LONG-TERM CAPITAL GOODS IMPORTATION AND MINIMUM WAGE RELATIONSHIP IN TURKEY: BOUNDS TESTING APPROACH

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Abstract:

In order to examine the long-term relationship between capital goods importation and minimum wage, autoregressive distributed lag (ARDL) bounds testing approach to the cointegration is used in the study. According to bounds test results, a cointegration relation exists between the capital goods importation and the minimum wage. Therefore an ARDL(4,0) model is estimated in order to determine the long and short term relations between variables. According to the empirical analysis, there is a positive and significant relationship between the capital goods importation and the minimum wage in Turkey in the long term. A 1% increase in the minimum wage leads to a 0.8% increase in the capital goods importation in the long term. The result is similar for short term coefficients. The relationship observed in the long term is preserved in short term, though in a lower level. In terms of error correction model, it can be concluded that error correction mechanism works as the error correction term is negative and significant. Short term deviations might be resolved with the error correction mechanism in the long term. Accordingly, approximately 75% of any deviation from equilibrium which might arise in the previous six month period will be resolved in the current six month period. This means that returning to long term equilibrium progresses rapidly.

Key words: *capital goods importation, minimum wage, autoregressive distributed lag, ARDL, bounds testing*

1. Introduction

Recently, in conjunction with globalization, the extent and the content of international trade is in a continuous change, and has a dynamic structure. Minimum wage or flexible wage implementations in developed or developing countries greatly differ among the same manufacturing sectors; and majority of the population, particularly in developing countries, is forced to live at the minimum wage level. Here, the most important point to take into consideration is that working conditions and

wages (generally flexible wage) in developed countries differ from working conditions and wages (generally minimum wage) in developing countries even in the same sectors. Income of Low-Skilled Labor has a tendency to decrease both in developed and developing countries; yet income of High-Skilled Labor has a tendency to continuously increase. Climbing of the inequality between the wages of Low-Skilled Labor and High-Skilled Labor is attributed to two reasons by economists (Şener, 2001); the first one is the technology, and the second one is globalization of the world economy. Improvements in production techniques and increasing utilization of computer technologies have increased the demand for High-Skilled Labor. Along with the liberalization, which came into existence after 1980s, there was a shift from labor intensive works requiring low-skilled labor towards technology intensive high-skilled works requiring high-skilled labor. With regard to this dynamic structure, today global trade is shifting from west the east again. The reason of this is that; eastern countries, which adopted labor intensive production until 2000s, were able to attract foreign direct investments (FDI) by low cost workforce due to globalization, and as a result of such production processes, they became technology producers towards 2020s. Thus, eastern countries are now successful both in labor intensive production requiring sectors and technology intensive sectors (Amiti and Freund, 2010).

In global trade, borders have been removed and minimum wage level paid for the labor force has gained importance especially for the low skilled. Considering USA and Europe, the two important economic regions which have the highest rates in terms of wages, where global trade transactions are most intensive, USA implements flexible wage model whereas Europe determines a minimum wage level. Thus factor prizes converge, yet Europe prevents reduction of minimum wage below a specific level. One of the most significant reasons for the shift of global trade towards the Far East is that minimum wage level is considerably low in these countries (especially in China) compared to Europe and USA. This makes the situation difficult for the workers in European countries, but does not influence the workers in USA negatively (Davis, 1998).

When examined in terms of international trade theory, Basic Ricardian model considers manpower as the sole factor for production, and according to this model import goods might be purchased for lower prices compared to their substitutes which increase the personal income and the purchasing power (Hoon, 2001). However, spaced at 1.2 according to Hechscher-Ohlin based comparative advantages theory, unemployment decreases in a country which has a labor intensive production model. On the contrary, liberalization of trade increases unemployment if it becomes difficult to maintain labor supply (Dutt et al., 2009). Empirical studies indicate that increasing capital accumulation clarifies the growth of export sector and decrease of unemployment in Singapore (Looi and Hoon, 2005). Along with globalization, income of the high-skilled has increased and income of the low-skilled has decreased; thereby unemployment has increased in import-oriented competitive sectors yet unemployment has decreased in export-oriented sectors.

Stolper-Samuelson has pointed out the rigidity in the labor market due to trade liberalization, and suggested that wage negotiation increased inequality of wages in open economies. Decrease of high-skilled labor force improves negotiating power of this class for their wages and result in reduction of wages of the low-skilled. Within the context of Nash Bargaining, if you have a low threatening power, then the extent of your negotiating power decreases. This balance works against the low-skilled labor force. Due to globalization, foreign low skilled workers can easily replace especially domestic low-skilled labor force; therefore negotiating power of the low-skilled workers has decreased (Moore and Ranjan, 2005). According to (Freeman, 1995); who suggests that international trade should not be considered as unidimensional considering the fact that the intensity of the low-skilled labor force in each sector is not at the same level among countries therefore it would be difficult to make an accurate interpretation on wages; other parameters of this difficulty [including the increase in the use of technology in developing countries, the improvement in transportation facilities, the decrease in tariffs, the unexpected events in the world (wars, famines, political crisis), the level of education and labor unions] are a mystery. Empirical studies carried out in Turkey, in relation with these labor-oriented developments between international trade and wages, were mostly centered on the relations between sticky wages and inflation, distribution of income and unemployment (Özdemir et al., 2012;Kargı, 2013;Korkmaz and Coban, 2006). This study aims to clarify the long-term relationship between minimum wage and capital goods importation, using the capital goods import values of Turkey.

2. Data

Semi-annual total capital goods import data and total minimum wage data constitute the data set of this study. The data which covers the 1993:1-2013:2 periods are measured in terms of TL (Turkish Liras), and their natural logarithms are used in the analysis. The data in relation with capital goods import and minimum wages are obtained from the web sites of Turkish Statistical Institute, and Ministry of Labor and Social Security respectively. Minimum wages are regularly determined for same six month periods starting from 2007, yet they differ in terms of periods before 2007. Therefore, differential data are rearranged in compliance with 2007 and after that.

3. Methodology

In order to examine the long-term relationship between capital goods importation and minimum wage, autoregressive distributed lag (ARDL) bounds testing approach to the cointegration developed by Pesaran et al. (2001) is used in the study. The most significant superiority of bounds test on other cointegration methods is that it does not require the variables to be integrated at the same level. Therefore I(0) or I(1) variables are adequate to search for cointegration relation between them. Moreover, this approach might be used in data sets with limited number of observations.

The bounds testing approach might be summarized in two steps. In the first step unrestricted error correction model is estimated. With reference to this model, it is aimed to determine the long-term relationship between variables using standard F statistics. For this purpose, following unrestricted error correction model is used in the study.

$$\Delta \ln CGI_t = \beta_0 + \beta_1 T + \beta_2 \ln CGI_{t-1} + \beta_3 \ln MW_{t-1} + \sum_{i=1}^{p} \delta_i \Delta \ln CGI_{t-i} + \sum_{i=0}^{q} \theta_i \Delta \ln MW_{t-i} + \varepsilon_t \quad (1)$$

In the equation Δ indicates the first degree difference operator, T indicates the trend variable, lnCGI and lnMW indicate the natural logarithm of the capital goods importation and the minimum wage respectively. p and q are the optimal lag lengths for lnCGI and lnMW variables. These two parameters can be determined using information criteria like Akaike (AIC) and Schwarz (SIC). The model indicating the smallest value for relevant information criterion is selected as the final model. After determining the optimal lag lengths, F statistics is calculated for the null hypothesis as given below which indicates non-existence of cointegration.

$$H_0 : \beta_2 = \beta_3 = 0$$

The calculated test statistics has a non-standard distribution. Therefore, mentioned F statistics is compared with the lowest critical value considered all variables as I(0) and the highest critical value considered all variables as I(1). The critical values calculated for various model definitions are given in Pesaran et al. (2001). Accordingly, if F statistics is greater than the highest critical value, null hypothesis is rejected, indicating a cointegration relation between variables. On the other hand, if F statistics is smaller than the lowest critical value, null hypothesis cannot be rejected, and therefore a cointegration relation does not exist between variables. A third possible case is that F statistics might be between critical values which do not lead to any conclusion regarding cointegration relation. In cases with limited number of observations, mentioned critical values might be obtained from Narayan (2005).

If existence of a long-term relationship is identified in the first step, following ARDL model is estimated:

$$\ln CGI_t = \phi_0 + \phi_1 T + \sum_{i=1}^{p} \phi_{2i} \ln CGI_{t-i} + \sum_{i=0}^{q} \phi_{3i} \ln MW_{t-i} + u_t \quad (2)$$

While estimating this model, optimal lag lengths of variables are determined using information criterion like in the first step. Yet while determining both (1) and (2), it should be noted that there shall not be serial correlation problem in the models. This is a significant assumption required for validity of the bounds test (Pesaran et al., 2001).

Then, at the second step, the coefficients indicating the long-term relationship and the error correction model clarifying the short-term dynamics between relevant variables are estimated with reference to the ARDL model in (2).

4. Empirical Results

Before searching for the existence of a long-term relationship between discussed variables with the bounds testing approach, it must be ensured that not all variables are I(2); because all critical values are set with the assumption that they are either I(0) or I(1). Therefore, before estimating the unrestricted error correction model, augmented Dickey–Fuller unit root test is applied on the variables. Both constant and linear trend inclusive models were used in the unit root tests, and lag lengths of the models were determined according to Schwarz information criterion. Results are given in Table 1.

Table 1. ADF Unit Root Test Results

Variable	Level		1st Difference		Result
	Test Statistic	p value	Test Statistic	p value	
lnCGI	-4.4050 (3)	0.0062	-	-	I(0)
lnMW	-1.3762 (1)	0.8528	-10.7224 (0)	0.0000	I(1)

Note: Numbers in parentheses are optimal lag lengths based on SBC criterion.

It can be seen in Table 1 that lnCGI variable is I(0), and lnMW variable is I(1). Therefore, bounds testing approach might be used for analyzing the data. First, unrestricted error correction model is estimated by AIC criterion with maximum lag length as four. According to serial correlation test results applied on the estimated model, there is no serial correlation problem in the model. The F statistics calculated from the model is 13.703. This value is compared with the critical values (7.135 and 7.980) obtained from Narayan (2005) at 5% significance level for one variable. F statistics is greater than the highest critical value, so null hypothesis is rejected. Therefore a cointegration relation exists between the capital goods importation and the minimum wage. Bounds test results are given in Table 2.

Table 2. Bounds Test Results

Lag		AIC	Breusch-Godfrey		F Statistic	Critical Values (%5)	
lnCGI	lnMW		$X^2(1)$	$X^2(4)$		I(0)	I(1)
4	1	-46.363	0.050 (0.823)	2.094 (0.718)	13.703	7.135	7.980

Note: p values of serial correlation tests are given in parentheses.

At this point, the ARDL(4,0) model given in Table 3 is estimated in order to determine the long and short term relations between variables. While estimating the model, again maximum lag length is selected as four and optimal lag length is decided

with reference to AIC criterion. Applied serial correlation test results are also given in the table.

Table 3. Estimation Results of the ARDL(4,0) Model

Variable	Coefficient	Std. Error	t-Statistic	p value
Intercept	12.188	2.608	4.673	0.000
Trend	0.0176	0.006	2.789	0.009
$lnCGI_{t-1}$	0.323	0.124	2.600	0.014
$lnCGI_{t-2}$	0.193	0.119	1.623	0.115
$lnCGI_{t-3}$	-0.450	0.131	-3.422	0.002
$lnCGI_{t-4}$	0.185	0.108	1.714	0.096
lnMW	0.605	0.185	3.266	0.003

$R^2 = 0.995$, $\overline{R}^2 = 0.994$, $\hat{\sigma} = 0.121$,
$X^2(1) = 0.016$ (0.899), $X^2(4) = 4.645$ (0.326)

The long term and short term coefficients estimated using the ARDL (4,0) model is given in Table 4 and Table 5 respectively. As for long term coefficients, there is a positive and significant relationship between the capital goods importation and the minimum wage. A 1% increase in the minimum wage leads to a 0.8% increase in the capital goods importation in the long term. The result is similar for short term coefficients. The relationship observed in the long term is preserved, though in a lower level. When Table 5 is considered in terms of error correction model, it can be concluded that error correction mechanism works as the error correction term is negative and significant. Short term deviations might be resolved with the error correction mechanism in the long term. Accordingly, approximately 75% of any deviation from equilibrium which might arise in the previous six month period will be resolved in the current six month period. This means that returning to long term equilibrium progresses rapidly.

Table 4. ARDL (4,0) Long Term Model

Variable	Coefficient	Std. Error	t-Statistic	p value
Intercept	16.272	0.514	31.661	0.000
Trend	0.024	0.006	3.660	0.001
lnMW	0.808	0.067	11.971	0.000

Table 5. ARDL (4,0) Error Correction Model

Variable	Coefficient	Std. Error	t-Statistic	p value
Intercept	12.188	2.608	4.673	0.000
Trend	0.018	0.006	2.789	0.009
$\Delta lnCGI_{t-1}$	0.072	0.154	0.465	0.645
$\Delta lnCGI_{t-2}$	0.265	0.148	1.791	0.083
$\Delta lnCGI_{t-3}$	-0.185	0.108	-1.714	0.096
$\Delta lnMW$	0.605	0.185	3.266	0.003
ECT_{t-1}	-0.749	0.180	-4.158	0.000

5. Conclusions

According to the empirical analysis, there is a positive and significant relationship between the capital goods importation and the minimum wage in Turkey in the long term. A 1% increase in the minimum wage leads to a 0.8% increase in the capital goods importation in the long term. Increase in capital goods importation in the long term means growth of national economy; therefore our assumption regarding that an increase minimum wage in the long term is related to capital goods importation verifies the hypothesis stating that increases in minimum wages leads to increase in national income in the long term.

Increase in capital goods importation in countries with current account deficit, like in Turkey, is controlled by the Central Bank through interest rates (monetary transmission mechanism), short and long term loan interests being considerably high compared to world markets slows down capital goods importation, and economy operates below production potential in Turkey (Unutilized Capacity). This paradoxical situation causes the fact that, contrary to the continuous development of economy in Turkey, minimum wage remains at low levels.

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