Capturing Effect of Exchange Rates on Exports: (A Case Developing Economy)

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Abstract

The paper recapitulates the current theory of capturing effect of exchange rates on exports, besides looking into what determines exchange rate itself. The paper investigates the relationship between exchange rates and exports in Pakistan, using time series analysis and annual data from 1981 - 2010. The structural equation model is used to find out the relations of the variables in the model with help of the regression equations. The empirical results indicate that exchange rates have significant effect on exports. The results imply that exchange rates are important for exports. Imports, exports and foreign direct investment first individually estimated than used the estimated values in main equation of the study.

Key Words: exchange rate, capturing effect, structural equation model, foreign direct investment, export & import.

1. Introduction & Background of the Study

The world has become a global village. One of the important and major benefit of the globalization is that the size of international trade has grown very rapidly. This has increased the need for foreign currencies to make international transactions of goods and services and the need to have a stable exchange rate. Exchange rate plays a very vital role in today's world economies. For a country like Pakistan where fluctations in currency are very subtle exchange rate stability is an important requisite for economic growth and stability. These fluctuations in exchange rate may influence both the monetary and real sectors of the economy favorably or unfavorably, depending upon the relationship shared. However, exchange rate is also influenced by the performance of macro economy.

A growing body of literature has recently focused on exchange rate and its interaction with macro-economic variables. It is now widely recognized that exchange rate play a vital and important role in the economic development and growth of an economy. However, despite its vital role in country growth and economic development, exchange rate did not receive much attention of the academicians and researchers in Pakistan. This research will investigate the determents of exchange and exports of Pakistan. Initially people used to exchange commodity for commodity known as barter system. After that era they used different commodities as currency such as cow heads, etc. For decades, the currencies of the world were backed by gold i.e. a piece of paper (currency) that are issued by any government represented the real amount of gold held by the issuing government.

In the nineteenth century, the world saw many countries following the gold standard. However, the gold standard was abandoned during the World War 1. As a consequence of this the exchange market collapsed. However, certain countries made efforts for the revival of the gold standard in the 1920s. The Great Depression of 1929 in the U.S. resulted in the failure of all such efforts for the revival of the gold standard. According to the theory, the appreciation or depreciation of exchange rates (ER) affects the country's trade; appreciation of a country's currency makes exports expensive and imports cheap, and depreciation makes exports cheap and imports expensive.

This stated phenomenon is true for the two trade partners, but is also affected by certain other situations prevailing in the two trading countries. The foreign country's exchange rates with respect to her other major trade partners, availability and prices of the substitutes in foreign country and world over, consumers' income, trade openness and political situations are some other important factors affecting export and import trade.

Tracing and finding out the effects of the determinants of export might be easy when trade of certain known commodities between two specific countries is analyzed; but the case becomes cumbersome, and needs extra care when analysis of trade is required at aggregate level, for instance the topic of this piece of research - Exchange rates and Pakistan's Exports: an analysis. In this research first think primarily about some very simple questions like what the exchange rates are (definition), how these are determined (or are autonomous in nature), they affect what and how, and specifically what relationship they have with exports –

Review of literature

Vergil (2003) Investigated, the relationship of exchange rate with macro-economic variables in Turkey and the European Union. Their results show that there was a strong effect of exchange rate volatility on real exports in Turkey. Further, exchange rate fluctuation has negative effect on real exports in short-run in Germany. Benita and Lauterbach (2007) found that the real exchange rate volatility has a statistically significant opposite impact on real exports. A positive correlation was found in the panel data; countries with huge exchange regime normally have higher real interest rates and more central bank intervention for the purpose of controlling exchange rate volatility. Kendal (2004) found a substantial relationship between exchange rates fluctuation and current account balance. The Breton Woods Agreement in 1944 introduced an exchange rate system that remained in effect till 1971.

According to this agreement, the value of U.S. dollar was fixed in terms of gold. All other countries fixed the value of their currencies in terms of the U.S. dollar. However, this system proved detrimental to the U.S. economy and the U.S. balance of payment suffered significantly. Consequently the U.S. government suspended the convertibility of U.S. dollar into gold as the supply of U.S. dollar exceeded its demand. Subsequently the Smithsonian agreement was enforced. However, it also failed to achieve the desired goals and ultimately countries were allowed to float their currencies. In a free float, the market demand and supply determine the exchange value of a currency. Since then most of the countries in the world have followed a free float regime for their currencies Jakab and kovacs (1999) reported that nominal exchange regimes do not play important role in tradable real exchange rate fluctuation.

They argued that policy of exchange rate was not the main factor of real exchange fluctuations. Instead supply shocks were the main determinants of exchange rate fluctuation. Engel and West (2005) reported that exchange rate fluctuations were helpful in explaining economic variables such as money, income, prices and interest rates. They suggested that exchange rates can help forecast fundamental macroeconomic indicators. Dong (2006) on the other hand reported the influence of macroeconomic variables on exchange rate. They reported that monitory policy shocks, interest rates and output gap significantly explained the variance of exchange rate. Ijaz, Akhtar and Abbas (2002) concluded that there is a direct relationship between real exchange rate and budget deficit. Further they concluded that budget deficit is both directly and indirectly affect the real exchange rates. There findings suggested that variations in real exchange rate depends upon whether fiscal deficit is reduced by increasing taxes or lowering government expenditure.

Lahrèche-Révil and Bénassy (2001) argued that the exchange rate is of more important and major concern for both trade and foreign direct investment. They suggested that exchange rate volatility also play a substantial role for attracting FDI, but they were unable to make evidence that influence the exchange rate uncertainty on trade. Aqeel and Nishat (2005) investigated the determinants of growth in foreign direct investment (FDI) in Pakistan. They further identified several factors or indicators affecting trade, fiscal and financial sectors in Pakistan economy by using co-integration and error correction model to specify variables in explaining the FDI in Pakistan. They considered the tariff rate, exchange rate, tax rate, credit to private sector and index of general share prices. They found that the variables explained the flow of foreign direct investment by including wages and per capita GDP to measure the relative demand for labor and market size hypotheses.

Schmidt (2001) reported that there is direct relationship between home currency depreciation and FDI outflows. He reported statistical significance for all industries except electric machinery. Kendal (2004) further reported that depreciation of the currency prevails to increase in real output.

Rosengren and Eric (1992) reported that there has been a significant positive correlation between inward foreign direct investment in the United States and the US real exchange rates since1970. Arizonan (1992) have concluded that nominal shocks in flexible exchange rate regimes have reverse implications on investment behavior and a fixed exchange rate encourage FDI. Some mail reason for established the relationship between exchange rate and stocks prices. First, influence the decisions about monetary and fiscal policy Gavin (1989) stated that booming market having positive effect cumulative demand. Sometimes decision maker makes not as much of expensive currency in order to boost the export sector. They should be aware whether such a policy might depress the stock market. Second currency normally is used in investment. Knowledge about the link between currency rates and other assets in a portfolio is very important for the performance of the fund.

Empirical Approach

Research is based on structural equation modeling. Before estimating the main equation three further equations were developed and estimated. Because of the assumption of classical regression model first stationary test (unit root test) apply both for dependent and independent variables.   The unit root test is evaluated using the ADF. Data is stationery at level. Data related to different variables first converted into natural log than used all the relevant pretests in SPSS.

Three structural equations are as follow:

IM = Imports
ER = Exchange rate
WR = Worker Remittance
FDI= Foreign Direct Investment
FB=Foreign Borrowing
GH = General hole Sale Price Index
GDP = Gross domestic Product,

Data description

The data used in this study covered the period of 1980 to 2011. Data is gathered from different sources like World Bank indicators, State Bank of Pakistan, World Economic Indicator, etc. The data is further tested in E-views to empirically investigate the stated hypothesis.

Exchange rates (ER) are not autonomous in nature, these are determined by the forces of demand for and supply of major medium of currency (US dollar in Pakistan) used in imports and exports trade. Value of imports seems to be the major factor to determine demand for US dollar in Pakistan, and while value of exports; workers' remittances (WR), foreign direct investment (FDI) and foreign borrowings (FB) appear to be the major determinants of supply of dollar.

Some other factor that affects the exchange rate monetary policy, Hence, these demand and supply factors determine exchange rates in Pakistan, which in turn affect volumes of import and export.

ER = f(IM, EX, WR, FDI, FB,)
FDI= f(ER, EXPORT, IMP, GDP)
IMP = f(ER, GDPM, POPGR)
EX = f(ER, GDPP, GDPM, GDPW)

In case of FDI is not independent in nature in determined by some other factors , These major determents are exchange rate, exports, custom duty, general hole sale price index, political instability, and GDP. The foreign investors move a part of their production to the country where market is large to absorb a substantial part of their production. To investigate such type of effect we included GDP growth rate as proxy for market size (The other measures for market size may be GDP per capita and size of the middle income group). Until 1996 the common wisdom was that change in the level of exchange rate did not alter the decision by a donor country to invest in a foreign country. In rough terms, while an appreciation of home country's currency would lower the cost of assets, the (expected) nominal return goes down as well in the home currency, leading the rate of return identical. Froot and Stein (1991) presented an imperfect capital market story for why a currency appreciation may actually increase foreign investment by a firm.

Imperfect capital market means that the internal cost of capital is lower than borrowing from external sources. Thus, an appreciation of the currency leads to increased firm wealth and provides the firm with greater low-cost funds to invest relative to the counterpart firms in the foreign country that experience the devaluation of their currency.

Another case may be that firms are interested in export production. The depreciation of the currency of a host country increases the attractiveness of that country as a host to FDI, because depreciation tends to improve export competitiveness of the products produced in that country. In the theory there may be two possibilities for the foreign investors to choose the host country depending upon the trade policy of the host country. The two broader categories of the policy represents the export promotion regime and import promotion regime. In export promotion regime, the foreign investors use lower labor costs and low price availability of raw material. On the other hand, in import promotion regime, the host country has no advantage leading to extra profit and rent seeking activities. Trade openness generally positively influences the export-oriented FDI into an economy. That is why the investors like to invest in countries, which have regional trade integration and where there are greater investment provisions in their trade agreements.

The link between FDI and trade protection in the form of tariff is seen fairly clear by most trade economists, that is higher trade protection should make firms more likely to substitute by producing in foreign country for domestic consumption to avoid the cost of trade protection. Workers' remittances are not autonomous; WR can calculated by income, employment status, educational level, association with country.

But ER is not the only determinant of import (IM). Imports in Pakistan have historically been largely composed of capital goods (28% in 1980-81 and 24% in 2010-11) and industrial raw materials (58% in 1980-81 and 60% in 2010-11); the value of the share of Pakistan GDP's manufacturing sector (GDPM) may therefore be included in equation 3.11 as proxy to represent the demand for imports, in addition to the population or its growth rate (POP) as proxy for the size of the market. Hence, equation 3.11 adopts new form, namely:

$IM = f(\text{ER, GDPM, POP})$

Case of exports, primary commodities and semi-manufactured and manufactured products have been the major components, with share of 44% in 1980-81 and 18% in 2010-11, 11% in 1980-81 and 13% in 2010-11 and 45% in 1980-81 and 69% in 2010-11, respectively. The values of the primary (GDPP) and secondary/manufacturing sectors' contributions to GDP (GDPM) may therefore be included in equation 3.12 as proxies to represent major supplying sectors of exports. The demand for Pakistani exports has come from both developed (60.8% in 1990-91 and 44.5% in 2010-11) and developing (39.2% in 190-91 and 55.5% in 2010-11) countries, the world's GDP can be taken as proxy to represent demand from the whole world (GDPW). Hence, equation 3.12 adopts the new form, namely:

$EX = f(\text{ER, GDPP, GDPM, GDPW})$

Methodology

In accordance with the theory and on the basis of empirical studies referred earlier in introductory section, it is concluded that exchange rate is dependent on server factors including imports, exports, foreign direct investment, worker remittances, and foreign borrowing. In the first attempt, a broader econometric model was used that included that all variables who effect the exchange rate, IMP, EXP etc. All variables initially included in the model were then tested for unit root; those found as I(0), were then gone through the OLS analysis, for determining the which variables are effect the exchange rate.

Data Description

Unit Roots Analysis

Since the data being used for this analysis pertains to time-series, and time series data usually have unit roots, meaning series data are non-stationary or are integrated of order 0 or I (0). In such a situation, the use of OLS used, It is recommended that time-series data should first be tested for unit roots, and then decision about the use of OLS or some other methods should be made. Accordingly, all variables, including both dependent and independent ones, have been tested for unit roots. Please refer to below table for the results of Augmented Dicky-Fuller (ADF) test.

Empirical Analysis Results and Interpretation

Variables		
	ADF test statistics	P-value
ER	-4.5421	0.0011
EXP	-5.2715	0.0002
FB	-4.83815	0.0005
FDI	-4.7616	0.0006
GDP	-5.10617	0.0003
GDPGR	-6.01764	0
GDPP	-3.62121	0.0113
GDPW	-3.81397	0.007
WR	-4.30784	0.002
GDPM	-4.68606	0.0008

The results of all variables are reported in the appendix. The ADF Unit Root test results for the time series presented in table 1 above reveal that all variables were stationary at level. Having established the stationary of the series, the next step is to carry out the OLS approach for check the relationship among dependent and independent variables.

Regression Analysis:

$ER = f(IM, EX, WR, FDI, FB, MP)$

First regression is run between variables that determine the exchange rate, these are imports, exports worker remittances, foreign direct investment and the foreign borrowing. First check the Ramsey reset test for the model misspecification. Tables show that model is significant, and then the check heteroskedasticity test so used Breusch-Pagan-Godfrey test. That shows that there is not any problem of heteroskedasticity.

The regression results shows in below tables that explain the exports, foreign direct investment and worker remittances are statistically significant at 95% confidence interval. The Coefficients of exports, worker remittances and foreign direct invest and -.429,-.041 and -.072 respectively. R square is .559 that shows that 59% variation of dependent variables explain the independentand the F statistics shows the model fitness that is .001.

Ramsey RESET Test

Ramsey RESET Test			
Equation: UNTITLED			
Specification: ER C IMP EXP01 FDI FB WR			
Omitted Variables: Powers of fitted values from 2 to 6			
	Value	df	Probability
F-statistic	0.844411	(5, 20)	0.5343
Likelihood ratio	5.93747	5	0.3124

Breusch-Pagan-Godfrey

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
F-statistic	0.280489	Prob. F(5,25)		0.9194
Obs*R-squared	1.646661	Prob. Chi-Square(5)		0.8955
Scaled explained SS	1.305997	Prob. Chi-Square(5)		0.9343

Breusch-Pagan-Godfrey

Model Summary-b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.748a	.559	.471	.041455353	.559	6.337	5	25	.001	1.975

a. Predictors: (Constant), fb, wr, fdi, exp, imp
b. Dependent Variable: er

ANOVA-a

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.054	5	.011	6.337	.001b
	Residual	.043	25	.002		
	Total	.097	30			

a. Dependent Variable: er
b. Predictors: (Constant), fb, wr, fdi, exp, imp

Coefficients-a

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.101	.013		7.783	.000		
	Exp	-.429	.096	-.650	-4.449	.000	.826	1.210
	Imp	.034	.069	.079	.492	.627	.681	1.469
	Fdi	-.041	.018	-.331	-2.248	.034	.815	1.228
	Wr	-.072	.034	-.284	-2.088	.047	.951	1.052
	Fb	.084	.140	.085	.604	.552	.897	1.115

a. Dependent Variable: er

ANOVA-a

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.054	5	.011	6.337	.001b
	Residual	.043	25	.002		
	Total	.097	30			

a. Dependent Variable: er
b. Predictors: (Constant), fb, wr, fdi, exp, imp

FDI= f(ER, EXPORT, IMP, GDP)

Second regression is run between variables that determines the foreign direct investment, these are expected exchange rate,imports, exports worker and gross domestic product.First check the Ramsey reset test for the model misspecification. Tables shows that model is significant, and then the check heteroskedasticity test so used Breusch-Pagan-Godfrey test. That shows that there is not any problem of heteroskedasticity.

The regression results shows in below tables that explain the relationship between foreign direct investment and exchange rate expected, exports, imports and gross domestic product. The results shows that expected exchange rate and exports are statistically significant at 95% confidence interval. The Coefficients of expected exchange rate and exports are -12.75 and 4.926 respectively. R square is .632 that shows that 63.2% variation of dependent variables explain the independent. Finally, the value of F significance is 0.000 which again reflects that the model was fit for the analysis of the relationship.

Ramsey RESET Test

Ramsey RESET Test			
Equation: UNTITLED			
Specification: FDI C EXHATE EXP01 IMP GDP			
Omitted Variables: Powers of fitted values from 2 to 4			
	Value	df	Probability
F-statistic	2.109788	(3, 23)	0.1267
Likelihood ratio	7.535943	3	0.0566

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
F-statistic	0.944448	Prob. F(4,26)		0.4541
Obs*R-squared	3.93285	Prob. Chi-Square(4)		0.4152
Scaled explained SS	1.627358	Prob. Chi-Square(4)		0.8039

Model Summary-b										
					Change Statistics					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	.795a	.632	.576	.297168691	.632	11.182	4	26	.000	1.516
a. Predictors: (Constant), gdp, Unstandardized Predicted Value, imp, exp										
b. Dependent Variable: fdi										

ANOVA-a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.950	4	.987	11.182	.000b
	Residual	2.296	26	.088		
	Total	6.246	30			
a. Dependent Variable: fdi						
b. Predictors: (Constant), gdp, Unstandardized Predicted Value, imp, exp						

Coefficients-a								
		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	1.251	.235		5.321	.000		
	Unstandardized Predicted Value	-12.755	2.269	-1.191	-5.622	.000	.315	3.173
	exp	-4.926	1.113	-.933	-4.426	.000	.318	3.145
	imp	.722	.500	.210	1.445	.160	.669	1.495
	gdp	.639	.944	.099	.677	.504	.665	1.503
a. Dependent Variable: fdi								

$IMP = f(ER, GDPM, POP)$

Third the regression is run between variables that determine the imports; these are expected exchange rate, Gross domestic product from manufacturing and populations. First check the Ramsey reset test for the model misspecification. Tables show that model is significant, and then the check heteroskedasticity test so used Breusch-Pagan-Godfrey test. That shows that there is not any problem of heteroskedasticity.

The regression results shows in below tables that explain the relationship between imports, expected exchange rate and gross domestic product from manufacturing. The results show that GDPM is statistically significant at 95% confidence interval. The Coefficients of GDPM and exports are - .784.R square is .428 that shows that 42.8% variation of dependent variables explain the independent. Finally, the value of F significance is .002 which again reflects that the model was fit for the analysis of the relationship.

Ramsey RESET Test			
Equation: UNTITLED			
Specification: IMP C EXHATE GDPM POPGR			
Omitted Variables: Powers of fitted values from 2 to 3			
	Value	Df	Probability
F-statistic	0.559741	(2, 25)	0.5784
Likelihood ratio	1.357976	2	0.5071

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	2.019838	Prob. F(3,27)	0.1348
Obs*R-squared	5.682024	Prob. Chi-Square(3)	0.1281
Scaled explained SS	2.382783	Prob. Chi-Square(3)	0.4968

Model Summaryb

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.655a	.428	.365	.105753583	.428	6.748	3	27	.002	2.314

a. Predictors: (Constant), popgr, gdpm, Unstandardized Predicted Value
b. Dependent Variable: imp

ANOVAa

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.226	3	.075	6.748	.002b
	Residual	.302	27	.011		
	Total	.528	30			

a. Dependent Variable: imp
b. Predictors: (Constant), popgr, gdpm, Unstandardized Predicted Value

Coefficients-a

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.052	.056		.924	.363		
	Unstandardized Predicted Value	-.628	.518	-.202	-1.212	.236	.764	1.309
	Gdpm	.784	.246	.523	3.183	.004	.783	1.277
	Popgr	.565	.623	.137	.906	.373	.919	1.088

a. Dependent Variable: imp

$EX = f(ER, GDPP, GDPM, GDPW)$

Finally the regression is run between variables that determines the exports, these are expected exchange rate, Gross domestic product from manufacturing gross domestic product of hole world. First check the ramsey reset test for the model misspecification. Tables show that model is significant, and then the check heteroskedasticity test so used Breusch-Pagan-Godfrey test that shows that there is not any problem of heteroskedasticity.

The regression results shows in below tables that explain the relationship between imports, expected exchange rate and gross domestic product from manufacturing. The results show that only expected exchange rate is statistically significant at 95% confidence interval. The Coefficients of exchange rate is -1.404. R square is .698 that shows that 69.8% variations of dependent variables explain the independent. Finally, the value of F significance is .000which again reflects that the model was fit for the analysis of the relationship.

Breusch-Pagan-Godfrey

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
F-statistic	1.554045	Prob. F(4,26)		0.2162
Obs*R-squared	5.981516	Prob. Chi-Square(4)		0.2005
Scaled explained SS	4.173622	Prob. Chi-Square(4)		0.383

Model Summary-b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.835a	.698	.651	.051030912	.698	15.019	4	26	.000	2.543

a. Predictors: (Constant), gdpw, gdpp, Unstandardized Predicted Value, gdpm
b. Dependent Variable: exp

ANOVA-a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.156	4	.039	15.019	.000b
	Residual	.068	26	.003		
	Total	.224	30			

a. Dependent Variable: exp
b. Predictors: (Constant), gdpw, gdpp, Unstandardized Predicted Value, gdpm

Coefficients-a

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.136	.040		3.350	.002		
	Unstandardized Predicted Value	-1.404	.270	-.692	-5.197	.000	.655	1.526
	Gdpp	.143	.327	.050	.438	.665	.892	1.122
	Gdpm	-.046	.136	-.047	-.341	.736	.599	1.670
	Gdpw	.404	.261	.232	1.548	.134	.517	1.935

a. Dependent Variable: exp

Conclusion and Recommendations

The above mention model provide us help to draw conclusion those are as follow; First increase in economic activity of Pakistan should focus more on exports because deprecation in exchange rate ultimately increase the exports profit and also should less relay on imports. Pakistan in importing economy and exports of Pakistan is less influence on its GDP, so exchange rate deprecation can increase its foreign debt and also more burden on whole economy, so it should increase its exports and less influence on imports.

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