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United State's Dollar & Economic Escalation: A Co Integration Case

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Abstract

Affect of increase and decrease in balance of trade is observed in determination of balance of payments of country. Balance of payment and exchange rate has significant relationship with each other. This research investigates that the determinants of trade i.e. Import, export, industrial growth, consumption level and oil prices fluctuation brings changes in exchange rate and its influence eventually on balance of payments in United state of America (USA). Data of defined variables is collected on annual basis for thirty one years. By applying cointegration, it is estimated that there exist a long run relationship. USA has significantly and correctly signs the short run dynamic. Exchange rate does not Granger cause balance of payment and balance of payment does not granger cause exchange rate. In conclusion, we found that determinatnts of balance of trade affect the exchange rates, also, these rates have an considerable effect (positive or negative) on balance of payments. Therefore, for the macroeconomic stability within a country; economists, policy makers and government should

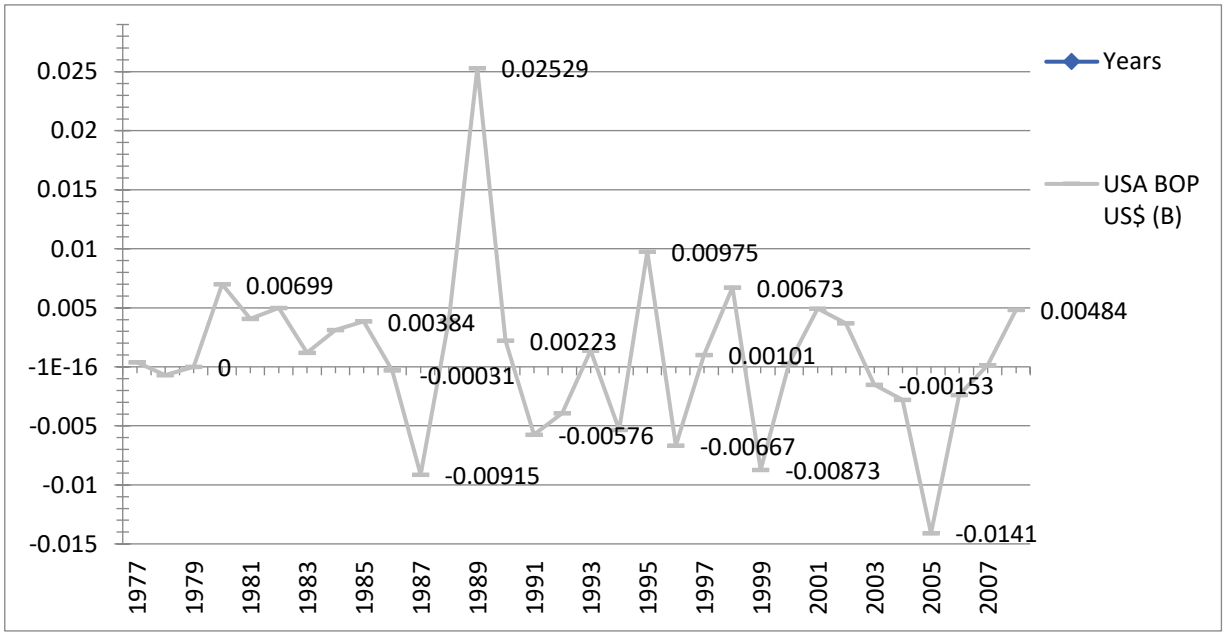
collectively device appropriately matched and synchronized monetary, trade and fiscal policies which stabilize the exchange rate and sustain the balance of payment objectives.

Keywords: Economic Escalation, exchange rate, cointegration.
JEL: F31, F30, P33

1. Introduction

Exchange rate has shown relationship with the balance of trade and has its impact on balance of payment (BOP) of any country. Trade balances calculations are measured with the subtraction of one country imports (goods & services) from its exports (goods & services), its balance result in positive if exports are greater than imports or negative in case country holds healthy account of import in contrast with its exports. Moreover, the effect of increase and decrease in balance of trade is observed in determination of BOP of country. BOP is established method which is used for the accounting of any country's total payments made during the specific period of time and the receipts collected from any other country from private sector or government exchange sources. (Oladipupo, 2011), nevertheless, is of the view that international exchange results in establishment of relationship between the exchange rates and balance of payments of countries. This concludes the quantity of payments involved in economic operation of among countries. Therefore, accounting equation of balance of payments illustrate receipts (which are generated from exports, foreign tourist payment in country, income from the overseas investment of country, gift and aid received from other country and money received from the country assets payments by foreigners) and payments. If we look out the history of the balance of payment of specifically in United State of America (USA) is given below in the graph.

Graph 1 - USA Balance of Payment



Graph represents the variation of BOP in last three decades. The growth of US declined in the mid 80's. In 90's due to macroeconomic instability the US BOP has upward and downward variation with the passage of time. Further, the United States deficit has grown each year from 2% in 1997 to a huge 6% in 2004. To keep this balance in equilibrium, from past few years 'governments' started paying valuable attention to correctly execute the economic policies to elevate export to other countries, and to reduce imports at the same time.

However, in countries having stability and consistency at policy level, this long term macroeconomic policies act as catalyst in achievement of their BOP objectives. Conversely, many developing countries are with unsuccessful implementation of these policies resulted in negative growth. Exchange rate affects the international transactions. As the topic suggests, this study is theoretically twofold, so we divide literature into two sections. These countries adopt few short term measures of attracting more funds in the shape of foreign and national debts keeping these economies afloat, but by a thin margin. There is a rising need for figure out relationship and behavior of these variables on each other. Therefore, this research investigates that the determinants of trade i.e. Import, export, industrial growth, consumption level and oil prices fluctuation bring changes in exchange rate and its influence eventually on BOP in United state of America.

2. Litrature Review

One of the foremost pillars of an economy is international trade, many developed and developing economies are facing challenge of trade deficit. Results of this deficit on current account balances are very unfavourable, and becoming a considerable challenge for different economies around the world, due to vulnerabilities existence in international and local markets. Later, the elasticity model presented (Koray & McMillin, 2006) provides the evidence of theoretical connection between both of exchange rate and the international trade. Furthermore, there have been numerous studies, which result in determination of the exchange rate and trade balance relationship, and provides important insights for and direction for development of new policies to balance out a country's foreign trade (Rose, 1991); (Himarios, 1989);(Bahmani-Oskooee, 1998); (Arize, 1997); (Parsley & Wei, 2001); (Liew, Baharumshah, & Chong, 2004); (Singh, 2002). Moreover, countries when compete internationally for trade of goods and services, is also affected by the current prevailing trade policies, if they are favorable then it will help them in long run and can result in improving BOP situation. Furthermore, any change in the currency rates and demands affects bilateral trade between two countries; therefore, these trade balances are also vulnerable to any movement in currency rates. Theoretical models, such as (Nagy & Furtan, 1978) identify valuable reasons of variation in imports and export; he defined the link between the increased trade balances with currency rates to minimize the domestic expenditures. The exchange rate devaluation improves the balance of trade balance. Such results match with the Murshall-Lerner condition. Similarly, (Broda & Romalis, 2011) examine data of 30 years with larger sample of tradable goods and commodities within different countries concluded that frequent two-sided trading in countries has dried out real exchange rate volatility. Volatility of Exchange rates has effects (positive or negative) on international trade; (Perée & Steinherr, 1989) find adverse trade relationship with exchange rates. Whereas, (Obstfeld & Rogoff, 1998) focused that exchange rate instability create sizeable troubles for exporting and importing nations. Furthermore, (Doğanlar, 2002) in study of volatility of exchange rate impact on export of different Asian countries and results in long run unstable relationship. However, this increase in exchange rate effect can benefit only if the country make export friendly policies to encourage exports. Governments across different regions have been focusing on correcting their balance of payment with mass focus on adjustment on raising more exports to their account with taking exchange rate impact volatility in consideration (Samdani). As a result of this volatility in exchange rate, weak economies are unable to take advantage of these exchange rate movements to make economic conditions favorable for their exports. Similarly other import dependent countries needs to pay more attention to

their exports rather than accumulating their imports account, which eventually, is resulting in adverse impact on balance of payments when these balances are calculated. In list of expensive commodities, great volume of oil import is mass expenditure for country not producing it. These countries rely mostly on the import of this commodity to facilitate manufacturing of their products and goods. Many researchers suggest that, changes in the oil price have considerable effects on the aggregate economic activity. Such effects are expected to be unlike for oil importing and exporting economies. Moreover, (Jiménez-Rodríguez* & Sanchez, 2005) and (Hamilton, 2008) investigated oil prices fluctuations and economy effect through the exchange rate. Since, crude oil is a fundamental production input; it is usually predicted by the theory that supply-side importance of oil price hikes includes a narrowing of aggregate economic activity and inflationary pressures. Additionally, aggregate demand is expected to decrease in an oil importing economy, and escalates for oil exporting economy. This inference is applicable for real currency rates, which is an actual price of local and international currencies. These can be stated as the nominal exchange rate aligned for inflation differentials amongst the countries. Hence, (Edwards, 1988) study depicts significant and negative relationship among the exchange rate and the economy in the context of oil prices and other variables in the short run. Countries with less oil production like Pakistan heavily rely on the import of oil from other countries to fuel their economy, similarly, other those developing countries not a good producer of oil, their trade balances are negatively affected due to this import. In developed countries like USA and Canada results indicates very less significant relationship among the currency rates and oil prices when calculated on basis of yearly data, on the contrary, strong significant relationship is found when daily data is used to test these variables in study conducted by (Ferraro, Rogoff, & Rossi, 2012). Moreover, conclusion of the study found cointegration in the U.S. real exchange rate results with the price of oil (Amano & Van Norden, 1998).

3. Methodology

In detail review of literature on exchange rate relationship and the trade balance, it has significant relationship with economic growth i.e. industrial growth ,capital goods and consumption level has strong negative relationship and oil prices has positive/negative relationship with exchange rate as its sign depends upon oil production at national level. This study investigates this kind of relation for USA.

$$\text{Exchange rate} = \beta_0 + \beta_1 (\text{Exports}) - \beta_2 (\text{Imp}) - \beta_3 (\text{Capital goods}) - \beta_4 (\text{industrial growth}) - \beta_6 (\text{Consumption level}) + \beta_7 (\text{Oil prices}) + \varepsilon \quad \ldots\ldots (1)$$

With the help of literature, we concluded that balance of payment and exchange rate has significant relationship with each other. Role of government is very significant in making advantage from this variation with the help of devising country favorable policies for boosting exports and reducing imports helps in their trade reforms, and eventually constructs a strong positive impact on balance of payment.

$$\text{Balance of payment} = \beta_0 + \beta_1 (\text{exchange rate}) + \varepsilon \quad \ldots\ldots (2)$$

The data of exchange rate (ER) and balance of payment (BOP) is collected from International Financial Statistics (IFS). The data for imports (IM), exports (EX), capital goods (CG) and industrial growth (IG) are taken from World Data Bank indicators. Furthermore, Oil prices (OP) (US $ per barrel) are taken from OANDA forex. We have selected Augmented Dickey-Fuller (ADF) unit root test for this study, with an objective to find out properties before the application of an econometric model. In analyzing the relationship between different time series, some of the variables in different time series may result in non-standard distribution

and false regression results. Therefore, for the meaningful results and measurement of long & short run relationship between data series, our data series should be classified, and variables are called stationary or integrated. With this we can conclude, unit roots problem can be resolved if when stationary of data is attained, then we will become in a position to draw a conclusion with meaningful results (Frankel & Wei, 2007)), similarly, (Maddala & Kim, 1998) also agreed with the stated notion in their studies regarding the s stationary of data sets for correlation. The attraction of cointegration analysis in economics stems from the fact that several key economic relationships. In the literature review, by using Joheanson cointegration procedure in his study for testing relationship among income and energy use in different Asian countries, he also used error-correction analysis in his study (Asafu-Adjaye, 2000). It is conducted that similar kind of technique in testing relationship between the usage of energy and GDP of country in different six of Asian countries including, Singapore, Indonesia, Philippines, Malaysia, India and Pakistan (Masih & Masih, 1996). The test for a cointegrating relationship provides a means for assessing the nature of this kind of relationship and for assessing the validity of economic theories hypothesizing equilibrium relationships. So, in this study we use the Johansen cointegration test (1991, 1995). After taking the order of stationary at I (d), this test is used to see whether there is long term relationship exists among the variables. Co-integration test is applied on non-stationary variables to check the long-term equilibrium. Vector error correction model (VECM) is used in finding the short run relationship between two variables. Long run equilibrium relationship is obtained from the cointergration between two or more series, and then to find out behavior properties in short run we use this model. Furthermore, in the case if there is no relationship exists among the series we do not apply this VECM and we directly proceed to granger causality test to establish causal link between variables. Furthermore, (Banerjee, 1999) view the error correction mechanism as a useful way of estimating dynamic regression models that incorporate both the long-term focus on levels found in cointegration analysis and the short-term focus on changes found in first-differenced regression models, such as those used (Cantor & Land, 1985). Granger Casualty test used for determining the statistical test hypothesis, Granger Casualty test is used in which one time series forecasting over another. The purpose of Granger Casualty test is to check the short run effect as likewise vector error correction model (VECM) approach. Similarly, in the case, if there is no relationship exists among the series we do not apply VECM which is stated above and we directly proceed to ganger causality test to establish causal link between variables (Johansen, 1988; Johansen & Juselius, 1990).

4. Data Analysis And Interpretation

Table 1 explains the results of ADF test on unit root on level, first and second difference for China and USA. As the null hypotheses time series is non-stationary (unit root). In the table 1 USA has variables exchange rate, import, export, industrial growth, capital goods, and consumption level, balance of payment and oil prices are stationary in their second difference I (2).

Table 1: ADF Test

	Variables	Types of Test	ADF test Statistics	R2	Stationary	D-W Statistics	Probability
USA	Δ Δ Exchange Rate	0 t 0	-4.403158*	0.4181	2nd Diff	1.861238	0.0078
	ΔΔ Import	0 t 0	-6.701072*	0.63551	2nd Diff	1.904336	0.000
	ΔΔ Export	0 t 0	-3.550164**	0.31956	2nd Diff	1.967961	0.0519
	ΔΔ Industrial Growth	0 t 0	-3.461655***	0.31316	2nd Diff	1.715187	0.0622
	ΔΔ Capital Goods	0 t 0	-4.285293*	0.41868	2nd Diff	1.897285	0.0106
	ΔΔ Consumption Level	0 t 0	-4.399164*	0.44352	2nd Diff	1.818481	0.0081
	ΔΔ Oil Prices	0 t 0	-4.288914*	0.40954	2nd Diff	1.557016	0.0102
	ΔΔ Balance of payment	c 0 0	-5.05747*	0.46865	2nd Diff	1.956099	0.0003

After taking the order of stationary at d time as I (d), the next step is to apply the cointegration. Since before applying the Johansen cointegration test, lag length is selected. Firstly, we estimate vector autoregressive model and determined the optimal number of lags by ER, IM, EX, IG, CG, CL and OP as endogenous variable. So the optimal numbers of lags for USA is 1. As the Johansen Cointegration results are shown in table 2. For USA, trace test 6 cointegration equation(s) are at 5% critical value. These statistics indicates that one null hypothesis is rejected as cointegration does not exist. Max-Eigen value test indicates 1 cointegration equation(s) at the 5% level.

Table 2: Johansen Cointegration

Unrestricted Cointegration Rank Test (Trace)				Unrestricted Cointegration Rank Test (Max Eigevalue)			
Hypothesized	Trace	0.05		Hypothesized	Max-Eigen	0.05	
No. of CE(s)	Statistic	Critical Value	Prob.**	No. of CE(s)	Statistic	Critical Value	Prob.**
r =0*	231.8179	134.678	0.000	r =0*	83.52201	47.07897	0.000
r <1*	148.2959	103.8473	0.000	r <1	40.9233	40.9568	0.0504
r <2*	107.3726	76.97277	0.000	r <2	34.7315	34.80587	0.051
r <3*	72.64111	54.07904	0.0005	r <3	26.56762	28.58808	0.0886
r <4*	46.07348	35.19275	0.0023	r <4	21.9523	22.29962	0.0558
r <5*	24.12118	20.26184	0.014	r <5*	18.2274	15.8921	0.0211

r <6	5.893783	9.164546	0.1991	**r <6**	5.893783	9.164546	0.1991

Results indicates that there is a long-run relationship between the exchange rate, export, import, industrial growth, capital goods, and consumption level and oil prices in USA. From the results generated after the application of test, it is stated that there is a positive and negative relationship of the exchange rate with the import.

Table 3: Analysis of Exchange Rate and its Determinants of Trade

Variables	**Import**	**Export**	**Industrial Growth**	**I Capital Goods**	**Consumption Level**	**Oil Prices**	**Constant**
USA	0.045448	-0.000889	0.016672	-0.026658	-0.010043	-0.091787	+29.43777
	[+15.7784]	[-0.7269]	[+4.61438]	[-8.2209]	[-14.7278]	[-8.3701]	[+6.59934]

Export shows the positive affect in USA but the impact of export is higher in USA and on the other side the results are opposite for the imports. Industrial goods has negatively related in USA. Capital goods has negative coefficient and consumption level has positive relations. Oil price is sensitive in USA and has positive relation. Negative relationship with exchange rate shows that direction i.e as it exports increases then currency appreciated and vice versa if all the variables remain constant then it means equilibrium level has been reached and constant term indicates the long run equilibrium. The intercept value indicates the change in constant change in exchange rate. All the constant term shows significant results.

Table 4: Vector Error Correction Model

	Error Correction:	**D(ER)**	**D(IM)**	**D(EX)**	**D(IG)**	**D(CG)**	**D(CL)**	**D(OP)**
USA	**CointEq1**	0.009398	2.064497	1.6783	7.357735	-4.65128	-7.71316	-8.24437
		-0.01462	-8.87705	-6.37147	-8.99029	-10.4496	-12.9521	-1.4861
		[0.64302]	[0.2357]	[0.26341]	[0.81841]	[-0.44512]	[-0.59552]	[-5.54765]

Table 4 exhibits the short run vector error correction results. For short run adjustment in the USA, exchange rate, exports and imports, capital goods, consumption level and industrial goods are not correctly signed while oil prices are correctly signed in short run adjustment for USA.

Table 5: Granger Causality Test

Countries	Null Hypothesis:	Obs.	F-Statistic	Probability
USA	ER does not Granger Cause BOP	31	1.06499	0.31091
	BOP does not Granger Cause ER		0.41410	0.52513

In table 5, Granger causality checks the bilateral effect as balance of payment on exchange rate and exchange rate on balance of payment. In USA we do not reject the null hypotheses as exchange rate does not cause granger balance of payment and balance of payment does not Granger cause exchange rate as the p-value is greater than 1%, 5% and 10% significance level. Exchange rate is very important determinant of trading in an open economy. Dealing in foreign exchange market, currency change affects every economy including developed or developing. This occurs because of the market forces of supply and demand, which pushes countries exchange rate as depreciated and appreciated.

5. Conclusion

It is concluded that it is crucial to have appropriate monitoring systems coupled with suitable macroeconomic policies policy mix for attracting foreign inflow in the markets. Furthermore, these established monitoring at different government levels (i.e. planning commission, State Banks, Ministries like commerce, trade, industries and Custom Department, Bureau of statistics) can act as a supervisory body for the implementation of economic policies. Likewise, for making viable environment for foreign investor consistency must be developed with the international exchange markets, this helps in achievement of reasonable balance of payments goals and for having consistent exchange rates this which will help in long run. In conclusion, we found that determinatnts of balance of trade affect the exchange rates, also, these rates have an considerable effect (positive or negative) on balance of payments.

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