

International Trade and Exchange Rate Behavior

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Abstract

Exchange rate is one of the factors that affect exports and imports of any country. Current study is an effort to present empirical evidence on the relationship between exchange rate and trade (exports & imports) with reference to Pakistan. Annual data of real exchange rate, imports, and exports has been collected, for the period 1967 to 2014, from World Bank's and State Bank of Pakistan's websites. Johanssen Cointegration technique and VECM (Vector Error Correction Model) are applied to find long run relationship among the variables. Study findings indicate significant and long run relationship between real exchange rate and trade (exports & imports). Results reveal that higher the rate of exchange of Pakistani rupee against US dollar, higher would be the exports.

Keywords: Exchange Rate; VECM; Exports; Imports

Introduction

Exchange rate has strong impact on import, export and current account of any country and hence on GDP or economic growth. Theoretically, if the domestic currency is depreciated, it makes goods cheaper and hence exports increase. Depreciation is used to reduce trade deficit and to balance current account. Imports become expensive that helps to increase local manufacturing. However, if a local manufacturing firm imports raw material, it increases manufacturing cost and therefore domestically produced products become expensive and ultimately it reduces exports. In the case of appreciation, prices of domestically produced products increase and volume of exports will decrease due to high prices. On the other hand, manufacturing firms which import the raw material have an advantage of low cost. Depreciation of currency can lead to economic growth and appreciating can slow down economic growth (Tsen Wong, 2013).

Pakistan has always faced misbalance of trade due to high imports and low exports. Theoretically, if Pakistan depreciates her currency, import bill can be reduced and balance of trade can be achieved. However, it can cause inflation and hype in prices. There are many countries who have kept weaker currency in order to encourage their exporters and increase exports to achieve better economic growth. If we look at the recent exchange rate of Japanese yen to dollar, in 2012 yen was 79 yen to one US dollar, strongest in the history of country. However, in the start of 2013 government intervened and started weakening the yen in order to achieve balance of payment and increase exports. China has also been alleged to keep the currency weaker intentionally. It has helped china to maintain a high trade surplus and larger exports (Corden, 2009).

Value of a currency is mainly, along with some other factors, determined based on its demand and supply in the international forex market. If the demand for a particularly currency increase, value of that currency also increases. Pure capitalistic economy holds the view that there should be no intervention and let the currency find its real value in the market. This is called floating exchange rate. Floating exchange rate may cause volatility which negatively affects the economy

(Abbott, 2004). In order to deal with this some countries peg their currency to a stable and strong currency. Another option is of the fixed exchange rate. From 1973 to 1981 Pakistan adopts fixed exchange rate. However failure to achieve the specific targets such as increase in exports, enforces the policy makers to switch to floating exchange rate. It has been observed that the ruling government in Pakistan is enforced by the opposition parties to intervene when the value of rupee is much weaker. Lack of financial and economic literacy among the politicians provokes them to demand for non-monetary measures.

In the light of these circumstances, purpose of this study is to examine, whether exchange rate has impact on Pakistan's imports and exports or not, and to explore policy implication for Pakistan to achieve better economic growth.

Literature Review

Exchange rate is an important factor that influences the trade among countries. Devaluated currency can help to increase exports, reduce imports, and hence achieve better economic growth (Akhtar & Hilton, 1984; Genc & Artar, 2014; Kemal & Qadir, 2005; Tsen Wong, 2013). However empirical results differ from country to country (Fountas & Aristotelous, 2005; Tarasova & Coupé, 2009). Because price or exchange rate is not the only factor that influences the trade but several other factors also contribute to determine the trade balance (Tarasova & Coupé, 2009). It is not necessary that all of the products being imported or exported are influenced by exchange rate. Depreciation can increase exports of medium technologies products, however the products of high tech industries are above from the impact of the exchange rate (Karadam, 2014). Exchange rate has also significant impact on balance of payment (BOP) position. The exchange rate devaluation can lead to enhanced balance of payments situation (Oladipupo, 2011). Along with some other factors such as import restriction and structural change, currency devaluation can be used a policy measure to achieve better BOP position (McCombie & Thirlwall, 2016).

Besides the exchange rate regime (appreciated or depreciated currency), another important aspect of exchange rate is the volatility. Exchange rate fluctuations adversely affect exports. Increase in standard deviation and volatility in exchange rate decrease the exports. (Abbott, 2004; Caballero & Corbo, 1989). For instance Caballero and Corbo (1989) report that Five Percent variation in exchange rate decreases or reduces the exports by two to thirty percent depending on the country. Furthermore along with the depreciation, currency stabilization is also important for the sectoral re-allocation policies. Not only exports, volatility also discourages the imports (Khan, Azim, & Syed, 2014). Stability in exchange rate has positive impact on BOP. If the exchange rate remains stable, it helps to boost foreign direct investment, eventually posing positive impact on balance of payment. (Ahmad, Ahmed, Khoso, Palwishah, & Raza, 2014). Impact varies from country to country. For example Fountas and Aristotelous (2005) conduct study on 8 EU countries to find out exchange rate impact on exports. Their results indicate that in short run there is no relationship between exchange rate and exports. However in long run positive relationship for Ireland and negative relationship for the Belgium, Germany and Denmark exist. Onafowora (2003) reports for Indonesia and Malaysia currency devaluation adversely affects the trade balance in the start however in the long run it positively affects the trade balance, whereas for Thailand the results are opposite.

To avoid the negatives effects of volatility some countries determine fixed exchange rate regime. Each of the fixed and flexible exchange rate comes with own advantages and disadvantages. every country has right to choose the exchange rate regime which is best suitable to prevalent economic situation (Frankel, 2006). There is significant relationship between pricing strategy and exchange rate regime. When prices are determined or set according to consumer country, floating

exchange rate have edge over the fixed exchange rate (Devereux & Engel, 1998). Difference of opinion exist among the researchers such as Laffer (1974) says that fixed exchange rate has advantage over the freely floating exchange rate. Giavazzi and Giovannini (1989) hold the view that managed exchange rate provides the country to effectively manage the inflationary shocks.

Methodology

To measure the impact of exchange rate, quantitative data for real exchange rate, imports, and exports has been used in this study. Data for the analysis has been obtained from World Bank and State Bank of Pakistan's websites. Study covers the period from 1967 to 2014, total 48 observations on annual basis.

Unit Root Test

The first step in selecting and constructing the appropriate and most suitable model for the analysis is testing stationarity of the data. Stationarity of data means that statistical properties of variables like mean, variance, and autocorrelation remain constant or do not change over the time period. Predictability of future behavior of stationary data is easy. In this study, to check the stationarity, ADF unit root (Dickey & Fuller, 1979; Said & Dickey, 1984) test has been applied.

Cointegration Test

Cointegration is the statistical property of the time series variables which are integrated of order one. If there is Cointegration among the variables, it means that there is some long run relationship; if one variable moves, the other tend to moves to that variable. As the variables of the study are $I(1)$ and aim of the study is to find long run relationship among these variables, therefore testing for Cointegration is right choice (Pesaran & Shin, 1998). In this regard, the Johansen Cointegration technique, developed by the Soren Johansen in 1991, has been applied.

Vector Error Correction Model

As the Cointegration has been established, now it's time to apply econometric model to find long run relationship, its magnitude and direction. There are two most widely used econometric models which are used to estimate long run relationship. One of them is ARDL or auto regressive distributed lad model and other is Vector error correction model (VECM). ARDL technique was introduced by Pesaran, Shin, and Smith (2001). Since its introduction it has become most widely used model of econometrics for the variables that are integrated at level or in other words the variables which are $I(0)$. Although ARDL is best technique for variables that are stationary at level, but when it comes to variables which are stationary at first difference, there are certain difficulties associated with this technique. These were first identified by the Granger and Newbold (1974). They called it spurious regression. Conventional OLS cannot be applied on the variables which are integrated of the order one. Reason is that such variables do not behave like constant which is prerequisite in OLS and as most of them are varying in time frame so OLS erroneously shows greater t value and significant results, however in reality, the results would be different. Therefore to tackle this problem, a new method has been developed and introduced which is called vector error correction model or VECM. So, as the variables in the study are $I(1)$, choice for the model selection stands for the VECM. It is constructed as follows

$$\Delta y_t = \mu + \alpha_t + \lambda \Delta X_{t-1} + \varepsilon_t$$

Δ Is first difference operator, y_t represent set of dependent variable which are exports and imports, ΔX_{t-1} is independent variable exchange rate, and ε_t is error term.

Results & Discussion

Unit Root Test

In order to test whether data is stationarity or not, Augmented Dicky Fuller test has been applied. Results of unit root test are presented in the following table.

Table-1, Unit Root Test

| | Level | | 1 st difference | |
|---------------|---------------|-------|----------------------------|-------|
| | t- statistics | Prob. | t-statistics | Prob. |
| Exchange Rate | -.5330 | .977 | -6.665 | .005 |
| Exports | 1.910 | .998 | -6.678802 | .000 |
| Imports | 1.282 | .998 | -6.237 | .000 |

First, all the variables are tested at level. Results show that they have got unit root, which means at level variables are not stationary as the probability value is higher than 5 %. Then all the variables are tested at first difference. At first difference probability value of all the variables is less than 5%. Variables are stationary at first difference (Table 1). As indicated by the unit root test that variables are $I(1)$, at next step Cointegration is applied to check the presence of Cointegration.

Johannsen Cointegration

Table 2, Johannsen Cointegration

| Unrestricted Cointegration Rank Test (Trace) | | | | |
|--|------------|-----------|----------------|---------|
| Hypothesized | | Trace | 0.05 | |
| No. of CE(s) | Eigenvalue | Statistic | Critical Value | Prob.** |
| None * | 0.490418 | 47.65824 | 29.79707 | 0.0002 |
| At most 1 * | 0.272176 | 16.64669 | 15.49471 | 0.0334 |
| At most 2 | 0.043226 | 2.032647 | 3.841466 | 0.1540 |
| Trace test indicates 2 cointegrating eqn(s) at the 0.05 level | | | | |
| * denotes rejection of the hypothesis at the 0.05 level | | | | |
| **MacKinnon-Haug-Michelis (1999) p-values | | | | |
| Unrestricted Cointegration Rank Test (Maximum Eigenvalue) | | | | |
| Hypothesized | | Max-Eigen | 0.05 | |
| No. of CE(s) | Eigenvalue | Statistic | Critical Value | Prob.** |
| None * | 0.490418 | 31.01155 | 21.13162 | 0.0015 |
| At most 1 * | 0.272176 | 14.61405 | 14.26460 | 0.0440 |
| At most 2 | 0.043226 | 2.032647 | 3.841466 | 0.1540 |
| Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level | | | | |
| * denotes rejection of the hypothesis at the 0.05 level | | | | |
| **MacKinnon-Haug-Michelis (1999) p-values | | | | |

Outcomes of Johansen Cointegration show that both trace and max-eigenvalue test indicate the presence of Cointegration. So there exist a long run relation among the variable.

Vector Error Correction Model

Table 3 shows the results of vector error correction model. The test is run taking two lags. Results show that there exists significant and negative relationship between exchange rate and exports, exchange rate and imports at lag one.

Table 3. Vector Error Correction Model

| Error Correction: | D(EXPORTS) | D(IMPORTS) | D(EXR) |
|--|------------|------------|------------|
| CointEq1 | -0.019304 | -0.021860 | -0.033445 |
| | (0.00801) | (0.01488) | (0.01931) |
| | [-2.41045] | [-1.46942] | [-1.73188] |
| D(EXPORTS(-1)) | -0.463763 | 0.650870 | -0.500613 |
| | (0.19216) | (0.35695) | (0.46335) |
| | [-2.41348] | [1.82341] | [-1.08043] |
| D(EXPORTS(-2)) | 0.198784 | 0.937458 | 0.487352 |
| | (0.18857) | (0.35029) | (0.45470) |
| | [1.05417] | [2.67624] | [1.07182] |
| D(IMPORTS(-1)) | -0.137100 | -0.494551 | -0.048042 |
| | (0.10262) | (0.19062) | (0.24744) |
| | [-1.33604] | [-2.59442] | [-0.19416] |
| D(IMPORTS(-2)) | -0.173861 | -0.062251 | -0.262341 |
| | (0.08744) | (0.16244) | (0.21085) |
| | [-1.98828] | [-0.38324] | [-1.24420] |
| D(EXR(-1)) | -0.236712 | -0.556673 | 0.195446 |
| | (0.08833) | (0.16408) | (0.21298) |
| | [-2.67995] | [-3.39275] | [0.91766] |
| D(EXR(-2)) | 0.138091 | 0.051331 | -0.330289 |
| | (0.10140) | (0.18837) | (0.24451) |
| | [1.36182] | [0.27251] | [-1.35082] |
| C | 1.383778 | 1.643118 | 2.717396 |
| | (0.53708) | (0.99768) | (1.29506) |
| | [2.57649] | [1.64693] | [2.09828] |
| R-squared | 0.440097 | 0.559617 | 0.407772 |
| Adj. R-squared | 0.334170 | 0.476301 | 0.295729 |
| Sum sq. resids | 38.93895 | 134.3676 | 226.4051 |
| S.E. equation | 1.025867 | 1.905664 | 2.473673 |
| F-statistic | 4.154701 | 6.716816 | 3.639427 |
| Log likelihood | -60.59722 | -88.46536 | -100.2047 |
| Akaike AIC | 3.048765 | 4.287350 | 4.809096 |
| Schwarz SC | 3.369950 | 4.608534 | 5.130281 |
| Mean dependent | 0.648000 | 0.987111 | 2.140889 |
| S.D. dependent | 1.257215 | 2.633331 | 2.947627 |
| Determinant <u>resid</u> covariance (dof adj.) | | 16.60863 | |
| Determinant <u>resid</u> covariance | | 9.232118 | |
| Log likelihood | | -241.5672 | |
| Akaike information criterion | | 11.93632 | |
| Schwarz criterion | | 13.02032 | |

Exchange Rate & Exports:

Results of this study reflect significant and adverse relation between real exchange rate and exports. T-value (-2.679) indicating the significance, whereas the coefficient value (-0.236) shows the negative direction of the relationship and magnitude of the relationship between these variables. It means if there is decrease in the value of Pakistani rupee by one unit, it will increase the exports by .23 units (Table 3). (In this study the unit of exchange rate is Pakistani rupee whereas the unit of exports is billion dollar). These results are consistent to theory that depreciating the currency can boost or help to increase and encourage the exports (Genc & Artar, 2014; Kemal & Qadir, 2005; Tsen Wong, 2013). Same policy has been adopted by the China and Japan for decades which are world's second largest and third economies respectively. However, it should be understood that depreciating the currency can boost exports up to limit. Drastic decrease can lead to hyperinflation which is destructive for the economy. Further research can be conducted to find out optimal level of maximum currency depreciation that will help to favor exports.

Exchange Rate & Imports:

Contradictory to literature, that indicate significant and positive relationship between exchange rate and imports, depreciating should reduce imports, in this study, results show negative relationship means that depreciation will increase imports. T-value is -3.392753 and coefficient value is -0.556673, indicating significant and negative relationship (Table 3). One of the possible reasons for the negative and contradictory results could be, also explained by Alvarez and López (2015), that, for developing countries, to increase the output level, it requires latest technology, machinery and equipment. Hence the import of these items is necessary to increase output level. So, to increase export, which could only be done via increasing production, it is necessary to import relevant machinery and equipment.

Conclusion

Current study is an effort to present empirical evidences on the relationship between exchange rate and trade. Based on study findings it is established that significant and negative long run relationship exists between real exchange rate and exports/imports for Pakistan. Depreciating currency can help to boost and increase exports. Developing countries like Pakistan, who has constantly been under the burden of high import bill, can use exchange rate as tool to give price competitive edge to their exporters to increase country exports. Although imports are discouraged and there must be less dependency on imported products, however certain imports are necessary to increase the output level. Such as advance IT equipment, machinery and equipment are essential for not only increasing the output level but also for enhancing the quality of domestically produced products. Although study findings vote in the favor of depreciated currency, however it should be understood that depreciating the currency can boost exports up to limit. Drastic decrease can lead to hyperinflation which is destructive for the economy. Further research can be conducted to find out optimal level of maximum currency depreciation that will help to favor exports.

Recommendation

Although research findings favor the depreciated currency, however exchange rate is a sensitive issue. Severe issue of inflation is associated with currency devaluation (Deravi, Gregorowicz, & Hegji, 1995). Too much weak currency may cause hyperinflation and unemployment, which would disturb the entire economic structure. Therefore it is recommended that government should conduct a detailed and comprehensive study to find out optimal level of the currency depreciation at which it will continue helping economic growth and exports.

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