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

JEL Codes: E25; F14; F43.

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1 Introduction

The last few decades have been marked by significant changes in the distribution of the social product, 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 & Saez, 2003), whereas the wage share in the social product 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 in public and policy circles and debates, 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, as noted in Atkinson et al. (2011) and Stockhammer (2017).

In an in-depth empirical analysis of the recent trajectory of the functional distribution of the social product in several countries, Stockhammer (2017) shows that the wage share (adjusted to exclude self-employment) has fallen in the advanced economies, on average, from around 73 percent in 1980 to 64 percent in 2007. These distributional changes 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, some of these countries have presented an entirely different path for the wage share, with distributional improvements for wage recipients - a phenomenon also associated with an improvement (on average) in the personal distribution of the social product.

The existing empirical literature regarding the effects of the functional distribution of the social product on aggregate demand follows either an aggregative approach, directly estimating the relation between capacity utilization and the wage share, or 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 (a rise in the profit share positively impacts on aggregate demand) and a profit-squeeze in distribution in the short run (Barbosa-Filho & Taylor, 2006; Carvalho & Rezai, 2016; Kiefer & Rada, 2014). The latter approach usually finds evidence of wage-led demand in large and relatively more closed economies, whilst the results for smaller and more open economies tend to indicate a profit-led demand regime (Hein & Vogel, 2007; Lavoie & Stockhammer, 2013; Onaran & Galanis, 2012; Onaran & Obst, 2016; Stockhammer et al., 2008; Stockhammer & Wildauer, 2015).

One of the main channels through which the functional distribution of the social product, in addition to the level of the social product itself, is likely to affect aggregate demand is the balance of trade. The existing evidence regarding such an additional relationship is mostly related to price competitiveness. In general, the results indicate that an increase in the wage share (or in the unit labor cost) negatively impact on the balance of trade (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 the functional distribution of the social product as a non-price factor affecting the balance of trade. With the notable possible exception of the Latin American structuralists (whose origins are described, for instance, in Boianovsky and Solís (2014) and Bresser-Pereira and Rugitsky (2017)) and Arestis and Driver (1987), the investigation of such an additional channel has been confined to the 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 highly timely issue in the political economy tradition in need of empirical addressing is whether and how international trade flows are affected not only by the level, but also by the functional distribution of the social product.

Given the prominent global declining trend in wage shares and such a noticeable gap in the related literature, this paper empirically explore the impact of a change in the functional distribution of the social product on a specific component of aggregate demand, namely, imports. The paper explores the potentially distinct effects of a change in the wage share on

the demand for imports in two groups of countries: developed and developing ones. Using dynamic panel techniques to estimate an extended version of a standard import function, we find robust evidence that a fall in the wage share has a statistically significant positive impact on the volume of imports in developing countries (and in the entire sample) and a negative impact on the volume of imports in developed countries. This evidence has a relevant implication: the neglect of such income distribution effects in import demand functions represents the omission of both an empirically relevant variable and a further theoretically significant channel through which the functional distribution of the social product affects output growth. It follows that the impact of the functional distribution of the social product on the demand for imports needs to be considered in growth empirics based on either a binding balance-of-payments constraint or a demand-led regime approach or a competitive real exchange rate. From an international political economy perspective, the different impacts 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 declining trend in wage shares.

The sequence of this paper is as follows. Section 2 offers a brief analytical review of the related literature, mapping out the potential macroeconomic implications of a fall in the wage share. In Section 3, we set forth an accounting structure showing that a standard specification of the import demand function can be amended to feature an income composition effect through the functional distribution of income in addition to the usual income level effect. Section 4 reports our estimations of the impact of the functional distribution of income on the importing behavior in developed and developing countries and discusses some implications for the related literature. Section 5 summarizes our main results and offers final comments.

2 Declining trend of the labor share: determinants and implications

Although this paper focuses on the functional distribution of income, there is a relationship between the functional and personal income distribution (Behringer & Van Treeck, 2018).

Atkinson (2009) and Bengtsson and Waldenström (2018) argue that the profit share and the personal income inequality tend to be positively correlated. 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 that an income transfer from labor to capital is very likely to increase inequality. 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.

As the relative constancy of the wage share in the longer run used to be seen as a stylized fact (as dubbed in Kaldor (1961)), the recent global trend of decline in wage shares has attracted a great deal of research attention. As recalled in Stockhammer (2017), the literature dealing with the determinants of such distributional changes falls into four relatively independent groups, although we identify a fifth determinant. First, there is the argument that technological change has become capital augmenting rather than labor augmenting since the 1980s and that average labor productivity may have grown faster than the real factor remuneration, so that wage shares have fallen (Stockhammer, 2017). Second, globalization is argued to benefit capital (and hence would be associated with a fall in the wage share) in developed and developing economies (IMF, 2007; Jayadev, 2007). Third, arguments regarding welfare state retrenchment are mainly related to the decline of unions and the bargaining power of labor (Stockhammer, 2017). Fourth, there is extensive evidence that financialization has contributed largely to the decline of the wage share, especially in developed economies (Kohler et al., 2019; Pariboni & Tridico, 2019; Stockhammer, 2017). Fifth, recent research indicates the major role of the increasing market concentration (especially in the US) in explaining the declining trend in the wage share (Autor et al., 2020; De Loecker & Eeckhout, 2018; De Loecker et al., 2020).

2.1 Macroeconomic implications

As intimated earlier, the literature on the effects of the functional distribution of income on aggregate demand is divided into studies following an aggregative approach and studies following a structural approach. Given that the main focus of our empirical investigation is on the potential impact of the functional distribution of the social product on the demand for

imports, we briefly discuss the literature dealing with the components of aggregate demand.

In stagnationist (Neo-)Kaleckian models, a rise in the wage share raises aggregate consumption and investment, resulting in higher capacity utilization and output growth (Dutt, 1984; Rowthorn, 1982). Yet, it is also possible an exhilarationist outcome, with an increase in the profit share, despite lowering aggregate consumption, boosting aggregate investment enough to raise output growth (Bhaduri & Marglin, 1990; Marglin & Bhaduri, 1990). Naastepad and Storm (2006) and Stockhammer et al. (2008) provide evidence supporting the positive (negative) effect of an increase in the wage share on aggregate consumption (investment) in developed countries (although the effect on investment is frequently small or even statistically non-significant). Considering some G-20 developing countries, Onaran and Galanis (2012) also find evidence that aggregate consumption (investment) is positively (negatively) affected by a rise in the wage share, but the latter effect seems to more than offset the former in most of those economies.

Several contributions have explored how international competition plays a key role in the effect of a change in the wage share on net exports as another component of aggregate demand (Bhaduri & Marglin, 1990; Blecker, 1989, 2016; Blecker et al., 2020). A usual argument is that a rise in real wages (or in unit labor costs) may harm the balance of trade. If increased nominal wages are, to some extent, passed through into higher goods prices, domestic production may become less competitive in international markets and the balance of trade may be negatively affected. Also, given that international competitive pressures may prevent firms from fully passing through such wage increases into higher prices, this would lead to a reduction in profit margins and hence in the variety (and quantity) of exported goods. In this case, even if the economy has a domestic wage-led growth regime, it may turn to a profit-led overall regime when considering open-economy effects.

The existing evidence on this issue is mostly related to price competitiveness, capturing the effect of a change in the wage share (or in the unit labor cost) through relative prices. Naastepad and Storm (2006) find that a rise in the profit share has a small positive effect on net exports in developed economies. Hein and Vogel (2007) find a strong positive effect of such a change in some developed countries, although they do not find a significant effect on other OECD economies. Stockhammer et al. (2008), Onaran and Galanis (2012) and Onaran and Obst (2016) find that, for developed countries, a rise in the wage share negatively impacts

on exports and positively impacts on imports (although this effect is relatively small and often statistically non-significant), having a negative net effect on net exports. Onaran and Galanis (2012) find similar evidence for the G-20 developing economies; however, the net impact on net exports is more substantial in such countries than in developed ones. Blecker et al. (2020) find that a rise in unit labor costs worsen net exports, while a fall in firms' monopoly power has no negative impact on net exports. Focusing on the current account as a whole, and using data for the G-7 economies and China, Behringer and Van Treeck (2018) 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 recent periods.

Much less empirical attention has been given to whether a change in the functional distribution of income has a separate impact on exports and imports. International trade can be influenced by within-country income inequality, especially if one considers the impact of this inequality on consumption patterns. In an early suggestive observation, 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 affected by income distribution. Francois and Kaplan (1996) show that, given the existence of non-homothetic preferences, the more unequal the personal income distribution, the greater the expenditure on luxury goods. Bohman and Nilsson (2006) and Dalgin et al. (2008) explore the implications of increasing income inequality for foreign trade, and reach similar conclusions when considering non-homothetic preferences.[1] Considering homothetic preferences within a trade model framework with vertically differentiated products, Adam et al. (2012) offer 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. Katsimi and Moutos (2011) find that increases in personal income inequality positively affected the import demand in the US in the 1948-2007 period.

Meanwhile, Latin American structuralists claimed that high levels of income inequality in developing countries lead to considerable differences in consumption patterns across classes. In these countries, low-wage earners often have their consumption restricted to basic needs (or even subsistence consumption). This consumption is usually met by local production,

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

and such workers do not typically consume imported goods. High-income classes (such as managerial or land-owning classes) spend a large fraction of their consumption expenditure on foreign goods and usually import luxury goods in order to imitate the consumption pattern of the high-income classes in developed countries (the so-called "demonstration effect"[2]), which would lead to a leakage of domestic savings to maintain the trade deficit, and hence to a slowing down in investment and output growth (Furtado, 1952, 1965; Tavares & Serra, 1972). The implications of this effect in a balance-of-payments-constrained growth framework *à la* Kaldor-Thirlwall are straightforward.[3] Developing countries usually export low value-added goods (from primary goods to low-tech goods) with low income elasticities. Considering that a large portion of the national income is detained by the upper classes, whose consumption is based a great deal on imports of luxury products and highly technological goods having high income elasticities, the implication is a tighter balance-of-payments constraint.

The same logic may not apply in developed countries, where workers tend to have a greater propensity to spend their marginal income on imported commodities. Arestis and Driver (1987, p. 85) suggestively argue that the recipients of unearned income and the self-employed in these developed economies tend to spend more of their marginal income on items such as land, second homes, art objects, and luxury services, and hence most certainly spend less of their consumption expenditure on imports compared to low-wage and salary recipients. Arestis and Driver (1987), using data for the UK, find that increases in wages and salaries relative to other sources of incomes have a positive and significant effect on imports. Stockhammer and Wildauer (2015) use data for 18 OECD countries to estimate separate equations for exports and imports featuring the wage share. Controlling for several factors, including the nominal effective exchange rate, they find that a rise in the wage share harms exports and has a non-significant impact on imports.

In this context, two issues bearing important political economy and policy implications require empirical addressing. First, does a change in the functional distribution (in addition

[2]This effect is discussed in Duesenberry (1949) and was later incorporated to the structuralist literature, especially in the writings of Celso Furtado (after an interesting series of debates with Ragnar Nurkse; see Nurkse (1951)) and other authors affiliated with UN-ECLAC (United Nations' Economic Commission for Latin America and the Caribbean), such as Tavares and Serra (1972).

[3]For an illuminating analytical review of the ample literature following the seminal contribution in Thirlwall (1979) see, for instance, Thirlwall (2012) and Thirlwall (2019).

to the level) of the social product has a separate and independent impact on imports and exports when a larger sample of countries and periods is considered? Second, does such a change in the functional distribution of the social product possibly impact on imports and exports differently across developed and developing countries? As the literature is lacking the empirical addressing of such issues, this paper is intended to partially fill such a gap.

3 Functional distribution of income and international trade

A realistic accounting framework can be used to demonstrate the role played by the functional distribution of the social product in an extended version of a standard specification of the import and export functions. We draw upon the accounting structure developed in Dutt (2002) assuming a division of the world economy in two regions (the North and the South). In a stylized way, such regions represent the two groups of countries featuring in our empirical exercise: developed and developing economies, respectively.[4] Admittedly, there is significant heterogeneity across countries in each group, especially in the group of developing countries. However, we sharpen our analytical focus by dealing only with inter-group differences in importing behavior.

3.1 Consumption and investment 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 key assumption is that for Northern workers as a class, the saving of some is matched by dissaving of others. Northern capitalists allocate a

[4]The accounting structure presented here is an extended version of the one outlined 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 demand for imports to be tested empirically. In Dutt (2002), such an accounting structure constitute one of several building blocks of a fully specified and worked out dynamic model dealing with issues related to uneven development between the North and the South within a balance-of-payments-constrained growth framework.

fraction α of their consumption expenditure and a fraction β of their investment expenditure to the Southern good and the remaining fractions, $1-\alpha$ and $1-\beta$, to the Northern good. The rationale is that Northern firms may use the Southern good as an intermediate good or raw material for their output production. Northern workers allocate a fraction δ of their consumption expenditure to the Southern good, and the remaining fraction, $1-\delta$, to the Northern good. Thus, aggregate demand for the Southern good in the North (or the Northern import demand) is given by:

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

where π_N is the profit share in the North, σ_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 λ of their consumption expenditure and a fraction η of their investment expenditure to the Northern good, and the remaining fractions, $1-\lambda$ and $1-\eta$ the good produced domestically. We assume that Southern workers do not save and spend a fraction κ of their wage income on the Northern good, with the remaining fraction, $1-\kappa$, being spent on the Southern good. Thus, aggregate demand for the Northern good in the South (or the Southern import demand) is given by:

$$M_S = \lambda(1-s_S)\pi_S Y_S + \eta s_S\pi_S Y_S + \kappa\sigma_S Y_S, \tag{2}$$

where π_S and σ_S are, respectively, the profit share and the wage share in the South, and Y_S is the Southern domestic output or income.

3.2 Import and export functions

As showed in Appendix A, the value of the Northern imports from the South, M_N, and hence the Southern exports to the North, X_S, is:

$$M_N = X_S = \Theta_S P^{-\mu_N} Y_N^{\varepsilon_N}, \tag{3}$$

where P denotes the terms of trade and $\Theta_S = \pi_N^{\varepsilon_N}[\alpha_0(1-s_N)+\beta_0 s_N] + \sigma_N^{\varepsilon_N}\delta_0$.

The value of Southern imports from the North, M_S, and hence the Northern exports to the South, X_N, is:

$$M_S = X_N = \Theta_N (1/P)^{-\mu_S} Y_S^{\varepsilon_S} \tag{4}$$

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 functions in (3) and (4) are quite similar to those typically used in (but are not restricted to) balance-of-payments-constrained growth models in the Kaldor-Thirlwall tradition. However, the intercept term of these expressions, Θ_S and Θ_N, depend on the functional distribution of the social product in both regions in addition to price and income elasticities and other parameters. Thus, such import demand functions feature both the level and the functional distribution of the social product in the region.

As showed in Appendix A, the impact of an exogenous change in the functional distribution of income on the respective demand for imports is ambiguous. This ambiguity results from our consideration of several channels through which the functional distribution of the social product can impact on the importing behavior. A positive feature of this realistic accounting structure is that it embodies only a few theoretical assumptions, so that we can proceed to the empirical analysis with an agnostic approach regarding the net effect of an exogenous change in the functional distribution of income on the respective importing behavior.

Although the multiplicative specification with constant price and income elasticities in (3) and (4) is quite standard, the empirical literature on international trade has been lacking the consideration of the composition effect represented by the functional distribution of the social product. New models for estimating trade flows have recently been developed, focusing on different economic activity measures and the key role that accounting for the 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, while standard empirical trade models typically use GDP (or domestic demand) as a measure of aggregate demand. The authors argue that it is necessary to attach 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 due to falls in investment and exports). Giansoldati and Gregori (2017) compare six alternative methods of computing the import demand functions and argue that the pre-

ferred models consider the separate effects of each final demand component. Their results show that private consumption exerts the most considerable effect in shaping imports. 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 has not been accompanied by equal attention to the key role that the functional distribution of the social product plays on the determination of such components. Such recent literature has been focusing on one aspect of the composition of income (the disaggregation of aggregate demand in several components), but not on the key facet underlined in this section: the functional distribution of income.

4 Imports and functional distribution of income

In order to capture the causal effects suggested in our motivating accounting structure, we draw upon the substance of the general specifications in (3) and (4) to define a simplified form for the import demand function.[5] Such a simplified specification features the two dimensions along which the social product matters for the aggregate importing behavior: its level and functional distribution.

We use a less aggregated specification as compared to our accounting structure to allow a feasible and econometrically robust analysis. Instead of specifying two regions including the whole world economy, we specify two groups of countries: developed and developing. The choice of a lower level of aggregation is mainly due to the greater malleability of the estimates and the possibility of properly treating for the heterogeneous effects of the different considered countries. Our sample consists of 124 countries (98 developing and 26

[5] Although it would certainly be interesting to empirically estimate the export demand function 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 far from trivial to compute a robust measure for the functional distribution of income of each of the main trading partners of the countries in the sample. However, the sample used in our econometric analysis 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.

developed ones) and covers the 2001-2017 period (see the list of countries in the sample and the description of the variables and its sources in Appendix B). In order to avoid potential problems associated with the use of a large panel, we built two-year time windows to define each period, so we considered eight periods between 2001 and 2016 and another period given by the year 2017 alone. As the number of countries is considerably larger than the number of periods, we initially discard any possible effects caused by the existence of unit roots.

Several variables can be used to explain imports and exports. For consistency and comparability with the well-established empirical literature, we considered the variables most commonly used in previous studies. The variables of most significant interest in our analysis are the imported volume (a clean measure of import flows); the real GDP, as a measure of the social product; 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 the social product (mainly due to its precise and direct relation to our motivating accounting structure).

We also considered 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 government consumption at current PPPs (% of real GDP), in order to incorporate further supply-side and institutional effects that may impact on import demand. The list of control variables is constrained by the need to incorporate a sufficient number of potential explanatory variables in addition to having a fair amount of developed and developing countries in the sample.[6] All the variables were transformed into natural logarithms.

In order to capture a persistence effect of past imports flows, we included one or two lags of the import volume as independent variables (depending on the estimated specification).[7]

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

[7] In an 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.

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 hence the number of instruments in the GMM estimates). This way we could also control for possible temporal heterogeneous effects related to the explanatory variables. We estimated the following specification:

$$\ln M_{i,t} = \beta_0 + \beta_1 \ln M_{i,t-1} + \beta_2 \ln \ln M_{i,t-2} + \beta_3 \ln P_{i,t} + \beta_4 \ln Y_{i,t} + \beta_5 \ln \sigma_{i,t} + \beta_6 X_{i,t} + \lambda_i + \delta_t + u_{i,t} \quad (5)$$

where β_0, β_1, β_2, β_3, β_4, β_5 and β_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 the import volume, which is considered an independent variable in the first and second lags, $\ln P_{i,t}$ denotes the log of the 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), λ_i represent an unobserved country-specific effect, δ_t is a period-specific effect, and $u_{i,t}$ is the error term.

We estimated three specifications derived from (5). First, our baseline specification considers a simplified version of (5), with only one lag of the dependent variable and excluding the control variables from the estimation; that is, $\beta_2 = 0$ and $\beta_6 = 0$ in (5). We then include the set of control variables but keep only one lag of the dependent variable (thus, the only restriction in (5) is $\beta_2 = 0$). Finally, we estimate a complete specification, in which we consider two lags of M_i and the whole set of control variables available in our sample.

4.1 Estimation strategy

The estimation of the specification in (5) poses numerous challenges due to the inclusion of both time and country-specific unobserved effects. The methods used to account for these specific effects, such as fixed-effects and first difference equations, tend not to be appropriate, especially due to the dynamic nature of the regression (Pesaran, 2015). Also, most of the independent variables used in our estimations tend to be endogenous to imports, so simultaneity must be properly controlled for. We treated almost all variables as endogenous, with only period dummies and the exchange rate as exogenous.[8]

[8]The literature using what Blecker et al. (2020) identify as the structural approach to demand-led growth regimes usually treats the wage share as exogenous, an assumption that could bring identification problems.

We circumvented such complications by following the dynamic estimations proposed by Arellano and Bond (1991) and Arellano and Bover (1995) and Blundell and Bond (1998), using the Generalized Method of Moments (GMM) to estimate the parameters of the specification in (5). These estimators are based on difference regressions and instruments to control for unobserved country and period-specific effects, also using 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 difference GMM represents an improvement over fixed-effects and first difference estimators. The estimator designed in Arellano and Bond (1991) seeks to eliminate country-specific effects and uses lagged observations of the independent variables as instruments. Yet, this technique has its disadvantages: if the variables of interest have a significant degree of persistence over time within a country, most of the variation of the variables is eliminated when the first differences are taken, so that the lagged observations of the independent variables tend to be weak instruments for the variables in difference. The system GMM is way of solving this problem. The estimators proposed in Arellano and Bover (1995) and Blundell and Bond (1998) create a system of regressions in difference and in level. The instruments used in the regressions in first difference are the same as in the difference GMM, whereas those used in the regression in level are the lagged differences of the independent variables.

In both techniques, the validity of the GMM estimators greatly depends on the exogeneity of the instruments used. This exogeneity can be tested with the commonly used Hansen test, analyzing its J statistics. The null hypothesis of this test implies the joint validity of the instruments. 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. Another key test is the Arellano-Bond test for residual correlation in the first difference, called the AR(2) test. The respective null hypothesis examines if the residual of the regression in first difference is second-order serially correlated. If the system of regressions is correctly specified, we

Skott (2017) rightly 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 Granger causality between capacity utilization and the wage share, so that an impact of output on the wage share should not be neglected.

should expect a first-order serial correlation in the residuals but not a second-order one. The rejection of the null hypothesis suggests that the instruments used are inappropriate, and higher-order lags of the instrumental variables are required.

The number of instruments used in the regressions is also a key concern. There is no standard recommendation in the literature, but 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 (2009) suggests that instruments should not outnumber the individual groups. We kept the number of instrumental variables close to the number of countries, choosing minimum lag orders of the endogenous variables and collapsing the instruments to prevent their proliferation.

4.2 Results and implications

We first estimated the import function for a group of developed countries (according to the IMF's definition - see the list of countries in Appendix B). The results are reported in Table 1. We considered all the other countries in the sample as developing ones.

The first two columns show the results of both GMM estimators for the baseline specification, considering only one lag of the dependent variable and without control variables. The third and fourth columns present the results of the GMM estimators for the intermediate specification that considers the set of control variables and one lag of the explained variable. The fifth and sixth columns show the estimation results of the complete specification, 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 specification. However, the system GMM estimations for the three specifications suffer from problems due to a large number of instruments (as 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 statistically

	Baseline specification		Intermediate specification		Complete specification	
	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	0.489	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

significant, and the signs of the coefficients representing the income elasticity of imports are different from the expected ones. Also, the difference GMM estimations for the baseline and the complete specifications suffer from problems related to the non-rejection of the null hypothesis of the AR(2) and Hansen test. These results indicate that both estimations are not correctly specified, and more lags of the explanatory variables are needed as instruments. 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 specification does not suffer from the previously discussed problems. This result is 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 means that a fall in the wage share reduces the volume of imports in developed countries. This first result implies that the observed sign of the respective partial derivative presented in Appendix A is positive, with a 1% fall in the growth rate of the wage share being associated, *ceteris paribus*, with a 0.61% decrease in the growth rate of the import volume in developed countries.

This result partially differs from the findings in Stockhammer and Wildauer (2015) for a panel of 18 OECD countries covering the period 1980-2013, but it is in line with the findings in Arestis and Driver (1987) for the UK (one of the developed countries in our sample). A possible explanation for this result (most likely in addition to others) is that an increase in the wage share in developed countries leaks abroad through the demand for imports, especially through a mechanism of search for variety of consumption goods (a "love of variety" kind of argument).[9] This can be the case in developed countries, especially if we take into account that most workers in such countries already have a consumption level higher than the basic one in the domestic market.

Table 2 reports the results for the group of developing countries. Our results indicate that a fall in the wage share has a positive impact on the volume of import demand in developing countries, since the coefficients associated with the log of wage share are negative and statistically significant for almost all estimations and specifications. We can tentatively interpret this result by looking at the parameters of the respective partial derivative calculated in Appendix A. It seems plausible to argue that capitalists in developing countries allocate a more significant share of their consumption expenditure to foreign goods than workers, especially if we take into account that a considerable proportion of workers in such countries still almost exhaust their disposable income to achieve basic or even subsistence consumption. Furthermore, capitalists in developing countries typically allocate a non-negligible proportion of their investment expenditure to goods produced in developed countries.

Regarding the statistical validity of all these results, note that the AR(2) test p-values indicate the non-rejection of the null hypothesis for all estimations, so that the residual term

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

	Baseline specification		Intermediate specification		Complete specification	
	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

is not (second-order) serially correlated. However, the Hansen test results indicate that the estimations presented in the first and last columns in Table 2 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 null hypothesis of the Hansen test and, in most cases, with the associated p-values being higher than 0.1. It follows that the results shown in the second to the fifth column in Table 2 are statistically robust.

The coefficients associated with the log of real GDP and the log of import price have the expected signs in almost all of these four robust estimations, although they are not statistically significant in both system GMM estimations. Based on the two difference GMM

estimations (given that the corresponding results, in addition to being statistically robust, also have general economic significance), the growth rate of the wage share can be seen as being negatively related to the volume of imports in developing countries. For the intermediate (complete) specification, the respective coefficient can be interpreted as follows: a 1% fall in the growth rate of the wage share has, all else constant, a positive 0.92% (0.38%) impact on the growth rate of the volume of imports. Thus, the impact of the functional distribution of income on the volume of imports differs across developed and developing countries.

Table 3 shows the results for the entire sample of countries. The coefficients associated with the log of wage share have negative signs and are statistically significant for the estimations reported in the second to the fifth column in Table 3. As in the sample of developing countries, a fall in the wage share positively impact on the volume of imports when the entire sample of countries is considered. However, as expected, the magnitude of such coefficients is slightly smaller when the estimation is carried out using the entire sample (recall that the latter consists of 98 developing and 26 developed countries).

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 specification), 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 the estimations, thus indicating that the residuals are not serially correlated. Yet, we reject the null hypothesis of the Hansen test for both GMM estimations of the baseline specification and the system GMM estimation of the complete specification, indicating that the instruments utilized in these regressions are not jointly valid. Similarly to the estimations only with developing countries, Table 3 shows that both the intermediate and the complete specification featuring difference GMM estimations yield the most statistically robust results. For the intermediate (complete) specification, the respective coefficient can be interpreted as follows: a 1% fall in the growth rate of the wage share has, all else constant, a positive 0.85% (0.31%) impact on the growth rate of the volume of imports.

Note that the coefficients of the regressions have a possible long-run interpretation: how a change 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. Per

	Baseline specification		Intermediate specification		Complete specification	
	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

(5), we can determine the long-run effect of a change in the wage share, ζ, as follows:

$$\zeta = \frac{\beta_5}{1 - \beta_1 - \beta_2} \tag{6}$$

Table 4 describes the results for the long-run effects of changes in the functional distribution of income on the import volume for all the estimation methods. As expected, the long-run effects are more substantial than the short-run ones. Again, the results reported 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 specification presents statistically robust results. Nevertheless, 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 tends to increase the imports in advanced economies (in their case, only the UK). Furthermore, the results for developing countries and the entire sample are quite robust in statistical terms (especially the third and fifth columns in Table 4). When considering possible long-run effects, the negative implications of omitting this distributional effect on estimates of import functions are even more severe.

	Baseline specification		Intermediate specification		Complete specification	
	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

Having described our results, we now discuss their main theoretical and empirical implications, especially regarding the research questions motivating this paper. First, the statistical significance of the coefficients associated with the functional distribution of the social product 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 corresponding estimators. Since a change in the functional distribution of income has a different effect on the import demand function in developed and developing countries, more detailed attention should be given to structurally different countries.

Second, our results contribute to the ongoing empirical and theoretical discussions on the effects of a change in the functional distribution of income in the context of the international price competitiveness (especially in the case of developing countries, for which our results are more robust). Given that a fall in the wage share is somehow related to a fall in the unit labor

cost, our results indicate that, although such a price effect may improve the competitiveness of domestic goods abroad (and hence raise exports), the respective change in the functional distribution of income results in a rise in the volume of imports. Depending on the relative strength of these effects, a fall in the wage share may deteriorate the balance of trade and thereby tighten the balance-of-payments constraint on output growth. The result may be the opposite in developed countries: the effect of a fall in the wage share on the volume of imports seems to operate in the same direction as the likely improvement of the price competitiveness of exports due to the lowering in unit labor costs, which would ultimately alleviate the balance-of-payments constraint on output growth.

Third, the negative or positive effect that a fall in the wage share has on the volume of imports of different countries is likely to be 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 (and thus a fall in the wage share), in addition to raising the volume of imports, is likely to increase the import of more luxurious goods to the detriment of more necessity (basic) goods (which are usually 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 likely to be especially the case in many developing countries, where workers typically consume all their possible surplus income in meeting relatively more basic needs so that a fall in the volume of imports (in addition to the composition effect just mentioned) occurs in response to an increase in the wage share. Nevertheless, this rationale may not apply (or may apply much less) to developed economies, where workers are more likely to have a greater propensity to spend their marginal income on imported goods, as suggested in Arestis and Driver (1987).

Finally, by showing the separate and independent influence of the functional distribution of income on the determination of the volume of imports, this paper offers an empirical contribution that speaks to an extensive and diverse (but sometimes overlapping) literature on demand-led growth regimes, balance-of-payments-constrained growth and the growth-enhancing potential of a competitive real exchange rate.[10]

As intimated in Section 2, empirical analyses of how output growth is affected by a change

[10]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).

in the wage share should take into consideration that not only consumption and investment as components of aggregate demand are possibly affected by such a change, but also net exports. Meanwhile, the empirics of balance-of-payments-constrained growth in the Kaldor-Thirlwall tradition should take into account that the demand for imports (exports) is possibly affected not only by the relative prices and domestic (world) income, but by the wage share in such an income as well. Hence, the dynamic version of the import (export) function typically used in empirical estimates of the balance-of-payments-constrained growth should feature the rates of growth of relative prices, domestic (world) income and wage share in such an income. As regards 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 the functional distribution of income should be considered when empirically estimating such a potential. Recall that currency devaluation often leads to a fall in the wage share, while we found that a fall in the wage share has a statistically significant positive impact on the volume of imports in developing countries. Therefore, our results suggest that currency devaluation, despite possibly raising exports, may ultimately tighten the balance-of-payments constraint on output growth in developing countries.

All in all, our cross-group results suggest that the separate and independent impact of the functional distribution of the social product on international trade flows should not be neglected in realistic growth empirics. Ultimately, whether and how imports and exports in a particular country are affected by the functional distribution of both its social product and its trading partners' social product is an empirical matter to be addressed with due recourse to historical and institutional analyses.

5 Conclusions

Following the political economy tradition, this paper explored the impact of the functional distribution of the social product on the demand for imports in developed and developing countries. Using an extended version of a standard specification of the import function, we found evidence that a fall in the wage share has a statistically significant positive (negative) impact on the volume of imports in developing (developed) countries and the entire sample of countries. Therefore, 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.

Another key implication of our results is that the impact of the functional distribution of the social product on the demand for imports should be considered in growth empirics based on either a binding balance-of-payments constraint in the Kaldor-Thirlwall tradition or a demand-led regime approach or a competitive real exchange rate. In either case, the neglect of such income distribution effects in import demand functions represents the omission of both an empirically relevant variable and a further theoretically significant channel through which the functional distribution of income affects output growth.

For instance, given that the functional distribution of income has changed dramatically in recent decades, it is timely to explore whether such a change has played a role in the determination of the long-run output growth associated with balance-of-payments equilibrium. In fact, it is essential to consider that such a possible causality may also run in the opposite direction, in that the fall in the wage share may have also been caused by slower growth due to a tightening of the external constraint.

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Appendix A

In the accounting structure presented in Section 3.1, we assume a general specification for the fraction of the consumption expenditure of the Northern capitalists which is allocated to the Southern good:

$$\alpha = \alpha_0(\pi_N Y_N)^{\varepsilon_N - 1} P^{1-\mu_N}, \tag{7}$$

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 α_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, and conversely if $\mu_N > 1$. 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 $\varepsilon_N > 1$. Note 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 the Northern social product. Depending on the magnitude of ε_N, a rise in the Northern profit share will result in a higher ($\varepsilon_N > 1$) or lower ($\varepsilon_N < 1$) fraction α, 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 way. The fraction of investment expenditure of Northern capitalists allocated to the Southern good is:

$$\beta = \beta_0(\pi_N Y_N)^{\varepsilon_N - 1} P^{1-\mu_N}, \tag{8}$$

where $\beta_0 > 0$ is a constant. Note that, for the fraction β, the same elasticity analysis developed above (for the fraction α) 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:

$$\delta = \delta_0(\sigma_N Y_N)^{\varepsilon_N - 1} P^{1-\mu_N}, \tag{9}$$

where $\delta_0 > 0$ is a constant and $\sigma_N Y_N$ is the flow of Northern income accruing to Northern workers. The fraction of the consumption expenditure of the Southern capitalists allocated to the Northern good is:

$$\lambda = \lambda_0(\pi_S Y_S)^{\varepsilon_S - 1}(1/P)^{1-\mu_S}, \tag{10}$$

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).

We can specify the other expenditure fractions of Southern capitalists and workers in a similar way. The fraction of the investment expenditure of the Southern capitalists allocated to the Northern good and the fraction of the consumption expenditure of Southern workers which is allocated to the Northern good are given, respectively, by:

$$\eta = \eta_0(\pi_S Y_S)^{\varepsilon_S - 1}(1/P)^{1-\mu_S}, \tag{11}$$

$$\kappa = \kappa_0(\sigma_S Y_S)^{\varepsilon_S - 1}(1/P)^{1-\mu_S}, \tag{12}$$

where $\eta_0 > 0$ and $\kappa_0 > 0$ are constants and $\sigma_S Y_S$ is the flow of Southern income accruing to workers.

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

$$P_S X_S = P_N(\alpha(1 - s_N)\pi_N Y_N + \beta s_N \pi_N Y_N + \delta \sigma_N Y_N), \tag{13}$$

which, using (7), (8), and (9), give us exactly (3). Similarly, the value of Southern imports from the North (and therefore the Northern exports to the South) is:

$$P_N X_N = P_S(\lambda(1 - s_S)\pi_S Y_S + \eta s_S \pi_S Y_S + \kappa \sigma_S Y_S), \tag{14}$$

from which, using (10), (11) and (12), we get the simplified version in (4).

Regarding the impacts of changes in the functional distribution of income on those trade functions, if we look at the Northern imports, from (3) we get:

$$\frac{\partial \Theta_S}{\partial \sigma_N} = \varepsilon_N \left\{ \sigma_N^{\varepsilon_N - 1} \delta_0 - \pi_N^{\varepsilon_N - 1} [\alpha_0 (1 - s_N) + \beta_0 s_N] \right\}. \tag{15}$$

Therefore, the sign of (15) is ambiguous and depends on the relative size of the parameters δ_0, α_0, β_0, the propensity to save of Northern capitalists, and the wage share and profit share in the North. For the Southern import demand, from (4) we get:

$$\frac{\partial \Theta_N}{\partial \sigma_S} = \varepsilon_S \left\{ \sigma_S^{\varepsilon_S - 1} \kappa_0 - \pi_S^{\varepsilon_S - 1} [\lambda_0 (1 - s_S) + \eta_0 s_S] \right\}. \tag{16}$$

Thus, the sign of (16) is also ambiguous and depends on the relative size of the parameters κ_0, λ_0, η_0, the Southern capitalists' propensity to save, and the factor shares of income in the South.

Appendix B

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