Purchasing Power Parity in the Euro Area: Evidence from Structural Break LM Test

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ABSTRACT

Purchasing power parity (PPP) which is an indicator of price level varieties across the countries is a popular work item at the present time. This study focuses on PPP for EU member countries which use Euro. In other words, in this study, Bulgaria, Croatia, Czech Republic, Denmark, Hungary, Latvia, Lithuania, Poland, Romania, Sweden and the United Kingdom which do not use Euro among the 28 member countries are being ignored, the study deals with 19 EU member countries which use Euro (Euro zone). These countries are Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Portugal, Slovakia, Slovenia, Spain and the Netherlands. In this study, LM unit root test which is improved by Lee ve Strazicich have been perfomed for the countries in question between 2000 and 2016 by gauss method.

Keywords: Purchasing Power Parity, Real Exchange Rate, EU Member Countries, Unit Root Test
JEL Classification: F31

1. INTRODUCTİON

From a historical standpoint, purchasing power parity (PPP) is one of the most studied research topic (Taylor, 2000. p. 1). The PPP theory has been traced to the University of Salamanca in Spain in 16th century and to the writings of Gerrard de Malynes appearing in 1601 in England. In the second part of the 18th and in the early 19th century the Swedih, French and English bullionists present further statements of PPP. Especially remarkable is the Builon Report in England. It arises in the context of the large inflows of precious metals from America. During the 19th century, classical economists like Ricardo, Mill, Marshall and Goshen have developed more or less their views on PPP. But even though the term PPP theory was well established by the time of 1. World War it was systematically taken up by the Swedish economist Gustav Cassel for the first time in 1918 and his first contributions on the subject were published in the Economic Journal (Nkurunziza, 2016. p. 17; Dornbusch, 1985. p. 6-7; Sarno and Taylor, 2002. p. 66; Duarte, 2005. p. 2).

The PPP theory says that the exchange rate change between two currencies is determined by the relative prices of two countries.

The PPP, which is a rate that transforms national currencies by eliminating price differences between countries, allows for a more accurate and reliable comparison of the level of development between countries (Tıraşoğlu, 2014. p. 69). The most widespread way to test for PPP consist in investigating unit root in real exchange rates. If the unit root can be deny in favor of level stationary, then deviations from parity are temporary and PPP is said to be hold in long term (Lopez and Papell, 2002. p. 1). The PPP has become increasingly widespread in 1973 with the collapse of the Bretton Woods system in IMF member countries and the increasing fluctations in real exchange rates as industrialized countries transition to a flexible exchange rate system (Yalçınkaya, 2016. p. 146).

Historically, the relative value of money in different countries was first examined by Colin Clark and published in 1940. In this study, he compared the PPP of many currencies across a series of consumption goods. In the early 1950s, Irving Kralis and Milton Gilbert, at the Organization of the European Economic Community (OECD), used national accounts data to compare the national incomes of four western European countries and the United States (Vachris and Thomas, 1999. p. 4).

This study, deals with Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Portugal, Slovakia, Slovenia Spain and the Netherlands, which are EU member countries and use Euro (Euro zone). In these countries, PPP between 2000 and 2016 will be examined and LM unit root test will be made with gauss method. Therefore, inflation (consumer price indexes) were obtained from The World Bank (WDI) and real exchange rate were obtained and after, an econometric model was created.

The study is organized as follows. In the second section, the concept of PPP is explained and briefly, the absolute PPP and the relative PPP are mentioned. In the third part of the study, a literature review has been made and the results of these studies are explained. In the fourth section, econometric analysis has been made and findings were reached. And in the last section, the results are explained.

2. THE CONCEPT OF PPP

For the international investor, risk at capital and money international markets is highly associated with exchange rates. For companies operating internationally, transactions and economic risk are determined by exchange rates. The PPP is thus one of the oldest and controversial doctrines of international finance (Cabello et al., 2005. p. 3). One of the reason is that policy makers, researchers, businesses and consumers want to compare incomes and expenditures when prices change or are different. The comparison of incomes and measurement of changes in incomes is one of the basic tools for analyzing the success of economic policies and especially, in asking about development (Moon et al., 2004. p. 1).

Recently, PPP has been a comprehensive subject of voluminous research (Lopez et al., 2004. p. 1). PPP is the law of one price applied to foreign exchange markets. In other words, the law of one price is the building block of PPP (Sarno and Taylor, 2002. p. 66). PPP can be expressed as a rate change that equals the purchasing power of different currencies by eliminating price level differences between countries (http://www.mahfiegilmez.com/2012/05/satnalma-gucu-paritesi-nedir.html Accessed: 05.12.2017). In other words, the PPP, which is the keystone of many theoretical models of international finance can be defined as the price ratio of the basket of goods and services in different countries. Accordingly, in addition to eliminating price differences between countries, real prices and volumes can be compared internationally. The law of one price relates exchange rates to prices of individual goods in diversified countries (Hakkio, 1992. p. 37). The PPP shows that when the PPP is the same in each of the two countries, the exchange rates between the currencies are balanced. This means that the exchange rate between any two countries should be equal to the fixed price of goods and services in two currencies (TÜİK; Alper, 2015. p. 91). The PPP is important for exchange rate estimates. For example, for the misalignment of the nominal exchange rate and the determination of the appropriate policy response, the determination of exchange rate parities, and the international comparison of national income levels (Sarno and Taylor, 2002. p. 66). PPP is an international multilateral price index calculated by the World Bank using international comparison data (Niu et al., 2016. p. 68). The only price law applicable to all economic assests subject to international trade, where the free trade of international trade is the same, the price of the same commodity, converted from the current exchange rate to a certain national currency, is the same everywhere in the world, meaning that there must be a single price (Seyidoğlu, 2013. p. 439-440).

The method of calculating the real value of a foreign currency which may be different from the current market price is called PPP. Calculating the PPP is useful to compare living standards in different countries to show the appropriate exchange rate for use in expressing income and prices in different countries for a general foreign exchange.

Economists says that a supply of money and a demand with a correct value will bring the rate to the balance in the long run. Current market rate shows only the short run equilibrium. They say that when measured by a common currency, the value of goods and services must be the same in all countries. The exchange rate is equal to the basket price of identical goods and services bought and sold in two different countries.

Generally, the PPP is very different from the current market exchange rate. Some economists argue that once the exchange rate moves away from the PPP, the trade and financial flows in a country will stabilize, leading to potential trade and current account deficits or surpluses. Instead, they prefer to designate a basic balance exchange rate that is both harmonious with that of an exchange rate that includes an exchange rate of goods and services as well as flows of capital, to ensure that an entirely reaches a general balance with the outside world (Bishop, 2013. p. 313).

PPP is different from exchange rate. PPP sets for differences in price levels between countries/economies and enable more robust comparisons of economic output, productivity and standards of living, based on a common set of average international prices (Han, 2008. p. 7).

In the long run, it is the inflationary developments that take place among countries which determine the exchange rate developments. Besides, in the long run, no country can withstand the deterioration of competitiveness because such a situation will harm net exports and also national income and employment. If a country has higher inflation than abroad, the exchange rate of that country should be weakened in the long run and should be equal to long run real exchange rate. Namely;

$$\frac{e_{t+1} - e}{e_t} = \pi - \pi^u$$

Where $\left(\dfrac{e_{t+1} - e}{e_t} \right)$ is the percentage change in nominal exchange rate, (π) is the domestic inflation and last (π^u) is the foreign inflation. This is also called the PPP theory. The meaning of this equation is that the percentage change in long run exchange rate corresponds to inflation differences between countries.

If domestic inflation is bigger than international inflation, local currency will weaken in the long run.

If domestic inflation is smaller than international inflation then it will be reflected in a corresponding strengthening of the local currency in the long run.

PPP which indicates that exchange rates and national-international inflation rates are linked can be handled and examined in two ways: (1) Absolute and (2) relative.

The equation of real exchange rate in the absolute PPP is as follows (Biede, 2015):

$$\varepsilon_t = e_t * \frac{P_t^*}{P_t}$$

Where (ε_t) is the real exchange rate, (e_t) is the nominal exchange rate and (P_t^u) and (P_t) are in turn the foreign and domestic price indices.

For the above equation, expressed logarithmically it will be as below (Çağlayan and Saçaklı, 2006. p. 127).

$$\ln R_r = \ln E_t + \ln P_t^* - \ln P_t$$

2.1. Absolute PPP

According to absolute PPP, the exchange rate between the two countries should be the same as the price levels for these two countries (https://www.investopedia.com/exam-guide/cfa-level-1/global-economic-analysis/absolute-relative-purchasing-power-parity.asp (Accessed: 16.12.2017). In other words, absolute PPP expresses that the domestic and foreign bundless of goods should sell for the same price when expressed in a widespread currency (Tambiev, 2015. p. 4).

For the realization of the absolute PPP, there is a constraint. The constraint in question, real exchange rate must be equal to 1.

The real exchange rate for the absolute PPP is expressed as follows:

$$r_t = e_t + p_t^* - p_t$$

2.2. Relative PPP

Relative PPP, emphasizing arbitrage across time instead across space, is that the exchange rate will adjust to offset inflation differentials between countries (Papell and Prodan, 2003. p. 1). Accordingly, the relative changes in the factors of price and exchange rates should be considered. Namely, the inflation rate (an increase in the general level of prices) between two countries cause exchange rates to change. According to the foreign country, the higher the inflation rates are in the national economy, the more the exchange rate needs to increase at that rate in the country in question (Seyidoğlu, 2013. p. 444).

The relative PPP assumes that there will be no change in the relative prices of the various goods in the countries. This approach shows the relationship between inflation rates.

The relative PPP predicts that the real exchange rate will be constant in equilibirum. The equation of real exchange rate in the relative PPP is as follows:

$$\Delta r_t = \Delta e_t + \Delta p_t^* - \Delta p_t$$

Where Δ shows the differences of the series. While there is a constraint where the real exchange rate have to been 1 in the absolute PPP, there is no such constraint on the relative PPP. When the absolute PPP does not come true, the relative PPP may be valid expected to be valid (Findreng, 2014. p. 24; Çağlayan and Saçaklı, 2006. p. 127).

3. LITERATURE REVIEW

There have been made some studies about PPP. Specially, there are a lot of studies about the validity of the theoretical PPP both for developed and for developing countries in the literature and very different results have been achieved. These studies continue to attract the attention of both empirical and theoretical economists. This may be due to the fact that in recent times, there has been a rapid theoretical development or and ambigous outcome in studies (Žďárek, 2010. p. 4; Taylor, 2002. p. 139). Many different econometric methods such as unit root tests and cointegration analyzes have been used in the studies in question. Accordingly, the findings obtained may differ accordingly to the methods used.

The first studies on PPP in developed countries used univariate Augmented Dickey-Fuller tests with post-1973 flexible (nominal) exchange rate and they often have no evidence for the long-term PPP (Alba and Papell, 2005. p. 1).

Some of the strongest evidence of long run PPP is provided by Taylor (2002). One of the most significant contribution of Taylor's work is to construct real exchange rate data for over 100 years for 20 countries (Lopez et al., 2004. p. 1).

There is a limited number of studies on the validity of the PPP hypothesis for European Union member states using the Euro currency (Euro zone). This section focuses on examining existing and previous studies on the PPP.

In the literature, PPP hypothesis of Romania (Barlow and Redulescu, 2002) and Turkey (Sarno, 2000; Yazgan, 2003) for studies indicating that the PPP hypothesis is provided (Kasman, Ayhan, 2008).

Zumaquero and Urrea (2002) performed Bai-Perron unit root tests and Granger ECM cointegration analysis for 7 developed countries. In the study, they investigated 1975:1–1995:12 period and as a result, they have come to the conclusion that the PPP hypothesis for the countries in question is invalid.

Breitung and Candelon (2005) investigated the validity of the PPP hypothesis of the Mexican and Asian crisis. They studied a widespread group of countries from Asia and Latin America. According to their conclusion, the PPP hypothesis is valid in Asian countries, but not in South and Latin American countries.

Payne et al. (2005) studied whether the PPP hypothesis is valid in Croatia. In their studies, unit root tests have shown that they can't present evidence on the validity of the PPP hypothesis.

Sayyan (2005) has studied whether the PPP hypothesis is valid by using the vector error correction model and the cointegration test by taking the monthly data from the years of 1982–2004 in Turkey. It is valid according to the results.

Alba and Papell (2005) have performed panel unit root test to 84 developed and developing countries and investigated the validity of PPP hypothesis for the period 1976–2002. According to their conclusion, while the PPP is valid in Europe and Latin America, it is invalid in Africa and Asia.

Bénassy-Quéré et al. (2005) examined the hypothesis of the purchaing power parity for the G20 countries between 1980 and 2001 in their study. The PPP hypothesis does not apply according to the results obtained using cointegration and panel unit root tests.

Çağlayan and Saçaklı (2006) have investigated the PPP hypothesis by using unit root tests and error correction model for Turkey and the United Kingdom between 1995 and 2004. According to the results they obtained, it is invalid.

Doğanlar (2006) investigated Azerbaijan, Kazakhstan and Kyrgyzstan economies by applying Engle-Granger and Phillips-Hansen tests during 1995–2002 period. According to his findings, the PPP hypothesis is invalid in the countries in question.

Basher and Silvestre (2007) have exmanied whether the real exchange rate is stable by using unit root tests for 17 OECD countries. They handled data for the period 1973:Q1–1998Q4. As a result, it is concluded that the PPP hypothesis is valid.

Çağlayan and Şak (2009) has examined the PPP hypothesis of 27 OECD countries. In his study, he handled monthly data for 1996–2006 for these countries and used panel unit root and panel cointegration tests. According to the results they obtained, the PPP hypothesis is invalid in the countries in question.

Narayan et al. (2009) examined 15 OECD countries in the period between 1973 and 2002. As a result, the PPP hypothesis of 14 countries is valid.

Tatoğlu (2009) examined the validity of the PPP hypothesis using panel unit root tests for 25 OECD countries using data for 1977–2004. As a result, the PPP hypothesis is valid in the countries in question.

Telatar and Hasanov (2009) examined whether the PPP hypothesis is valid for the Commonwealth of Independent States countries using traditional unit root tests and nonlinear unit root tests. As a result, the PPP hypothesis is valid.

Yıldırım and Yıldırım (2012) used unit root tests in their work for Turkey for the period between 1990 and 2006. As a result, the PPP is invalid.

Sadoveanu and Ghiba (2012) investigated Hungary, Czech Republic, Poland and Romania's economies in their work. As they used different price indices in their study, the results differed from country to country.

Korkmaz et al. (2013) investigated whether the PPP hypothesis for Azerbaijan, Kyrgyzstan and Kazakhstan economies is valid. In the study, they used both traditional unit root tests and unit root tests that allow structural break in series. They obtained two different results. According to traditional unit root tests, the PPP hypothesis is not valid but according to unit root tests that allow structural break in series, it is valid.

Yıldırım et al. (2013) examined the PPP by using data perform time series and panel data analysis for Turkey between 1960 and 2012, for the EU-15 and G8 countries between 1975 and 2012 and finally, for the OECD between 1980 and 2012. PPP is not valid for Turkey but it is valid for EU-15 and G8 countries.

Cuestas and Regis (2013) investigated whether the PPP hypothesis in the OECD countries is valid for the period 1972:01–2010:01 by using the linear and nonlinear unit root test. According to the empirical results, while it is valid in 11 countries, it is invalid in Turkey.

Çeviş and Ceylan (2015) used the cointegration test to examine the validity of the PPP for the fragile five using data from 2003:01–2013:08. As a result, the PPP is valid for India, Brazil, South Africa and Turkey.

Ümit (2016) investigated the validity of PPP for the period between 2003:01 and 2015:10. As a result, the PPP hypothesis is invalid for South Africa and India.

4. DATA AND ECONOMETRİC ANALYSİS

This paper examines the PPP of the Euro area. For this purpose, these countries will be dealt with in the application part of the study and LM unit root test will be made by gauss method using the data for the period 2000–2016 for the mentioned countries. Time series will be used in the study. Time series can briefly be expressed as the sum of the observations made in time. At least one of the data obtained in the time series must be dependent on time and when time series is performed, the time-dependent changes of the data will be examined. Time series data are usually processed daily, monthly, yearly and longer intervals and occur within a certain time period (Chatfield, 2015. p. 24 and Seker, 2015: 24).

In this study, LM unit root test developed by Lee and Strazicich has been performed by gauss method for 19 Euro countries. Here, one break LM Model A: Break in level (Lee and Strazicich, 2013) and one break LM Model C: Break in level and trend (Lee and Strazicich, 2013) tests have been used. One break minimum LM unit root test tends to predict the break point correctly and in LM unit root test is free of size distortions and spurious refusals in the presence of a unit root with break. In short, dimensional breakdown is not observed in the LM unit root test. Additively, the test is unchanging to the size of a break under the null and

Table 1: Structural one break LM test values

LM test (Lee and Strazicich, 2013) (one break)	
Model A: Break in level	Model C: Break in level and trend
LM-stat: −3.234	LM-stat: −4.855
Break date: 14.000	Break date: 13.000
Fraction: 0.824	Fraction: 0.765
Lag: 0.000	Lag: 0.000

is mostly stable to its location (Lee and Strazicich, 2004. p. 10). Since the break points of the LM unit root test were determined endogenously, there is no false refusals in the case of breaks and unit root existence. This is one of the advantages of the LM unit root test. At the same time, there is no false rejection when the alternative hypothesis is true. If the null hypothesis is rejected in the LM test, this means that the unit root is rejected without breaks (Özcan, 2012. p. 102). In the LM test, when the break magnitude increase, the rate of correct prediction of the break point also increases. If the LM unit root test is in the middle of the break point series, it is closer to the nominal significance level unless the break size is high. However, if the break size increases, it remains farther away from the nominal significance level (Çağlar, 2015. p. 21-22).

The results for the Euro zone are as follows in Table 1.

As the Table 1 shows, in the Model A: Break in level test, we can see that the break date realized in 2013 where the value is 14. And in Model C: Break in level and trend test, we can see that the break date realized in 2012 where the value is 13. These breaks may have been due to an unusual event such as a sudden decline or rise in the period. In Model A: Break in level test, 10% is significant because LM-stat value is −3.234. And in Model C: Break in level and trend test, 5% is significant because LM-stat value is −4.855.

5. CONCLUSION

In the literature, there have been made many studies about PPP and many different results have been obtained.

In this study, the PPP, which theoretically explains the relationship between inflation rates and exchange rates, has been analyzed for countries using Euro among the EU member countries (Euro zone). In the research, the period 2000–2016 is studied. In the study, LM unit root test analysis has performed with gauss method using time series. As a result, in the Model A: Break in level test, we can see that the break date realized in the 14th value. And in Model C: Break in level and trend test, we can see that the break date realized in the 13th value. By the reason of that the LM-stat value is −3.234 in model A: Break in level test, it is 10% significant. And because of the LM-stat value is −4.855 in model C: Break in level and trend test, it is 5% significant.

REFERENCES

Alba, J.D., Papell, D.H. (2005), Purchasing Power Parity and Country Characteristics: Evidence from Panel Data Tests. Singapore: Nanyang Technological University. p1-19.

Alper, A.E. (2015), Testing the validity of purchasing power parity For BRICS countries using non-linear unit root test. Journal of Academic Researchers and Studies, 7(12), 90-99.

Available from: https://www.investopedia.com/exam-guide/cfa-level-1/global-economic-analysis/absolute-relative-purchasing-power-parity.asp. [Last received on 2017 Dec 16].

Barlow, D., Radulescu, R. (2002), Purchasing power parity in the transition: The case of the romanian leu against the dollar. Post Communist Economies, 14(1), 123-135.

Basher, S.A., Silvestre, J.L. (2007), Another Look at the Null of Stationary Real Exchange Rates: Panel Data with Structural Breaks and Cross-section Dependence. Department of Economics. New York: New York University. p1-30.

Biede, H.J. (2015), Makroøkonomi – İ Teori og Praksis. Copenhagen: Hans Reitzels Press.

Bishop, M. (2013), A'dan Z'ye Ekonomi Sözlüğü., New York: Liberte Press.

Breitung, J., Candelon, B. (2005), Purchasing power parity during currency crises: A panel unit root test under structural breaks. Review of World Economics, 141(1), 124-140.

Bénassy-Quéré, A., Duran-Vigneron, P., Mignon, V. (2005), Real Equilibrium Exchange Rates: A G20 Panel Cointegration Approach. Conference T2M, Lyon.

Cabello, A., Johnson, R., Ortiz, E., Soenen, L. (2005), Exchange Market Efficiency and Purchasing Power Parity: Long Run Behavior of Latin American Currencies. Latin America: Mexican Crisis.

Çağlar, A.E. (2015), Yapısal Kırılmalı Kök Testlerinin Küçük Örneklem Özelliklerinin Karşılaştırılması. Turkey: Pamukkale Üniversitesi Sosyal Bilimler Enstitüsü Yüksek Lisans Tezi.

Çağlayan, E., Saçaklı, İ. (2006), Satın alma gücü paritesinin geçerliliğinin sifir frekansta spektrum tahmincisine dayanan birim kök testleri ile incelenmesi. Marmara University, Faculty of Economics and Administrative Sciences, The Department of Econometrics, Journal of Economics and Administrative Sciences, 20(1), 121-137.

Çağlayan, E., Şak, N. (2009), OECD ülkelerinde satinalma gücü paritesi: Panel eşbütünleşme yaklaşimi. Marmara Üniversitesi İİBF Dergisi, 26(1), 483-500.

Çeviş, İ., Ceylan, R. (2015), Kırılgan beşlide satin alma gücü paritesi (SAGP) hipotezinin test edilmesi. Journal of Yasar University, 10(37), 6381-6393.

Chatfield, C. (2003), The Analysis of Time Series: An Introduction. Newyork: Chapman and Hall.

Cuestas, J.C., Regis, P.J. (2013), Purchasing power parity in OECD countries: Nonlinear unit root tests revisited. Economic Modelling, 32, 343-346.

Dornbusch, R. (1985), Purchasing Power Parity. Cambridge, Massachusetts: National Bureau of Economic Research. p1-34.

Doğanlar, M. (2006), Long-run validity of purchasing power parity and cointegration analysis for central Asian countries. Applied Economics Letter, 13, 457-461.

Duarte, A.P. (2005), Purchasing Power Parity: An Empirical Study of Three EMU Countries. Faculty of Economics. Portugal: University of Coimbra and Group for Monetary and Financial Studies. p1-21.

Eğilmez, M. (2012), Available from: http://www.mahfiegilmez.com/2012/05/satnalma-gucu-paritesi-nedir.html. [Last received on 2017 Dec 05].

Findreng, J.H. (2014), Relative purchasing power parity and the European monetary union: Evidence from Eastern Europe. Economics and Sociology, 7(1), 22-37.

Hakkio, C.S. (1992), Is purchasing power parity a useful guide to the dollar? Economic Review. Quarter: Federal Reserve bank of Kansas City. p37-51.

Han, S.W.S. (2008), Purchasing Power Parity and the 2005 International

Comparison Program, Statistics Singapore Newsletter. p7-12.

Kasman, S., Ayhan, D. (2008), Avrupa Birliği'nin Genişleme Sürecinde Satın Alma Gücü Paritesi Sağlanıyor mu? 2. National Economics Congress. p1-14.

Korkmaz, T., Çevik, E.İ., Çevik, N.K. (2013), Satın alma gücü paritesinin azerbaycan, kazakistan ve kirgizistan için geçerliliği: Birim kök ve eşbütünleşme analizi. Bilig, 64, 259-284.

Lee, J., Strazicich, M.C. (2004), Minimum LM Unit Root Test with One Structural Break. p1-15.

Lee, J., Strazicich, M.C. (2013), Minimum LM unit root test with two structural break. Economics Bulletin, 33(4), 2483-2492.

Lopez, C., Murray, C.J., Papell, D.H. (2004), State of the Art Unit Root Tests and Purchasing Power Parity. p1-14.

Lopez, C., Papell, D.H. (2002), Convergence to purchasing power parity at the commencement of the Euro. Review of International Economics, 15, 1-18.

Moon, S., Page, S., Rodin, B., Roy, D. (2010), Purchasing Power Parity Measures: Advantages and Limitations. London: Overseas Development Institute. p1-8.

Narayan, P.K., Narayan, S., Prasad, A. (2009), Evidence on PPP from a cointegration test with multiple structural breaks. Applied Economics Letters, 16(1), 5-8.

Niu, H., Chu, X., Ma, Y. (2016), Study on the fluctuation of purchasing power parity. Open Journal of Business and Management, 4, 67-78.

Nkurunziza, F. (2016), GDP official exchange rate and GDP purchasing power parity comparison: East African community (EAC): A comparative study. International Journal of Learning and Development, 6(2), 13-30.

Özcan, B. (2012), İşsizlik histerisi hipotezi OECD ülkeleri için geçerli mi? Yapisal kirilmali birim kök analizi. Erciyes Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 40, 95-117.

Papell, D.H., Prodan, R. (2013), Long Run Purchasing Power Parity: Cassel or Balassa-Samuelson? Houston: Department of Economics, University of Houstonp. p1-34.

Payne, J., Lee, J., Hofler R. (2005), Purchasing power parity: Evidence from a transition economy. Journal of Policy Modeling, 27(6), 665-672.

Sadoveanu, D., Ghiba, N. (2012), Purchasing power parity: Evidence from four CEE countries. Journal of Academic Research in Economics, 4(1), 80-89.

Sarno, L. (2000), Real exchange rate behaviour in high inflation countries: Empirical evidence from Turkey, 1980-1997. Applied Economics Letters, 7, 285-291.

Sarno, L., Taylor, M.P. (2002), Purchasing power parity and the real exchange rate. IMF Staff Papers International Monetary Fund, 49(1), 65-105.

Sayyan, H. (2005), Satınalma gücü paritesi: Vektör hata giderme modeli

yaklaşimi. İktisat İşletme ve Finans, 20(232), 96-104.

Seker, S.E. (2015), Zaman serisi analizi. YBS Ansiklopedi, 2(4), 23-31.

Seyidoğlu, H. (2013), Uluslararası İktisat. İstanbul: Güzem Can Press.

Tambiev, A. (2015), Purchasing Power Parity in the Nordic Countries. p1-25.

Tatoğlu, F.Y. (2009), Reel efektif döviz kurunun duranliğinin yapisal kirilmali panel birim kök testleri kullanilarak sinanmasi. Doğuş Üniversitesi Dergisi, 10(2), 310-323.

Taylor, A.M. (2000), A Century of Purchasing Power Parity. California: National Bureau of Economic Research. p1-20.

Taylor, A.M. (2002), A Century of Purchasing-Power Parity. Cambridge, MA: The MIT Press. p139-150.

Telatar, E., Hasanov, M. (2009), Purchasing power parity in rransition economies: Evidence from the commonwealth of independent states. Post Communist Economies, 21(2), 157-173.

Türkiye İstatistik Kurumu. (2017). TÜİK. Available from: http://www.tuik.gov.tr/PreHaberBultenleri.doid=27896.

Tıraşoğlu, B.Y. (2014), Yapısal kirilmali birim kök testleri ile oecd ülkelerinde satin alma gücü paritesi geçerliliğinin testi. İstanbul University Econometrics and Statistics e-Journal, 20, 68-87.

Ümit, Ö.A. (2016), Stationarity of real exchange rates in the "fragile five": Analysis with structural breaks. International Journal of Economics and Finance, 8(4), 254-270.

Vachris, M.A., Thomas, J. (1999), International price comparisons based on purchasing power parity. Monthly Labor Review, 122, 3-12.

World Bank. (2018), World Development Indicators. (WDI); 2018. Available from: https://www.data.worldbank.org/.

Yalçınkaya, Ö. (2016), G-20 ülkelerinde satin alma gücü paritesi teorisinin geçerliliği: Panel birim kök testinden kanitlar (1994:Q1-2015:Q4). Bitlis Eren University Social Science Institute Journals, 5, 145-162.

Yazgan, M.E. (2003), The purchasing power parity hypothesis for a high inflation country: A Re-examination of the case of Turkey. Applied Economics Letters, 10(3), 143-147.

Yıldırım, K., Mercan, M., Kostakoğlu, S.F. (2013), Satın alma gücü paritesinin geçerliliğinin test edilmesi: Zaman serisi ve panel veri analizi. Eskişehir Osmangazi Üniversitesi İİBF Dergisi, 8(3), 75-95.

Yıldırım, S., ve Yıldırım, Z. (2012), Reel efektif döviz kuru üzerinde kirilmali birim kök testleri ile Türkiye için satin alma gücü paritesi hipotezinin geçerliliğinin sinanmasi. Marmara Üniversitesi İ.İ.B.F. Dergisi, 33(2), 221-238.

Žďárek, V. (2010), Some new empirical evidence on the relative PPP hypothesis in new EU member states. Research Centre for Competitiveness of Czech Economy, 10, 1-49.

Zumaquero, A.M., Urrea, R.P. (2002), Purchasing power parity: Error correction models and structural breaks. Open Economies Review, 12, 5-26.