

# The Impact of Functional Income Distribution on Capital Accumulation in Turkey: A Linear ARDL Analysis

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**Abstract:** The aim of this study is to examine the relationship between functional income distribution and capital accumulation in Turkey using a linear autoregressive distributed lags (ARDL) models. The bound test of the ARDL identification provide whether a process of the relationship between two or more variable is cointegrated or not. This relationship includes saving out of wages, saving out of profits and share of gross capital formation in gross domestic product. The bound test of the ARDL models are estimated by using yearly observations for the mentioned macroeconomic variables, covering about last three decades for the Turkish economy. The ARDL methods allow estimating with limited observations. This study also analysis the Turkish economic fluctuation in Post-Keynesyen theoretical framework. On the theoretical ground I propose an interpretation of the Turkish economic fluctuation depend on the Kaldorian perspective. Kaldor (1955-56) and Pasinetti (1962) asserts that functional income distribution may influence economic growth through saving propensities of labor and capitalists. The bound test of ARDL results show that the saving out of wages and capital accumulation have a cointegrated process, in support of the basic hypothesis that has argued in the study. Besides, saving out of wages have positive effects on capital accumulation during this period.

**Keywords** Turkish Economy, Functional Income Distribution, Economic Growth, Autoregressive Distributed Lag Model (ARDL)

## 1.Introduction

Economic growth in developing countries hasn't retrieved as well as developed countries since the 2008 Global Recession. The Global Financial Crisis that started in 2008 has compelled many economists and politicians like to reconsider the related theories and policies

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that had increasingly been accepted as conventional wisdom during the last two three decades (Lavoie and Stockhammer, 2012). When the financial sector's players' behaviours are one of the main source of the crisis, a significant number of economists have emphasized that increasing inequality and a re-distribution from labour to capital were seen as a big part of the event (Stockhammer and Onaran, 2012). After the global crisis, Keynesian fiscal promotive programs that includes infrastructure spendings, demand refreshing policies and some supportive social programs that were conducted by international organizations (Lavoie and Stockhammer, 2012). However, contrary to this process, a critical policy inference that necessary for recovering macroeconomic performance of recession economies is that together with the financial activity, a revision of distributional policy and labour income level if it is desired a viable economic growth regime (Stockhammer and Onaran, 2012).

The relation of distribution and growth is still to be an important subject for the discipline of macroeconomics. This paper aims to contribute to related literature by illuminating the concept of wage-led growth. In line with this purpose it try to evaluate both an analytical notion and an economic policy strategies. Post-Keynesian macroeconomics assesses the demand role of wages in stimulating economic growth, accumulation and employment depending on Kaleckian perspective and later on Bhaduri and Marglin (1990) rather than a cost item in last years. Bhaduri and Marglin (1990) separate wage-led and profit-led regime into two different way for growth. First of this ways, which is wage-led growth regime, has slowdown effect on accumulation allied with a high profit share in GDP (Onaran and Stockhammer, 2001). However employment is excluding this study. Moreover, beyond many of studies in related literature that treat wages as demand factor, the effect of functional income distribution on capital accumulation is examined through savings out of wages and savings out of profits in this study. On the theoretical ground I propose an interpretation of the Turkish economic fluctuation depend on the Kaldorian perspective. Kaldor (1955-56) and Pasinetti (1962) asserts that functional income distribution may influence economic growth through saving propensities of labor and capitalists.

Almost all of the studies in the relevant empirical literature were based on Bhaduri and Marglin (1990). Therefore, this study is an important contribution to the literature as it is based on the Kaldorian perspective and Pasinetti (1962). This study which investigate the impact of functional income distribution on capital accumulation through saving behavior of labor and capitalists, as far as is known, is a novel for an ongoing debate in the disciplines of post-Keynesian macroeconomics during last two or three decades. Although several empirical

research about the relationship between distribution and economic growth is articulated in some case of developing countries, none of them have investigated the macroeconomic impacts of savings out of wages and savings out of profits. This paper provide an empirical evidence of interaction of functional income distribution and capital accumulation for the case of Turkish economy. Economic growth has built upon export-oriented industrialization after 1980. In this period, growth strategy is based on liberalization and privatization. The 1980s was also the period of implementation of certain policies to the liberalization of the financial sector in Turkey as well as all other developing economies. Financial liberalization starting in the early 1980s in Turkey was completed by allowing full circulation of international capital movements in 1989 (Boratav and Yeldan, 2001).

Liberalization and privatization practices in both the real economy and the financial economy since the end of the 1980s, has aimed to play an important role of domestic savings in economic growth and stabilization processes. With the release of international financial capital liberalization in 1989, savings increased by around 25% until the mid-1990s. In recent years, private sector savings are in a horizontal swing. This savings fluctuate at 10% levels especially after 2010. Household savings constitute about 80% of private sector savings. From the late 1980s to 2001 banking crisis, household savings fluctuated around a band of 13-17%. Household savings have been realized at 7% in recent years. Although savings out of wages have shown a horizontal trend for the last three decades, it have been increasing recently. Savings out of profits, despite a horizontal swing until the 2001 banking crisis, it has a significant downward trend in last years. In this study, while the analysis of the relationship between functional income distribution and economic growth is carried out, economic growth is represented by the ratio of gross fixed capital formation to gross domestic product as internal variable in the model. So, this ratio have shown an increasing trend during last three decades. It realized at about 25% in last five years.

Depending on the theoretical framework described above, the purpose of this study is to analyze the relationship between functional income distribution and economic growth through savings out of wages and profits in Turkey using Autoregressive Distributed Lag Model (ARDL) Bound tests. This study also aims to contribute to the relevant literature by analyzing the effects of functional income distribution on economic growth through savings. The remainder of this study is organized as follows: the related literature is discussed in Section 2. Data and the methodology is explained in Section 3. Section 4 is covered the findings of estimated model. Finally, consequences are drawn in Section 5.

## 2. Literature Review

This section of this study introduces the related studies in post-Keynesian empirical literature about relationship between functional income distribution and economic growth. The post-Keynesian theory, which assumes wages as an element of demand, criticizes the Neo-Classic approach because of treating wages only as a cost in the production process. The basic research in the post-Keynesian literature is based on the “Wage-Leg Growth” approach which is widely known in recent years. Two different estimation methods were used in the studies in the relevant empirical literature that examined the relationship between functional income distribution and economic growth. A significant majority of the studies carried out the analysis with Error Correcton Model (ECM) estimation method by establishing and equality model for consumption, investment and net export as element of total demand. A little studies are made with Ordinary Least Squares (OLS) estimation method. Bowles and Boyer (1995) is the first study that used OLS estimator in related empirical literature. They investigated the demand structure of some developed economies such as France, Germany, Italy, UK and USA. Naastepad and Storm (2006) is also analyzed the demand structure of selected OECD countries that based on Keynesian growth model with OLS and ECM.

Most of the studies in related empirical literature researched demand structure of selected developed countries. When some of them examined the relationship between aggregate demand and functional income distribution with ECM estimation method, other related studies used Structural Vector Autoregressive Model (SVAR). Hein and Vogel (2008) analyzed to aggregate demand structure of selected countries between 1960-2005. Stockhammer and Ederer (2008) investigated Austria’s demand structure. Then, Hein and Vogel (2009) examined the relationship between functional income distribution and economic growth for France and Germany. There is some other studies that analyzed the impact of changing of wage share on economic growth with ECM methodology for developed countries (Stockhammer et al, 2009; Hein and Tarassow, 2010; Onaran et al, 2011; Stockhammer et al, 2011; Stockhammer and Stehrer, 2011, Molero-Simarro, 2015, Jetin and Kurt, 2016, Stockhammer et al, 2017; Kurt, 2017).

Hartwig (2014) investigated the effect of functional income distribution on growth in the demand structure for OECD countries. Onaran and Galanis (2014) examined the relationship between global wage share and economic growth for G20 countries. In their studies on demand-side growth model for fifteen European Union (EU) member countries and the demand structure of the economy, Onaran and Obst (2016) analyzed the with the data between

1960-2013. Obst et al. (2017) investigated the impact of income distribution and fiscal policies on aggregate demand structure for fifteen EU countries. In other studies in the related literature, Vector Autoregressive Models (VAR) estimation method was used. The first of these studies was the work of Gordon's (1995a, 1995b). Gordon (1995a, 1995b) examined the aggregate demand structure for the US economy whether is wage-led or not. Stockhammer and Onaran (2001) analyzed the effects of functional income distribution on macroeconomic indicators such as capital accumulation, capacity utilization and employment for four developed countries. Then Stockhammer and Onaran (2004) investigated the relationship between aggregate demand, income distribution and unemployment for USA, UK and France economies.

There is also several studies that analysed the relationship between functional income distribution and capital accumulation or economic growth directly. Two of them were employed for same country which is Turkey and one of these covered South Korea. As far as is known, the latest study analyzed the Croatia's capital accumulation. Onaran and Stockhammer (2001) investigated the impact of functional income distribution on capital accumulation, capacity utilization and employment for Turkey in the framework of wage-led growth approach. In another study that analyzed to Turkey and South Korea as in comparison, Onaran and Stockhammer (2005) examined the relationship between functional income distribution, economic growth, capital accumulation and employment for each country. Vujcic et al. (2014), which is known the latest study in related literature that used SVAR estimation method, investigated the effect of functional income distribution on selected macroeconomic variables in Croatia.

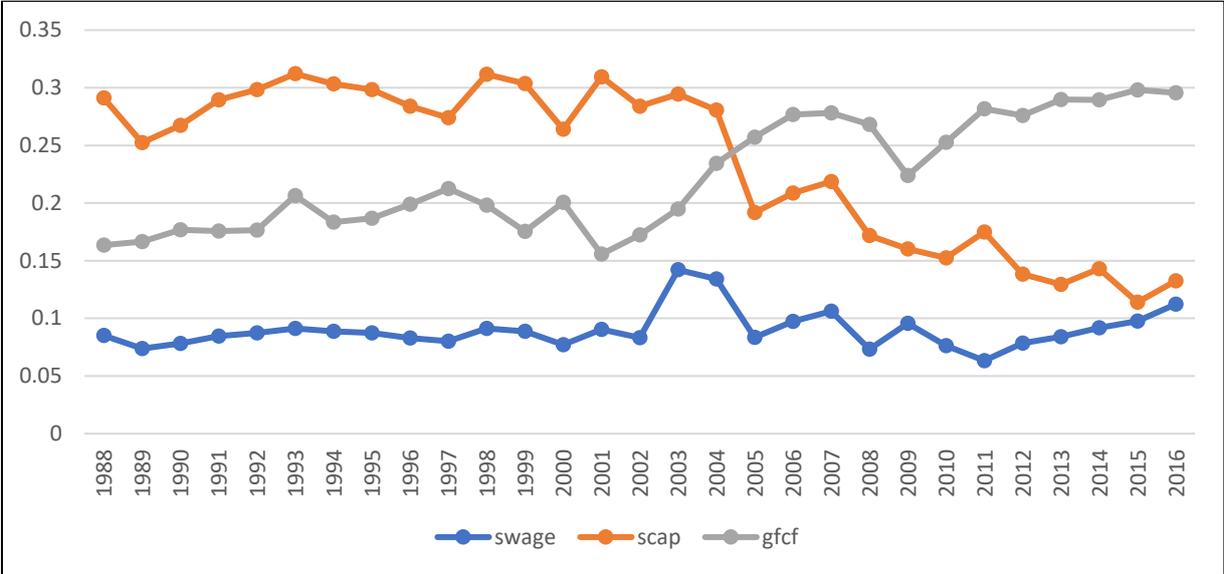
According to related empirical literature that explained above, while some studies found the developed countries's demand structure is wage-led, others were profit-led. On the other hand, a little of studies were carried out for developing countries but they found the economic growth and capital accumulation were wage-led. Generally, two different estimation methods and almost identical sampling periods were used in studies.

### **3. Data, Methodology and Model Specifications**

In this study, the empirical analysis has covered annual data for the period between 1988-2016. There are three macroeconomic variables pertain to Turkish economy in examining the long-run cointegration relationship between functional income distribution and capital accumulation in this study. The capital accumulation (*gfcf*) is from the OECD databases and functional income distribution variables that are savings out of wages (*swage*) and savings out

of profits (*scap*) come from the Turkish Statistical Institute (TUIK). The capital accumulation occurs with the ratio of gross fixed capital formation to gross domestic product. Savings out of wages and profits are calculated by author using “Household Budget Surveys”. All variables used in this study are in percent and linear form.

**Graph-1: Capital Accumulation, Savings out of Wages and Profits in Turkey (1988-2016)**



**Sources:** Turkish Statistical Institute, OECD

Graph-1 introduces the capital accumulation that is used in the ARDL model for Turkish economy in 1988-2016. There were not any significant change for the capital accumulation until 2001 banking crisis in Turkey. However, a significant increase in capital accumulation has been observed since 2001 about 75%. The capital accumulation in Turkey reached 30% in recent years. During the banking sector crisis in 2001, capital accumulation was around 15% and the lowest level of the last two decades. Regarding the savings out of wages and profits, like capital accumulation that have affected by banking sector crisis, there is a structural change in the beginning of millenium. Savings out of profits decreased from about 30% to 20% levels in 2004. Then, it started to decrease in recent years.

Although the share of wages in national income has decreased gradually, the savings out of wages of the labour force have followed a horizontal course in the period of 1988-2000. Savings out of wages fluctuated around the 6-8% band until the period of sharp increase after the 2001 banking crisis. A temporary increase in savings out of wages is observed after 2001. Labor savings increased by around 75% in 2002-2003. Especially after 2010, the savings out of wages has re-entered a significant upward trend in recent years. In 2016, savings out of

wages, which were above the total household savings with about 11%, were at same level as the savings of private sector.

**Table-1: Descriptive Statistics of Variables**

Variable	Observation	Mean	Std. Dev.	Min	Max
<b>gfcf</b>	29	0.22	0.05	0.15	0.29
<b>swage</b>	29	0.09	0.02	0.06	0.14
<b>scap</b>	29	0.24	0.07	0.11	0.31

Table-1 shows that the descriptive statistics of *gfcf*, *swage* and *scap* variables. There can be seen that the mean, standart deviations, minimum and maximum values of the used variables. All the variables are percent and linear form. There is a huge different between savings out of wages and profits. Besides the maximum deviation from the average is savings out of profits.

### 3.1 Model Specifications

The model that used to examine the long-term analysis of the relationship between functional income distribution and economic growth in Turkish economy based on post-Keynesian approach, is also based on the study of Feldstein and Horioka (1980). The reason for this is that the model used in long-term analysis is created using capital accumulation and saving variables. Feldstein and Horioka (1980) investigated the relationship between domestic savings and international capital flows. The following model was used to determine the relationship between savings and investment in the study.

$$\left(\frac{I}{Y}\right) = \gamma + \eta\left(\frac{S}{Y}\right) \quad (1)$$

Where  $(I/Y)$  is the ratio of gross domestic investments to gross domestic product and  $(S/Y)$  is the ratio of gross domestic savings to gross domestic product. Accordingly, as in many studies based on the study of Feldstein and Horioka, our baseline model is used as follow in the long-term analysis of this study that analyzed the relationship between savings and capital accumulation.

$$gfcf_t = \alpha_0 + \alpha_1 swage_t + \alpha_2 scap_t + e_t \quad (2)$$

Briefly explain the variables in the model (2), *gfcf* shows gross fixed capital ratio (capital accumulation), *swage* is savings out of wages and *scap* is savings out of profits. To investigate the long-term relationship between the savings and capital accumulation in Turkish economy,

Autoregressive Distributed Lag Model (ARDL) Bound Test is used. Three basic steps are followed in ARDL application. First of all, the stability of the variables in the predicted model is examined. In non-stationary series, there are different averages at different time points and the variances of these series increase with sample size in this case (Harris and Sollis, 2003). When any regression model is established with non-stationary series, linear combinations of time series lead to a spurious regression problem (Alimi, 2014). In the case of spurious regression,  $t$  values are significantly high,  $r$  square is very close to 1 and Durbin-Watson (DW) statistical value is quite low in the predicted results (Granger and Newbold, 1974). Consequently, the estimation results of the coefficients are deviated. Therefore, in order to avoid a spurious regression problem, tests are needed to examine whether the series is stationary or not in an analysis.

Stability tests are also known as unit root tests. If one or more series contain unit roots, then tests are performed to determine whether there is an integrated relationship between series. In this study, the most recent and advanced approach known as ARDL Bound Test approach is used in analyzing the long-term relationship between variables in model (2). This method was developed by Pesaran et al. (2001). The ARDL bound test approach has many advantages over traditional approaches. For example, the ARDL approach can be applied even if the variables in the model are integrated in different degrees (such as  $I(0)$  and  $I(1)$ , which is unacceptable in traditional approaches). However, it should be noted that the series are not  $I(2)$  in this approach developed by Pesaran et al. (2001). Another advantage of the ARDL bound test approach is that it can produce good results for small sample sizes. According to Haug (2002), in ARDL bound test method, very good results are obtained for both small sample sizes and short and long term coefficients can be estimated simultaneously.

While analyzing this model with ARDL bound test approach, the error correction format that used to distinguish short-term effects from long-term effects is as follows:

$$\Delta gfcf_t = \lambda_0 + \lambda_1 gfcf_{t-1} + \lambda_2 swage_{t-1} + \lambda_3 scap_{t-1} + \lambda_4 \Delta gfcf_{t-i} + \lambda_5 \Delta swage_{t-i} + \lambda_6 \Delta scap_{t-i} + \eta ECM_{t-1} + \varepsilon_t \quad (3)$$

$$t = 1, \dots, T, i = 1, \dots, N$$

In the model (3),  $\Delta$  is the first order difference operator and  $\lambda$  shows the long and short-term coefficients. In the cointegration analysis performed with ARDL bound test approach, hypothesis testing is established to test whether cointegration is available.

$$H_0: \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6 = 0$$

$$H_1: \lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq \lambda_5 \neq \lambda_6 \neq 0$$

According to results of the hypothesis testing, whether or not there is a cointegration relationship is determined that based on the F-test value which is the result of estimation. Table critical values are used in determination with F-test. The emergence of the cointegration relationship by this way is known as the Bound Test.

### 3.2 Bound Test

When ARDL is applied to the regression model, it is determined with the help of F statistic test whether there is a cointegration relationship. The existence of cointegration relationship between variables is determined by comparing the calculated F statistic value with the table critical values. In the Bound Test, the stationary levels of the variables in the model are assumed to be a group of variables are I(0) and the other group of variables are I(1). Accordingly, if the calculated F statistic value is greater than the upper limit of the table critical values, the null hypothesis is rejected in the hypothesis testing to test whether or not there is a cointegration relationship. If the calculated F statistic value is below the critical value which is small within the table critical values, then the null hypothesis is accepted and there is no cointegration relationship. When a cointegration relationship is found between the variables in the model, the causal relationship between the variables can be determined with the help of the Error Correction Mechanism (ECM).

### 3.3 Error Correction Mechanism (ECM)

According to Granger (1988), a causal relationship between variables can be determined by the ECM for variables that have a cointegration relationship. Error Correction Term (ECT) contains information on long-term causality. While the ECT is negative and statistically significant and shows long-term causality, the importance of delayed independent variable shows a short-term causality. The short-term causality is estimated by the model shown below,

$$\Delta gfcf_t = \delta_0 + \delta_1 \Delta gfcf_{t-i} + \delta_2 \Delta swage_{t-i} + \delta_3 \Delta scap_{t-i} + \eta ECM_{t-1} + \varepsilon_t \quad (4)$$

$$t = 1, \dots, T, i = 1, \dots, N$$

ECM shows error correction term from long-term cointegration relationship from ARDL model. The coefficient  $\eta$  in front of the error correction term in model (4) must have a negative and meaningful sign for a causal relationship that may occur in the long-term. In

addition, the negative and statistically significant ECM value should also take a value between 0 and -1. The last step of the ARDL bound test is the structural break test. This test also shows the stability of the predicted long-term coefficients of variables. When the error correction model is estimated, according to Pesaran and Pesaran study, cumulative sum of recursive residuals (CUSUM) test and CUSUM square test should be applied to determine whether there is a structural break in the model and also the stability of the coefficients should be determined.

#### 4. Empirical Results

As ARDL bound test method was used in this study, standart Augmented Dickey-Fuller (ADF) and Ng-Perron unit root tests were performed for the data in the model.

**Table-2: Dickey-Fuller and Ng-Perron Unit Root Tests Results**

<i>Variables</i>	<i>Prob. (Dickey-Fuller)</i>			<i>Prob. (Ng-Perron)</i>		
	<i>Level</i>	<i>Trend- Level</i>	<i>Trend- Difference</i>	<i>Level</i>	<i>Trend- Level</i>	<i>Trend- Difference</i>
<i>gfcf</i>	0.7559	0.3042	0.0000***	0.7796	0.2682	0.0000***
<i>swage</i>	0.0120**	0.0519*	0.0000***	0.0122***	0.0495**	0.0000***
<i>scap</i>	0.8475	0.4128	0.0000***	0.9064	0.5111	0.0000***

Note: The asterisk \*\*\*,\*\* and \* denotes significances respectively at the 1%, 5% and 10% level. Test results are given with intercept and trend and intercept in the table.

ARDL bound test method can be applied if the dependent variable in the model is I(1) and the independent variables are the same or different degree if they are not I(2) or more. However, it should be noted that according to Tursoy and Faisal (2018), the dependent variable in the model should be I(1) when the cointegration analysis is performed with ARDL bound test. In the model that used for the long-term analysis performed in this study provides this methodological detail.

**Table-3: The Results of Delay Length Selection**

<i>Length</i>	<i>Prob.</i>	<i>FPE</i>	<i>AIC</i>	<i>HQIC</i>	<i>SBIC</i>
0		.000471	-4.82289	-4.78233	-4.67663
1	0.033	.000427	-4.9247	-4.87061	-4.72968*
2	0.099	.000416*	-4.95345*	-4.88584*	-4.70968
3	0.284	.000432	-4.91931	-4.83818	-4.62678
4	0.351	.000454	-4.87411	-4.77945	-4.53282

As shown in the Table-3 above, the maximum delay length of up to four delay lengths is determined by three different criteria, two delays. AIC can be selected to calculate the appropriate number of delays in the packet program used when performing bound test estimation. According to Table-3, the above (2) model is estimated for a regression model as ARDL (2,1,1). At this stage of the ARDL bound test application, whether or not there is a cointegration relationship between the variables in the predicted model is tested by the F test.

**Table-4: ARDL Bound Test Results**

Dependent variable: <i>gfcf</i>		
F value	5.695*	<b>There is a cointegration</b>
k=3	Critical Values	
Prob.	Lower Limit I(0)	Upper Limit I(1)
% 1	6.776 (5.15)	8.739 (6.36)
% 5	4.415 (3.79)	5.841 (4.85)
% 10	3.491 (3.17)	4.701 (4.14)

Note: The critical values used according to the bound test results made with the Stata-14.2 package program belong to Kripfganz and Schneider (2018) study. However, the critical value in parentheses are critical values used in the study of Pesaran et al. (2001) and they are presented for comparison.

The null hypothesis is tested in the hypothesis testing according to traditional cointegration tests. According to this,

$H_0$ : There is not a cointegration relationship

$H_1$ : There is a cointegration relationship

According to the results in Table-4, the calculated F statistic value is above the table critical values. The calculated F statistic value is 5.695 in the results of table above. These results are above the I(1) critical value for 10% and 5% confidence intervals when looking at table values. Thus, the ARDL bound test results for the variables in model (2) show that there is a long-term cointegration relationship between the dependent variable *gfcf* and the independent variables *swage* and *scap*. These results also show that the independent variables in model (2) have an effect on the dependent variable in long-term. However, in order to measure the direction and magnitude of these effects, it is necessary to reveal the results of the applications for short and long-term ARDL models.

**Table-5: Long-term Results of ARDL Model**


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*ARDL (2,1,1)*

Dependent variable:  
*gfcf*

<i>Variables</i>	<i>Coefficient</i>	<i>Std. Dev.</i>	<i>Prob.</i>
<i>Cons.</i>	<i>0.2690</i>	<i>0.0882</i>	<i>0.007***</i>
<i>swage</i>	<i>0.6450</i>	<i>0.3694</i>	<i>0.098*</i>
<i>scap</i>	<i>-0.6147</i>	<i>0.0635</i>	<i>0.000***</i>
<i>Observations</i>		<i>25</i>	
<i>r square</i>		<i>0.52</i>	

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Note: The asterisk \*\*\*,\*\* and \* denotes significances respectively at the 1%, 5% and 10% level.

According to the results of Table-5, both labor force savings and entrepreneurial savings have a statistically significant effect on capital accumulation in the long-term. Empirical findings show that the relationship between labor savings and capital accumulation is positive at 10% significance level. Although this significance level is weak, it can be said that there is a long-term relationship. Another finding is the emergence of a long-term and statistically significant at high level relationship between the savings of the entrepreneur and capital accumulation. However, in contrast to the related empirical literature and theoretical foundations, the long-term relationship between the savings out of profits and the capital accumulation is negative. This situation can be considered as evidence that the increasing accumulation of capital through external debt in recent years in Turkish economy.

Long-term analysis findings show that an increase of 1% in labor savings will increase capital accumulation by 0,64%. In addition, the 1% increase in the savings of the entrepreneurs reduces the capital accumulation by about 0,61%. These results show that the savings of labor force in the long-term have an expansionary effect on capital accumulation, while the increase in the savings of the entrepreneurs has a contractionary effects. Another results of the ARDL bound test analysis is that 53% of changes in capital accumulation can be explained by labor and entrepreneur savings.

**Table-6: Short-term Results of ARDL Model**

<i>Dependent variable:</i>			
<i>gfcf</i>			
<i>Değişken</i>	<i>Katsayı</i>	<i>Standart hata</i>	<i>Olasılık değ.</i>
$\Delta gfcf_{t-1}$	0.4542	0.2019	0.037**
$\Delta gfcf_{t-2}$	-0.3071	0.2098	0.160
$\Delta swage$	-0.0350	0.2507	0.891
$\Delta swage_{t-1}$	0.5851	0.2875	0.057*
$\Delta scap$	-0.2839	0.1760	0.124
$\Delta scap_{t-1}$	-0.2404	0.1844	0.209
$\Delta ECM_{t-1}$	-0.8528	0.2343	0.002***

Note: The asterisk \*\*\*,\*\* and \* denotes significances respectively at the 1%, 5% and 10% level.

As shown in Table-6, the short-term relationship of the variables in the model (2) was analyzed with the estimated error correction model by using ARDL methodology. The ECM variable in model (4) is the error correction term and the coefficient of this variable indicates the error correction factor. The error correction term in Table-6 is negative and statistically significant. The ECM coefficient is approx. 0,85. Error correction mechanism shows the speed of adaptation between short and long term coefficients. The coefficient is expected to be between 0 and -1 due to the methodology.

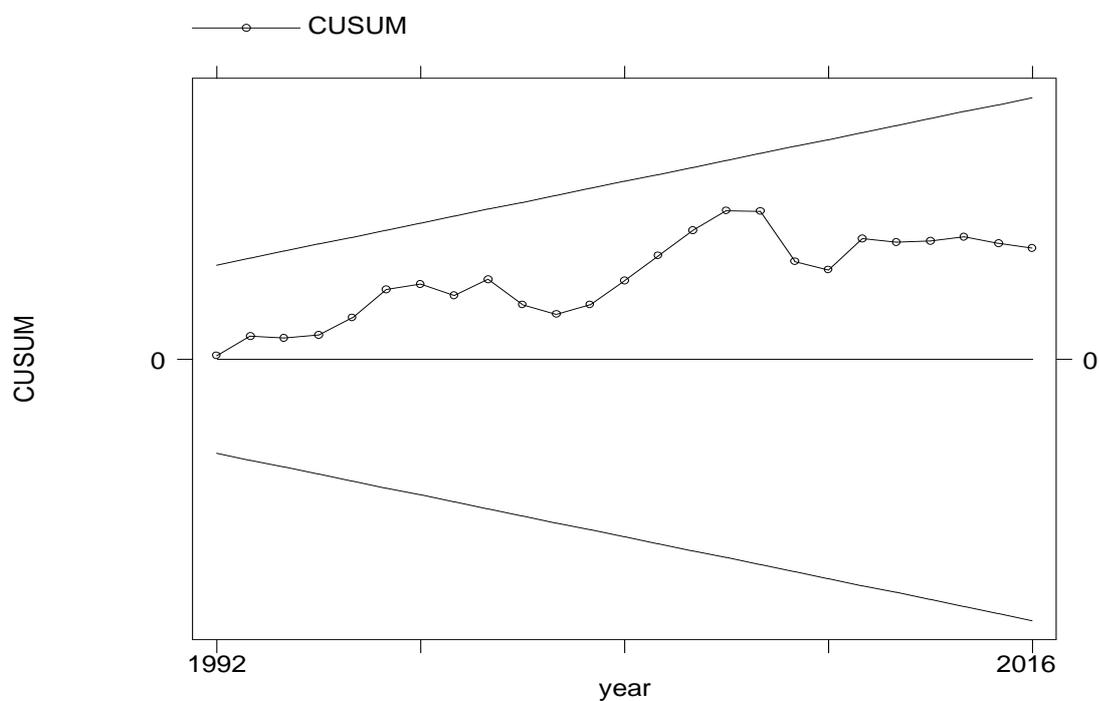
According to the result of the ECM coefficient in Table-6, this deviation is corrected in the long-run if there is a deviation from the equilibrium in the capital accumulation variable in the long-term analysis of the study. The magnitude of the ECM coefficient indicates the rate at which this correction will take place and how long. Accordingly, approximately 85% of this correction means that a short-term deviation is expected to disappear after about 1 year due to the use of annual data. On the other hand, according to the results of the short-term estimation, it is observed that all variables in the model are statistically significant at 5% and 10% except for the savings of the entrepreneur.

Some diagnostic tests are performed to determine the validity of the model and variables used in ARDL bound test methodology. Accordingly, autocorrelation and heteroscedasticity tests were performed the model and variables used in the study. Table-7 shows the results for Durbin-Watson (DW) autocorrelation and Breusch-Pagan Heteroscedasticity test.

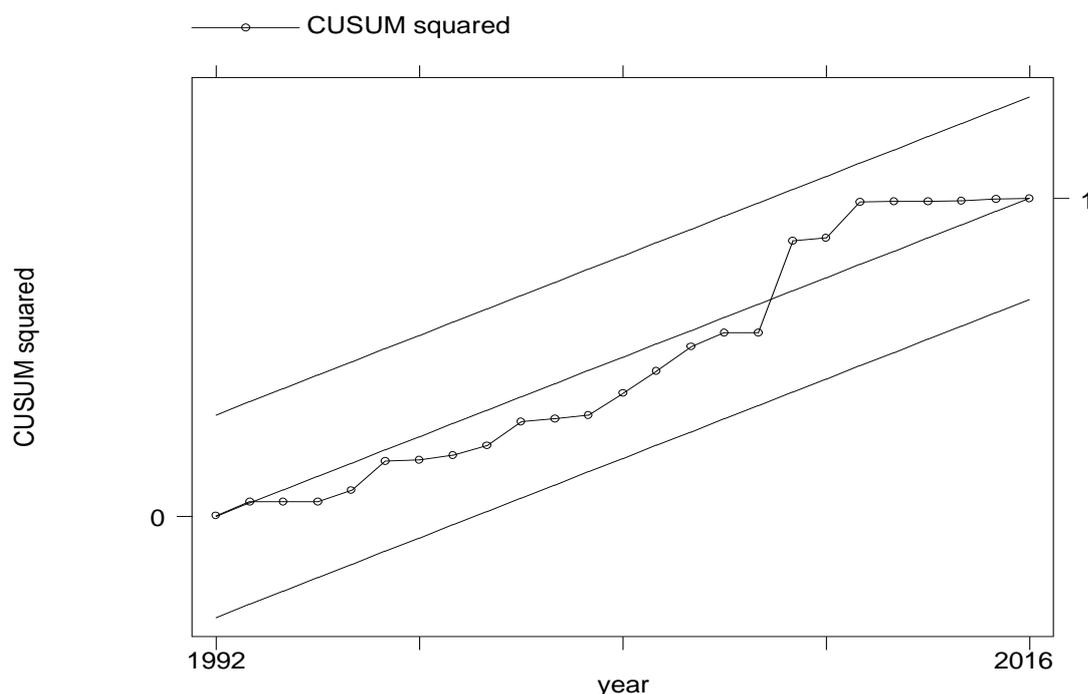
**Table-7: Diagnostic Tests**

<i>Tests</i>	<i>Calculated value</i>	<i>Chi-Square</i>	<i>Prob.</i>
<i>Durbin-Watson</i>	2.2103		
<i>d-statistic (7, 25)</i>			
<i>ARCH-LM</i>		0.342	0.5589
<i>Breusch-Godfrey</i>		1.505	0.2199
<i>Breusch-Pagan</i>		2.71	0.0995
<i>Heteroskedasticity</i>			
<i>test</i>			
<i>Ramsey-RESET test</i>	2.34		0.1143
<i>F(3, 15)</i>			

According to the results in Table-7, the model does not contain autocorrelation and heteroscedasticity problems. In the last stage of ARDL application, CUSUM tests are performed to measure the stability of the coefficients and to determine whether there is a structural break in the model as a result of the analysis.

**Figure-1: CUSUM Test**

**Figure-2: CUSUMSQ Test**



Note: CUSUM and CUSUM square figures show 5% confidence interval.

According to the figures above, the CUSUM and CUSUMSQ appears within the 5% confidence interval. These results accept the long-term relationship between variables. At the same time, these results also show the stability of the coefficients and the absence of a structural break in the model. CUSUM figures show that the ARDL bound test analysis in this study is verified as a whole.

### 5. Concluding Remarks

In this study, an analysis of the relationship between functional income distribution and economic growth by wage-led growth approach for households has conducted in Turkey. The major findings obtained in this study suggest that the structure of the economy in Turkey may be wage-led not only through consumption but also through savings. According to the findings of the study, when the wages increase, the savings of the labor force increases and so this has positive effects on the capital accumulation. In this study, which examines the relationship between functional income distribution and economic growth based on post-Keynesian approach, the effect of functional income distribution on economic growth has been analyzed with through the savings in contrast to the previous studies in related literature.

The results of the analysis performed by the ARDL bound test for households in Turkey, criticizes an assumption of post-Keynesian approach on savings strongly. This assumption is related to attributing private sector savings to only one segment of society. Accordingly, private sector savings in an economy are attributed only to the capitalists in both Neo-Classical and Keynesian theory. Although post-Keynesian theory suggests that there may be savings out of wages with the study of Kaldor (1955-56) and Pasinetti (1962), especially the recent post-Keynesian literature, which Kalecki (1954,1971) led and motivated, accepts the marginal saving propensity of labor is zero. Therefore, the findings of this study draw attention to the importance of a situation that is ignored in the related literature.

The findings obtained in this study contains some important consequences for Turkish economy. The most important of these results for Turkish economy is that determining the role of real wages that have been decreasing share in national income for the last thirty years. Real wages are an important element of demand in Turkish economy. However, according to the results of the analysis conducted in this study, real wages also have a positive effect on capital accumulation through savings. This is refused for Turkish economy that the hypothesis that wages are included in the production processes as a cost element according to Neo-Classical approach and therefore have a negative impact on capital accumulation and profit share, so that there is a conflict of interest between wages and profits or between labor and entrepreneur income. Another important result of the study is that determining the macroeconomic effects of savings out of labor's wages in Turkish economy. According to the results of the study that a significant and positive impacts of labor savings on macroeconomic indicators have been introduced for Turkey.

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