

PAKISTAN`S TRADE PATTERNS WITH CHINA AND UAE: Application of Purchasing Power Parity Theory

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The present study examines the trading patterns of Pakistan with its two major trading partners: China and the United Arab Emirates (UAE), through the application of purchasing power parity (PPP) theory. Purchasing Power Parity (PPP) is a theory of exchange rate determination and a way to compare the average price of goods and services between the countries. The theory assumes that the transactions undertaken by importers and exporters are motivated by the cross country price difference; which in turn induce changes in the bilateral exchange rate. The objective of the research paper is to assess the PPP theory behavior, in case of Pakistan, with its two major trading partners, i.e., whether the long-run movements in the exchange rate are affected by changes in the price level in the country. The study examines the PPP theory on the time series data from 1980 to 2013, through an application of the Ordinary Least Square (OLS) regression. The results indicate that in the case of China, PPP theory holds with Pakistan and the price level has a significant role to play. It induces changes in the exchange rate determining the long-run equilibrium path for trade between Pakistan and China. On the other hand, for UAE, the PPP theory does not hold with Pakistan, which might be due to productivity differences or fiscal shocks.

I. Introduction

In the 16th century, the ‘School of Salamanca’ proclaimed an idea which was about the long-term relationship between the equilibrium exchange rates and the price levels. The Purchasing Power Parity (PPP) theory was popularized by Gustav Cassel in 1918. According to Cassel (1918), the willingness to pay certain price for foreign money must ultimately and essentially be due to the fact that this money possess a purchasing power as against commodities and services in that country. On the other hand, when we offer more of our own money, we are actually offering a purchasing power as against commodities and services in our own country. Our valuation of a foreign currency in terms of our own, therefore, mainly depends on the relative purchasing power of the two currencies in their respective countries.

The term “parity” means “on equal basis”. In different countries a typical consumer will face a balanced purchasing power, but all this can happen only if some

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assumptions exist in the competitive market i.e., absence of transaction cost and other costs, and insignificant impact of barriers to trade. The Purchasing Power Parity theory is an extended version of “the law of One Price”. According to the law of one-price, a commodity should be sold for the same price in two separate markets provided there is no transportation cost and there are no differential taxes applied in the two markets. The PPP theory is a variation to the law of one-price as it is the application of law of one-price to the aggregate economy by taking into consideration the basket of commodities.

Pakistan and China have enjoyed good political and strategic relations over the past 60 years. The economic ties got more strengthened in November 2006 when a Free Trade Agreement (FTA) was signed between Pakistan and China. The FTA agreement became applicable in July, 2007 and as a result of it a gradual reduction in the bilateral tariff rates was considered. In 2013, the trade volume reached to an amount of 12 billion US\$. China is contributing nearly 9 per cent of the total exports and 15 per cent of the total imports of Pakistan. The major trading commodities in the mutual trade are: cotton yarn, cotton cloth, leather, marble and stones, art silk, ready-made garments and other machinery, etc. However, overall in this trade balance, Pakistan has to suffer because of its crumbled economic situation. The trade deficit has been widened and it requires immediate cure [Pakistan Business Council, (2013)]

Pakistan and the United Arab Emirates (UAE) have also experienced strong trade relationships. Since its independence in 1971, UAE has extended its warm and long-term economic assistance towards Pakistan in various sectors. Cultural harmony, mutually shared beliefs and traditions, as common interests have been the real cause for this close trading relations. Almost 1.2 million Pakistani, both skilled and semi-skilled render their services in UAE and they have been a major source for providing healthy foreign reserves to Pakistan. Investment in the oil and gas sectors, banking, energy, telecommunication and aviation, etc., have been effectively made by UAE and the trade volume reached to almost 9 billion US\$ in 2013. Out of its total trade volume, Pakistan share 10 per cent exports and 17 per cent imports from the UAE.

The present study has empirically tested the PPP theory relation of Pakistan with its two major trading partners: China and UAE. The selection of these countries is dependent upon their trade share with Pakistan. China has emerged as the largest trading partner of Pakistan replacing the United States and is being closely followed by the UAE. The USA has slipped to third position on the list of the top ten trading partners of Pakistan [Dawn, (2012)].

The main focus of this study is to empirically examine the application of PPP theory in the case of Pakistan. Under the purchasing power parity (PPP) theory it is examined as to how the relative price (measured through GDP deflator) values between these nations determine the bilateral equilibrium exchange rates. Therefore,

it is important to observe the direction in which the PPP would behave and will help to determine the future trade patterns. The assumptions such as symmetry and proportionality are not met and a weak form of PPP might exist in Pakistan.

The study attempts to examine as to how the relative exchange rates are affected and get determined by the prevailing price levels in the corresponding nations i.e., Pakistan with its two major trading partners; China and UAE. This theory will try to statistically measure the variations in the GDP deflator rates and how the trading patterns between these nations will get affected under the lines of PPP theory. In addition, in the long-run, it will indicate as to how the movements in equilibrium exchange rate are being determined by changes in the prevailing price levels.

The organization of the paper is as follows: after the introduction (Section I), Section II presents the literature review, whereas, Section III describes the theoretical framework. In Section IV, the theoretical model is developed. The data and methodology is described in Section V. Section VI is devoted to discussion of results and interpretation; while the last Section VII concludes the paper and presents some policy recommendations.

II. Literature Review

The PPP theory reveals that the relative exchange rates were determined by the price differentials among the trading countries. Once the purchasing power parity is achieved then all commodities should be made available at the same price in the respective countries. Price ratios between the two nations should be equated with the exchange rates. In shorter time span, the fluctuations have been seen between the GDP deflators and the exchange rates. However, in the extended period, this will drive the profits to zero and the exchange rates will shift to normalization, due to the effects of price ratios [Balassa (1964)].

Chacholiades and Johnson (1978) observed movements in the exchange rate values expressed by their average percentage ratios, which get affected by the prevailing market situation where interest rates, income levels and government decisions weigh much value and significance. The results show that inflation rates do help in bringing the same effects in the trading nations.

Abuaf and Jorion (1990) also analyzed the patterns of purchasing power parity in the long run. Some previous results were unable to reject the hypothesis that real exchange rate adopts the random walk behavior in the long run. Estimation techniques with multilateral framework have been used and the purchasing power parity (PPP) deviations take almost 3 years to reach to half its level, in the short-run. On the other hand, Rogoff (1996) implies that the purchasing power parity (PPP) works as simple empirical proposition, according to which once the system of common currency is adopted, then the price level should be the same across countries. The basic idea is that if goods market is capable of enforcing the price level parity over

a broad range of commodities, then a high correlation would be seen in the price levels. Empirical literature argues in favor of the point that PPP is a short-term proposition and plays an anchor role for the long-term real exchange rates. The PPP puzzle follows that it seems difficult to assume the short term instability without influential effect on money and the financial markets.

Islam and Ahmad (1999), empirically tested the PPP proposition for Korea-US exchange rate and their respective prices. The quarterly time series data is used, covering the time from 1971 to 1996. First, unit root tests are applied to check the stationarity of the data. Then, causality and co-integration tests are applied. The study concludes the existence of weak PPP. The short run dynamics of VECM also show the stability of relationship with the speed of adjustment of 24 per cent a year. The causality test shows unidirectional relationship, which is opposite as expected; the causality flowing from exchange rate to the relative prices. This might be due to the government regulated exchange rate in Korea during the time period covered in the analysis.

Papell and Prodan (2003) tried to investigate the various patterns of purchasing power parity. The data for real exchange rate of sixteen countries have been extracted and the Cassel's constant mean reversion and Balassa and Samuelson's constant trends were followed. The unit root tests were applied. The results indicate that nine out of sixteen countries shows the evidence of PPP. The restricted tests have shown evidence in five additional countries. Ten countries for Cassel and four for Balassa are supported by the evidence, where as, Samuelson test showed much strength of the restricted tests.

The purchasing power parity theory was tested for the Asian countries by Khan and Ahmad (2005) for the time period 1976-2001. The study employs the co-integration technique to test the long-run relationship among exchange rate and the relative prices. The conclusion does not support the existence of PPP among these nations, due to the real shocks in the economies, productivity differences; and the impact of Asian financial crisis of 1997.

Coakley et al. (2005) analyse a panel data to check the validity of purchasing power parity (PPP) in 19 industrialized and 26 developing countries. The study concludes that, in general, the relative PPP holds in each of the panel. The data on both consumer price index (CPI) and producer price index (PPI) was used. On the other hand, Sekioua and Karanasos (2006) provide the additional point about the convergence paths of the real exchange rates. Median unbiased estimation, annually and monthly sample data in long horizon was used to estimate the deviation patterns of Purchasing Power Parity (PPP). The points estimated are not enough to show the convergence towards PPP. The intervals used for monthly data are tougher than for the annual data but still are not capable to solve the PPP puzzle.

Khan and Qayyum (2008) examine the validity of PPP for the case of Pakistan. The multivariate co-integration technique and the VECM modeling used to test the theory. The study supports the existence of long-run relationship of exchange rate

with the domestic and foreign price, but, the adjustment of PPP towards the long-run equilibrium is a slow process. Hence, the study suggests a weak form of PPP.

Alam et al. (2009) highlight that the Purchasing Power Parity theory tries to statistically measure the long run relationship between the variations in the price levels and their effects on the relative exchange rates prevailing in different countries. The study tests the PPP theory for Bangladesh with India and China. According to this theory, the degree of deviations should be same in the respective nations due to the changes in the GDP deflator values. Statistical measures show that under PPP, the trading patterns between Bangladesh and India are largely determined by relationship between the exchange rate and the price values, whereas, in case of China, this relationship does not exist.

Acaravci and Ozturk (2010) use the monthly data from 1992 to 2009 of eight transition countries to check the validity of PPP theory. These countries include Bulgaria, Croatia, Czech Republic, Hungary, Macedonia, Poland, Romania and Slovak Republic. The unit root test is applied. The study proposes weak form of long run PPP relationship. The empirical findings indicate that PPP holds only in the case of Bulgaria and Romania, while the exchange of rate for rest of the countries do not converge in the long-run as predicted by the PPP theory.

III. Theoretical Framework

The Purchasing Power Parity theory is an extended version of “the law of One Price”. According to the law of one price, a commodity should be sold for same price in the two separate markets provided there is no transportation cost and no differential tax applied in the two markets. The PPP theory is a variation to law of one price as it is the application of law of one price to the aggregate economy by taking into consideration the basket of commodities. Hence, under the PPP theory; external value of the currency depends on the domestic purchasing power of that currency relative to that of another currency. The PPP theory tries to establish a relationship between the domestic price level and the exchange rate and also helps to explain the nature of trade by taking into consideration the balance of payments of a nation.

When domestic currency is exchanged for any foreign currency, it resultantly exchanges the domestic purchasing power with the foreign purchasing power, as it can buy some amount of goods or services in the domestic economy. This exchange of purchasing power takes place at some specified rate at which the purchasing power of the two currencies is equalized. Therefore, the relative purchasing power of the two currencies would determine the exchange rate of two currencies. Thus, exchange rate under the Purchasing Power Theory is in equilibrium when their domestic purchasing power at that rate of exchange is equivalent. The PPP theory tries to establish a relationship between the domestic price level and the exchange rate, and also helps to explain the nature of trade by taking into consideration the balance of payments of a nation.

There are two versions of the Purchasing Power Parity theory; the absolute PPP and the relative PPP. Absolute PPP refers to equalization of the real price levels across countries, i.e., exchange rate between different currencies is in equilibrium when their purchasing power equalizes in the two countries. According to the relative PPP, percentage change in exchange rates, over a given period, equals the difference in percentage changes in the domestic prices of different countries. Therefore, relative PPP refers to equalization of the real price change across countries. It takes into accounts the market imperfections like transportation cost and trade restrictions that absolute PPP theory fails to take into consideration. The theoretical model of the PPP theory is discussed in Section IV.

IV. Theoretical Model

In building up the theoretical model of PPP, the absolute purchasing power parity cannot be used due to factors like tariffs, non-tariff barriers (NTB), cost of non-traded items and the transportation cost etc. However, the relative purchasing power parity can be used for the analysis.

The linear equation form of the PPP theory is given below [Voinea (2013)]:

$$\ln \varepsilon_t = \beta_0 + \beta_1 \ln P_t + \beta_2 \ln P_t^* + U_t \quad (1)$$

where

- ε_t = Official Nominal Exchange Rate of Pakistani rupee with trading partners (China and UAE).
- P_t = Domestic Price Level measured through GDP deflator of Pakistan.
- P_t^* = Foreign Price Level measured through GDP deflator of the trading partners (China and UAE).

The subscript t indicates the time period. The coefficient " β_0 " gives the intercept value and β_1 and β_2 indicate the slope coefficients and " U_t " is the error term. The present study has used GDP deflator instead of Consumer Price Index (CPI) because it include not only the value of traded goods but also the non-traded items. CPI uses only a basket of commodities, whereas, GDP deflator includes all goods and services produced in the country.

The PPP model requires the bilateral exchange rate to be stationary or mean reverted. If, it has a unit root then PPP theory will be violated. To calculate the bilateral real exchange rate (*BRET*), the value of the GDP deflator of Pakistan is divided by the exchange rate value and the GDP deflator values of

the foreign country; China and UAE in the present case. The equation form is given below:

$$BERT_t = \frac{P_t}{\varepsilon_t \cdot P_t^*} \quad (2)$$

where

- ε_t = Official Nominal Exchange Rate of Pakistan's rupee with trading partners.
- P_t = Domestic Price Level measured by GDP deflator of Pakistan.
- P_t^* = Foreign Price Level measured by GDP Deflator values of China and UAE, separately.

The subscript t indicates the time period. Equation (1) provides linear form of absolute purchasing power parity. On the other hand, relative PPP theory takes into account the market imperfections like transportation costs and trade restrictions that absolute PPP theory fails to incorporate. Hence, results can be interpreted in a more refined manner, if instead of equation (1) the combined effect equation, which is represented in Equation (3) is applied. Relative purchasing power parity predicts a relationship between inflation rate of the two countries, over a specified period; and the movement in the exchange rate between the two currencies over the same period. It is a dynamic version of the absolute PPP theory. Equation (3) is derived by imposing restriction [Voinea (2013)] on Equation (1). The restriction imposed is $\beta_1 = -\beta_2 = \beta$, to prove the relative PPP theory.

$$\ln \varepsilon_t = \beta_0 + \beta (\ln P_t - \ln P_t^*) + U_t \quad (3)$$

where

- ε_t = Official Nominal Exchange Rate of Pakistani rupee with trading partners.
- P_t = Domestic Price Level measured through GDP deflator of Pakistan.
- P_t^* = Foreign Price Level measured by GDP Deflator values of China and UAE, respectively.

In Equation (3), if β value is greater than one, it means the local currency will appreciate but if β value is below one, it will indicate that the currency of a country is depreciating against the currency of the other country. The β value equal to one means that PPP will hold between those two nations [Alam et al. (2009)]. Hence, Equations (2) and (3) are both tested for China and UAE, respectively.

V. Data and Methodology

The data used in the analysis is a time series data of Pakistan and its major trading partners are China and UAE. The study uses secondary data sources covering the time period from 1980 to 2013. Data for the official nominal exchange rate (in US\$) of Pakistani rupee with China and UAE is taken from the World Development Indicators. The data for domestic exchange rate of Pakistan with its two trading partners (China and UAE) is obtained from the State Bank of Pakistan.

The first step is to check the stationarity of Bilateral Real Exchange Rate (BRET). If the series of BRET is stationary than the PPP, the theory will hold. To test the stationarity of BRET [Equation (2)], the Augmented Dickey Fuller (ADF) test is applied [Dickey and Fuller (1981)]. The equation for ADF test is given as:

$$\Delta BERT_t = \alpha_0 + \Omega BERT_{t-1} + \sum_{i=1}^n \beta \Delta BERT_{t-i} + \varepsilon_t \quad (4)$$

This test uses the t-statistic on the coefficient of lagged level of $BRET_{t-1}$ and ε_t is assumed to be white noise. If the calculated value is greater than the critical t-values, then the null hypothesis is rejected. The null and alternative hypotheses may be written as:

$$H_0 = \Omega = 0 \text{ (series is non-stationary i.e., have a unit root).}$$

$$H_1 = \Omega < 0 \text{ (series is stationary i.e., does not have unit root).}$$

If the null hypothesis cannot be rejected then it implies that the time series is non-stationary at the level and hence it requires the first or higher order differencing of data to ascertain stationarity.

To calculate the coefficient value (β) in Equation (3), the regression technique is applied. The study employed Ordinary Least Square (OLS) regression to estimate the coefficients. Since, OLS estimation of time series may lead to spurious regression the Best Linear Unbiased Estimator (BLUE) properties may not hold; but If BLUE properties hold then the results obtained from the OLS will be considered fit for the proposed theory. Therefore, after application of the OLS technique on the data, various diagnostic techniques are applied. AR (1) term is added while estimating, to capture the autocorrelation. The normality test is also applied, which shows that error term is normally distributed.

VI. Results and Interpretation

The time series data from 1980-2013 has been used. Individual analysis is performed for both the China and UAE, respectively. In the first step, the Bilateral

Real Exchange Rate [Equation (2)] is tested for stationarity. ADF unit root test on Bilateral Real Exchange Rate (BRET) is applied (Table 1) and the rejection of unit root of BRET indicates mean reversion in the real exchange rate i.e., BRET is stationary series which means that PPP theory holds.

The Unit Root test of Equation (2) for China gives the value of t-statistics (-2.965225) and it is significant at 5 per cent level of significance. This indicates that the null hypothesis of unit root is rejected and bilateral real exchange rate (BRER) with China is stationary i.e., PPP theory holds for China with Pakistan.

Similarly, the unit root test on BRET for Pakistan with UAE is applied. The ADF test gives insignificant t-statistics value for UAE (-0.596930). The results show the non-stationary behavior of bilateral real exchange rate (BRER) for UAE, thus, concluding that the PPP does not hold with UAE. The results are provided in Table 2.

TABLE 1

ADF Unit Root Test on BRET with China

BRET for China	Null Hypothesis	t-statistics	Probability
	Unit Root	-2.96*	0.04

*indicates that null hypothesis is rejected at 5 % level of significance.

TABLE 2

ADF Unit Root Test on BRET with UAE

BRET for UAE	Null Hypothesis	t-statistics	Probability
	Unit Root	-0.59	0.8

Note: The insignificant t-statistics indicates that null hypothesis is not rejected.

As concluded from the ADF unit root test, the PPP theory holds with China but not with UAE. To confirm these results, regression analysis is applied on Equation (3). The PPP theory requires that β value in Equation (3) should be equal to one. If β value is greater than one, it means that local currency will appreciate against foreign currency. On the other hand, if β value is less than one it indicates that the domestic currency will depreciate against currency of other country. If β value is equal to one, it means that PPP will hold between the two nations.

By applying OLS regression on Equation (3), the Durbin-Watson value showed that the auto-correlation exists. Hence, the auto-correlation was removed by adding AR(1) term in the equation. The results are provided in Table 3.

If the value of β coefficient is equal to one then the PPP will hold, otherwise not. In the case of China, the coefficient value is 0.859448 and statistically significant; but the Durbin-Watson value of 0.287152 imply presence of auto-correlation. This could be due to the time series nature of the data. To remove auto-correlation problem, AR(1) term is added and the equation is again estimated using OLS regression. With AR(1) term the β coefficient value is 1.06 which is quite near to one. The Durbin-Watson value of 2.2 indicates that auto-correlation is removed. Therefore, it can be predicted that PPP holds between Pakistan and China.

Similarly, Equation (3) is estimated for UAE and the ADF unit root test of BRET with UAE indicates that PPP does not hold for UAE. Hence, β coefficient [in Equation (3)] should deviate from one. To test whether the Pakistani currency appreciates or depreciates with the currency of UAE, Equation (3) is estimated through OLS, in order to get the sign and magnitude of β Coefficient. If β coefficient is greater than one then the local (Pakistan) currency will appreciate against the UAE currency and a value below one will indicate depreciation in the local currency value. The estimated results are provided in Table 4.

TABLE 3

Estimated Value of β Coefficient for China

β Coefficient	t-statistics	Probability	Std. Error	Durbin-Watson Statistic
1.06	8.827*	0.00	0.12	2.2

*indicates that β coefficient is statistically significant at 1 % significance level.

TABLE 4

Estimated Value of β Coefficient for UAE

β Coefficient	t-statistics	Probability	Std. Error	Durbin-Watson Statistic
0.68*	7.04	0.00	0.09	2.2

*indicates that the coefficient is statistically significant at 1%.

Initially, when Equation (3) was estimated, using OLS, the β coefficient value was 1.26 but the D-W value was 0.893386. Hence, there was a serious problem of auto-correlation. Therefore, the AR(1) and AR(2) terms were used in the model to remove the problem of auto-correlation. The diagnostic of error term show that it is normally distributed. The estimated value β coefficient is 0.684485 which is less than one. This indicates that the Pakistan rupee depreciates against the UAE dirham and therefore, it is concluded that PPP does not hold between Pakistan and UAE.

VII. Conclusion and Policy Recommendations

The study examines the trading patterns of Pakistan with two major trading partners; the China and the United Arab Emirates (UAE), through the application of purchasing power parity (PPP) theory. Purchasing Power Parity (PPP) is a theory of exchange rate determination and a way to compare the average price of goods and services between countries. To test whether the PPP exist or not, the ADF unit root test is applied on bilateral real exchange rate of Pakistan with China and UAE, respectively. OLS technique is also applied to get the regression coefficients.

For China, the results provide the evidence of existence of purchasing power parity and the long-run equilibrium in the exchange rate is determined by the GDP deflator rates persisting between these two countries. Therefore, it can be concluded that the equilibrium exchange rate between Pakistan and China will adjust by the same magnitude, as is the difference in the inflation rates of the two countries. Hence, the trading links of Pakistan are influenced by the fluctuation occurring in the economy of China. The trade volume has increased after the signing of FTA between Pakistan and China; and in future, it is expected to grow more bringing benefits to both countries. Therefore, in future, Pakistan may find it beneficial to enhance the trade volume with China.

In recent years, UAE has become an important trade partner of Pakistan. The present study shows that PPP does not hold between Pakistan and UAE. This might be due to greater transportation cost, trade barriers of non-tradable goods, productivity differences and fiscal shocks. The results indicate that Pakistani rupee will depreciate against the UAE currency. At present, the trade volume is increasing but if it continues to increase for a long period, Pakistan may lose with an increased trade linkage with UAE.

According to the analysis, Pakistan can further improve its trade with China. However, as the study suggests the PPP does not hold between Pakistan and UAE; the Pakistani Rupee will depreciate further against the currency of UAE. Hence, the conclusion is made that if trade volume of Pakistan with UAE is increased, then Pakistan might become a loser and UAE will benefit.

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