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RESEARCH ARTICLE

Import Dependence of Exports, Aggregate Demand and Income Distribution in the Turkish Economy: A Post-Keynesian Econometric Analysis

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Abstract

This study aims to investigate the impact of import dependence on exports on the relation between aggregate demand and functional distribution of income in the Turkish economy. To achieve this, the model proposed by Stockhammer, Hein, and Grafl (2011) was employed and applied to the Turkish economy throughout 1988-2019. The findings indicate that the demand regime was wage-led in Türkiye throughout the sample period, and the integration of import content of exports into the analysis renders the demand regime even slightly more wage-led. Subperiod analyses show that even though the negative effect of a higher labor share in total income on net exports has doubled in absolute value from the 1995-98 subperiod to the 2008-18 subperiod, the positive effect of a higher labor share on private consumption expenditures did not only counterbalance but exceeded it, while its negative effect on private investment remained relatively small and constant over the subperiods. Our findings also show that the integration of import content of exports into the analysis also rendered all the subperiods moderately more wage-led.

Keywords: *income distribution, aggregate demand, foreign trade, globalization, post-Keynesian economics*

Jel Codes: *E12, E20, E25, F41, F62*

Türkiye Ekonomisinde İhracatın İthalata Bağımlılığı, Bütünleşik Talep ve Gelir Dağılımı: Post-Keynesyen Ekonometrik Bir Analiz

Özet

Bu çalışmanın amacı, Türkiye ekonomisinde ihracatın ithalata bağımlılığının bütünleşik talep ve gelirin fonksiyonel dağılımı arasındaki ilişkiye olan etkisini araştırmaktır. Bu amaçla Stockhammer, Hein ve Grafl (2011) tarafından önerilen model kullanılmış ve 1988-2019 dönemi için Türkiye ekonomisine uygulanmıştır. Bulgular, Türkiye'de örneklem dönemi boyunca talep rejiminin ücret-çekişli olduğunu ve ihracatın ithalat içeriğinin analize dahil edilmesinin talep rejimini biraz daha ücret-çekişli hale getirdiğini göstermektedir. Alt dönem analizleri, toplam gelirdeki daha yüksek bir emek payının net ihracat üzerindeki olumsuz etkisinin 1995-98 alt döneminden 2008-18 alt dönemine kadar mutlak değer olarak iki katına çıkmasına rağmen özel tüketim harcamaları üzerindeki olumlu etkisinin onu dengelemekle kalmayıp aştığını, bununla birlikte özel yatırımlar üzerindeki olumsuz etkisinin alt dönemler boyunca nispeten küçük ve sabit kaldığını gösteriyor. Bulgularımız aynı zamanda ihracatın ithalat içeriğinin analize dahil edilmesinin bütün alt dönemleri bir miktar daha ücret-çekişli hale getirdiğini gösteriyor.

Anahtar kelimeler: *gelir dağılımı, toplam talep, dış ticaret, küreselleşme, post-Keynesyen iktisat*

Jel Kodu: *E12, E20, E25, F41, F62*

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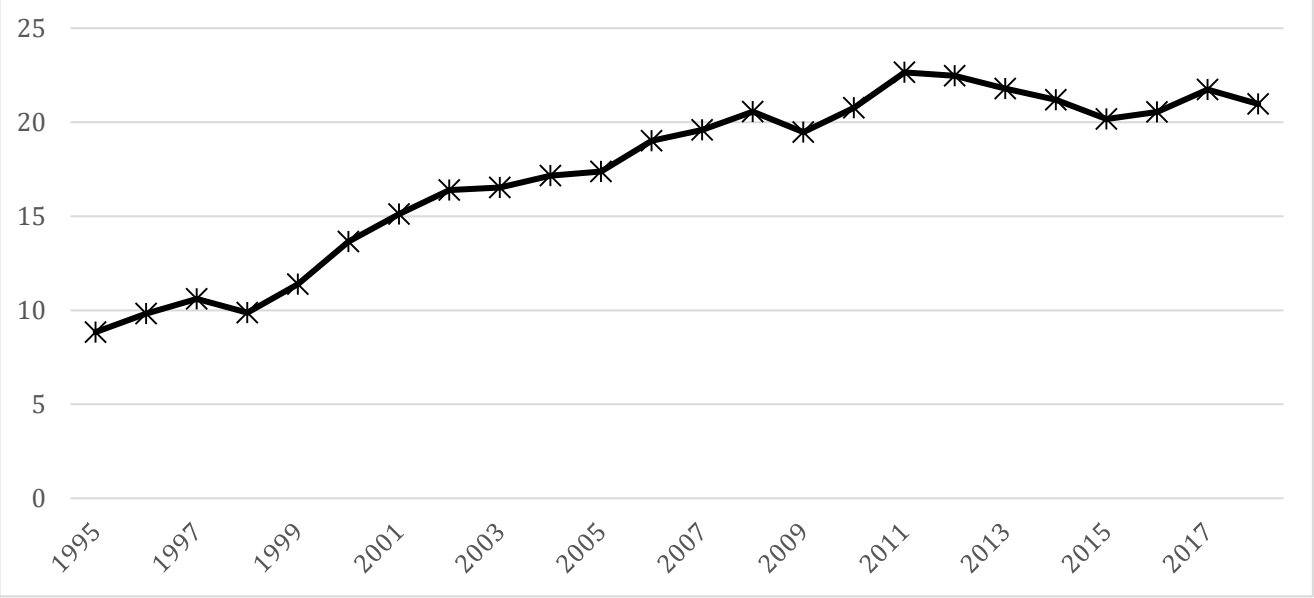
1. INTRODUCTION

The Turkish economy switched from import-substitution industrialization (ISI) to export orientation towards the end of the 1970s (Şenesen and Günlük-Şenesen, 2003:3) and an important economic policy shift took place after the 1980s.[2] This policy switch was an important component of the neoliberal economic agenda, which also consisted of the dismantling of organized labor and repression of wages over most of the past four decades. It included the liberalization of the capital account in 1989, privatization attempts in the 1990s, and their 'successful' implementation in the 2000s. During the second half of the 1990s, import liberalization was completed and direct price support for exports was terminated almost in the same period (Akkemik, 2012:173). A milestone in this period was Türkiye's inauspicious entrance to the European Customs Union in 1996. These policies led to a gradual structural change in the economy that resulted in a higher degree of dependence of the Turkish economy on foreign inputs. However, import dependency had already started to increase before 1980, contrary to common belief (Şenesen and Günlük-Şenesen, 2003:3).

The empirical literature on the (increasing) import dependency of Turkish exports is well-established (see Saygılı, Cihan, Yalçın, and Hamsici, 2010; Akkemik, 2012; Yükseler, 2019; among others). In a more recent study, Erduman, Eren, and Gül (2020) analyzed the import content of production and exports in Türkiye over the 2002-18 period using input-output data from 20 sectors. They found that the dependency of production on imports remained stable throughout analysis while that of exports on imports increased in the same period. OECD (2021) also confirmed the latter result (see Figure 1).

Figure 1: Imports Content of Exports, as a percentage of Exports in Türkiye over 1995-2018



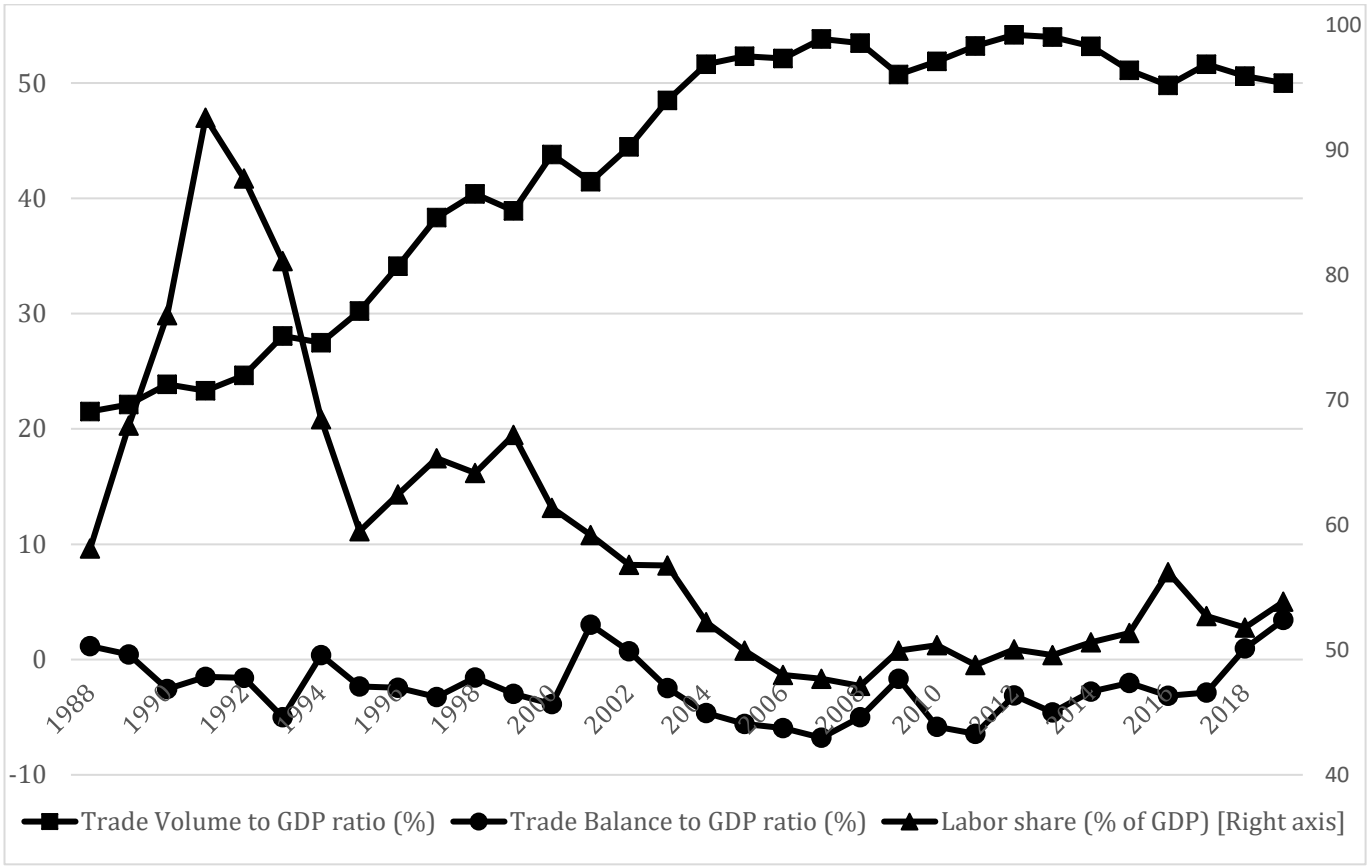
Source: OECD (2021) Input-Output Tables

The increasing dependence of Turkish exports on imports was accompanied by an increasing foreign trade volume, chronic trade deficits that only temporarily and partially disappeared during recessions or crises, and a decreasing labor share in national income (See Figure 2).

While neoclassical models view wages merely as costs of production, those based on a post-Keynesian theoretical perspective consider them also a source of demand. In the latter types of

[2] See Akçay and Türel (2022) for a review of Türkiye's ISI and planning experience over the 1960-80 period.

Figure 2: Trade Volume, Trade Balance and Labor Share in the Turkish Economy over 1988-2019



Source: AMECO and World Bank

models, a higher labor income share brings about an increase in aggregate demand (and also aggregate output/income) under a *wage-led* demand regime, while under a *profit-led* demand regime, the opposite occurs. The seminal study that led to the emergence of the massive theoretical and empirical literature on the characterization of demand and other types of regimes was by Bhaduri and Marglin (1990). Their model has been developed in several directions during the last three decades.[3] In our empirical analysis, we adopted the model by Stockhammer, Hein, and Grafl (2011), whose contribution to this literature is the integration of global effects via import content of exports into the post-Keynesian framework. This integration allows for the analysis of its impact on the relationship between growth and functional distribution of income.

There exists a rich empirical literature that examined the Turkish economy from a post-Keynesian perspective.[4] Among those, Onaran and Galanis (2014) examined the demand regimes of a subgroup of G20 economies including Türkiye by a model that integrated global interactions among economies through effects of variations in functional income distribution at the global scale via import prices and foreign demand. Kurt (2020), employing the model by Hein and Tarassow (2010), examined Türkiye's demand and overall regimes, the latter being a regime augmented by endogenous productivity growth. Mutlugün (2022) examined the Turkish economy along with 9 other countries through a model that endogenizes profit share and productivity growth along with capital

[3] Hein (2017) summarizes these theoretical developments and main contributions.

[4] See Kurt (2023) for a detailed survey and assessment of empirical post-Keynesian studies on the demand regime of Türkiye.

accumulation and capacity utilization. Kurt (2022), employing the model by Stockhammer and Wildauer (2016), analyzed the Turkish demand regime taking into consideration the effects of debt stocks of firms and households and measures of personal income distribution on aggregate demand.

Following the theoretical and empirical model by Stockhammer et al. (2011), the contribution of the current empirical study is the integration of the import content of Turkish exports in the characterization of the demand regime of Türkiye. The paper is structured as follows: Section 2 presents the theoretical model, while Section 3 reviews empirical post-Keynesian studies with a focus on the applications to the Turkish economy. In Section 4 we present the data, sources, and the econometric approach employed. Section 5 reports econometric findings and synthesizes them. Finally, Section 6 provides the concluding remarks.

2. THEORETICAL FRAMEWORK

This section presents Stockhammer et al.'s (2011) model, which is built on the seminal theoretical contribution of Bhaduri and Marglin (1990). The two main equations of the model are the following:

$$Y = AD \equiv C(Y, WS) + I(Y, WS, z_I) + NX(Y, P, z_{NX}) \quad (1)$$

$$P = f(WS, z_P) \quad (2)$$

where Y is aggregate income/output, AD aggregate demand, WS wage share[5], C private consumption, I gross private domestic investment, NX net exports, z_i are some other control variables for the variables i and P domestic price level. Government expenditures are excluded from the model and the empirical investigation. The analysis is based on the assumption that there exists an equilibrium between the aggregate demand and the aggregate income/output at each period.

In this model, the classical Keynesian consumption function, which is a function of aggregate income/output, is augmented by distinguishing between labor and capital incomes. It is based on the Kaleckian premise that the marginal consumption propensity (and also elasticity) of labor income exceeds that of capital income. Conversely stated, the saving propensity (and also elasticity) of labor income is lower than that of capital income. This implies that all else being equal, a higher labor share causes a higher level of consumption.

The typical Keynesian private investment function, which is a function of aggregate income/output and interest rates, is also augmented by the inclusion of functional income distribution. In Stockhammer et al.'s (2011) model, it is a function of aggregate output, long-run interest rate,[6] and labor share. An increase in interest rates and labor share leads to a lower level of profits, thus discouraging investments, while a higher level of aggregate output boosts investment.

Net exports depend positively on foreign demand and negatively on domestic aggregate demand and domestic prices. The latter is a function of import prices P_m and nominal unit labor costs ULC, which is equal to the product of real unit labor costs $RULC$ and P. Since $RULC$ and WS are equivalent, the domestic price equation also takes into account the effects of exogenous variations in WS (or $RULC$)

[5] *Wage share* and *labor share* correspond to different measures. The former is equal to the latter in an economy where there are no self-employed individuals. However, to calculate the labor share in a real economy, the wage share is adjusted by making some assumptions on the income of the self-employed. We use these two terms interchangeably throughout the text.

[6] The interest rate is usually found to be insignificant in empirical studies. We dropped this variable due to this reason and also because no systematic series of annual interest rates are available for the Turkish economy.

on it.[7] An increase in the labor share increases unit labor costs and this, in turn, rises both domestic and export prices. Consequently, an increase in the labor share is supposed to have a negative impact on net exports. Separate equations are estimated for exports and imports in the econometric analysis. Exports are a function of foreign demand Y_f and the ratio of exports to imports prices P_x/P_m. Employing this ratio implies that exported goods and services are substitutable with imported ones, or vice versa. Imports depend on Y and P_x/P_m.

Differentiation of Eq. (1) with respect to WS and collection of the terms gives the following:

$$\frac{dY^*}{dWS} = \frac{h_2}{1-h_1} \tag{3}$$

where $h_1 = \left(\frac{\partial C}{\partial Y} + \frac{\partial I}{\partial Y} + \frac{\partial NX}{\partial Y}\right)$ or $\left(\frac{\partial C}{\partial Y} + \frac{\partial I}{\partial Y} - \frac{\partial M}{\partial Y}\right)$ and $h_2 = \left(\frac{\partial C}{\partial WS} + \frac{\partial I}{\partial WS} + \frac{\partial NX}{\partial P}\frac{\partial P}{\partial WS}\right)$ or $\left(\frac{\partial C}{\partial WS} + \frac{\partial I}{\partial WS} + \frac{\partial NX}{\partial WS}\right)$

The denominator of the expression at Eq. (3) must be positive for *Keynesian stability* (Hein, Lavoie, and van Treeck, 2011:589-593). In the literature h_2 is called *private excess demand* and it reflects the total change in components of aggregate demand due to a change in labor share at a given aggregate income/output level. Based on the assumptions of the model, it is hypothesized that $\partial C/\partial WS>0$, $\partial I/\partial WS<0$ and $\partial NX/\partial WS<0$, thus the sign of h_2 is not known before the empirical analysis. If this expression is negative(positive) in a given period, the demand regime is *profit-led* (*wage-led*).

The model by Stockhammer et al. (2011) is quite similar to that of Stockhammer, Onaran, and Ederer (2009). However, the contribution of the former lies in its treatment of the relationship between exports and imports. The former took into account the dependence of exports on imports, which has been rising due to the globalization of production. This is captured by the last term of the expression below:

$$\frac{\partial NX}{\partial WS} = \frac{\partial X}{\partial P}\frac{\partial P}{\partial WS} - \frac{\partial M}{\partial P}\frac{\partial P}{\partial WS} - \frac{\partial M}{\partial X}\frac{\partial X}{\partial P}\frac{\partial P}{\partial WS} \tag{4}$$

The inclusion of this term implies that the changes in the net exports are not merely dependent on the labor share but also on the (exogenous) import content of exports, which is proxied by the term $\partial M/\partial X$. This term catches the effect of an all-else-equal increase in exports on imports. The impact of the magnitude of this term on the character of the demand regime of an economy attracts attention. If the import content of exports is zero, the model boils down to that of Stockhammer et al. (2009). If it is 100%, which is the maximum limit for the import content of exports by definition, this implies that imports are re-exported without new value-added, which is not economically plausible. Excluding these two extreme cases, all else being equal, an increase (decrease) in the import content of exports is more likely to generate a wage-led (profit-led) demand regime by dampening (heightening) the negative effect of wages on net exports, and thus increasing (decreasing) the private excess demand h_2.

3. REVIEW OF EMPIRICAL LITERATURE

The empirical literature on post-Keynesian models of growth and income distribution is well-developed. This vast literature can be analyzed in at least three categories with respect to the methodologies employed: single equations approach, systems approach, and panel studies.

The first category of studies is based on the estimation of separate equations for each aggregate demand component. Some of these studies, as in that of Stockhammer et al. (2009, 2011), are accompanied by domestic and exports prices equations. In augmented models, they are accompanied

[7] The exogeneity of functional income distribution and its measures are questionable. In the literature, in some rare studies such as those of Blecker, Cauvel, and Kim (2022), they are endogenized using different instruments, but these are not systematically available for the Turkish economy.

by an equation for productivity growth, as in that of Hein and Tarassow (2010). Bowles and Boyer's (1995) empirical study on five developed capitalist economies is the first one that employed this approach. A second wave of empirical research began in the second half of the 2000s and the number of these studies significantly grew after the 2008-2009 global economic and financial crisis. Empirical studies were also extended from developed emerging/developing economies. The majority of these empirical investigations focused on the determination of demand regime(s) of a single or a group of countries. However, more complex overall regimes that take into account accumulation and productivity are also addressed, as by Kurt (2020, 2021) based on Hein and Tarassow (2010). The partial effects of the labor share (or profit share) on each GDP component are determined and summed to characterize the demand regime of an economy. The overwhelming majority of these studies assume that the functional distribution of income is exogenous.

Another group of studies adopts a systems approach employing Vector Autoregression (VAR) models or their variants. This method is flexible for modeling since past values of all variables in a model can be allowed to determine the present values of others. This method also takes into account interactions among variables by tracing the effects of innovation on a variable through the system. However, it should be mentioned that the response of a variable to an innovation is quite different from partial derivates that are calculated using the single equation approach discussed above. The drawbacks of this approach are that the number of variables that can be analyzed within the system is limited due to rapidly declining degrees of freedom and that it does not distinguish between total and partial effects (Stockhammer and Onaran, 2004:429-430). A group of hypotheses on demand, capital accumulation, productivity growth, and (un)employment are tested in these studies. Onaran and Stockhammer (2005) analyzed Türkiye and South Korea using this approach. In this study, the terms *stagnationist* and *exhilarationist* are used to characterize the demand regime, while *wage-led* and *profit-led* are used for the accumulation and employment regimes. According to the authors' findings and conceptions, the demand regime in Türkiye was found to be stagnationist in the short term, and the accumulation regime and employment regime were found to be wage-led.

The last category is panel econometric studies. Demand or productivity regimes of a panel of countries are estimated in these studies. Hartwig (2014), based on Naastepad's (2006) model, analyzed 34 OECD countries, while Stockhammer and Wildauer (2016) examined a panel of OECD countries using a more advanced model augmented by debt, personal income, and wealth inequality variables. For the average hypothetical OECD country, both authors found that the demand regime is wage-led and in the former study, productivity is also found to be so. Not all multi-country studies, however, fall into this category. The empirical studies by Onaran and Galanis (2014) and Onaran and Obst (2016) employed the single equation approach to study a group of G20 countries and EU15 countries, respectively. These studies took into account international interactions through trade channels among countries and found world and EU demands to be wage-led. Furthermore, in these studies countries that were identified to be profit-led in isolation turned less profit-led or even wage-led when these channels were integrated into the analysis. In the former study, the demand regime of Türkiye turned out to be wage-led and the integration of global effects rendered it even more wage-led.

4. DATA AND ECONOMETRIC APPROACH

We present the data and the econometric approach adopted in our empirical analysis in this section. We compiled data from AMECO (Annual macro-economic database of the European Commission's Directorate General for Economic and Financial Affairs), OECD (Organisation for Economic Co-operation and Development), and World Bank to construct some of the time series and conduct our econometric analyses. Table 1 presents data definitions and sources.

Table 1: Data Definitions and Sources

Symbol	Definition and Notes	Source
Y	GDP (in constant 2015 US dollars)	World Bank
Inv	Gross fixed capital formation (in constant 2015 US dollars)	World Bank
C	Final consumption expenditures of households and NPISHs (in constant 2015 US dollars)	World Bank
X	Total exports (in constant 2015 US dollars)	World Bank
M	Total imports (in constant 2015 US dollars)	World Bank
WS	Adjusted wage share (labor share) as a percentage of GDP at current factor cost. Equivalent to RULC (Real Unit Labor Costs).	AMECO
W	Total labor income. Calculated by multiplying Y by WS.	World Bank and AMECO
R	Total capital income. Calculated by subtracting W from Y.	World Bank and AMECO
Y_f	World Imports (in constant 2015 US$ dollars). Calculated by subtracting Turkish imports from global imports.	World Bank
P	Price deflator for GDP (2015=100)	AMECO
P_x	Price deflator for exported goods and services (2015=100)	AMECO
P_m	Price deflator for imported goods and services (2015=100)	AMECO
P_x/P_m	The ratio of P_x *to* P_m (2015=1)	AMECO
ULC	Unit Labor Costs. Equal to the product of WS and P.	World Bank and AMECO
$\boldsymbol{\partial M/\partial X}$	Import content of exports	OECD

Note: All the data are retrieved from AMECO, OECD, and World Bank in September 2022.

Our estimation period is limited to the 1988-2019 period due to two reasons. First, the labor share series prior to 1988 are not available for all sectors, i.e., agriculture, services, and industry, in Türkiye. Second, the import content of the exports series is only available for the 1995-2018 period. Since starting the sample period in 1995 would have significantly reduced the number of observations, our sample starts from 1988. We also included the year 2019 in order to gain additional observation; however, we excluded the post-COVID period. The summary statistics of the data are tabulated in Table 2.

Table 2: Summary Statistics of the Variables (1988-2019)

Variable	Mean	Standard Deviation	Minimum	Maximum
C	333969069131	130193485898	168223352514	582037029022
Inv	131502312024	79072485900	43741411678	282633532189
X	117755418117	71876039088	29817327910	266451160373
M	131530108495	76820695359	26796221418	261558695966
Y	538161123725	230374439555	263489521766	997437115406
WS (%)	59.25	11.77	47.12	92.60
W	302240394449	101906486717	153146760526	537317044056
R	235920729276	137344313207	21507066628	476566576823
Y_f	13508552931958	5882859818158	5312992406157	23552870670099
P	77.87	17.43	45.16	106.24
P_x	81.33	12.68	62.15	101.34
P_m	76.90	16.60	54.48	105.61
P_x/P_m	1.07	0.07	0.95	1.22
ULC	44.86	7.44	26.25	59.70
$\boldsymbol{\partial M/\partial X}$ (%) [a]	17.41	4.47	8.84	22.65

Source: Author's calculations. [a] Sample period is 1995-2018.

At the first step of our econometric investigation, we tested stationary properties of the time series using ADF, KPSS, and PP unit root tests. All the tests indicated that the natural logarithm of the series X, M, Y, W, Y_f are I(1), i.e. integrated of order 1, and that of ULC is I(0), i.e. stationary. The natural

logarithm of the series *C*, *Inv*, *P*, P_x, and P_m, however, are I(0) according to the KPSS test, but I(1) according to the ADF and PP tests. The natural logarithm of the series *R* and P_x/P_m are I(0) according to the ADF and KPSS tests, but I(1) according to the PP test. According to our results, it is certain that none of the series are I(2); however, there exist uncertainties about whether some of them are I(0) or I(1). Consequently, in the second step, we tested the existence of cointegration among the variables in each separate equation employing the "Bounds test" developed by Pesaran, Shin, and Smith (2001). This method is used for testing cointegration among variables equations that consist of both I(0) and I(1) variables or if there is uncertainty about them being I(0) or I(1). Since this test showed no sign of cointegration among variables in the six regression equations, at the third step of our econometric analysis we estimated them using the logarithmic differences of the series.[8] A diagnostics check followed the estimation of parameters through regressions. Autocorrelation, heteroskedasticity, specification adequacy, and parameter stability were tested via LM, White and ARCH, RESET, and CUSUM tests, respectively.

5. ECONOMETRIC ANALYSIS AND FINDINGS

In this section, we present our findings of the estimations of the equations of the model by Stockhammer et al. (2011) applied to the Turkish economy. The latter divided their sample which consisted of 36 observations into two subperiods and ran separate regressions for each model equation (except the one for consumption) in order to check whether parameter values shifted due to the effects of globalization. The authors, however, mentioned that their sub-samples had been too small to give accurate results and did not use their sub-sample estimates of parameters in the final calculations (p. 17). It is evident that our sample size of 32 does not permit such a sub-period analysis. However, in the last subsection, we calculated separate marginal effects for three different subperiods, which were classified with respect to the import content of exports.

5.1 Consumption Function

The results of the consumption function are reported in Table 3. The econometric findings confirm the assumption that the consumption elasticity of labor income is considerably higher than that of capital income. Both coefficients are statistically significant at 1%, the former is estimated to be 0.57 and the latter 0.12. In previous comparable studies on the Turkish economy, Onaran and Galanis (2014) found the consumption elasticity of labor income to be 0.51 and that of capital income to be 0.29. Yılmaz (2015) found very close and high elasticities of 0.97 and 0.965, respectively. Bölükoğlu (2019) found the former to be 0.93 and the latter 0.55. Kurt's (2020) findings of the former are, 1, i.e., workers do not (or cannot) save out of their income, while the latter lies between 0.77 and 0.85. All these findings suggest that the difference between the elasticity of consumption out of labor income and that of capital income, ranges from 0.005 to 0.38, while in our study it turned out to be 0.45.[9]

[8] The unit root and Bounds tests are available upon request. For the Bounds test, an F-test and a t-test must be conducted together. We used the critical values of the F-test provided by Narayan (2005) for different sample sizes and the asymptotic values of the t-test provided by Pesaran et al. (2001) as our reference.

[9] In some of these studies, instead of consumption, saving elasticities are estimated. The former is obtained by subtracting the latter from unity. In some of these studies, the consumption equation is estimated using the lags of dependent and independent variables. The necessary calculations are made to derive the elasticities from the studies cited.

Table 3: Results of the Consumption Function

Dependent Variable: *ΔlnC*	**Coefficient**	**t-ratio**
Constant	0.01**	2.06
ΔlnW	0.57***	7.52
ΔlnR	0.12***	3.65
Diagnostics		
R^2	0.61	
Adjusted R^2	0.58	
F-test	0.00	
Test for ARCH of order 1	0.99	
CUSUM test for parameter stability	0.36	
LM test for autocorrelation	0.50	
RESET test for specification	0.78	
White's test for heteroskedasticity	0.65	
Number of observations	31	

Note: The p-values of the diagnostic tests are presented in the related cells. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively.

5.2 Investment Function

The investment was also estimated using the differences in the logarithms of the variables since the Bounds test did not support the existence of cointegration among the equation variables. We employed the lags of the explanatory variables since the regression without those suffered from parameter instability. Our findings are tabulated in Table 4.

Table 4: Results of the Investment Function

Dependent Variable: *ΔlnInv*	**Coefficient**	**t-ratio**
Constant	-0.07***	-6.84
ΔlnY	3.10***	15.80
ΔlnY(-1)	-0.17	-0.76
ΔlnR	-0.02	-0.58
ΔlnR(-1)	0.03*	1.89
Diagnostics		
R^2	0.90	
Adjusted R^2	0,89	
F-test	0.00	
Test for ARCH of order 1	0.74	
CUSUM test for parameter stability	0.14	
White's test for heteroskedasticity	0.60	
LM test for autocorrelation	0.56	
RESET test for specification	0.77	
Number of observations	30	

Note: The p-values of the diagnostic tests are presented in the related cells. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively.

The findings indicate that aggregate output/income has a high, positive, and significant effect on private investment in the Turkish economy while the (first lag of the) profit level has a small, positive, and marginally significant effect (at 10%) on it. We also observed negative 'animal spirits', which were captured by the constant. The only directly comparable estimation in the literature on Türkiye is that of Onaran and Galanis (2014). The accelerator effect on investment was found to be 3.34 in their study, while the authors found no significant effects of profit level on investment.

5.3 Exports Function

The findings of the export function are reported in Table 5.

Table 5: Results of the Exports Function

Dependent Variable: ΔlnX	**Coefficient**	**t-ratio**
Constant	0.04***	5.17
ΔlnY_f	0.60***	3.60
ΔlnP_xP_m	-0.37*	-1.80
$\Delta lnP_xP_m(-1)$	-0.14	-0.73
Diagnostics		
R^2	0.28	
Adjusted R^2	0.20	
F-test	0.00	
Test for ARCH of order 1	0.99	
CUSUM test for parameter stability	0.49	
White's test for heteroskedasticity	0.93	
LM test for autocorrelation	0.92	
RESET test for specification	0.91	
Number of observations	30	

Note: The p-values of the diagnostic tests are presented in the related cells. *, ** and *** represent 10%, 5%, and 1% significance levels, respectively.

The findings show that foreign demand has a significant effect on Turkish exports while the export prices to import prices have the expected negative sign with a value of -0.37 but only significant at 10%. The only comparable study that similarly estimated the export equation is that by Onaran and Galanis (2014). However, they employed unit labor costs instead of the ratio of export prices to import prices in their estimation of this equation for Türkiye.

5.4 Imports Function

The results of the imports function are tabulated in Table 6.

Table 6: Results of the Imports Function

Dependent Variable: ΔlnM	**Coefficient**	**t-ratio**
Constant	-0.08***	-3.31
ΔlnY	3.23***	14.16
ΔlnP_xP_m	0.49**	2.11
rho: 0.45		
Diagnostics		
R^2	0.84	
Adjusted R^2	0.82	
F-test	0.00	
Test for ARCH of order 1	0.46	
Number of observations	30	

Note: The p-values of the diagnostic tests are presented in the related cells. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively. The estimation is conducted through the Cochrane-Orcutt method. LM autocorrelation, White's heteroskedasticity, RESET specification, and CUSUM parameter stability tests are not available for the estimations using this method in the GRETL software, which was used for the estimation of model equations.

The imports equation was estimated using the Cochrane-Orcutt method to solve the autocorrelation problem. The findings indicate that aggregate demand is an important driver of imports with an estimated parameter value of 3.23 and the corresponding coefficient for this variable is significant at 1%. The ratio of exports to imports prices is also significant at 1% and an increase in this ratio by 1% leads to a 0.49 increase in imports of Türkiye. Onaran and Galanis (2014) estimated this equation as a function of domestic aggregate demand and the ratio of domestic prices to import prices, so their findings are not directly comparable to ours. According to their study, an increase in the domestic aggregate demand led to a 1.68% increase in Turkish imports, which is much weaker than our estimated parameter.

5.5 Domestic Prices Function

Domestic prices are a function of unit labor costs and import prices, both of which are exogenous in the model. The estimation results of the domestic prices function are reported in Table 7.

Table 7: Results of the Domestic Price Function

Dependent Variable: ΔlnP	**Coefficient**	**t-ratio**
Constant	0.00	0.13
$\Delta lnULC$	0.59***	9.76
ΔlnP_m	0.38***	3.70
Diagnostics		
R^2	0.81	
Adjusted R^2	0.80	
F-test	0.00	
Test for ARCH of order 1	0.40	
CUSUM test for parameter stability	0.97	
White's test for heteroskedasticity	0.89	
LM test for autocorrelation	0.80	
RESET test for specification	0.12	
Number of observations	31	

Note: The p-values of the diagnostic tests are presented in the related cells. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively.

The findings show that both unit labor costs and import prices are highly significant and the corresponding coefficients for these two variables are 0.59 and 0.38, respectively. Onaran and Galanis (2014) estimated these two coefficients to be 0.48 and 0.49, respectively, for Türkiye.

5.6 Export Prices Function

Export prices are also a function of unit labor costs and import prices, The results of the export prices function are tabulated in Table 8.

The findings point out that both unit labor costs and import prices are significant at 1% and the corresponding coefficients for these two variables are 0.10 and 0.58, respectively. Onaran and Galanis (2014) found these two coefficients to be 0.18 and 0.87, respectively.

5.7 Synthesis of Findings and Total Effects

In this subsection, we synthesize the findings from the estimations and calculate the effects of an increase in the labor share on each component of private excess demand and finally on aggregate output. We integrated the global effects into our calculations. However, for comparison, we also calculated the effects that do not take them into account. The calculations follow those made by Stockhammer et al. (2011:7-18).

Table 8: Results of the Export Prices Function

Dependent Variable: ΔlnP_x	**Coefficient**	**t-ratio**
Constant	0.00	0.09
$\Delta lnULC$	0.10***	3.02
ΔlnP_m	0.58***	8.87
Diagnostics		
R^2	0.68	
Adjusted R^2	0.66	
F-test	0.00	
Test for ARCH of order 1	0.29	
CUSUM test for parameter stability	0.87	
White's test for heteroskedasticity	0.15	
LM test for autocorrelation	0.09	
RESET test for specification	0.27	
Number of observations	31	

Note: The p-values of the diagnostic tests are presented in the related cells. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively.

The marginal effect of an increase in the labor share on consumption at a given income (output) level is calculated using the following formula:

$$\partial C/Y/\partial WS = \partial C/\partial W - \partial C/\partial R = e_{CW}\left(\frac{C}{W}\right) - e_{CR}\left(\frac{C}{R}\right) \quad (5)$$

where $\partial C/\partial W$ is the marginal effect of an increase in labor income on consumption and $\partial C/\partial R$ is that in capital income on consumption. e_{CW}, which is estimated to be 0.57, is the elasticity of consumption with respect to labor income and e_{CR} , which is estimated to be 0.12, is that with respect to capital income. The ratios $\left(\frac{C}{W}\right)$ and $\left(\frac{C}{R}\right)$ are calculated by the sample averages of the variables.

The marginal effects of an increase in the labor share on investment at a given level of income are calculated as follows:

$$\partial I/Y/\partial WS = -e_{IR}.I/R \quad (6)$$

where e_{IR} , which is estimated to be 0.03, is the elasticity of investment with respect to profits.

The marginal effects of an increase in the labor share on exports (or imports) are calculated by the multiplication of a chain of expressions that start from real unit costs and end up with exports (or imports) (Stockhammer et al., 2011:14). The marginal effect on the exports is equal to the following:

$$\partial X/Y/\partial WS = e_{XP_x}\, e_{P_xULC}\, e_{ULCWS}\frac{X}{Y}\frac{1}{WS} \quad (7)$$

where e_{XP_x}(equivalent to $e_{XP_xP_m}$) is the elasticity of exports with respect to export prices, which is estimated to be -0.37, e_{P_xULC} is the elasticity of export prices with respect to unit labor costs, which is estimated to be 0.10 and e_{ULCWS} is the elasticity of unit labor costs with respect to labor share, which is calculated by the expression 1/(1-e_{PULC}), where e_{PULC} is the elasticity of domestic prices with respect to unit labor costs, which is estimated to be 0.59.[10] The ratios $\frac{X}{Y}$ and $\frac{1}{WS}$ are sample averages of the variables. The current formulation does not take into account global effects captured by the import content of exports. These effects can be integrated by multiplying the expression at the

[10] This is because ULC=P.WS and P is a function of ULC. (Stockhammer et al., 2011).

right-hand side of Eq. (7) by (1-$\partial M/\partial X$) following Eq. (4). Likewise, the marginal effect of a higher labor share on the imports is calculated using the formula below:

$$\partial M/Y/\partial WS = e_{MP_x}\, e_{P_xULC}\, e_{ULCWS} \frac{M}{Y}\frac{1}{WS} \tag{8}$$

where e_{MP_x}(equivalent to $e_{MP_xP_m}$) is the elasticity of imports with respect to export prices, which is estimated to be 0.49.

The sum of the marginal effects at equations 5 and 6 gives us the domestic private excess demand (h_2) and the addition of the expression in equation 7 onto them and the subtraction of that in equation 8 from them gives us the private excess demand for the total economy. However, in order to find the impact of an increase in labor share on total output, private excess demand must be multiplied by the multiplier 1/(1-h_1). The components of h_1 are calculated as follows:

$$\partial C/\partial Y = e_{CY}\left(\frac{C}{Y}\right) \tag{9}$$

$$\partial I/\partial Y = e_{IY}\left(\frac{I}{Y}\right) \tag{10}$$

$$\partial M/\partial Y = e_{MY}\left(\frac{M}{Y}\right) \tag{11}$$

where e_{CY} is the income elasticity of consumption, e_{IY} is the income elasticity of investment and e_{MY} is the income elasticity of imports. e_{CY} is proxied by summing the elasticities e_{CW} and e_{CR} and the other two are directly estimated in the regressions.

The syntheses of our findings for the full sample and the subperiods are tabulated in Table 9. Subperiodization of the full sample period is based on the evolution of the import content of exports. During the 1995-98 subperiod, the average import content of exports remained around 10% and then it started to increase until it reached 20% in 2008. Through the 2008-2018 period, it became as high as 23% in 2011, but the period average fluctuated around 21% over this period (see Figure 2).

The calculations show that both domestic and total economies in Türkiye are wage-led throughout the full sample period and the subperiods, regardless of whether the import content of exports is taken into account or not. According to our results, a 1% increase in the labor share leads to a 0.58% (0.59% with effects of import content of exports) increase in the aggregate output over the 1988-2019 period in the Turkish economy. The integration of import content of exports into the calculations turns the economy slightly more wage-led. The positive effect of a higher labor share on consumption exceeds its negative effect on investment. However, when the total economy is considered, this positive effect on consumption remains higher than the combined negative effect of a higher labor share on investment and net exports. Among the components of the aggregate demand, the impact of a change in the labor share on consumption is the highest in absolute value and that on investment is the lowest over the full sample period and the sub-periods.

The sub-period analyses show us that the magnitudes of effects on components of aggregate demand except private investment changed over the subperiods. A 1% increase in the labor share led to a 0.49% increase in consumption at a given level of aggregate income/output over the 1995-2018 period. However, this effect was the smallest (0.37) in the first subperiod of 1995-98 and the highest (0.52) in the last subperiod of 2008-18. However, the impact of labor share on investment remained the same (-0.02) in the full sample and over the subperiods. The effects on net exports also changed over the subperiods due to increasing trade volumes and lower labor shares. The negative effect of an increase in the labor share on net exports almost doubled in absolute value

Table 9: Average Effects of a 1% Increase in the Labor Share on Aggregate Demand and its Components with and without Effects of Import Content of Exports over the Full Sample and Subperiods

	1988-2019	**1995-2018**	**1995-98**	**1999-2007**	**2008-18**
$\partial(C/Y)/\partial WS$	0.45	0.49	0.37	0.49	0.52
$\partial(I/Y)/\partial WS$	-0.02	-0.02	-0.02	-0.02	-0.02
Domestic h_2	0.44	0.48	0.35	0.47	0.50
$\partial X/Y/\partial WS = e_{XP_x}\, e_{P_xULC}\, e_{ULCWS} \frac{X}{Y}\frac{1}{WS}$	-0.03	-0.04	-0.03	-0.04	-0.05
$\partial M/Y/\partial WS = e_{MP_x}\, e_{P_xULC}\, e_{ULCWS} \frac{M}{Y}\frac{1}{WS}$	0.05	0.06	0.04	0.06	0.07
$\partial NX/Y/\partial WS$ without effects of import content of exports	-0.09	-0.10	-0.06	-0.10	-0.11
h_2 without effects of import content of exports	0.35	0.38	0.29	0.37	0.39
h_1	0.40	0.37	0.45	0.29	0.39
$h_2/(1-h_1)$ without effects of import content of exports	0.58	0.60	0.52	0.52	0.64
Average import content of exports (%)	17		10	16	21
$\partial M/Y/\partial WS = e_{MP_x}\, e_{P_xULC}\, e_{ULCWS} \frac{M}{Y}\frac{1}{WS}(1-\frac{\partial M}{\partial X})$	0.04	0.05	0.03	0.05	0.05
$\partial NX/Y/\partial WS$	-0.08	-0.09	-0.06	-0.09	-0.10
h_2	0.35	0.38	0.29	0.38	0.40
$h_2/(1-h_1)$	0.59	0.61	0.53	0.53	0.66

Note: Parameters were estimated using the full sample of 1988-2019 and the import content of the exports series is only available for the 1995-2018 period. To calculate the effects of the latter in the full sample of 1988-2019, the average value of the import content of exports over the 1995-2018 period was used. Numbers may not add up due to rounding.

from -0.06 in the 1995-98 subperiod to -0.11 in the 2008-18 subperiod. However, when the import content of exports is taken into account, these negative effects dampen in terms of absolute value. The sub-period analyses also indicate that, despite the increased absolute effects of the labor share on net exports, the Turkish economy has become more wage-led due to the increased effects of the labor share on consumption. Integration of import content of exports into the analysis does not change this trend and increases the magnitude of these effects. With these effects taken into account, an increase in the labor share by 1% led to a 0.53% increase in the aggregate demand and aggregate income/output over the 1995-98 and 1999-2007 subperiods and a 0.66% increase over the 2008-18 subperiod.

6. CONCLUSION

In this study, we examined the impact of the import content of exports on the relation between functional income distribution and aggregate demand in Türkiye over three decades. We built our empirical analysis on the model developed by Stockhammer et al. (2011).

Our findings indicate that both domestic and total economies are wage-led over the 1988-2019 period and also over subperiods in Türkiye. The import content of exports more than doubled in percentage terms, increasing from around 10% during the 1995-98 subperiod to approximately 21% during the 2008-18 subperiod. This was accompanied by a doubling of the negative effects of a higher labor share on net exports of Türkiye. The integration of the import content of exports into the analysis makes the demand regime slightly more wage-led. The analyses of subperiods show that

although the negative effect of a higher labor share in total income on net exports doubled in absolute value from the subperiod of 1995-98 to 2008-18, its positive effect on private consumption expenditures more than counterbalanced it. However, the negative effect of a higher labor share on private investment remained relatively small and unchanged over the three subperiods. Our findings show that the integration of import content of imports into the analysis also rendered all the subperiods moderately more wage-led.

While the current study took into account the import content of exports, further research should also take into account that of the other components of GDP. The study by Palley (2009) might form the basis of such an approach. It should also be mentioned that the import dependency on exports is assumed to be exogenous to the economy. The drivers of this dependence should also be integrated into further research.

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