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## **Export Price Stability and Compatibility of Euro under the Export- Biased Productivity Growth in Turkey: A Criticism against the Maastricht Inflation Criterion**

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**Abstract.** In this work, we analyzed the export- biased productivity, wage growth and the ULCP in Turkey. Then, by using input- output methods, we could show that Turkey has an economy which is able to be a part of the Euro system and Euro is compatible under the export- biased productivity growth in Turkey though its relatively high inflation. That means Maastricht inflation criterion should be revised in terms of countries' economic performance.

**Keywords.** Export-Biased Productivity, Unit Labor Cost Parity (ULCP), Wage Growth, Export Price.

**JEL.** E2, F5, N1, O4.

### **1. Introduction**

Turkey is the only country which waited for many years to become a member of the EU. Since 1999, Turkey has been a candidate to join the EU and it has been criticized because of political, cultural and human rights issues. However, this work will be about Turkey's economic performance. In this work, we will analyze the compatibility of the Euro under the export- biased productivity growth of Turkey. By using the Leontief inverse matrix, the growth rate of productivity in domestic and export industries will be calculated between 2001 and 2008. Then, we can find the unit labor cost parity (ULCP) of chosen countries and make a comparison analysis and a conclusion about Maastricht inflation criterion.

Before the 2000s, the Turkish economy was not strong and it was fragile against external factors. High inflation and trade deficit were the main problems in economy, which showed that Turkey cannot be the part of the EU. However, after the 2000 financial crisis, Turkey produced structural changes to regulate its economy. Therefore, in the last decade, inflation rate and government debt to GNP decreased dramatically and created a strong economy via high growth rates and development. The export- biased productivity growth increased significantly, and export price level became more stable. However, it is still open to question whether it can be a successful part of the EU. In order to make a comparative analysis, several countries were chosen: Germany, Sweden, the UK, Hungary, The Czech Republic and Poland. The strongest country in the center of the EMU (European Monetary Integration) is Germany which is also the central country in this analysis. Many countries became the part of EMU but some countries refused to be in this system. In order to make a comparison with exchange rates, Sweden, the UK,

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Hungary, the Czech Republic, and Poland were chosen because they use their own currencies.

By analyzing the ratios of export price to wholesale price of Turkey and other countries in the EU we can have an idea about export price stability. By calculating the growth rate of the productivity in export industries and wage growth, the ULCP will be estimated and its movement with exchange rates will be identified. In order to have a stable export price level, the disparity between the ULCP and exchange rate should not be very large. Through analyzing export industries' productivity growth, wage growth, and exchange rate we can make a comparison among the countries. These forms are very important because they are key elements of the regulation which helps countries to maintain stable economies through institutional arrangements (Boyer & Hollingsworth, 1997).

### 2. Concepts of Analysis

In this work, several forms were used. They are mainly wage growth, export-biased productivity growth, the ULCP and export price. Export-biased productivity and wage growth are important to calculate the ULCP. These key elements can help to see differences among countries' economic conditions. Moreover, these factors have influence on economic stability of a country. Income, distribution and generation of demand are affected by wage growth which plays big role in effective demand (Boyer, 1990; Boyer & Saillard, 2002). These forms are important factors to regulate economies or help economies to produce new plans in the next future.

The export price level's stability depends on the productivity growth in export industries. If the productivity in export industries increases, with a high degree of probability, the export price level decreases related to the central country's condition. Thus, the export price stability can be broken by the rising export-biased productivity growth. In order to analyze the export price stability, the ratio of the export price to whole price will be calculated. If the ratio is around one, it means the export-biased productivity growth does not break stability, if the ratio is below zero, it means export goods' price decreases compare to the domestic goods' price – goods just for domestic market (Uni, 2007 & 2012). There are some other factors that influence export-biased productivity growth; exchange rate, investment, technology and new organizations. For example, the FDI became important part of increasing productivity growth in export industries in developing countries.

The stable export price level is produced by the relation among the growth rate of the productivity in domestic industries, export industries, and wage growth. These three forms will be calculated by using input-output methods. Thus, their relationship with each other will be analyzed. The high growth rate of wage increases the ULC and inflation rate. If the productivity growth in export industries is bigger than the wage growth, the ULCP of a country decreases compared to the central country which is in center of analysis (Germany) in terms of the monetary integration of the EU. The disparity between the appreciation of the ULCP and exchange rate creates unstable export price level.

If Turkey becomes a part of the Euro system, it will lose the chance to devalue the lira against foreign currencies. In current member countries of the EU, trade deficits were eliminated by the devaluation of exchange rates before the EMU. For example, if Turkey devalues the lira, it means that the price of export goods decreases; thus, it helps the country to reduce its trade deficit (Uni, 2007). Devaluation in national currency increases export-biased productivity. However, if a country cannot use the tool of exchange rate, it can go to repress wage growth for

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the internal devaluation which causes a low inflation rate and a slow economic growth.

In the EU, the band level for monetary integration was 2.25 percent before 1992. However, this rule created monetary problems in member countries. Therefore, band level was increased to 15 percent which means a country after becoming a member country, its national currency should fluctuated in decided band level. In order to be the part of the EMU, France successfully decreased its national currency' fluctuation rate against Mark (Aglietta & Uctum, 1995). Turkish lira's fluctuation was very large before the 2000s. However, in the last decade, the fluctuation of Lira declined significantly. The lira fluctuated averagely in 15 percent fluctuation band against the euro, which means that the lira moved between the volatility levels of ERM II.<sup>1</sup> The ERM (Exchange Rate Mechanism) was used before 1999. ERM II was established to provide economic stability among member countries. Also, this institution was used as the base of the monetary integration for some countries whose exchange rates fluctuated greatly against Euro. In essence, this system ensures the stability among the currencies of EU's member countries. In order to be the part of the Euro System, a country should be the part of ERM II and fix its currency to the euro. This country has right to vary its own currency within limited band levels. A currency can fluctuate by 15 percent. Therefore, a country which is not in the Euro system can decide its currency fluctuation margin up to the decided band limit.

### 3. Methods of Analysis

By using Leontief inverse matrix (Pasinetti, 1993) export- biased productivity growth will be calculated. In order to find the productivity growth in domestic and export industries (Uni, 2012 and Uni, 2007), input and output tables were used derived from world input output database, and the ULCPs were found via these calculations;

$$x_i = x_{i1} + x_{i2} + \dots + x_{in} + Y_i \quad (2.1)$$

We can find results in each production industries by sets of equations;

$$\begin{aligned} x_1 &= x_{11} + x_{12} + \dots + x_{1n} + Y_1 \\ x_2 &= x_{21} + x_{22} + \dots + x_{2n} + Y_2 \\ &\dots \\ x_i &= x_{i1} + x_{i2} + \dots + x_{in} + Y_i \\ &\dots \\ x_n &= x_{n1} + x_{n2} + \dots + x_{nn} + Y_n \end{aligned} \quad (2.2)$$

Technological coefficient is "a<sub>ij</sub>". In order to show delivery from industry "i" to industry "j" on the level of output in industry "j" (X<sub>j</sub>), and "a<sub>ij</sub>", the equation evolves into a new form as indicated below;

$$\begin{aligned} x_{ij} &= a_{ij} \cdot X_j \\ a_{ij} &= x_{ij} / X_j \end{aligned} \quad (2.3)$$

"a<sub>ij</sub>" shows the technological coefficients of industries. If the equation is rearranged for the industries by substituting (2.3) into (2.2);

<sup>1</sup> Source: European Commission

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$$\begin{aligned}
 x_1 &= a_{11}x_1 + a_{12}x_2 + a_{13}x_3 + \dots + a_{1n}x_n + y_1 \\
 x_2 &= a_{21}x_1 + a_{22}x_2 + a_{23}x_3 + \dots + a_{2n}x_n + y_2 \\
 x_3 &= a_{31}x_1 + a_{32}x_2 + a_{33}x_3 + \dots + a_{3n}x_n + y_3 \\
 &\dots \\
 x_n &= a_{n1}x_1 + a_{n2}x_2 + a_{n3}x_3 + \dots + a_{nn}x_n + y_n
 \end{aligned} \tag{2.4}$$

It will be useful to create a formulation in matrix equation as follows;

$$Ax + y = x \tag{2.5}$$

In this equation “A” shows technological coefficients matrix, “y” represents the vector of final demand and “x” is a vector indicates changes in outputs. This form can be written by “I” unit matrix as follows;

$$\begin{aligned}
 y &= x - Ax \\
 y &= (I - A)x \\
 x &= (I - A)^{-1}y
 \end{aligned} \tag{2.6}$$

Thus we can see the Leontief inverse matrix  $(I - A)^{-1}$  in the equation to calculate directly and indirectly required labor to produce one physical unit of each commodity. Thus, in order to measure the productivity growth in domestic and export industries, the equation described below is used.

$$e x = L \tag{2.7}$$

$$(I - A)^{-1}y = L \tag{2.8}$$

$$e(I - A)^{-1} = v \tag{2.9}$$

$$vy = v(D + F) = L \tag{2.10}$$

In the equation domestic final demand is “D” and export is “F”. “e” is a row vector that shows the amount of labor which is used directly and indirectly to produce one unit of output in each industry. “L” is a scalar which shows total labor in an input- output table.

$$D = d \sum D \text{ and } F = f \sum F \tag{2.11}$$

$$v(d \sum D + f \sum F) = vd \sum D + vf \sum F = L \tag{2.12}$$

vd and vf are the vertically integrated labor input coefficient of domestic industries and export industries respectively. Labor productivity is calculated by vertically integrated input labor coefficients (Pomini 2012) and (Yagi 2012) in each factor; demand and export. If coefficients decrease, it means the productivity in domestic and export industries increase. We found the coefficients respectively, then, calculated the rate of decrease in the coefficients which shows the growth rate of productivities.

$$\begin{aligned}
 ULCP^A &= \left[ \frac{(w_{t+1}^T) - (w_t^T)}{(w_t^T)} - \frac{(vf_t^T * p_t^T) - (vf_{t+1}^T * p_{t+1}^T)}{(vf_t^T * p_t^T)} \right] \\
 &- \left[ \frac{(w_{t+1}^G) - (w_t^G)}{(w_t^G)} - \frac{(vf_t^G * p_t^G) - (vf_{t+1}^G * p_{t+1}^G)}{(vf_t^G * p_t^G)} \right]
 \end{aligned}$$

In the equation,  $w^T$ ,  $vf^T$  and  $p^T$  show the nominal wage, integrated labor input coefficient and export price level in Turkey respectively.  $w^G$ ,  $vf^G$  and  $p^G$  indicate the nominal wage, integrated labor input coefficient and export price level in Germany respectively. Hence, we can calculate the appreciation of the ULCP against Germany. Finally, it can be possible to estimate whether the ULCP decreased in Turkey which has influence on the export- biased productivity. Export- biased productivity growth emerges if export industries’ productivity is

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larger than that of domestic industries. The ULCP means the value of labor in different countries based on the central country. If the ULCP decreases that means appreciation.

### 4. Export Price Stability in Turkey

Turkey's integration process into the EU began nearly 60 years ago. After 1958, when the European Economic Community was created, Turkey made its first attempt to join. In 1963, with the Ankara Agreement, negotiations resulted in an association between Turkey and the EEC. In the 1970s, association with the customs union began, which provided for the abolition of tariff and quantitative barriers in a short time for the member countries, but in 12 and 22 years for Turkey. After several political problems, Turkey finally applied for full membership of the EU in 1987. In 1999, Turkey became a candidate of the EU<sup>2</sup>.

During the 1980s, as many countries did, Turkey became the part of global neoliberal policies. However, this result did not help it to become a strong economy. During the 1990s, the ratio of net public debt to GNP increased from 29 percent to 61 percent, inflation rate rose above 80 percent, the growth rate of the productivity in export industries decreased, and Lira was dramatically devaluated.<sup>3</sup> Export price level went up with increases in wage growth rate. Hence, it cannot be said that Turkey was a country for the monetary integration in Europe. Turkey had a chronic inflation problem for many years which made it impossible to be the part of the EU. After the severe economic crisis in 2000, Turkey instituted significant regulations in its economy and created new policies called the transition to a strong economy. Thereby, the growth rate of wage decreased with inflation rate because of the high wage growth that was not indexed to the growth rate of the productivity in domestic or export industries.

According to the Maastricht Criteria, the member countries have to have stable price levels and the average rate of inflation should not exceed the three best-performing countries by more than 1.5 percent.<sup>4</sup> The ratio of the annual government deficit to gross domestic product (GDP) should not be more than 3 percent or should be close to the demand level at the end of the preceding financial year; the ratio of gross government debt to GDP should not exceed 60 percent. If the country cannot reach this level, it should at least approach 60 percent; in the category of the exchange rate, the member countries should not devalue their national currencies for at least two years against any other member countries' currency; the long-term interest rate should not exceed the best performing member countries by more than 2 percent.<sup>5</sup> Turkey successfully decreased government deficit and government debt after 2000. The ratio of the annual government deficit to GDP was at 2.1 percent, and the ratio of the gross government debt to GDP was 36 percent in 2012<sup>6</sup>. Therefore, Turkey became an example of a country which reduced the public debt successfully in the last ten years. However, according to the criteria, in order to have price stability, Turkey needs to decrease inflation rate. Therefore, in this work, we will look at the export price stability by the ratio of the export price to wholesale price. Thereby, it can be

<sup>2</sup> Source: Republic of Turkey, Ministry for EU Affairs.

<sup>3</sup> Source: Central Bank of the Republic of Turkey (TCMB): "Strengthening The Turkish Economy: Turkey's Transition Program"

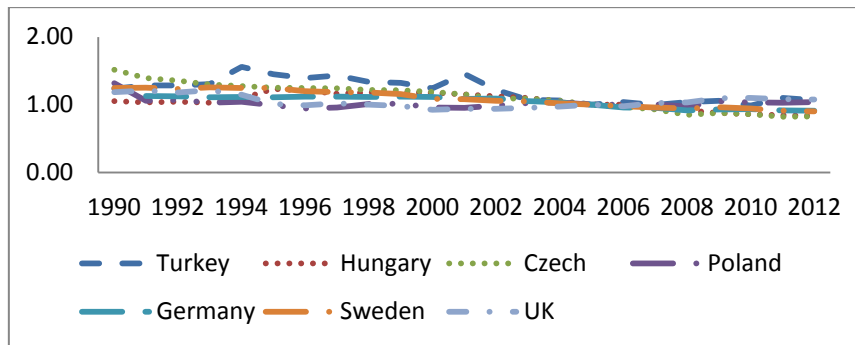
<sup>4</sup> Source: European Central Bank: "The Maastricht Convergence Criteria and Optimal Monetary Policy for the EMU Accession Countries"

<sup>5</sup> Source: European Commission: "Summaries of EU Legislation"

<sup>6</sup> Source: IMF (International Monetary Fund).

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clear that relatively high inflation rate of Turkey influenced on export price or not compared to that of the member countries in the EU.



**FIGURE 1.** *Ratio of Export Price to Wholesale Price in European Countries*

**Source:** Author's Calculation; deflators derived from the World Bank and the United Nations; 2005=100

In order to create a strong monetary integration in a region, the ratio of export price to wholesale price should not fluctuate dramatically. The ratios of countries have to be closer to each other. If it is around one the growth rate of the productivity in domestic and export industries do not cause disproportional growth which means they change at similar rate over years (Uni, 2012 and Uni, 2000). Mainly, the ratio of export price to wholesale price depends on export- biased productivity growth, wage growth, the ULCP and the exchange rate. If the exchange rate devalues, while the appreciation rate of the ULCP increases, export price decreases that shows importance of the relationship between exchange rate and the ULCP.

The figure indicates the ratio of export price to wholesale price in European countries between 1990 and 2012. If we take 2005 the normalization period in account, we can see the differences in export prices over years. Before 2005, the ratio was very high in Turkey. In 1995, it reached the 1.5 level whereas in the current member countries, it was much lower. Structural problems caused instability in export price level before the 2000s. after 2005, by the new government and new reforms, the wage growth rate decreased with inflation rate, also, the disparity between the ULCP and exchange rate disappeared, thus, the ratio became around one compared to other European countries. The growth rate of productivity in domestic and export industries' influence on export price became more stable. In member countries Hungary, the Czech Republic, Germany and Sweden export price decreased after the normalization year. The ratio decreased by nearly 20 percent in Hungary and the Czech Republic, and 10 percent in Germany and Sweden. Their price levels became 0.8 and 0.9 respectively in 2012. However, the ratios of Turkey, Poland and the UK stayed at around the 1.0 level and export price did not decreased in these countries.

## 5. Analysis of Export- Biased Productivity Growth and ULCP

During the 2000s, the Turkish economy became more stable. The wage growth was indexed to the productivity growth in industries. The FDI inflows to Turkey increased significantly more than in Hungary and the Czech Republic.<sup>7</sup> Turkey has been the one of the fastest growing countries around the world in the last decade.

<sup>7</sup> Source: Republic of Turkey Ministry of Economy "Foreign Direct Investment in Turkey 2012"

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The GDP and GDP per capita tripled which made it to be the one of leading countries in Europe. Turkey did not have serious problems in economy except in the year of 2008 crisis that caused low productivity growths.

The table shows the mid- term growth rates of productivity in domestic and export industries between 2001 and 2008. According to this table, the growth rate of the productivity in export industries was 8.7 percent two times bigger than the growth rate of the productivity in domestic industries. Wage growth and Inflation rate were 17.4 percent and 21.7 percent respectively. Inflation rate was high because in 2001 and 2002, it just began decreasing. After 2003 dropped below 10 percent and in 2011 it became 6.4 percent. The appreciation in the exchange rate against Euro was -9.3 percent and in the ULCP it was -10.3 percent. In these years, the growth rate of the productivity in export industries was lower than the growth rate of wage by nearly 9 percent and higher than the growth rate in domestic industries by nearly 4 percent, but wage growth decreased significantly compared to before the 2000s, at that time, growth rate of wage and inflation rate were dramatically high around 70 percent.

The difference between the appreciation in the ULCP and exchange rate was around 1 percent which means two forms fluctuated closer to each other. However, compare to the ULCP, it can be seen that Lira's appreciation rate was higher than the ULCP's in Turkey. The appreciation of the ULCP was negative because the growth rate of wage was higher than the growth rate of the productivity in export industries compared to that of Germany. After 2000, Turkey could create high growth rates in the productivity of export industries. However, high wage growths kept the export price in stability and prevented it to decrease after the normalization year. This was the one of the reasons that inflation rate was still high in Turkey because it was not decreased compared to the rising the productivity growth. The wage growth in Turkey had an inclination towards the productivity growth in export industries. In 2004, wage was indexed to the export industries' productivity growth. In this year, the export industries' productivity growth was 11.1 percent, wage growth was 10.1 percent and inflation rate was 10.5 percent. After the global financial crisis, in 2009, the annual export industries' productivity growth was 7.8 percent, wage growth was 9.9 percent and inflation rate was 6.2 percent.

**TABLE 1.** *Comparing Turkey with The Member Countries in the EU*

Countries	Productivity	Growth	Wage Growth	Inflation	Appreciation	Appreciation
	Domestic Industries	Export Industries			in Exchange Rates Against Euro	in ULCP Against Germany
Turkey	4.3	8.7	17.4	21.7	-9.3	-10.3
Hungary	2.6	9.4	9.6	5.9	-1.3	-1.8
Czech R.	3.0	9.0	6.7	2.5	2.9	0.6
Poland	3.8	4.7	5.1	2.7	-2.6	-2.0
Sweden	2.0	3.9	3.1	1.7	-1.8	-0.9
UK	2.2	2.9	3.7	1.3	-4.7	-2.5
Germany	0.9	3.3	1.7	1.7		

**Source:** Author's Calculation; the mid- term growth rate of the productivity in the domestic and export industries calculated from World Input-Output Database, the annual averages of exchange

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rates and the growth rates of wage in manufacturing calculated from OECD, the rates of Inflation are derived from World Bank.

The table shows the data in chosen countries between 2001 and 2008. The growth rate of the productivity in export industries and wage growth- rate were 9.4 percent and 9.6 percent respectively in Hungary. This shows the wage was indexed to the productivity growth in export industries. The gap between these two factors was not larger. Therefore, the appreciation rate of exchange rate and the ULCP were higher than in Turkey against that of Germany whose growth rate of wages was lower than the growth rate of the productivity in export industries. In Germany, the growth rate of the productivity of domestic industries was 0.9 percent lower than export industries' productivity growth and inflation rate was 1.7 percent. In Hungary, the appreciation rate of the ULCP and exchange rate was -1.8 percent and -1.3 percent respectively, which means the these two forms fluctuated closer together between 2001 and 2008.

In the Czech Republic, as can be seen on the table, the mid- term growth rate of wage and the export industries' productivity were 6.7 percent and 9.0 percent respectively. Since the growth rate of wage was lower than the export industries' productivity growth its inflation rate was 2.5 percent lower than in Turkey and Hungary and the appreciation growth rate in the ULCP and exchange rate were 0.6 and 2.9 percent respectively higher than in other countries. However, as can be seen on the figure 1, the rising export- biased productivity and lower wage growth caused export price to decrease in this country.

The growth rate of the productivity in export industries was higher than the growth rate of the productivity in industries shows that Poland had the export- biased productivity growth. The export industries' productivity growth was 4.7 percent and wage growth was 5.1 percent. The inflation rate was low around 2.7 percent. The appreciation growth rate of exchange rate and the ULCP were -2.6 percent and -2.0 percent respectively. The high wage growth provided the export price to be stable in Poland similar to Turkey.

In Sweden, the export industries' productivity growth was higher than the wage growth by 0.8 points. However, the 1.6 percent differences between these factors in Germany caused Sweden to produce a lower growth rate in the appreciation of exchange rate and the ULCP which were -1.8 percent and -0.9 percent respectively. Inflation rate was 1.7 percent in Sweden. The export price decreased after the normalization period under the export- biased productivity growth (see figure 1).

In the UK, the growth rate of wages was around 3.7 percent. The productivity growth in export industries was 2.9 percent. The wage growth rate was higher than the growth rate of the productivity in export industries by 0.8 points. Hence, the appreciation of the ULCP was -2.5 percent, and the exchange rate was -4.7 percent against Germany and inflation rate was around 1.3 percent. Over the years, the export price of the UK did not decline compared to other countries in the EU. As can be seen the wage growth was closer to the export industries' productivity growth just as in Turkey and Poland.

## 6. Conclusion

In this work, the export- biased productivity growth, wage growth, the ULCP and export price were analyzed to indicate that Turkish lira has compatibility with the Euro system. In order to create a stable monetary integration, export price level should not fluctuate greatly. As can be seen on figure and table over time between 2001 and 2008, Turkey's export price level did not change significantly after the normalization year, which means Turkey successfully kept its ratio of export prices to wholesale prices at a stable level around one, whereas this ratio decreased in



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Hungary, the Czech Republic, Sweden and Germany. In Turkey, the gap between the ULCP and exchange rate were closer each other, and Lira did not lose significant value, in particular, fluctuated in the decided band level of the Maastricht criteria. After 2000, Turkey has been a stable economy, and better equipped to join the EU and the Euro System. In other words, the disproportional growth of productivity between domestic and export industries did not change export price level. Relatively high inflation emerged because the wage growth was not strongly indexed to the export industries' productivity growth. However, although Turkey has a relatively high inflation rate compared to the other member countries, it has successfully kept the ratio of export price to wholesale price around one. That is to say Euro can be compatible under export- biased productivity growth in Turkey. Therefore, the Maastricht inflation criterion should be overviewed and revised in terms of the Countries' economic performance.

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