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Purchasing Power Parity Theory Test in Turkey: (1923-1980) Cliometric Fourier Analysis

Türkiye'de Satın Alma Gücü Paritesi Teorisi Testi: (1923-1980) Kliometrik Fourier Analizi

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ÖZ

Çalışma, Türkiye'de satın alma gücü paritesinin (PPT) 1923-1980 yılları arasındaki istikrar düzeyini belirlemek amacıyla oluşturulmuş kliometrik bir analizdir. Cumhuriyet sonrası dönemi Fourier analizi yöntemiyle inceleyen herhangi bir çalışmanın bulunmaması bu çalışmanın literatüre katkısını göstermektedir. Çalışmada ilgili yıllara ait reel döviz kuru değerleri kullanılmıştır. Bu değerler Devlet İstatistik Enstitüsü raporu kullanılarak elde edilmiştir. Çalışmada serilerin doğrusal olduğu varsayılarak Birim Kök Testleri (ADF, Phillips-Perron), serilerin doğrusal olmadığı varsayarak Fourier ADF Birim Kök Testleri kullanılmıştır. Test sonucu ilgili yıllar arasında PPP teorisinin geçerli olmadığını göstermektedir.

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ABSTRACT

The study is a cliometric analysis created to determine the stability level of purchasing power parity (PPT) in Turkey between the years 1923-1980. The absence of any study examining the post-republican period with the Fourier analysis method shows the contribution of this study to the literature. Real exchange rate values for the relevant years were used in the study. These values were obtained using the State Institute of Statistics report.. In the study, Unit Root Tests (ADF, Phillips-Perron) were used assuming that the series were linear and Fourier ADF Unit Root Tests were used assuming that the series were non-linear. The test result shows that the PPP theory is not valid between the relevant years.

1. Introduction

Although the realization of commercial activities by the countries is important for economic development, the provision of commercial mobility can be carried out through a determined common unit. The aim of purchasing power parity is to standardize the currencies of countries over a common quantity. Gustav Cassel pioneered the

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determination of a single unit, known as purchasing power parity, in order to keep up with globalization in 1921. Determining a common amount will have a positive effect on the economy, as well as on a political and social basis. Therefore, it is important to study the subject. The determination of this amount is determined over real exchange rates. Although there are more than one study in the literature that concludes that the purchasing power parity theory is accepted or not, the results of the studies vary according to both the accuracy of the tests applied and the stable structure adopted on the political, social and economic basis between the countries and the years in which the countries were evaluated in the study. When the studies in the literature were examined, it was observed that Gozgor (2011) carried out a study in the field. In the study, it was stated that after the exchange rate system in Turkey changed in 2001, the country's foreign exchange mobility and financial values in the country changed. In line with these statements, it is aimed to examine how the change in exchange rates is affected in the long term and to determine the validity of the purchasing power parity theory in the light of economic crises. Quantitative analysis methods are used in the study. As a result of the study, the validity of the purchasing power parity theory is among the outcomes of the study.

In his study, Aydın (2019) carried out an examination on Turkey, as in the study of Gozgor (2011), and tested the validity of the theory by examining the real exchange rate data obtained between 1992:01 and 2018:02. In addition to the study was carried out using quantitative analysis methods, it was determined that the series was not linear. Based on the achieved output, stationarity analysis was carried out and the validity of the purchasing power parity theory was determined. In this regard, it can be stated that similar results for Turkey were obtained in two different studies for two different data ranges.

Another study was written by Aydın (2019) and evaluated in TL and Sterling. The study was created by examining the exchange rates obtained between 2001-2020 and quantitative analysis methods were used. As a result of the study, it was determined that the theory was not confirmed by the evaluation made on two currencies. In this regard, although all three of the studies chose Turkey as a sample, the conclusion reached about the validity of the theory changes if the examination limitations change. The validity of the theory depends on the range of years, variables, currency studied, etc. It gives different results depending on the factors.

In this study, analysis will be performed under the assumption that the series are both linear and non-linear. From this point of view, both Augmented Dickey Fuller and Phillips-Perron unit root tests and Fourier ADF unit root tests will be applied. The fact that the test is applied in both directions will be important both in terms of academic researchers and in terms of being guiding by politicians. The data of the study, which was created through real exchange rates between 1923 and 1980, were obtained from the database of the State Institute of Statistics.

The years 1923-1980, which the study deals with, refer to the post-Republican and Turkey's pre-structural transformation period. This research is a cliometric analysis, according to the economic analysis of a certain historical segment within the study. The Nobel Prize-winning work of North and Fogel in 1993 brought cliometric analysis to the literature. This method is important in terms of bringing the data that shed light on the historical process to the literature by making an econometric analysis on an important historical period. In addition to the testing of purchasing power parity theory has been carried out using quantitative analysis methods in more than one study in the literature, the results of the studies vary depending on the sample, variables, year range, etc. varies due to factors. In this case, it can be said that the political, social and economic factors faced by that country in the relevant year in which the purchasing power parity theory is examined have an impact on the validity of the theory. In this regard, examining the historical intervals that are important for the country and determining the validity of the purchasing power parity theory in this important year interval will provide an economically important outcome. Using cliometric analysis, which allows for the assessment of a specific and significant historical time, the purchasing power parity hypothesis will be examined in this study by evaluating the period until 1980, which is the coup period, also known as the post-Republican period. In this context, it is thought that this study will be the first to examine the years 1923-1980 and will contribute to the literature by determining the validity of the theory for the period by including cliometric analyses.

The research on purchasing power parity will be shown in the table in the first section of the study. The methodologies and procedures that constitute the foundation of the study will be addressed in the next section. In the empirical findings section; the data set will be subjected to Augmented Dickey Fuller and Phillips-Perron tests, followed by the Fourier ADF unit root test, under three constraints, assuming that the series is non-linear.

2. Literature Review

The capacity to operate on a common currency in economic relations between countries explains the importance of purchasing power parity theory. As a result of this situation, the subject has been examined in more than one study in the literature. Despite the fact that the studies' approaches to the issue varied, the analysis was carried out making statistical analysis of the data sets. In the literature review section; the publication years of the studies, the year range of the data they deal with, the variables that form the basis of the study, the country/countries covered by the study, the tests used in the study and the conclusion of the study will be taken into consideration. It is thought that

the literature review to be carried out will be beneficial in revealing the importance of this study.

When the literature was examined, it was determined that there were many studies written on the subject, but it is not possible to examine all of these studies. In this regard, the summary, introduction and conclusion sections of the randomly selected studies in the literature were examined, academic studies that tested the validity of the theory using quantitative analysis methods were selected and the relevant studies were included in the table. The selected studies contribute to the literature because their contents are similar to the current study and reveal the difference of this study from other studies in the literature.

Table 1. Studie's on Purchasing Power Parity

More than one research has been created in the literature by more than one different author to investigate the validity of the purchasing power parity idea. These studies are significant in terms of defining the subject's emphasis and the validity of the hypothesis based on the sample. Existing research and findings provide an opportunity to compare with other studies as well as provide information about the sample under consideration. In this direction, publications based on purchasing power parity and the "Web of Science" index are included in this part of the research. In addition, because of using the same analysis method, a study that performed cliometric analysis was included in the literature review. These studies were included in the literature review due to the application of the method and are not related to PPP. From this point of view, it can be said that the first cliometric study dealing with the PPP theory will be included in this study.

The studies published between 1996-2021 are included in the table. When the studies are examined, it is discovered that the studies employ econometric tests that perform analysis under the premise that the series are linear. Theoretical validity varies depending on years of study in OECD countries. Among the authors dealing with OECD countries; while the study of MacDonald (1996) validated the theory between 1973-1992, Cerato and Sarantis (2008) stated in their study that the theory was invalid between 1973-2000. From this point of view, it would be correct to say that there has been a method-based change between the years. In the study of Destek and Okumuş (2016), it is concluded that the theory is valid in 14 of the 14 countries analyzed between the years 1990:01-2015:05. In this context, only 14 of the evaluated OECD countries can achieve stable exchange rate levels, while other countries fail to provide the necessary stability. In addition to the studies mentioned, the studies of Ay (2021), Coşkun and Ballı (2021), and Kapakli and Sumer (2021) conclude that the purchasing power parity theory is valid in the years discussed. It can be said that the acceptability of the purchasing power parity hypothesis increases as the development level of the countries increases. Among the studies in which the validity of the purchasing power parity theory could not be determined is Baharumshah, Lau, and Nzirimasanga (2010)'s study of African countries. In addition to this study, Turkey was examined in the study of Coşkun (2020) and Erdoğmuş (2021), and it was observed that the purchasing power parity theory was not valid. This situation is explicable by the absence of a stable exchange rate system, as well as political, social, and economic volatility.

3. Method

The aim of this research is to examine the validity of the purchasing power parity theory between 1923 and 1980 in post-Republic Turkey. The real exchange rate statistics for the years included in the study were gathered from the State Institute of Statistics. When the studies in the literature are examined, it is observed that traditional unit root tests are frequently used, and these tests carry out the examination under the assumption that the series are linear. And with this assumption, the validity of the test results is skeptical and has low explanatory power. In this regard, it is deemed necessary to apply the Fourier ADF test, which is a new generation unit root test and performs examination under the assumption that the series is non-linear. In this study, both tests will be applied and the results will be compared in line with the assumptions. With the assumption that the series is linear, Augmented Dickey Fuller test, which was introduced to the literature by D. Dickey and W. Fuller in 1979, will be used. In addition to this test, the Phillips-Perron test, which was introduced to the literature in 1988, will be applied within the study.

In addition to these tests, the Fourier ADF unit root test will also be applied. The test performs analysis under the assumption that the series is not linear and contributes to the literature as it is an up-to-date test. First, the French mathematician; the Fourier approach, which was discussed by Jean-Baptiste Joseph Fourier, made an important introduction to its status in the literature with the study published by Enders and Lee in 2012. The use of the expressed test within the study is important in terms of confirming the validity of the analysis.

It is thought important to investigate the Augmented Dickey Fuller test under three distinct limitations while examining it. It is constructed with three unique constraints: the series is constant, the series has both constant and trending characteristics, and the series is neither fixed nor trending. Restrictions are calculated with the formulas explained below.

$$\Delta Yt=(\rho-1)\ Y(t-1)+ut \quad (1)$$

$$\partial=(\rho-1) \quad (2)$$

$$\Delta Yt=\partial Y(t-1)+ut \quad (3)$$

The general equations of the test are given below.

$$\Delta Yt=\beta 1+\partial Y(t-1)+ut \quad (4)$$

$$\Delta Yt=\beta 1+\beta 2t+\partial Y(t-1)+ut \quad (5)$$

With the above equations, it is aimed to determine the H_0 and H_1 hypotheses discussed in the study and to evaluate their validity. While examining the H_0 hypothesis within the equation; gamma will be decisive. If the gamma value is larger than or equal to zero, the examined series has a unit root and is not stationary. Furthermore, if the same analysis is performed on H1, the fact that the gamma is smaller than zero ensures that there is no unit root in the series and that the series is stationary.

Another test subject to analysis is included in the study as the Phillips-Perron unit root test. In terms of whether the series has a trend and a fixed root, the Phillips-Perron unit root test, like the ADF unit root test, is assessed under three different restrictions. (6), (7) and (8) below, respectively; indicates that the series is fixed, that the series is both fixed and trending, and that the series is neither fixed nor trending.

$$Yt=\partial Y(t-1)+\varepsilon t \quad (6)$$
$$Yt=\beta 1+\partial Y(t-1)+\varepsilon t \quad (7)$$
$$Yt=\beta 1+\partial Y(t-1)+\beta 2(t-T/2) \quad (8)$$

Although studies constructed using tests under the assumption that the series is linear are common in the literature, studies using tests performed under the assumption that the series is non-linear are very rare. Even though it was brought to the literature with Enders-Lee in 2012, the usability of the Fourier ADF test remained rare within the literature. The Fourier ADF unit root test is expressed within the equations in (9), (10) and (11), respectively, under constraints.

$$Yt: \alpha(t) + PYt\text{-}1 + Yt + \varepsilon t \quad (9)$$
$$\alpha(t) = \alpha 0 + \sum \alpha_k \sin(2\pi kt/T) + \sum_{k=1}^{n} \beta \cos(2\pi kt/T); \quad n \leq T/2, \quad (10)$$
$$\Delta yt = \rho y_{t-1} + c_1 + c_2 t + c_3 \sin(2\pi kt/T) + c_4 \cos(2\pi kt/T) + e_t . \quad (11)$$

The validity of the tests and the purchasing power parity theory will be examined in the next parts of the study, respectively.

4. Empirical Findings

In order to determine the validity of the purchasing power parity theory, the relationship between the real exchange rates of the period should be tested. Augmented Dickey Fuller and Phillips-Perron test will be used under the assumption that the series is linear, and the Fourier ADF unit root test will be used with the assumption that the series is nonlinear, in order to perform the stated test and to eliminate the inconsistencies in the results. The series' real exchange rate rates are based on the years 1923-1980.

Chart 1. 1923-1980 Real Exchange Rate

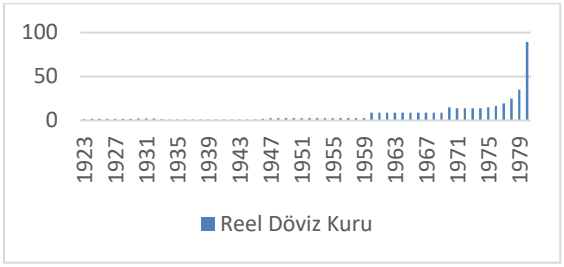

Chart 1 shows the parities of real exchange rates between 1923 and 1980. Although the table was created as a bar chart, a more or less balanced exchange rate was observed until 1947, while the ratio was between 1.60-2.20. It can be said that there was a sudden increase in 1947 and the exchange rate remained at the level of 2.80 until 1959. As a matter of fact, it is seen that there was a high upward movement in the exchange rates with the effect of the political coup in 1960 and the exchange rate tested the 9 level. While the actual rise advanced at comparable rates until 1970, it commenced an ascending slope with 14.85 in 1970 and settled at a relatively high level of 89.25 in 1980. The statistics acquired suggest that political difficulties have a negative impact on exchange rates, and that exchange rates tend to rise. In this regard, Augmented Dickey Fuller, Phillips-Perron, and Fourer ADF will be submitted to unit root tests in order to assess the validity of the purchasing power parity hypothesis using real exchange rate data from 1923 to 1980. Extended Dickey Fuller and Phillips-Perron unit root tests to be used in the study are among the traditional analysis methods. And the analysis will be applied in the study assuming that the series are linear. Fourier ADF test is among the new generation unit root tests in the literature. And with this analysis, the evaluation will be carried out under the assumption that the series is non-linear. Evaluating both results and producing a comprehensive output is among the aims of the study. The tests will be evaluated under 3 different constraints; it can be expressed as that the series is fixed, that the series is both fixed and trending, and that the series is neither fixed nor trending.

Table 2. Augmented Dickey Fuller Constant Term Model (1923-1980)

Augmented Dickey Fuller		
	t-Statistic	Prob.
ADF Test Statistics	-1,201193	0,6664
%1 Critical Value	-3,577723	
%5 Critical Value	-2,925169	
%10 Critical Value	-2,600658	

To begin, the Augmented Dickey Fuller unit root test, also known as the extended Dickey-Fuller test, will be used with the premise that the real exchange rate data from 1923 to 1980 is linear. When the test was performed, it was seen that the probability value (0.6664) was greater than 0.05. In addition to the relevant result, Table 2 shows that the t-statistics value is -1.201193. When this value is analyzed in

terms of absolute value, it was calculated as less than the critical values of 1%, 5% and 10%. In this case, it is observed that the series in question contains a unit root and from this point of view, the series is not stationary.

Table 3. Augmented Dickey Fuller Model with Constant Term and Trend (1923-1980)

Augmented Dickey Fuller		
	t-Statistic	Prob.
ADF Test Statistics	0,747	0,9996
%1 Critical Value	-4,165	
%5 Critical Value	-3,508	
%10 Critical Value	-3,184	

When the test is examined under another constraint, the results are calculated as in Table 3. The test result shows that the probability value is calculated as 0.9996. The value shows that there is a unit root in the series. The probability value is greater than the constraint value (0.05). In addition, when the t-statistic value of 0.747123 is examined, it is seen that this value in terms of absolute value is smaller than the significance levels of 1%, 5% and 10%. If the value is small, it means that there is a unit root in the series. From this point of view, it is concluded that the series is not stationary.

Table 4. Augmented Dickey Fuller Constant Term and Trend-Free Model (1923-1980)

Augmented Dickey Fuller		
	t-Statistic	Prob.
ADF Test Statistics	-2,008064	0,0438
%1 Critical Value	-2,615093	
%5 Critical Value	-1,947975	
%10 Critical Value	-1,612408	

Table 4 appears within the last constraint to be examined by the ADF test. When Table 4 is examined, the probability value of the series is seen as 0.0438. This number indicates that it is less than the constraint value of 0.05, and more specifically, it indicates that there is no unit root in the series. When the relevant result is examined considering the significance levels; The t-statistical value was calculated as -2,008064, which is less than 1% significance level in terms of absolute value, but greater at 5% and 10% significance levels. This result leads to the conclusion that there is no unit root in the series at 5% and 10% significance levels.

The series will be studied in terms of the Fourier ADF unit root test from this perspective. To validate the analysis, the Phillips-Perron test will also be applied under the assumption that the series is linear before the Fourier test. In Table 5, the Phillips-Perron test is examined under the assumption that the first constraint is the series constant term.

Table 5. Phillips-Perron Constant Term Model (1923-1980)

Phillips-Perron		
	t-Statistic	Prob.
Phillips-Perron	-3,245863	1,0000
%1 Critical Value	-3,550396	
%5 Critical Value	-2,913549	
%10 Critical Value	-2,594521	

When the table is examined, it is seen that the probability value is greater than 1.0000 and the constraint value is 0.05. This result necessitates the interpretation that "the series has a unit root".

Table 6. Phillips-Perron Model with Constant Term and Trend (1923-1980)

Phillips-Perron		
	t-Statistic	Prob.
Phillips-Perron	3,317176	1,0000
%1 Critical Value	-4,127338	
%5 Critical Value	-3,490662	
%10 Critical Value	-3,173943	

When examined under another constraint, the results in Table 5 are observed. The probability value is calculated as 1,000. It shows that there is no unit root in the series. When the T-statistics values are examined; At 1% and 10% significance levels, the result is that there is no unit root in the series. From this point of view, it is concluded that there is contains unit root in the series and the test of the theory is carried out with tests that analyse nonlinear series.

Table 7. Phillips-Perron Constant Term and Trend-Free Model (1923-1980)

Phillips-Perron		
	t-Statistic	Prob.
Phillips-Perron	3,459044	0,9998
%1 Critical Value	-2,606163	
%5 Critical Value	-1,946654	
%10 Critical Value	-1,613122	

Analysis of the Phillips-Perron test under the last constraint is observed in Table 7. The probability value is calculated as 0.9998. The relevant calculation shows that there is no unit root in the series. If the examination is carried out considering the T-statistics values; with the value of 3.459044, it is seen that it is greater than the 1%, 5% and 10% significance levels in terms of absolute value. This situation, which emerged as a result of the analysis, leads to the conclusion that there is unit root in the series.

Fourier ADF unit root test is among the preferred analysis methods as it does not require determining where the breaks

in the series occur and it analyzes non-linear series. (Mike & Alper, 2020). Based on the stated situation, the Fourier ADF unit root test will be applied for the analysis of the series. For the test, the real exchange rate amounts between 1923 and 1980 will be examined and the results are shown in Table 8.

Table 8. Fourier ADF (1923-1980 PPP)

Var	Freq	Min. KKT	F Constraint Test	Appropriate Delay Length	FADF Statistics	Test
Y	0,40	896,22	7,76	10,00	2,13	

Note: For k=1, the optimal values according to the significance levels are respectively; It is -4.42 for 1%, -3.81 for 5%, -2.9 for 10%.

Table 8 shows the results of the Fourier ADF unit root test between 1923 and 1980. When the test results are analyzed, the frequency value is estimated to be 0.40. In the Enders-Lee investigation, the computed result is reviewed inside the table data, unique to the series' 1 constraint value. For the significance levels specific to 1 constraint value; Evaluation should be made taking into account the value of -4.42 in 1%, -3.81 in 5%, and -2.9 in 1%. The value to be evaluated is the FADF test statistical value in Table 8. It was computed as 2,133142 and is smaller than the 1%, 5%, and 10% significance levels when compared to the significance levels. From this perspective, it will be determined that the series has a unit root. As a result of the test examining the nonlinear series of the series, it can be said that the PPP theory is valid in this direction.

5. Conclusion and Evaluation

Purchasing power parity theory, which is valid or invalidated by the political, social and economic stability of the countries, as well as the stability level of exchange rates, has been the main subject of more than one study in the literature and has been analysed. The analysis results depend on the degree of development and stability of the nations; The sample considered varied depending on factors such as year range and country/country group.The results of the analysis have varied depending on the degree of development and stability of the nations. The analyses were generally carried out with tests that performed thinning under the assumption that the series were linear (Gozgor, 2011; Aydın, 2019) and examination with tests under the assumption that the series was nonlinear, such as the Fourier ADF, remained rare.

When studies in the literature were examined, it was determined that the use of traditional unit root tests was common (Destek & Okumuş, 2016; Coşkun, 2020; Koçak & Özbek, 2020; King, 2021; Erdogmus, 2021). And the use of traditional unit root tests causes detailed explainable outputs not to be obtained when analysis is performed with non-linear series. For this reason, the Fourier ADF unit root test, which is among the new generation unit root tests, has begun to be used in current studies to analyze nonlinear series çalışmalarda (Destek & Okumuş, 2016; Bozgeyik & Aydın, 2019; Aydın, 2019; Ay, 2021).

This study evaluates the series both under the constraint of linearity and under the assumption that it is non-linear. Tests used in the study; Augmented Dickey Fuller unit root test and Phillips-Perron unit root test under the assumption that the series is linear, but Fourier ADF unit root test under the assumption that the series is nonlinear. The data examined for testing were obtained from the State Institute of Statistics database. In the study, a type of cliometric analysis was carried out to determine the validity of the purchasing power parity theory after the declaration of the Republic, which is a historically important process. For this reason, the year range discussed in the study was determined as the post-Republican period of 1923-1980. The fact that there is no study in the literature testing the validity of purchasing power parity theory in the Turkish sample in the relevant year range explains the contribution of this study to the literature.

When the test results applied in the study were examined, 3 different results were determined for the Augmented Dickey Fuller unit root test under 3 different constraints. When these results are evaluated respectively; Under the constraint that the series is constant and is both constant and trending, the probability value is calculated to be greater than the reference value of 0.05.This leads to the conclusion that the series contains unit roots. In this case, it is concluded that the series is not stationary. For the Augmented Dickey Fuller test, under the assumption that the series is neither constant nor trending, the probability value remains lower than the reference value of 0.05. This gives the result that the series does not contain a unit root and is stationary. When the relevant evaluation is made for the Phillip-Perron test, it is concluded that all the results obtained under 3 different constraints are the same, and that the series contains a unit root and is not stationary because the probability value is greater than the reference value of 0.05. Another test applied in the study is the Fourier analysis method, which is among the new generation analysis methods, and the Fourier ADF test was applied. Test results show that there is a unit root in the series. This shows that the applied test is an accurate analysis method for the relevant series.

The test result shows that the purchasing power parity theory is not valid in Turkey between the years 1923-1980. When the studies in the literature are examined, those who do research in Türkiye; Purchasing power parity theory was found to be valid as a result of Gozgor (2011)'s study covering the years 2003:01-2010:12. Aydın's work published in 2019 also accepts the theory as valid between 1992:01-2018:12. In the study of Koçak and Özbek (2020), he proved the invalidity of the theory by considering the years 1994:01-2019:01, and finally, Erdogmus (2021)

proved that the theory was invalid in the study he examined between the years 2001:01-2020:11. According to the test results, the outcome of the research that deem the theory valid was decided for two distinct reasons. While the first of these is thought to be the high level of stability in exchange rates in the period of the studies, the possibility of this situation is not seen as correct within the statistics. Another reason can be expressed as insufficient tests applied. According to this viewpoint, nations with unstable economies, such as Turkey, and hence nonlinear series, should be evaluated using tests such as the Fourier ADF. From this point of view, it is thought that this study, which is a cliometric analysis, will contribute to the literature.

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Table 1. Studie's on Purchasing Power Parity

Author(s)	Year	Data Range	Variables	Countries	Tests	Findings
MacDonald	1996	1973-1992	Real Exchange Rate Purchasing Power Parity	23 OECD Countries	Panel Unit Root Test	The purchasing power parity hypothesis is not valid
Cerato & Sarantis	2008	1973:01-2000:12	Purchasing Power Parity	OECD	Panel Data Analysis	The purchasing power parity hypothesis is not valid
Kalyoncu, Kula &Aslan	2010	1970-1998	Purchasing Power Parity	MENA Countries	LM Unit Root Test	The purchasing power parity hypothesis is valid
Baharumshah, Lau & Nzirimasanga	2010	1980-2007	Purchasing Power Parity	11 African Countries	Panel SURADF Test	In some of the countries subject to the test, the theory is valid.
Gozgor	2011	2003:01-2010:12	Purchasing Power Parity	Türkiye	Panel Augmented Dickey Fuller Panel Phillips-Perron	The purchasing power parity hypothesis is valid
Chang, Lee & Chou	2012	1980:01-2008:09	Purchasing Power Parity	G-7 Countries	AESTAR Unit Root Test	The purchasing power parity hypothesis is valid
Liu, Zhang & Chang	2012	1995:01-2011:10	Purchasing Power Parity	Romania	Unit Root Test	The purchasing power parity hypothesis is valid
Hassan & Salim	2013	2008	Purchasing Power Parity	80 Countries	Panel Cointegration Test ADF Phillip-Perron	Population growth plays an active role in the change of purchasing power parity..
Chang & Tzeng	2013	1995:01-2008:12	Purchasing Power Parity	Estonia and Hungary	Panel Unit Root Test	There is not enough information about the validity of the purchasing power parity theory.
Canarella, Miller & Pollard	2014	1999-2011	Purchasing Power Parity	Germany and the United Kingdom	Johansen Cointegration Test	The purchasing power parity hypothesis is valid.
Destek & Okumuş	2016	1990:01-2015:05	Purchasing Power Parity	27 OECD Countries	ADF Unit Root Test KPSS Unit Root Test Fourier ADF Unit Root Test	The purchasing power parity test is valid for 14 of the tested countries.
Yasa & Yardımcı	2017	1963-1989	State Intervention Economic Growth	Turkiye	Least Squares Method	When the intervention of the state is evaluated in terms of economic growth, it does not show any effect on the manufacturing industry.
Choji & Sek	2017	1996-2016	Purchasing Power Parity	ASEAN 5 Countries	Cointegration Test	The purchasing power parity hypothesis is not valid.
Wang & Liu	2018	2005:06-2013:06	Purchasing Power Parity Exchange Rate	ABD Euroland Republic of China	Johansen Cointegration Test Granger Causality Test	Purchasing power parity theory is valid for a three-economy world consisting of the USA, Euroland and the Republic of China.
Murad & Hossain	2018	1973-2015	Purchasing Power Parity	ASEAN Countries	Panel Cointegration Test	The purchasing power parity hypothesis is valid.
Wu, Bahmani-Oskooee & Chang	2018	1970:01-2013:12	Purchasing Power Parity	G-6 Countries	Cointegration Test	The purchasing power parity hypothesis is valid.
Ha	2019	2008:08-2017:02	Exchange	Southwest Asian Countries	Panel Cointegration Test	The purchasing power parity hypothesis is valid
Aydın	2019	1992:01-2018:12	Real Exchange Rate Purchasing Power Parity	Turkiye	Fourier ADF Unit Root Test	The purchasing power parity hypothesis is valid
Bozgeyik & Aydın	2019	1994:01-2019:05	Real Exchange Rate Purchasing Power Parity	16 Developing Countries	Fourier ADF Unit Root Test	The purchasing power parity hypothesis is valid
Koçak & Özbek	2020	1994:01-2019:01	Real Exchange Rate Purchasing Power	Turkiye	KPSS Unit Root Test ADF Unit Root Test	The purchasing power parity hypothesis is not valid

			Parity		Phillips-Perron Unit Root Test Unit Root Test with Structural Break	The purchasing power parity hypothesis is valid
Coşkun	2020	1994:01-2018:11	Real Exchange Rate Purchasing Power Parity	South Africa, India Brazil, Indonesia and Türkiye	Harvey, Leybourne and Xiao Linearity Test ADF Unit Root Test Ranjbar, Chang, Elmi, and Lee Unit Root Test	SGP is accepted for South Africa and India. Not accepted for Brazil, Indonesia and Türkiye.
King	2021	2005:06-2013:05	Purchasing Power Parity	United Kingdom, China and the Eurozone	WL Unit Root Test Granger Causality Test	The purchasing power parity hypothesis is not valid
Ay	2021	2008-2020	Purchasing Power Parity	OECD Countries	Panel Unit Root Test	The purchasing power parity hypothesis is not valid
Coşkun & Ballı	2021	2000-2017	Nominal Exchange RatePurchasing Power Parity	OECD Countries	PANKPSS	The purchasing power parity hypothesis is valid
Gövdeli & Sumer	2021	1980-2018	Purchasing Power Parity	BRICS Countries	Fourier Cointegration Test Forier KPSS	The purchasing power parity hypothesis is valid
Erdogmuş	2021	2001:01-2020:11	Purchasing Power Parity	Turkiye	Unit Root Test (ADF, KPSS, Phillips-Perron, Ng-Perron)	The purchasing power parity hypothesis is not valid