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## The Effect of Exchange Rate Fluctuation on Trade Balance: Empirical Evidence from Saudi Arab Economy

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*Fluctuation of the exchange rate has a different unwanted implication towards the economic growth. The right choice of exchange rate regime will bring an economy back to the equilibrium and many economists claim that it is one of the factors for the positive economic development. In contrast, a long term fluctuation of the real exchange rate from the nominal rate can lead to severe macroeconomic imbalances, lead to speculation attack and against the orthodoxy of macroeconomic parities. However the empirical findings of previous studies with regards to the relationship of exchange rate and trade balance are not inclusive and are inconsistent for different countries. The main objective of this paper is to analyse the long run relationship between fluctuation of exchange rate and trade balance in Saudi Arab. The economy of the Saudi Arab has developed tremendously in which the average gross domestic production (GDP) for the period of 1980 – 2008 is more than 300 percentages. Using the Purchasing Power Parity (PPP) model, we empirically identify that the currency of Saudi Arabia at most of the time are overvalued. The study also shows Saudi Arab is enjoying positive trade balance. Utilising two-step Engel-Granger co-integration technique we find a significant long run relationship between the exchange rate fluctuation and trade balance for Saudi Arab in the long run but not in the short-run.*

**Keywords:** Real Exchange Rate; Nominal Exchange Rat; Trade Balance

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## Introduction

Without transportation costs, tariffs and other trade barriers, prices for identical goods, in an open economy or free trade, will be equalised. In other words, the free market will automatically enforce the “law of one price”, or also known as the doctrine of purchasing power parity (PPP).

The nominal exchange rate can also be considered as PPP, whereby the price differences between two countries will be adjusted to reach the equilibrium. The real exchange rate is the exchange rate that takes into account other costs such as inflation, transportation and transaction costs. According to theory, if PPP is in place, the real exchange rate will be constant. Therefore, any changes in the real exchange rate will indicate the deviation from its equilibrium i.e. PPP or deviation from the nominal exchange rate. Studies on the exchange rates have received many attentions, especially after the Bretton-Woods era whereby the foreign exchange rates are exposed to uncertainty. In summary, the chronological of the world exchange rate regime since 1880s are shown in Table 1.

**Table 1:** The Chronological of Exchange Rate Regime, 1880-2000

Year	Regime
1880-1914	Specie: Gold Standard; Currency Union; Currency Boards; Floats
1919-1945	Gold Exchange Standard; Pure Floats and Managed Floats.
1946-1971	Bretton Woods Adjustable Pegs; Floats; Dwi/Multiple Exchange Rates.
1973-2000	Free and Managed Floats; Adjustable, Crawling and Basket Pegs; Target Zones or Bands; Fixed Exchange Rates; Currency Union; Currency Boards.

Source: (Ishfaq, 2010).

Since the middle of 1970s, Saudi Arabia’s financial system has experienced structural changes as a result of innovation in the banking and financial sector. Initially, the Saudi Arabia Monetary Agency (SAMA) had the currency fixed to the riyal. The implementation of this fixed exchange rate regime was to ensure a stable economic condition, price level and international trade. The situation became difficult in stabilizing the riyal against the USD after the crisis of the Bretton Woods system. Thus, SAMA

changed the country's policy and fixed the currency against the International Monetary Fund's Special Drawing Rights (SDR) unit in 1975. On July 22, 1981, SAMA had the riyal fixed to the USD.

## Literature review

(Akhtar and Hilton, 1984) have created adverse influence of exchange rate fluctuations on trade balance. (De Grauwe , 1988) suggested that if the fabrication of model is accurate, then relationship between exchange rate volatility and trade should be positive. (Zhang, 2000) says that inflation occurs in the end due to devaluation of the currency. (Virgil, 2002) investigated that the long run relationship between Turkey's real exports and its exchange rate instability is negative but statistically significant for Germany, France and the United states. (Smith, 1999) stated that the analysis shows that an increase in exchange rate volatility is set out along with a decline in international correlations between bond and stock market.

(Abeyasinghe and Yeok, 1998) suggested that exchange rate depreciation stimulates exports and restrain imports, while exchange rate appreciation would be reduced exports and encourage imports. This finding is thus more tightly related to the literature on exchange rates and FDI, (Rodrik, 2008) is perhaps the most complete assessment of the role of under-valued exchange rates in promoting economic growth. The author argued that exports can be hampered by market (coordination) failures, currency undervaluation can provide an impetus to exports and overcome said obstacles, and hence they are associated with faster growth. However, the statistical work presented by Rodrik is far from conclusive regarding the expected link between exchange rate under-valuation and exports as the primary mechanism linking such policies to subsequent economic growth, relying primarily on the econometric evidence presented in (Hausmann, Pritchett and Rodrik, 2005).

(Similarly, Freund and Pierola, 2008) analyzed over ninety episodes of manufactured "export surges" and concluded that export surges in developing (but not in developed) economies were associated with large real exchange-rate devaluations that left exchange rate undervalued and with the advent of new export products and destinations. (Campa, 2004) found that export growth associated with hysteresis driven by the extensive margin of

trade was small in a sample of Spanish manufacturing firms, which is consistent with Freund and Pierola's finding that persistent devaluations are not associated with export surges in developed economies

The real exchange rate measures the external purchasing power of money, that is to say, its purchasing power over foreign goods. The studies of Edwards (1997), de Melo and Robinson (1990), Biggs, Shah and (Srivasta, 1995), (Bigsten et al., 1997) and (Lucas, 1993) show empirically and theoretically, that exports of manufactured products have a beneficial impact on total factor productivity.

The exchange rate and productivity seem to decide in explaining the differential market shares for exports. The importance of the real effective exchange rate for exports of manufactured goods in Africa has been demonstrated by (Ndulu and Semboja, 1995), who found that the real effective exchange rate has a significant influence on manufacturing exports. Among the factors thought to influence export competitiveness, is the real effective exchange rate. (Balassa, 1990) established a link between the real effective exchange rate and exports of manufactured goods.

In other studies by (Shatz and Tarr, 2009), it is found that countries that practice fixed exchange rate had contributed towards the overvaluation of the real effective exchange rate (REER). (Razin and Catia, 2007) undertook the same study for some developed and developing countries and the findings showed that overvaluation has negative impact on the economic growth. Another study by Rincon (1998), for Colombia indicated that exchange rate does have a role in determining the trade balance for the country, both in the short run as well as in the long run. It is found that devaluation will lead to increased trade balance.

A research by (Olga, 2010) discovered that for the last decades, as a result of depreciation of the nominal exchange rate in Arab World, which was in line with depreciation of the American dollar, REER in the Arab World did not indicate any consistent nor similar pattern. For example, depreciation of the local REER has led to a worsening of the trade balance for Saudi, Oman and Bahrain whilst UAE, Qatar and Kuwait experienced the strengthening of trade.

The findings of previous studies with regards to the relationship of exchange rate and trade balance are not conclusive and are inconsistent for different countries. Although theoretically, the strengthening of a currency is expected to contribute towards the improvement of trade balance, there

are other factors influencing the environment that might produce different outcome.

## Data and Methodology

Main data are obtained from the World Development Bank and International Financial Statistics, for the period of 30 years (1982 to 2011). All of the currency value has been converted to the USD, based on the current year exchange rate. The value of trade balance is also quoted in the USD.

## Model Specification

In literature, there are a few exchange rate models including financial model, Mundell-Fleming with a fixed and flexible price approach, and Dornbush model with a sticky price approach (Copeland 2008). However in this study we utilize the purchasing power parity (PPP) is also one of the determinants of an exchange rate. The PPP explains the relationship between domestic and foreign price with an equation:  $P = SP^*$ . This equation can be shown in a log form, with small letters representing the log sign:  $p = s + p^*$ . Hence, the nominal exchange rate, in a log form, can be represented as:

$$s = p + p^* \quad [1]$$

in which:

$s$ : nominal exchange rate

$p$ : domestic price level

$p^*$ : foreign price level

Real exchange rate is the fixed exchange rate practiced by Saudi Arab. Nominal exchange rate is the equilibrium or can also be considered as PPP, as indicated by equation [1].

The assumption made is that there is a relationship between trade balance (TB) and deviation of the exchange rate (EXF), in a functional form of:  $TB = f(EXF)$  or as follow in equation 2.

$$TB = \alpha_0 + \alpha_1 EXF + \varepsilon_2 \quad [2]$$

The two-step Engle-Granger co integration test involves the long run estimation of the exchange rate equation through standard regression. In order to proceed to the co integration test, the residual is first tested for stationary, using the ADF test. If the result shows that the residual is stationary at level, it is concluded that in the long run, the variables are co integrated. However, if the residuals are not stationary at level, it means that there is no significant relationship between deviation of the exchange rate and trade balance and the estimated coefficients in the OLS technique are spurious.

Since the data are time series, the unit root test with the Augmented Dickey-Fuller (ADF) method is used to test the stationary of the residual from the OLS estimation. The standard regression test can only be meaningful once the residual is found to be stationary at level.

Two variables are said to be co integrated if, individually, each of the variable is stationary. However, there might exist a linear combination for the non-stationary variables. This means that the economic time series which are not stationary may produce a stationary relationship if the variables are co integrated. For this, the unit root test for residual from the standard regression is conducted. If the residuals are stationary at level, then there might be integration between the variables.

According to the Granger Representation Theorem, if the variables, in the long run are co integrated, there will be an error correction model (ECM). This ECM can be used to analyze the short run relationship and to differentiate the long run relationship for all the variables. The procedure of the implementation involves first differentiation of the independent variables and lag value of the first differentiation of all other variables, including lag of the residual. The parameter of the ECM equation is estimated through OLS.

### **Cointegration Results**

Based on the OLS result, the value of t-statistics obtained for Saudi Arabia is 3.107 (with the probability of 0.004. These t-values are bigger than the critical values at the significant level of 1% and 5%. Thus, it can be concluded that there is significant relationship between the variables tested i.e. fluctuations of the exchange rate and trade balance, as indicated in Table 2.

**Table 2:** Fluctuations of the exchange rate and trade balance

	<b>Coefficient</b>	<b>t-stats</b>	<b>Probability</b>
Constant	2.450	3.107	0.004
Trade Balance	0.158	1.89	0.05
Exchange Rate	0.526	2.48	0.045
Adjusted-R <sup>2</sup>	0.256	--	--
Durbin Watson stat.	1.459	--	--
F-statistics	9.656	--	0.000

Source: Authors' estimation

A stationary test is conducted on the residual. It is found that all residuals are stationary at level, with the value of -2.521 with intercept and -2.346 with intercept and trend, as in Table 3. This means that there is significant relationship between trade balance and fluctuation of the exchange rate in Saudi Arab.

**Table 3:** Residuals Stationarity Test

	<b>With Intercept</b>	<b>With Intercept &amp; Trend</b>
<b>ADF Test Statistics</b>	-2.521	-2.346
<b>Probability</b>	0.011	0.024

Note: McKinnon critical values for intercept (C); 1% level = -3.6394 , 5% level = -2.9511, and intercept & trend (C & T); 1% level = -4.2529, 5% level = -3.5485.

Source: Authors' estimation.

The EGC test with univariate ECM method is to test the direction of the relationship between the two variables in the short run. Based on the result obtained as in Table 4, it is found that all the statistics values or the p-values for trade balance and fluctuation of the exchange rate are bigger than the critical values. Therefore, in the short run, we unable to reject the hypothesis of no Granger causality in the trade balance and the deviation of the exchange rate and vice versa.

**Table 4:** Result of Granger Causality Test

			<b>Fluctuation of</b>
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Variable	Unit Root Test for the Residual	Trade Balance (p value)	Exchange Rate (p value)
Trade Balance	0.0387	-	0.6166
Exchange Rate	0.0881	0.6992	-

Source: Authors' estimation

There many studies have been examined about important exchange fluctuation to economic and finance. Where exchange fluctuations are very important for any country as they determine the level of imports and exports. If a domestic currency appreciates with respect to a foreign currency, imported goods will be cheaper in the domestic market and local companies would find that their foreign competitor's goods become more attractive to customers. If the country has a strong currency then its goods become more expensive in the international market, which results in lost competitiveness.

In addition to exchange fluctuate system has an important role in reducing or minimizing the risk of fluctuations in exchange rates, which will have an effects on the economy. Any changes in exchange fluctuations will have a great effect on the economy. On the other hand, Saudis will find that their imports have become more expensive and therefore they may reduce the purchase of foreign goods and increase the consumption of domestic substitute goods. Addition to that there are various studies have been conducted to assess the influence of trade balance on exchange fluctuation , with the objective of providing valuable inputs to policy makers on the effectiveness of exchange rate policy such as effected through nominal exchange rate to balance a country's foreign trade.

## Conclusions

This paper has analyzed the long run relationship between fluctuation of exchange rate and trade balance in Saudi Arab. Employing the Purchasing Power Parity (PPP) model, we able to identify that the currency of Saudi Arabia at most of the time is overvalued. The study also has shown that Saudi Arab is enjoying positive trade balance. Utilizing two-step Granger co integration technique, study find a significant relationship between the

exchange rate fluctuation and trade balance in the long run but not in the short-run. In the long term, there is significant relationship between fluctuation of the exchange rate and trade balance. This is evident for the GCC member countries that the policy makers should not totally ignore the important role of exchange rate policy in influencing trade balance, especially in the long run for the benefit of their trade balance.

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