Purchasing Power Parity: An Application For Turkey

(1980-1987)

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PURCHASING POWER PARITY:

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(1980-1987)

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tarafından bağışlanmıştır.

We certify that we have read this thesis and in our opinion it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Business Administration.

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ABSTRACT

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Purchasing Power Parity (PPP) is claimed to be the oldest and simplest theory in determining the exchange rates of currencies. With its three versions, *absolute PPP*, *relative PPP*, and *efficient markets PPP*, this theory argues that price index levels of the countries are considered while setting the exchange rates. In this study, a general review of the theory and its failures are initially summarized. As the main purpose of the paper, the relative PPP has been applied for Turkey between 1980 and 1987 by taking USA as the comparision country. The application has been concentrated on both the official and black-market exchange rate determinations.

Keywords: Purchasing Power Parity, Absolute PPP, Relative PPP, Efficient Markets Version of PPP, Wholesale Price Index, Consumer Price Index, Official Exchange Rates, Black-Market Exchange Rates.

ÖZET

SATINALMA GÜCÜ PARİTESİ:
TÜRKİYE İÇİN UYARLAMA
(1980-1987)

Hazırlayan:
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Tez Yöneticileri: Dr. GÖKHAN ÇAPOĞLU & Dr. ÜMİT EROL

Satınalma Gücü Paritesi (SGP) ülke para birimleri arasındaki kurların saptanmasında bilinen en eski ve en basit teorilerdendir. Kurların belirlenmesinin ülkelerin fiyat endeks seviyelerine göre olması gerektiğini savunan bu teoride, *mutlak SGP, göreceli SGP* ve *etkin piyasalar yöntemi* adı altında üç farklı yaklaşım bulunmaktadır. Bu çalışmada, SGP teorisinin genel bir tanımı ve bu teorinin pratikteki varsayım hataları anlatılmaktadır. Çalışmanın ana amacı doğrultusunda, göreceli SGP yöntemi 1980 ve 1987 yılları arasında ABD ile kıyaslanarak Türkiye için uygulanmaktadır. Uygulamada hem resmi hem de karaborsa döviz kurlarının belirlenmesi ayrı ayrı incelenmektedir.

Anahtar Kelimeler: Satınalma Gücü Paritesi, Mutlak SGP, Göreceli SGP, Etkin Piyasalar Yöntemi, Toptaneşya Fiyat Endeksi, Tüketici Fiyat Endeksi, Resmi Döviz Kuru, Karaborsa Döviz Kuru.

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1. INTRODUCTION

Purchasing power parity (PPP) is claimed to be the oldest and the simplest theory for determining the exchange rates. In the broader sense, PPP theory is the explanation of the exchange rates with respect to the ratio of the domestic price level to the foreign price levels.

1.1. HISTORICAL BACKGROUND

According to *L.H.Officer* [1], the theory of PPP was mentioned in the writings of the Salamanca School in Spain during 16th and the 17th centuries. With the bullionist periods, at the end of 18th century and at the beginning of 19th century, theorists such as *Christiernin, Ricardo, Wheatley* and *Tharton* contributed to the construction of the theory; especially with their work on the depreciation of English pound due to the high inflation after the Napoleonic wars. Untill the first World War, the PPP theory had been worked on by a very small group of economists: *John Stuart Mill, Goschen, Marshall* and *von Mises* .

After the first World War, the PPP issue reemerged due to the inflation practiced during and right after the war. The Swedish economist *Gustav Cassel* received much credit as being the originator of the theory with his proposal on reestablishing the exchange rates which had been ceased during the war. Cassel applied a similiar approach to the modern version of PPP theory in determining the exchange rates. He proposed to calculate the value of a certain currency by relative inflation rates. In other words, he suggested to set the equilibrium exchange rates by taking into account the amount of goods and services that a unit of currency can buy in its domestic markets.

For the time being, the theory of PPP is adopted in three different versions.The most initial one,*absolute PPP*, is followed by the *relative PPP*.Finally, the most recent one is the *efficient markets version of PPP* which assumes that the markets are efficient enough to generate the information and respond in their behaviors accordingly.

[1] see Vinals (1983)

1.2. PURPOSE OF THE STUDY

This study mainly aims to test the relative PPP hypothesis for Turkey. In testing process, the time period between 1980 and 1987 is covered, while taking USA as the comparision country.Moreover, both official and black-market rates in Turkey, are used while deriving the exchange rate changes.On the other hand, wholesale price and consumer price indexes will be taken into account for calculating the inflation differentials. Also, there will be given a review of the PPP theory initially in the study.This part will have the definitions of three approaches in PPP.Additionally, points that may fail the validity of the theory will be offered in order to make the reader to precisely asses the results.

Within the above frame, hopefully, some outcomes will be generated with respect to the determination of official and black market exchange rates in Turkey. Those decisions may be utilized at the macro level, whereas researchers or practitioners can have some insights about the exchange rate policies in Turkey. With respect to its micro implications; international traders, financial institutions, and investors or savers can benefit from the results in such a market with high inflation rates and uncertainity.

2.RELATED RESEARCH

The purchasing power theory (PPP) attracts great attention due to its simplicity in data requirements and ease of application. The theory gathers support and counterarguments by various economists.The discussions about the relevance of the theory have been in the issue for many years.

2.1. DIFFERENT APPROACHES IN PPP THEORY

In today's literature, three different versions of PPP are being discussed:
1.Absolute PPP
2.Relative PPP
3.Efficient Markets Version of PPP

2.1.1. Absolute PPP

This approach, which has been originated by Cassel, states that the exchange rate between the two currencies must be the ratio of the price levels in the countries of issue. In that sense, the absolute version of PPP theory can be formulated as further:

$$E_t = \frac{P_t}{P_t^*}$$

where;

E: exchange rates between two currencies
P: domestic price level
P^*: foreign price level
t: current period

As an example:

Let 10 units of domestic currency buy a certain bundle of goods in the domestic market at a given time period. If it takes 5 units of foreign currency to buy the same bundle in the foreign market at the same time; then the equilibrium exchange rate must be equal to 2 units of domestic currency per a unit of foreign

currency.

2.1.2. Relative PPP

Relative version of PPP is based upon the price level changes affecting the exchange rates. According to this approach, the exchange rate variations must compensate the relative increases (or decreases) of the price levels between the two countries. Relative approach can be formulated as:

$$\frac{dE_t}{E_t} = \frac{dP_t}{P_t} - \frac{dP_t^*}{P_t^*}$$

where;

$\frac{dE}{E}$: percentage change in exchange rate
$\frac{dP}{P}$: percentage change in domestic price level
$\frac{dP^*}{P^*}$:percentage change in foreign price level
t: current period

As an example:

If the domestic price level is increasing by 10% (inflation) and the foreign price level is decreasing by 2% (deflation) then the exchange rate between the two currencies (units of domestic currency per a unit of foreign currency) must increase by 12%. In other words, the domestic currency must depreciate by 12% as a response to the inflation differential of 12%.

2.1.3. Efficient Markets Version of PPP

The previous versions of PPP state that the exchange rates are a reaction to the price level changes in the sense of reflecting the equlibria. But the question is about how long it takes to reach to this equilibrium level.

Empirical studies show that the price level changes do effect the exchange rates; however, there is a lag in the adjustment process. A good example for this case is the study of *Hodgson and Phelps*; they report a lag of eighteen months in Japanese Yen markets after examining the data between April 1919 and April 1925 .[2] *Fatemi*

[2]see Hodgson and Phelps (1975)

refers to this result in his paper[3]; and he states that price level changes precede exchange rate changes, implying lack of efficiency in foreign exchange markets. The term of *efficiency in foreign exchange markets* assumes that the exchange rates must immediately reflect any new information containing relative variations of price levels (inflation or deflation).

The lag question actually leads to the application of the efficient markets version of PPP theory.This approach implies that the future exchange-adjusted difference in price levels between two countries may be estimated from the current exchange rate.

Within this perspective, *Koveos* and *Seifert* [4]summarize and formulate the concept of efficiency theory by referring to *Roll*,who is one of the first to utilize of this approach: The present spot rate contains all information necessary to predict the future spot rate adjusted for anticipated inflation;

$$\text{Exp}[lnE_t - DI_t|\phi_{t-1}] = lnE_{t-1}$$

where;

Exp:expectations operator
ϕ_{t-1}:information set at time t-1
E_t: spot exchange rate at time t.
E_{t-1}: spot exchange rate at time t-1
DI_t:difference in the continuously compounded inflation rate

or; DI_t may be expressed as follows:

$$DI_t = \frac{P_t}{P_{t-1}} - \frac{P_t^*}{P_{t-1}^*}$$

Moreover, they add that the differences between the change in spot rate and the inter-country inflation differential should be uncorrelated over time. In the sense that, current period's deviation from PPP should not be affected from the

[3]see Fatemi (1985)
[4]see Koveos and Seifert (1985)

previous periods' deviations.

2.2. CONCEPTUAL BACKGROUND BEHIND PPP

Many assumptions are made in the theory of PPP. These assumptions lead to the deviations from PPP. The simplicity and the practical usefulness of the theory,however, are not invalidated by these assumptions.

2.2.1. Law of One-Price

This law states that the domestic price of a certain commodity must be equal to its price in the foreign market, when the current exchange rate is used to convert the domestic currency to the foreign currency. Law of one price is a necessary condition for the absolute PPP; but it is not sufficient by itself.[5]

When considering the spatial arbitrage process [6], one may assume that this law is reliable. If there exists differences in the real prices of a commodity in two countries, then the traders will purchase that commodity in the cheaper market and will sell it in the more expensive one. This naturally will lead to an increased demand in the low-price market and a more supply in the high-price market. Consequently, this proces will increase the price of that commodity in the cheaper market while decreasing its price in the other one. This arbitrage mechanism will continue until the prices are equalized in both markets.

On the other hand, this process does not seem to be so smooth when thinking of the factors such as non-tradable goods and barriers to trade.

2.2.2. Barriers to Trade

This issue leads to trade restrictions through the use of tariffs, quotas, export controls, exchange controls, etc. Transportation costs, as the means of hindrance to perfect arbitrage, may also be considered as a barrier to trade. In that sense, the consequences of the above restrictions will lead to deviations from PPP by increasing the real prices of foreign goods[7]. This issue may be included in the

[5]see Vinals (1983)

[6]spatial arbitrage is the economic mechanism behind the price adjustment process of goods in different markets

[7]see Balassa (1973)

computation of the exchange rates from the view of absolute and relative approaches:

$$E_t = \frac{P_t}{P_t^*(1+k)}$$

and;

$$\frac{dE_t}{E_t} = \frac{dP_t}{P_t} - \frac{dP_t^*}{P_t^*} - \frac{d(1+k)}{(1+k)}$$

where "k" represents money cost of transportation or trade barriers per a unit of a commodity.

It should be noted that, the significance of the trade barrier issue becomes vital when the restriction policies (or the transportation costs) of the two countries hugely vary between them. If it is the case of similiar restrictions between the two markets, this issue will have no impact on the calculations. Nevertheless, the difficulty in computing the restriction term "k" makes it quite a bit challenge to apply this approach.[8]

Within that view, *Aizenman*[9] expresses that the presence of transportation costs introduces a framework which will tend to reject the PPP hypothesis even if goods markets are well arbitraged[10].

Finally, it is not a sufficient solution by itself to include effect of trade barriers in the computations for the sake of ceasing deviations from PPP. Use of certain price indices containing non-tradable goods exists as a source of erroneous results as well.

[8]price indices used with PPP contains bundle of goods which have various means of trade barriers

[9]see Aizenman (1986)

[10]in the sense that profit opportunities are absent

2.2.3. Tradable Goods vs. Nontradable goods

It can be concluded that commodity arbitrage equalizes the prices of tradable goods. The calculations may also be finetuned by including the trade barrier effects. But, the use of an index containing only the traded goods will not represent the real price levels of the countries. *Keynes* criticised *W.Churchill* that he had overvalued the pound because he took into account only the tradables while determining the exchange rates after the first World War[11].

At this point a dilemma emerges with respect to the consideration of traded and nontraded goods. Nontradables are claimed to be irrelevant for exchange rate determinations since they do not enter international arbitrage. On the other hand, the price levels that are being used with the PPP theory are the general price indexes[12], they contain nontradables as well. Nevertheless, this practice is claimed to be reasonable since such general price indexes express the real value of the currency in terms of goods and services that it can acquire. But such an approach leads to deviations from PPP simply because it undermines the basic assumption of the theory (i.e. law of one price).

The major reason for the deviations with respect to this issue, is the differentiated ratios between tradables and nontradables in the price indexes of various countries. A shift in those ratios tends to cause shifts in the deviations as well. Bela Balassa points out that poorer countries can be expected to have a ratio of prices of nontraded goods to prices of traded goods lower than richer countries[13]. He reasons that issue with respect to the low productivity and low wage levels of poorer countries. In that sense, the consumption bundles of less developed countries contain more labor intensive goods since the consumers in those countries substitude towards goods that are relatively cheap in their markets.

2.2.4. Variations in Price Indexes

The difference in the consumption basket across countries implies that changes in relative prices will result deviations from PPP[14]. Within the content of the pre-

[11]see Krueger (1983)
[12]i.e. CPI, WPI
[13]quoted from Grennes
[14]see Aizenman (1984)

vious section, it is natural to have different consumption bundles with different weights in the price level indexes due to the economical structure of countries. In that sense, the relevancy of indexes becomes debatable.

Questions pertaining to what is an appropriate sample and the relative weights that should be allocated to each commodity in the sample are open to many arguments: "Should the sample represent all goods and services or only those which are traded?"; "Should the weights given to each item be those of importing country, the exporting country, or a third country?"[15].

In practice, several types of price indexes are being used within the PPP approach: i.e. consumer price index, wholesale price index, cost of living index, GDP deflator, export prices, etc. Consequently, different results are being obtained when using various standart price indexes. Studies show that some of those price indexes favor the PPP approach while others create larger deviations[16]. For example, if WPI is being used, then the PPP theory holds better since it contain traded goods heavily[17].

2.2.5. Sticky Prices

The deviations from PPP are partly caused by the different patterns of behavior in goods and assets markets[18]. Sticky prices, which do not instantaneously react to the economic disturbances, are claimed to be permanent in a world of uncertainity and adjustment cost. The exchange rates are said to incorporate new information and adjust to the new conditions more rapidly than the commodity prices. This naturally results with different type of variations in those two series[19] which leads to deviations from PPP.

2.2.6. Money Shocks

A monetary disturbance which affects production, consumption and the trade balance,tends to create deviations from PPP through changes in the terms of trade. Also, such a disturbance may induce PPP deviations due to the different patterns

[15]quoted from Rodrigues and Carter
[16]see Davutyan and Pippenger (1985)
[17]see Rush and Husted (1984) and Fatemi (1985)
[18]see Daniel (1986)
[19]i.e. exchange rates and price indexes

of goods and assets markets as it is in the case of sticky prices.

A detailed investigation of this issue has been handled by *Koh*[20]. He identifies the effects of money shocks as being *anticipated* and *unanticipated*. From his point of view, unanticipated money shocks cause deviations from PPP because residents do not have full current information about the nature of underlying disturbances affecting the economy; therefore they may confuse monetery with real shocks in the observed price signals. On the other hand, anticipated money shocks lead to departures from PPP since the disturbance is not a surprise for the residents and thus will not alter relative prices.

2.2.7. Capital Movements

The theory of PPP ignores the consequences of international capital movements which are unrelated to inflation. The case of Switzerland[21] where the banks are attractive for the investors who need to keep secret accounts explains this issue quite well. Appreciation of Swiss franc and the depreciation of other currencies cannot be stated in terms of relative inflation rates; i.e., the relative annual differences between the GNP deflators of USA and Switzerland is 3.9 in favor of Switzerland, whereas Swiss franc appreciated against US$ by 11.3% annually (between 1973 and 1979).Moreover, this issue becomes really important because the size of capital flows is much larger than trade flows nowadays.

2.2.8. Miscellaneous

There exists several other factors that may cause deviations from PPP. Technological aspects (i.e. innovations from Japan), discoveries of natural resources (i.e. British oil in the North Sea), changes in the market structure (i.e. changes in the consumers' tastes), or speculations in the foreign exchange markets will result with the changes in the exchange rates although they are unrelated to inflation.

2.2.9. Pitfalls in Application of PPP

Apart from the previously explained issues leading to deviations from PPP, there are also methodological constraints within the testing process that may cause erronous results. The problems related to the price indexes has been brought up

[20]see Koh (1984)

[21]this example is given by R.J.Gordon

in section 2.2.4.; the remaining application hindrances due to the *base period* and *comparision country* will be discussed under this topic.

2.2.9.1. Base Period

While testing the relevancy of the relative PPP, the base period should be chosen as the year when the absolute PPP holds for the determination of the exchange rates. Otherwise, changes in the exchange rates may reflect the relative changes of the price levels, although the result does not give the equilibrium exchange rate with respect to the ratio of price indexes.

2.2.9.2. Comparision Country

The choice of the country which is to be compared with the given country, may affect the PPP test results either favorably or unfavorably. The empirical studies indicate that compared countries with similiar economic policies and regulations, and with strong trade links favor the PPP approach. If it is the case of applying the PPP approach for a broad group of countries, the practice of taking USA as the reference country seems reasonable since United States is the most common market in terms of economic relations and trade.

2.3. A PREVIOUS APPLICATION FOR THE TURKISH CASE

The most recent detailed study in testing the PPP for Turkey, has been done by *Zeynep Önder*[22]. Hereby, a broad explanation of her study and findings will be discussed, in order to give the reader a chance of comparision between our approach and hers.

Önder applies the three versions of PPP[23] both for the official and black-market exchange rates.Tests are processed by comparing Turkey with USA and West Germany seperately. The time period covered in her study is between January,1981 and November,1986. Because of similiar concerns about the black-market exchange rates of our study, she also mentions the need of testing the black-market rates in two different time intervals of 1981-1983 and 1985-1986. On the other hand, she tests the official rates between 1981-1986.

[22]see Önder (1987)

[23]i.e.- absolute, relative, and efficient markets versions

She obtaines the official and black-market rates (after July,1985) from Dünya Newspaper and the Official Gazette of Turkey. Those are of *end-of-month rates* rather than *monthly averages*. For the black-market rates between 1981-1983, she uses Pick's Currency Yearbook. At this stage, it should be noted that she takes Turkey İş Bank's rates applied on banknotes as the black-market rates for the first six months of 1985. Use of those banknote rates may lead to erronous results since they are not reliable substitudes for the black-market rates[24].

While deriving the inflation rates for Turkey, she uses WPI and CPI data of the State Institude of Statistics.For those of USA and West Germany, her source is International Financial Statistics.

Due to her results, she concludes that the determination of official and black-market exchange rates are not validated both with the absolute and relative approaches of PPP. On the other hand, she mentiones that the black-market rates support the efficient markets version of PPP. Consequently, it is asserted that current spot exchange rate contains all information necessary to predict the next month's spot exchange rate adjusted for the anticipated inflation. But this issue does not come out to be relevant when considering the official exchange rates.

[24]see Önder (1987); pp.9

3. EMPIRICAL STUDY

In this part of the paper the relative version of PPP is being tested for the Turkish case between the years 1980 and 1987. Within the process WPI and CPI are taken into account for the inflation rates; as the exchange rates, both official and black-market rates are considered[25].The comparision country, used for the test, is USA since it is one of the main trading partners of Turkey.

3.1. HYPOTHESIS

The testing hypothesis is related to the *relative* version of PPP. The relative approach argues that the difference in the price levels of two countries are to be offset by the same percentage change of the exchange rates between those two currencies[26]. Previously explained relationship is to be recast in the following form, and a regression analysis is to be implemented:

$$y_t = \alpha + \theta(T) + \beta(x_t) + \epsilon_t$$

where;

y: rate of change in the exchange rate between the two currencies
x: inflation differential of the two countries
T: trend
ϵ: error term
t: current period

According to the hypothesis α and θ should not be significantly different from zero, whereas β should not be significantly different from unity[27]. In that sense, PPP approach may be claimed relevant by getting a relationship such as:

$$y_t = x_t$$

[25]selection of the variables and the time period will be reasoned later in the chapter
[26]see section 2.1.2. for detail
[27]significance will be discussed with respect to the t-Statistics test

This above relation states that, change in the inflation differentials between the two countries is equal to the change in the exchange rate of the two currencies.

Trend term "T" is included in the calculations for the first five tests. Thereafter, the hypothesis are examined in the following form:

$$y_t = \alpha + \beta(x_t) + \epsilon_t$$

The above mentioned properties of the coefficients are usefull in this version as well.

Throughout the tests, the lag structures will be explored as well. In order to find how long it takes the exchange rates to adjust the differential inflation, the equation will be modified in the following form:

$$y_t = \alpha + \beta(x_{t-i}) + \epsilon_t$$

i.e.-up in the above formula, differential inflation rates before "i" months are being regressed against today's exchange rates.

3.2. DATA

Gathering and the quality of data[28] are being explained below.

3.2.1. Exchange Rates

Official and black-market exchange rates (TL/$) are used with the PPP approach. Consequently, both rates are being tested seperately for the hypothesis.

3.2.1.1. Official Exchange Rates

Official rates are retrieved from the Turkish Central Bank's monthly bulletins[29]. Since the PPP is tested on the monthly-base, the official exchange rates are the monthly-averages. At this point, one may argue against the relevancy of the official rates for the PPP. Such an argument is to be supported when considering the dirty floating-rates mechanism in Turkey since 1980.

[28] i.e. WPI,CPI,Exchange rates

[29] see Monthly Statistical and Evaluation Bulletin (May-June 1988); T.C. Merkez Bankasi

The daily exchange rates announced by the Central Bank, follow the government's real exchange rate policy for the given period, and utilizing PPP principles[30]. The economic policy of the government dictates the periodic (annual, semiannual) real change in the rate of exchange between the TL and a basket of currencies. This information is not publicly announced. The Central Bank takes this policy decision and then makes a monthly forecast for the inflation differential between Turkey and the countries whose currencies are in the fixed basket. The sum of the inflation differential and the real change is divided by the number of working days in the month; and the daily change in the TL/currency basket exchange rate is found. To determine exchange rates for the individual currencies, cross rates between basket currencies are obtained from European markets[31].

3.2.1.2. Black-Market Exchange Rates

After June,1985, black-market rates are being announced daily in the newspapers. In that sense, data is available and reliable [32].This point is to be supported since the black-market starts to work in a more legal mechanism after 1985[33].

There emerges problem in collecting the black-market data before 1985. The only available source is *Pick's Currency Yearbook*; and that source is found in *Önder*'s MBA thesis in METU[34] and adopted for this paper. But, the rates for 1980,1984, and 1985 do not exist whereas they are not available in Turkey or abroad[35]. At that stage, it has been tried to estimate the black-market rates from the gold prices[36], but the results were not consistent. Interpolating the data for the missing years has been ignored since the use of artificial data is to result with irrelevancy.

With respect to the above considerations, it has been decided to test the PPP approach, with the black-market rates, in two different time intervals of 1981-1984

[30]as of August 1, 1988 this procedure has changed

[31]this paragraph is quoted from Akgiray, Aydoğan, Booth (1988)

[32]black-market rates, used in this paper, are collected from the daily issues of Hürriyet newspaper; and their monthly averages are taken

[33]that conclusion sounds concrete when comparing the behaviour of the black-market before and after 1985 (it will be discussed later in this section)

[34]see Önder (1987)

[35]Önder mentiones this as well

[36]it has been mentioned that Tahtakale (black-market in Istanbul,Turkey) rates are determined by dividing the gold price in Turkey to the ones in the London (or Zurich) market

	1981-1983	1986-1987
mean of black-market rates	188.83 TL / $	798.50 TL / $
mean of official rates	164.95 TL / $	762.04 TL / $
black-market premium	14.4%	4.8%

Table 1: Comparision of the Exchange-Rate Behaviors

and 1986-1987. Such a decision is also supported by accounting the different natures of black-market exchange rates in those two different time intervals. This may be attributable either to change in the black-market premiums and/or to the differences in exchange rate policies after 1985. *Önder* expresses this situation very clearly by graphically emphasizing higher differences between the black-market and official rates before 1985 with respect to the ones after 1985. Similiar to her point, such a conclusion is reached by simply calculating the mean ratios between those two series in the two time intervals (see Table 1).[37]

3.2.2. Inflation Rates

While deriving the inflation rates for Turkey, wholesale and consumer price indexes[38] are used seperataly; and US producer price index[39] is taken for comparision. As it is mentioned previously, the empirical study is to be processed for both price indexes[40] in the sense of answering to which index performs better with PPP[41].

At this stage, it should be noted that price indexes calculated by the State Institute of Statistics (SIS) may be critisized as not being reliable for testing the PPP. The basket constructed in 1979, but not modified with respect to the possible changes in the consumers' preferences, may lead to erronous results. It is asserted that there is a *plus or minus 10%* error range of the SIS indexes[42].Nevertheless, the other option of using Istanbul Chamber of Commerce (ICC) index is to be ig-

[37]it is concluded that black-market rate premiums are much higher (with respect to their means in the two intervals) between 1981-1983 compared to the ones between 1986-1987; black-market premiums are calculated by dividing the difference between the two rates to the official rate

[38]source: State Institute of Statistics

[39]source: Citibank data

[40]i.e. WPI and CPI

[41]it is argued that WPI holds better (see section 2.3.4. for detail)

[42]see Güvenen (1989)

nored since it is valid only for Istanbul and the index basket has been constructed in 1963. Within such a frame, it must be denied that the appropriateness of the PPP testing, is confined with the relevancy of the data used in the process.

3.2.3. Time Period

The time period covered in the testing process is between January 1980, and December 1987. By the launch of the liberalization policies in *January 24,1980* , a new era has started in the economic life of Turkey. The liberalization and stabilization rules, implemented on a continious manner, provide a consistent base to adopt studies such as this one. Consequently, including the earlier years is to demolish the PPP testing, because of concrete differences between the policies used before and after 1980.

3.3. TESTS AND THE RESULTS

The testing results are to be evaluated by analyzing the relevance of the hypothesis[43]. During this process the following steps are considered[44]:

- Coefficient of the inflation differentials,"β_i", should not be significantly different from unity, whereas the others are not to be significantly different from zero.
- "t-Statistics" for significance is to test "β_i"s are equal to unity (i.e.-H_o: $\beta_i = 1$), and "α" and "θ" are equal to zero (i.e.-H_o: $\alpha = \theta = 0$). The critical "t" values at 95% level for certain degrees of freedom (d.f.) are given in the tables.
- The correlation coefficient,"R^2", should be assesed in terms of linear relationship between the two series.
- "Durbin-Watson" statistic (D.W.) should be between 1.5 and 2.5, in order not to suspect positive or negative serial correlation between the residuals which may bias the estimates of standart errors, and consequently the hypothesis testing.

[43]see section 3.1. for detail

[44]results of the tests are available in the APPENDIX

Within the above framework, evaluation of the results are summarized below.To start with, it should be expressed that all the tests satify the Durbin-Watson condition.

Test 1 & 2: Turkish inflation rates derived from WPI and CPI are taken into account at Test 1 and Test 2 respectively. At both tests, inflation differential coefficients,"β", are significant and greater than unity."θ" coefficients of trend are not significantly different from zero, whereas "α"s are insignificant. It can be concluded that PPP does not hold for determining the official exchange rates by using WPI and CPI; i.e.- a 10% differential in inflation, results in 15% depreciation of Turkish Lira (TL), rather than 10%. With respect to the relevance comparision of WPI and CPI, it can be stated that WPI holds better although there occurs no huge differences between the results of the two indexes[45].

Test 3: A lag of one month is analyzed for the official rates between 1980 and 1987[46]. The hypothesis is rejected since all the coefficients are significantly different from their hypothesized values.

Test 4: Due to previously explained change in the behavior of exchange rates[47], the hypothesis is tested between 1980-1984 for the official rates. "R^2" is close to one, whereas "β" is significantly larger than unity.The remaining coefficients are insignificant. This result suggests that PPP hypothesis does not hold for this test; i.e.- a 10% differential in inflation is to cause 17.5% depreciation of TL.

Test 5: Same above process is held between 1985-1987 for the official rates. All the coefficients are insignificant and there occurs no linear correlation between the two series. This leads to the analysis of the lag structure in the coming tests.

Test 6 & 7: In both tests, there appears a lag of two months in the adjustment of exchange rates to observed inflation differentials; i.e.- only "β_2" is significant but less than unity. On the other hand, "R^2" is relatively low. Finally, it may be stated that PPP does not hold; i.e.- a 10% differential in inflation is to result in 6% of depreciation of TL after two months.

Test 8 & 9 & 10 & 11: According to the issues mentioned about the black-

[45]Turkish inflation rates derived from WPI will be used for the remaining tests.

[46]change in the exchange rates at time "t" is regressed with the inflation rates at time "$t-1$".

[47]see section 3.2.1.2. for detail

market exchange rates[48], the hypothesis is tested for the time periods between 1981-1983 and 1986-1987."Test 8" analyses the relevance of PPP for the black-market rates between 1981-1983. The coefficient "R^2" states that there is no correlation between the two series. "α" coefficient is significantly different than zero, whereas "β" is insignificant. Consequently, lags up to six months are analyzed in tests 9 to 11. But, the outcomes are not supporting the PPP again: No linear correlation between the series; "β_i"s are not significant; "α"s are significantly different from zero.

Test 12: Before testing the hypothesis for black-market rates between 1986-1987, the official rates are again tested, but for this issue of time interval[49]. The purpose of such an approach is to compare official and black market rates in the same time interval. The results of this test do not support the hypothesis.

Test 13: Testing results of black-market rates between 1986-1987, reject the hypothesis: "β" is not significant; "α" is significantly different from zero; no linear correlation between the two series.

Test 14 & 15 & 16 & 17: Lags up to four months are analyzed for official rates between 1986-1987. Outcomes of the tests 14 & 16 & 17, do not support the hypothesis at all. On the other hand, the results in Test 15 state a lag of two months similiar to the Test 6 of 1985-1987. Moreover, it may be concluded that PPP holds in Test 15, since "β_2" is significantly equal to unity (i.e.- $\beta_2 = 0.834$)[50] and "α" is not significant.

Test 18 & 19 & 20 & 21: Similiar to the above process, black-market rates ,between 1986-1987, are tested with lags up to four months. Results of the tests 19 to 21 reject the hypothesis. Although there occurs a low correlation (i.e.-$R^2 = 0.252$), Test 18 favors the PPP by expresing a lag of one month: "β_1" coefficient is significantly equal to unity (i.e.- $\beta_1 = 0.98$); "α" is not significant.

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[48]see section 3.2.1.2. for detail

[49]the previous results for official rates were for the years between 1985-1987, and the outcomes stated a lag of two months in the adjustment of exchange rates to inflation differentials (see tests 5 to 7 for detail)

[50]standart error, equal to 0.283, leads us to accept the "β_2" coefficient between 1.283 and 0.717

4. CONCLUSION

The aim of this paper is to test the relative approach of PPP for the Turkish case. This approach states that the exchange rate changes between the two currencies are directly affected by the change in the inflation differentials between the countries of issue. At this stage, it must be expressed that one should keep in mind all the theoretical and empirical constraints when assesing these results. Since specifically reasoning the failures is beyond the scope of this paper, those are left for further studies.

PPP approach has been implemented both for the official and black-market exchange rates. The time period covered in this paper, is between January,1980 and December,1987 for the official rates. On the other hand, black-market exchange rate sources, which are not available, led us to consider two different time intervals of 1981-1983 and 1986-1987. United States has been taken as the comparision country since it is the main partner of Turkey in trade and economical relations. While deriving the inflation rates, WPI has been used since it is proved to be more appropriate for PPP theory. But in the study, CPI is also taken into account with the official rates testings, in order to make a comparision due to the relevance of the two indexes. The results with respect to this issue did not reflect absolute differences between the use of either indexes. However, the outcomes slightly favored the use of WPI rather than CPI.

Testing findings (in tests 1 to 3) of the official rates between 1980-1987, both with WPI and CPI, reject the hypothesis. But, significant "β" coefficient gives an idea about the relationship between the exchange rates and inflation differentials. It states that TL is undervalued; in other words, depreciation of TL is above the level of real inflation rates. Within the same framework, the next analysis expressed that there is no lag structure, meaning that exchange rates do not adjust to previous period's inflation differential.

The further tests aimed to analyze the determination of official exchange rates between 1980-1984 and 1985-1987 seperately (in tests 4 to 8). Although the hypothesis was again rejected, the significant outcomes asserted a more undervaluation of TL between 1980-1984 than it is between 1980-1987. This real depreciation of Turkish Lira may be attributable to the governmental policies trying to stimulate the exports untill 1985. On the other hand, a lag of two months is seen

between 1985-1987, whereas an overvaluation of TL emerged. This result was again obtained while applying the hypothesis for the time period of 1986-1987 (in tests 14 to 17). But, hereby it is concluded that PPP holds ,since the "β_2" coefficient was significant between the limits of acceptance.

As it is mentioned previously, the black-market rates determination within the PPP hypothesis is tested in two seperate time intervals due to data availability.The first one, between 1981-1983, neither supported the hypothesis nor gave satisfactory results to explain the determination of black-market exchange rates, although lags up to six months have been analyzed (in tests 8 to 11). The second approach, between 1986-1987, supported the validity of PPP (in tests 18 to 21).The outcomes asserted that there is a one-month lag in the adjustment of black-market exchange rates to the inflation differentials.

To sum up the above evaluation, it may be concluded that, there is an undervaluation and overvaluation of TL before and after 1985 respectively. The case after 1986 supports the relevance of the theory both with the tests of official rates and black-market rates. It may be stated that black-markets perfectly adjust to the changes in the inflation differentials in one month. The lag of two months, which existed with the tests of official rates, can be interpreted such as The Central Bank of Turkey considers the black-market rates while determining the official ones.

APPENDIX

Equation	$y_t = \alpha + \theta(T) + \beta(x_t)$
Period	January 1980 - December 1987
Exchange-Rate	Official
Price Index	WPI
Critical t-Stat.	1.99 (a=0.05 ; d.f.=93)
R^2	0.62427152
D.W.	1.70940825

Label	Coefficient	Standart Error	t-Statistics
α	1.474238	0.960970	1.534414
θ	-0.043122	0.015465	-2.788283
β	1.552193	0.131030	11.846060

Table 2: TEST 1

Equation	$y_t = \alpha + \theta(T) + \beta(x_t)$
Period	January 1980 - December 1987
Exchange-Rate	Official
Price Index	CPI
Critical t-Stat.	1.99 (a=0.05 ; d.f.=93)
R^2	0.45254498
D.W.	1.76046123

Label	Coefficient	Standart Error	t-Statistics
α	1.965437	1.179180	1.666783
θ	-0.056826	0.018606	-3.054109
β	1.571075	0.191740	8.193782

Table 3: TEST 2

Equation	$y_t = \alpha + \theta(T) + \beta_1(x_{t-1})$
Period	January 1980 - December 1987
Exchange-Rate	Official
Price Index	WPI
Critical t-Stat.	1.99 (a=0.05 ; d.f.=93)
R^2	0.00615204
D.W.	1.67865124

Label	Coefficient	Standart Error	t-Statistics
α	0.453145	1.195908	0.378913
θ	-0.002396	0.018815	-0.127363
β	-0.120556	0.158891	-0.758736

Table 4: TEST 3

Equation	$y_t = \alpha + \theta(T) + \beta(x_t)$
Period	January 1980 - December 1984
Exchange-Rate	Official
Price Index	WPI
Critical t-Stat.	2.00 (a=0.05 ; d.f.=57)
R^2	0.70155864
D.W.	1.79154641

Label	Coefficient	Standart Error	t-Statistics
α	1.386323	1.339893	1.034652
θ	-0.063386	0.034770	-1.823012
β	1.751221	0.156865	11.163850

Table 5: TEST 4

Equation	$y_t = \alpha + \theta(T) + \beta(x_t)$
Period	January 1985 - December 1987
Exchange-Rate	Official
Price Index	WPI
Critical t-Stat.	2.04 (a=0.05 ; d.f.=33)
R^2	0.06996217
D.W.	1.76068258

Label	Coefficient	Standart Error	t-Statistics
α	2.276992	2.373571	0.959298
θ	-0.007254	0.029839	-0.243126
β	0.245753	0.156675	1.568545

Table 6: TEST 5

Equation	$y_t = \alpha + \beta_1(x_{t-1}) + \beta_2(x_{t-2})$
Period	January 1985 - December 1987
Exchange-Rate	Official
Price Index	WPI
Critical t-Stat.	2.04 (a=0.05 ; d.f.=33)
R^2	0.32043664
D.W.	1.89450537

Label	Coefficient	Standart Error	T-Statistics
α	2.276992	2.373571	0.959298
β_1	0.287890	0.186240	1.545798
β_2	0.574083	0.184984	3.103410

Table 7: TEST 6

Equation	$y_t = \alpha + \beta_1(x_{t-1}) + ... + \beta_4(x_{t-4})$
Period	January 1985 - December 1987
Exchange-Rate	Official
Price Index	WPI
Critical t-Stat.	2.04 (a=0.05 ; d.f.=31)
R^2	0.35126592
D.W.	1.90028529

Label	Coefficient	Standart Error	t-Statistics
α	0.678273	0.764241	0.887511
β_1	0.306467	0.191549	1.599940
β_2	0.630484	0.193566	3.257200
β_3	-0.224852	0.194966	-1.153287
β_4	-0.012145	0.191906	-0.063289

Table 8: TEST 7

Equation	$y_t = \alpha + \beta(x_t)$
Period	January 1981 - December 1983
Exchange-Rate	Black Market
Price Index	WPI
Critical t-Stat.	2.04 (a=0.05 ; d.f.=34)
R^2	0.00344960
D.W.	2.25314960

Label	Coefficient	Standart Error	t-Statistics
α	4.573069	1.572297	2.908527
β	-0.190542	0.555414	-0.343063

Table 9: TEST 8

Equation	$y_t = \alpha + \beta_1(x_{t-1}) + \beta_2(x_{t-2})$
Period	January 1981 - December 1983
Exchange-Rate	Black Market
Price Index	WPI
Critical t-Stat.	2.04 (a=0.05 ; d.f.=33)
R^2	0.01060971
D.W.	2.28627014

Label	Coefficient	Standart Error	t-Statistics
α	5.094415	1.898272	2.683711
β_1	-0.200394	0.572121	-0.350266
β_2	-0.265241	0.579780	-0.457485

Table 10: TEST 9

Equation	$y_t = \alpha + \beta_1(x_{t-1}) + ... + \beta_4(x_{t-4})$
Period	January 1981 - December 1983
Exchange-Rate	Black Market
Price Index	WPI
Critical t-Stat.	2.04 (a=0.05 ; d.f.=31)
R^2	0.05247203
D.W.	2.32586123

Label	Coefficient	Standart Error	t-Statistics
α	4.749446	2.662149	1.784061
β_1	-0.130576	0.591591	-0.220719
β_2	-0.392097	0.597922	-0.655765
β_3	0.593489	0.568707	1.043576
β_4	-0.363481	0.567016	-0.641042

Table 11: TEST 10

Equation	$y_t = \alpha + \beta_1(x_{t-1}) + ... + \beta_6(x_{t-6})$
Period	January 1981 - December 1983
Exchange-Rate	Black Market
Price Index	WPI
Critical t-Stat.	2.04 (a=0.05 ; d.f.=29)
R^2	0.16329564
D.W.	2.48708697

Label	Coefficient	Standart Error	t-Statistics
α	8.692969	3.549303	2.449204
β_1	-0.326102	0.592434	-0.550445
β_2	-0.540183	0.587238	-0.919870
β_3	0.286288	0.579032	0.494426
β_4	-0.354176	0.572670	-0.618465
β_5	-1.005947	0.554649	-1.813663
β_6	-0.327637	0.556531	-0.588712

Table 12: TEST 11

Equation	$y_t = \alpha + \beta(x_t)$
Period	January 1986 - December 1987
Exchange-Rate	Official
Price Index	WPI
Critical t-Stat.	2.07 (a=0.05 ; d.f.=22)
R^2	0.03090794
D.W.	1.71290775

Label	Coefficient	Standart Error	t-Statistics
α	1.939766	0.646660	2.999666
β	0.164242	0.196075	0.837652

Table 13: TEST 12

Equation	$y_t = \alpha + \beta(x_t)$
Period	January 1986 - December 1987
Exchange-Rate	Black Market
Price Index	WPI
Critical t-Stat.	2.07 (a=0.05 ; d.f.=22)
R^2	0.05556850
D.W.	1.51271781

Label	Coefficient	Standart Error	t-Statistics
α	2.033910	0.794749	2.559184
β	0.274168	0.240977	1.137733

Table 14: TEST 13

Equation	$y_t = \alpha + \beta_1(x_{t-1})$
Period	January 1986 - December 1987
Exchange-Rate	Official
Price Index	WPI
Critical t-Stat.	2.07 (a=0.05 ; d.f.=22)
R^2	0.09129685
D.W.	2.04873360

Label	Coefficient	Standart Error	t-Statistics
α	1.308909	0.809218	1.617498
β_1	0.473967	0.318801	1.486717

Table 15: TEST 14

Equation	$y_t = \alpha + \beta_2(x_{t-2})$
Period	January 1986 - December 1987
Exchange-Rate	Official
Price Index	WPI
Critical t-Stat.	2.07 (a=0.05 ; d.f.=22)
R^2	0.28310122
D.W.	1.80405217

Label	Coefficient	Standart Error	t-Statistics
α	0.503780	0.718926	0.700740
β_2	0.834408	0.283090	2.947497

Table 16: TEST 15

Equation	$y_t = \alpha + \beta_3(x_{t-3})$
Period	January 1986 - December 1987
Exchange-Rate	Official
Critical t-Stat.	2.07 (a=0.05 ; d.f.=22)
Price Index	WPI
R^2	0.01887223
D.W.	1.58700108

Label	Coefficient	Standart Error	t-Statistics
α	2.835489	0.825369	3.435416
β_3	-0.206334	0.317184	-0.650519

Table 17: TEST 16

Equation	$y_t = \alpha + \beta_4(x_{t-4})$
Period	January 1986 - December 1987
Exchange-Rate	Official
Price Index	WPI
Critical t-Stat.	2.07 (a=0.05 ; d.f.=22)
R^2	0.04703652
D.W.	1.61031042

Label	Coefficient	Standart Error	t-Statistics
α	3.113979	0.819255	3.800985
β_4	-0.326400	0.313227	-1.042055

Table 18: TEST 17

Equation	$y_t = \alpha + \beta_1(x_{t-1})$
Period	January 1986 - December 1987
Exchange-Rate	Black Market
Price Index	WPI
Critical t-Stat.	2.07 (a=0.05 ; d.f.=22)
R^2	0.25205893
D.W.	1.48607199

Label	Coefficient	Standart Error	t-Statistics
α	0.558628	0.913985	0.611200
β_1	0.980442	0.360075	2.722881

Table 19: TEST 18

Equation	$y_t = \alpha + \beta_2(x_{t-2})$
Period	January 1986 - December 1987
Exchange-Rate	Black Market
Price Index	WPI
Critical t-Stat.	2.07 (a=0.05 ; d.f.=22)
R^2	0.09211083
D.W.	1.48498681

Label	Coefficient	Standart Error	t-Statistics
α	1.423245	1.007217	1.413046
β_2	0.592535	0.396610	1.493999

Table 20: TEST 19

Equation	$y_t = \alpha + \beta_3(x_{t-3})$
Period	January 1986 - December 1987
Exchange-Rate	Black Market
Price Index	WPI
Critical t-Stat.	2.07 (a=0.05 ; d.f.=22)
R^2	0.00143442
D.W.	1.21419072

Label	Coefficient	Standart Error	t-Statistics
α	2.906887	1.036633	2.804161
β_3	-0.070818	0.398371	-0.177771

Table 21: TEST 20

Equation	$y_t = \alpha + \beta_4(x_{t-4})$
Period	January 1986 - December 1987
Exchange-Rate	Black Market
Price Index	WPI
Critical t-Stat.	2.07 (a=0.05 ; d.f.=22)
R^2	0.00806404
D.W.	1.22909098

Label	Coefficient	Standart Error	t-Statistics
α	3.131271	1.040577	3.009167
β_4	-0.168252	0.397845	-0.422908

Table 22: TEST 21

	1980	1981	1982	1983	1984	1985	1986	1987
January	9.23	4.51	3.87	9.54	3.88	4.81	4.52	3.61
February	29.28	2.21	3.72	2.41	3.38	4.72	2.15	2.20
March	4.47	-0.76	3.33	1.57	3.27	5.35	1.18	3.52
April	3.51	-0.76	1.90	1.42	8.27	2.33	1.99	2.62
May	2.95	2.09	1.30	1.65	6.90	2.16	1.59	4.76
June	2.72	6.46	1.36	1.31	4.70	-1.27	0.97	0.45
July	0.28	0.10	1.98	1.17	-0.70	0.49	1.22	1.73
August	1.53	1.11	1.94	2.07	3.18	1.76	0.17	2.80
September	3.42	3.00	1.14	2.09	2.32	2.74	2.16	2.05
October	7.15	1.65	0.75	2.75	3.27	4.98	3.90	3.48
November	3.71	1.91	1.04	4.10	3.71	3.06	1.46	2.84
December	3.10	1.69	0.59	4.38	1.74	1.89	0.92	10.77

Table 23: MONTHLY INFLATION RATES IN TURKEY

§ all figures are to be read in percent(%)
¶ inflation rates are derived from WPI (source SIS)

	1980	1981	1982	1983	1984	1985	1986	1987
January	8.05	3.96	2.08	4.20	3.45	5.57	3.20	2.94
February	22.11	4.02	2.28	2.52	1.53	3.30	1.74	2.70
March	8.37	0.94	2.28	2.03	3.10	4.78	1.30	3.74
April	6.56	1.29	0.95	1.47	6.23	0.83	0.38	2.09
May	7.86	1.87	0.30	0.67	4.85	2.40	1.90	4.93
June	1.78	2.02	1.69	1.32	6.49	-0.76	2.39	-0.10
July	1.91	4.37	1.02	1.04	0.92	1.42	1.87	1.91
August	0.04	0.03	1.35	2.34	2.49	2.59	0.87	1.71
September	3.78	3.51	3.11	3.23	2.07	4.75	2.39	2.92
October	4.02	1.02	2.71	5.31	4.36	6.26	7.25	4.80
November	1.81	1.09	2.32	3.74	3.85	4.64	2.28	6.25
December	1.17	1.19	3.50	4.20	1.86	1.61	1.64	11.20

Table 24: MONTHLY INFLATION RATES IN TURKEY

§ all figures are to be read in percent(%)
¶ inflation rates are derived from CPI (source SIS)

	1980	1981	1982	1983	1984	1985	1986	1987
January	2.06	1.41	0.84	-0.26	0.61	-0.09	-0.41	0.80
February	2.05	0.97	0.10	0.33	0.29	-0.12	-1.46	0.59
March	0.65	0.93	-0.20	-0.09	0.67	-0.16	-1.35	0.03
April	0.34	1.06	0.00	0.00	0.09	0.22	-0.70	0.75
May	0.53	0.23	0.20	0.29	0.06	0.16	0.33	0.29
June	0.52	0.23	0.23	0.29	0.06	-0.19	-0.06	0.32
July	1.79	0.47	0.36	0.26	0.19	-0.06	-0.05	0.16
August	1.24	0.06	-0.06	0.49	-0.38	-0.05	-0.06	0.16
September	0.29	-0.23	-0.30	0.19	-0.45	0.45	0.10	0.16
October	1.15	0.13	0.16	0.22	0.32	0.65	0.30	0.16
November	0.46	-0.20	0.16	-0.16	0.29	0.51	0.10	0.32
December	0.60	0.10	0.13	0.19	-0.16	0.22	-0.06	0.32

Table 25: MONTHLY INFLATION RATES IN THE U.S.A.

§ all figures are to be read in percent(%)

¶ inflation rates are derived from WPI (source CITIBANK DATA)

	1980	1981	1982	1983	1984	1985	1986	1987
January	42.90	89.70	136.25	187.09	300.20	449.11	581.91	751.05
February	70.00	95.37	142.57	192.95	309.68	465.18	586.14	758.61
March	70.00	95.85	144.34	197.59	313.38	490.37	627.49	773.50
April	73.70	97.01	147.28	205.46	328.25	498.48	660.37	787.61
May	73.70	101.89	148.75	210.12	349.76	520.79	664.30	804.84
June	76.85	107.28	158.27	216.97	360.28	530.12	675.04	833.74
July	78.00	113.02	165.41	223.07	373.74	530.04	672.21	864.90
August	79.80	120.47	170.54	234.22	383.90	532.14	672.85	886.15
September	80.00	120.34	173.81	241.85	398.34	547.87	685.59	910.16
October	82.10	124.50	176.36	245.89	411.77	546.51	701.30	944.27
November	87.20	127.24	181.38	256.81	414.20	554.99	745.81	954.91
December	88.90	129.55	185.10	273.97	432.49	567.91	755.15	991.18

Table 26: OFFICIAL EXCHANGE RATES (TL/$)

§ all rates are monthly averages
¶ source: The Central Bank of the Republic of Turkey

	1981	1982	1983	1986	1987
January	102.50	160.00	217.00	604.83	787.38
February	99.75	150.00	231.00	622.55	786.91
March	95.50	165.00	239.00	662.86	785.18
April	110.00	170.00	252.00	686.83	794.78
May	115.50	172.00	259.00	696.89	814.89
June	115.50	200.00	249.00	709.35	862.56
July	121.00	185.00	247.00	705.39	881.95
August	134.00	210.00	270.00	692.29	913.41
September	158.00	190.00	269.00	712.71	964.91
October	139.00	189.00	271.00	716.85	1011.41
November	145.00	188.00	290.00	765.63	1074.86
December	159.00	215.00	315.00	775.01	1134.48

Table 27: BLACK-MARKET EXCHANGE RATES (TL/$)

§ rates after January,1986 are monthly averages
¶ source#1: (1981-83) Pick's Currency Yearbook
† source#2: (1986-87) daily issues of Hürriyet Newspaper

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