which the functional distribution of income affects output growth under conditions of balance-of-payments constraints and a competitive real exchange rate. Furthermore, the different effects that changes in wage shares have on the volume of imports in different groups of countries indicate that the structural specificities of developed and developing countries do matter for the macroeconomic implications of the recent global declining trend in national wage shares.

# 5 Concluding remarks

This paper provides an empirical contribution that speaks to a considerable (and sometimes overlapping) literature on demand-led growth regimes in open economies, balance-of-payments-constrained growth, and the role of a competitive real exchange rate in economic growth. In short, we find robust empirical evidence that an increase in the wage share has a statistically significant negative impact on the volume of imports in developing countries (and for the entire sample) and a statistically significant positive impact on the volume of imports in developed countries. By showing the importance of the functional distribution of income for the determination of the volume of imports, our results imply that the neglect of such income distribution effects in import demand functions represents the omission of both an empirically relevant variable and a theoretically significant channel through which the functional distribution of income affects output growth under conditions of balance-of-payments constraints and a competitive real exchange rate. Moreover, the different effects of a given change in the functional distribution of income on the volume of imports in different

groups of countries show that the structural specificities of (and structural heterogeneity across) developed and developing countries do matter for the macroeconomic implications of the recent global declining trend in national wage shares.

Finally, it is worth pointing out some promising follow-up possibilities opened up by our results, in both the theoretical-formal and the empirical-econometric dimensions. In fact, further empirical studies should be carried out with more developed countries, so as to obtain additional econometrically robust results which can be compared to those reported in this paper. Moreover, an interesting extension that stands out in both dimensions regards the implications of a change in the functional distribution of income in a balance-of-payments-constrained growth framework in the Kaldor-Thirlwall tradition, using the import and export functions straightforwardly derived in this paper from accounting relationships. In particular, given that the functional distribution of income has been changing dramatically in recent decades, it is timely to explore the role played by such changes in the determination of long-run economic growth associated with balance-of-payments equilibrium. Furthermore, it is essential to consider that the involved causality may also run in the opposite direction (that is, the fall in the wage share may be caused by slower growth due to the tightening of the external constraint), and the resulting implications in terms of the prospects for growth-enhancing policies in both developed and developing countries.

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# Appendix

| Variable | Definition | Source |
|---|---|---|
| Real GDP (rgdpna) | Real GDP at constant 2011 national prices (in million 2011 USD) | PWT 9.1 |
| Exchange Rate | Exchange rate, national currency/USD (market and estimated) | PWT 9.1 |
| Wage share | Share of labour compensation in GDP at current national prices | PWT 9.1 |
| Government spending (%GDP) | Share of government consumption at current PPPs | PWT 9.1 |
| Investment share (% GDP) | Share of gross capital formation at current PPPs | PWT 9.1 |
| Capital stock (rnna) | Capital stock at constant 2011 national prices (in million 2011 USD) | PWT 9.1 |
| PL_X | Price level of exports (price level of USA GDPo in 2011 = 1) | PWT 9.1 |
| PL_M | Price level of imports (price level of USA GDPo in 2011 = 1) | PWT 9.1 |
| 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 5: 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 6: 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 7: List of developing countries

| Variable | | Mean | Std. Dev. | Min | Max | Observations |
|---|---|---|---|---|---|---|
| Log of import volume | overall | 5.198951 | .5445626 | 2.805297 | 6.934744 | 1116 |
| | between | . | .4068561 | 3.824909 | 6.072995 | 124 |
| | within | . | .3636943 | 3.577109 | 6.321222 | 9 |
| Log of import unit price | overall | 4.893803 | .2813292 | 4.016017 | 6.070382 | 1116 |
| | between | . | .1882152 | 4.276662 | 5.645819 | 124 |
| | within | . | .2097384 | 3.869314 | 5.447408 | 9 |
| Log of real GDP | overall | 11.50054 | 2.0194 | 6.538409 | 16.75882 | 1116 |
| | between | . | 2.015008 | 6.643605 | 16.54247 | 124 |
| | within | . | .2203372 | 10.56138 | 12.1107 | 9 |
| Log of wage share | overall | -.7318605 | .2874918 | -2.004699 | -.2154216 | 1116 |
| | between | . | .2790317 | -1.704647 | -.2154216 | 124 |
| | within | . | .073376 | -1.356108 | -.4010686 | 9 |
| Log of exchange rate | overall | 2.592472 | 2.693221 | -1.973281 | 10.4111 | 1116 |
| | between | . | 2.690838 | -1.235829 | 9.427673 | 124 |
| | within | . | .2604067 | .6911919 | 8.062319 | 9 |
| Log of the terms of trade | overall | .380173 | .1189459 | -.4168094 | 1.62104 | 1116 |
| | between | . | .998709 | -.2435098 | .2830558 | 124 |
| | within | . | .0651895 | -.3228111 | 1.773649 | 9 |
| Log of investment share of GDP | overall | -1.523148 | .3923465 | -3.759232 | .7784234 | 1116 |
| | between | . | .3234929 | -2.559852 | -.8846853 | 124 |
| | within | . | .2237205 | -2.894968 | .513263 | 9 |
| Log of gov. cons. share of GDP | overall | -1.786669 | .368249 | -4.101109 | .864169 | 1116 |
| | between | . | .3237314 | -2.731814 | -1.051796 | 124 |
| | within | . | .1781771 | -3.222268 | .3563735 | 9 |

Table 8: Descriptive Statistics