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The Impact of Some Economic Factors on Imports in Jordan

Adel .A.Haddaw，Mahdy. S. Othman
ISRA University- Faculty of Adm. And Financial – Jordan- Amman

ABSTRACT
The purpose of this paper is to build a multiple linear econometrics model which reveals impact of some important economic factors on Jordanian imports**.** Different models have been modified to get the best model in estimating and predicting imports. The major findings of the paper were that imports in Jordan are dominated by Consumer Price Index (CPI), Remittance (REM), Relative Prices RP) and Exchange Rate(ER) respectively. ER has a small coefficient compared to *other* predictors. *CPI* actually contributes more to the model because it has a larger standardized coefficient.

Introduction

No doubt that the Jordanian economy suffers a lot of serious problems. One of these major problems is a big deficit of the trade balance which caused by importing nearly more than the double of the exports.

As a result of the tendency toward the adoption of liberal trade policies by most countries and the associated reduction of trade barriers worldwide, international purchasing decisions have become increasingly important to the survival and growth of modern business organizations as well as their home countries. The function of international purchasing is different from that of domestic purchasing due to the impact of a variety of factors such as: exchange rates; trade regulations and complex distribution channels.(Min & Galle,1991).

For most countries, raw material, food, and oil imports must be maintained at an adequate level to allow the economy to function. Any decrease of such imports might damage a country's export potential and economic development.(Leslie,1987).

In Jordan, it has a poor economy, described as an open and fully exposed economy to the external world and its economic implications. Statistics in 1999 shows that the ratio of Jordan external trade (export & import) to its Gross National Product GNP was 93% which make the international prices have a severe effect on the Jordanian inflation rate and prices stability. Also the Jordanian consumption depends on importing from the outside world most of its essential requirements such as crude oil, food and metal. On the other hand, Jordan exports two major products which are phosphates and potash. The main economic indicators shows that imports of Jordan exceeds its exports more than the double during the period 2004-2008 causing a deficit in the trade balance reached up to 5 billion in 2008 consisting about -36% of its Gross Domestic Product(GDP). Although the Jordanian economy maintains a stable growth in its GDP for the last few years by the foreign aids and the Jordanian workers remittances, some economists described that is unreliable financial resources because of the effects of any political and economic conditions. Also we should pay attention to the fact that the Jordanian economy already suffers a serious continuous economic problems including: the external deficit resulted from the big gap between imports and exports.

The previous discussion shows the importance of studying these major problems which affects the Jordanian economy. So the purpose of this paper is to underline the factors that impact Jordan's imports trying to resolve one of the major problems affecting the domestic economy of Jordan. For this purpose this topic will be achieved by building an imports function of Jordan. The paper focuses on some factors including Gross Domestic Product at current prices (GDP), Exchange Rate (ER), Consumer Price Index (CPI), Relative Prices (RP) and Remittance from Jordanian working (REM) as independent variables. In order to test the relationship among these variables and dependent variable (imports of Jordan), it will be done by using a multiple linear econometrics model

1-Literature Review

Before reviewing the literature in order to build a theoretical framework about factors that may have possible effect on imports, it is important to identify the definitions of theses factors. The Gross Domestic Product (GDP) can be defined as the market value of the final goods and services produced in a country during a given period. While Consumer Price Index (CPI) can be defined as a tool that measures for any period the cost in that period of a standard basket of goods and services relative to the cost of the same basket of goods and services in fixed year, call it base year. Relative Prices (RP) can be defined as the price of specific good or service in comparison to the prices of other goods or services. Exchange Rate(ER) can be defined as the number of units of a foreign currency i.e. US dollar the domestic currency can buy. Finally the Remittance (REM) represents the amount of money transferred to home country by citizens working outside it.

In reviewing the literature we couldn't find any research looking for estimating imports function using the earlier mentioned factors. But it was found many researches have tested the impact of two or more factors of

them on imports in separate way. Onwuka and Zoral (2009) proved that there is a strong significant relationship between imports and GDP, CPI in turkey in the long run. While the most significant factors that affected imports were GDP, RP and CPI in the short run. Bahmani-Oskooee and Kovyryalova (2008) concluded that in the long run, imports of 62 industries in the United States were significantly affected by exchange rate ER. Rad and Dehghan (2006) showed that in the Islamic Republic Of Iran, GDP and RP were significantly determine the behavior of total imports in the long run. Islam and Hassan (2004) estimated some critical parameters of the aggregate imports function for Bangladesh, they found showed that the imports function were dominated by GDP and RP. GPD was a positive significantly while RP was a negative significantly. Dutta and Ahmed (2004) investigated the behavior of Indian aggregate imports, they concluded that imports is largely explained by GDP, and is generally less sensitive to RP. Tang and Nair (2002) tried to estimate the long term relationship between imports and its determinants, namely GDP and RP, the results showed that import volume, GDP and RP are countertraded. On the contrast Matsubayashi and Hamory (2003) tested the aggregate imports function for G7 countries, they concluded that there is no stable relationship between imports and GDP, RP.

The difference between above and this paper is to test the impact of the five factors namely, GDP, ER, CPI, RP and REM on imports in Jordan.

2- Theoretical framework (Some of The Statistical Methods used)

In this section a brief discussion of methodology and estimation issues, relating to analyze the relationship between IMOERTS and GDP, ER, CPI, RP and REM in Jordan using a multiple linear time series econometrics model since the data are economic time series data. The data is obtained from central bank of Jordan for the years 1976 to 2008. Assuming that the independent variables (GDP, ER, CPI, RP and REM) are potentially related to the dependent variable (IMOERTS). In order to conduct this analysis, it is assumed that IMOERTS (IM) are a function of GDP, ER, CPI, RP and REM as follows :

$$IM = f(\text{GDP, ER, CPI, RP, REM}) \quad (1)$$

The following a multiple linear econometrics model are representing the previous function which establishes the relationship among the variables :

$$IM_t = b_0 + b_1 GDPt + b_2 ERt + b_3 CPIt + b_4 RPt + b_5 REMt + u_t \ldots\ldots \quad (2)$$

Where :

b_0 :A constant , b_1 , b_2 , b_3 , b_4 , b_5 : Regression Coefficients

$E(u_t) = 0$, $V(u_t) = \sigma^2$

u_t stands for normally and independently distributed with mean zero and variance σ^2

3- Applied Side (Results and Discussion)

In this section, we first determine whether or not a linear model is reasonable for the variables. To do this, the simple correlation coefficients have been used by SPSS 17. The results of the simple correlation between IMOERTS and each of GDP, ER, CPI, RP, REM) are (0.90, -0.60, 0.85, -0.55, 0.94) respectively. They show that the linear correlation among them. The multiple correlation coefficient has also been used. The result of multiple correlation among IMOERTS and (GDP, ER, CPI, RP, REM) is (0.966), which shows that the linear correlation and it indicates a very strong relationship among them. So a multiple linear econometrics model is considered. In order to see descriptive statistics for the variables, some of them have been used. So means and standard deviations for the IMOERTS and GDP, ER, CPI, RP, REM), are shown on Table1.

Table 1 Summary Statistics

Variable	Mean	Std.Deviation	n
IMPORTS	2847.332	2812.703	33
GDP	3999.279	2550.479	33
RP	0.044	0.025	33
CPI	77.272	34.897	33
ER	2.037	0.768	33
REM	768.497	609.224	33

It can be seen that GDP has the largest mean followed by imports and REM. All standard deviations of variables are less than means.

To analyze the relationship between IMOERTS and GDP, ER, CPI, RP and REM in Jordan using a multiple linear time series econometrics model. To do this a linear multiple regression analysis SPSS 17 has also been used. So it can be used *Log-transformed IMPORTS as* the dependent variable because of the distribution of *Log-transformed IMPORTS* is closer to normal than *IMPORTS*.

The resulting of simple correlation between *Log*-IMOERTS and each of (GDP, ER, CPI, RP, REM) are (0.97, -0.81, 0.98, -0.85, 0.94) respectively, show that better results than before. The resulting of multiple correlation

between *Log*-IMOERTS and (GDP, ER, CPI, RP, REM) is (0.981) shows that grater result than before. Descriptive statistics for *Log*-IMOERTS and (GDP, ER, CPI, RP, REM), are provided on Table2.

Table 2 Summary Statistics

Variable	Mean	Standard Deviation	n
Log-IMOERTS	3.281	0.395	33
GDP	3999.279	2550.479	33
RP	0.044	0.025	33
CPI	77.272	34.897	33
ER	2.037	0.768	33
REM	768.497	609.224	33

It can be seen that GDP has the largest mean followed by REM. All standard deviations of variables are less than means.

In order to carry on the analysis, Table 3 provides the ANOVA table which reports the significance value of the (F) statistics is less than o.o5, which means that the variation explained by the model is not due to chance. There for there is an effect of (GDP, ER, CPI, RP, REM) on IMOERTS.

Table 3 ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	4.819	5	.964	140.776	0.000
Residual	.185	27	.007		
Total	5.004	32			

Also from Table 4, As a whole, the regression does a good job of modeling IMOERTS since R Square= 96.3 % the variation in IMOERTS is explained by the model. As a further measure of the strength of the model fit, Std. Error of the Estimate (0.083) is lower than standard deviation of(*Log*-IMOERTS : 0.956).

Table 4 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin- Watson
1	0.981	0.963	0.956	0.083	0.629

Even though the model fit looks positive, the first part of the coefficients Table 5 shows that there are too many predictors in the model. There are two non-significant coefficients such as (GDP, REM), indicating that these variables do not contribute much to the model.

Table 5 Coefficients

Model	Unstandardized Coefficints		standardized Coefficints	t	Sig.	Correlations			Collinearity Statiatics	
	B	Std.Error	Beta			Zero-Order	Partial	Part	Tolerance	VIF
Constant	-12934.7	3644.87		-3.55	0.00					
GDP	-0.96	0.92	-0.870	-1.05	0.30	0.896	-0.198	-0.05	0.004	280.11
RP	32414.28	12528.3	0.287	2.587	0.02	-0.55	0.446	0.128	0.200	5.01
CPI	138.67	46.45	1.721	2.986	0.01	0.85	0.498	0.148	0.007	135.06
ER	2234.56	786.90	0.610	2.840	0.01	-0.60	0.480	0.141	0.053	18.79
REM	3.82	2.30	0.828	1.664	0.11	0.94	0.305	0.082	0.010	100.82

From table 5, it can be determined that the relative importance of the significant predictors. By looking at the standardized Coefficients, GDP has a small coefficient compared to *other* predictors, *CPI* actually contributes more to the model because it has a larger standardized coefficient.

The second part of Table 5 coefficients shows that there might be a problem with multicollinearity and for most predictors, the values of the partial and part correlations drop sharply from the zero-order correlation. This means, for example, that much of the variance in IMOERTS that is explained by GDP is also explained by other variables.

In statistics, when the tolerances are close to 0, there is high multicollinearity and a variance inflation factor (VIF) greater than 2 is usually considered problematic (Norusis,2004).Whereas a variance inflation factor (VIF) less than 10(Draper and Smith,1981) is not considered problematic. So the smallest VIF in the second part of Table 5 is 5.01. There for because of different values of Tolerance and VIF which are obtained from above these

references, it can be used statistical concept (Collinearity Diagnostics : Eigenvalues and the Condition Index) which provides on Table 6 to determine the collinearity. So the Collinearity Diagnostics confirm that there is a problem with multicollinearity since two eigenvalues for predictors(ER, REM) are close to 0, indicating that the predictors are highly intercorrelated .

Also from (Collinearity Diagnostics : Eigenvalues and the Condition Index) and Table 6, when values greater than 15 indicate a possible problem with collinearity or greater than 30, a serious problem. So because of two of these indices for predictors(ER, REM) are larger than 30, suggesting a very serious problem with collinearity.

Table 6 Collinearity Diagnostics

Model	Dimension	Eigenvalue	Condition Index
1	Constant	4.958	1.000
	GDP	0.957	2.276
	RP	0.047	10.247
	CPI	0.037	11.629
	ER	0.001	76.492
	REM	0.001	92.471

To determine anther problem that is an autocorrelation, we back to Table 4. So from table 4, Durbin-Watson statistics, DW= 0.620 indicating that there is evidence of an autocorrelation since $d < d_L$: $0.629 < 1.109$(Gujarati, 2003).

Firstly, to fix the collinearity problem by rerunning the regression using *z* scores of (GDP, ER, CPI, RP, REM) and the stepwise method of model selection.

So Table7 shows Collinearity Diagnostics, there are no Eigenvalues close to 0, and all of the condition indices are much less than 15. The strategy has worked, and the model built using stepwise methods does not have problem with collinearity.

Table 7 Collinearity Diagnostics

Model	Dimension	Eigenvalue	Condition Index
1	Constant	1.000	1.000
	CPI	1.000	1.000
2	Constant	1.931	1.000
	CPI	1.000	1.390
	REM	0.069	5.294

Now it can be seen that from Table 8, the new model's ability to explain IMOERTS compares with that of the previous model, on Table 4.

Table 8 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin- Watson
2	0.979	0.958	0.955	0.084	0.480

The adjusted *R*-square statistics, which are very identical and Std. Error of the Estimate are very identical too. Durbin-Watson statistics, DW= 0.480 still indicating that there is evidence of an autocorrelation since $d < d_L$, $0.480 < 1.109$.

In order to select the best model, Table 9 shows the stepwise chooses CPI and REM as predictors. IMOERTS are positively affected by CPI and REM.

Table 9 Coefficients

Model	Unstandardized Coefficints		standardized Coefficints		
	B	Std.Error	Beta	t	Sig.
1 Constant	3.281	0.015		211.997	0.000
ZCPI	0.386	0.016	0.975	24.536	0.000
2 Constant	3.281	0.015		225.450	0.000
ZCPI	0.301	0.041	0.761	7.424	0.000
ZREM	0.091	0.041	0.230	2.249	0.032

Then CPI was chosen first because it is the predictor that is most highly correlated with IMOERTS. The remaining predictors are then analyzed to determine which, if any, is the most suitable for inclusion at the next step.

Excluded Variables are provided in Table10. *Beta In* is the value of the standardized coefficient for the predictor if it is included next.

To carry on the analysis, two of the significance values (ZER and ZREM) are less than 0.05, so any of them predictors would be adequate if included in the model.

To choose the best variable to add to the model, it can be seen that at the partial correlation, which is the linear correlation between the proposed predictor and the dependent variable after removing the effect of the current model. Thus, REM is chosen next because it has the highest partial correlation (0.38).

After adding REM to the model, none of the remaining predictors are significant in model 2.

Table 10 Excluded Variables

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Tolerance
1	ZGDP	0.35	1.75	0.09	0.31	0.04
	ZRP	- 0.03	- 0.40	0.69	- 0.07	0.33
	ZER	0.18	2.06	0.05	0.35	0.18
	ZREM	0.23	2.25	0.03	0.38	0.13
2	ZGDP	- 0.37	- 0.72	0.48	- 0.13	0.01
	ZRP	- 0.07	- 0.98	0.33	- 0.18	0.31
	ZER	0.06	0.37	0.71	0.07	0.01

Secondly, to fix an autocorrelation problem by rerunning the regression using standardized log-transformed of (GDP, ER, CPI, RP, REM) and the stepwise method of model selection.

Table11,shows Collinearity Diagnostics, there are no Eigenvalues close to 0, and all of the condition indices are much less than 15. The strategy has worked, and the model built using stepwise methods does not have problem with collinearity.

Table 11 Collinearity Diagnostics

Model	Dimension	Eigenvalue	Condition Index
1	Constant	1.004	1.000
	zlgREM	0.996	1.004
2	Constant	1.943	1.000
	zlgREM	1.000	1.394
	zlgCPI	0.058	5.809
3	Constant	2.824	1.000
	zlgREM	1.001	1.680
	zlgCPI	0.120	4.847
	zlgRP	0.055	7.146
4	Constant	3.651	1.000
	zlgREM	1.001	1.910
	zlgCPI	0.243	3.880
	zlgRP	0.087	6.466
	zlgER	0.018	14.057

Also it can be seen that from Table 13, the new model's ability to explain IMOERTS compares with that of the model, on Table 12 below.

Table 12 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin- Watson
1	0.994	0.989	0.987	0.045	1.374

Table 13 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin- Watson
4	0.994	0.989	0.987	0.045	1.404

The adjusted *R*-square statistics, which are very identical and Std. Error of the Estimate are very identical too. Durbin-Watson statistics, DW= 1.404 indicating that there is no evidence of an autocorrelation since $d > d_L$, $1.404 > 1.109$.

Also from Table 14, shows the stepwise chooses ERM, CPI , RP and ER as predictors. IMOERTS are positively affected by REM, CPI , RP and ER.

Table 14 Coefficients

Model		Unstandardized Coefficints		standardized Coefficints		
		B	Std.Error	Beta	t	Sig.
1	Constant	3.283	0.019		170.469	0.000
	zlgREM	0.382	0.020	0.961	19.440	0.000
2	Constant	3.285	0.016		201.843	0.000
	zlgREM	0.211	0.050	0.530	4.241	0.000
	zlgCPI	0.185	0.050	0.458	3.668	0.001
3	Constant	3.288	0.011		307.065	0.000
	zlgREM	0.319	0.037	0.802	8.665	0.000
	zlgCPI	0.233	0.034	0.579	6.876	0.000
	zlgRP	0.167	0.026	0.426	6.363	0.000
4	Constant	3.291	0.008		422.254	0.000
	zlgREM	0.257	0.029	0.645	8.759	0.000
	zlgCPI	0.452	0.049	1.123	9.261	0.000
	zlgRP	0.185	0.019	0.473	9.557	0.000
	zlgER	0.152	0.029	0.375	5.193	0.000

REM was chosen first because it is the predictor that is most highly correlated with IMOERTS. The remaining predictors are then analyzed to determine which, if any, is the most suitable for inclusion at the next step.

To see Excluded Variables that are provided on Table15. *Beta In* is the value of the standardized coefficient for the predictor if it is included next.

Three of the significance values (GDP, RP and CPI) are less than 0.05 in model 1, so any of them predictors would be adequate if included in the model.

To choose the best variable to add to the model, it can be seen that at the partial correlation, after removing the effect of the current model. Thus, CPI is chosen next because it has the highest partial correlation (0.556).

After adding CPI, RP and ER to the model from model 1 throw model 4, GDP predictor is none significant in model 4.

Also from table 14, it can be determined that the relative importance of the significant predictors. By looking at the standardized Coefficients, ER has a small coefficient compared to *other* predictors , *CPI* actually contributes more to the model because it has a larger standardized coefficient.

Table 15 Excluded Variables

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Tolerance
1	ZlgGDP	0.450	2.564	0.016	0.424	0.067
	zlgRP	0.322	3.096	0.004	0.492	0.177
	zlgCPI	0.458	3.668	0.001	0.556	0.112
	zlgER	-0.175	-2.037	0.051	-0.349	0.302
2	zlgGDP	- 0.489	- 1.287	0.208	- 0.232	0.012
	zlgRP	0.426	6.363	0.000	0.763	0.168
	zlgER	0.250	1.734	0.094	0.306	0.079
3	ZlgGDP	1.030	3.643	0.001	0.567	0.007
	zlgER	0.375	5.193	0.000	0.700	0.076
4	zlgGDP	0.213	0.585	0.564	0.112	0.003

Thirdly, to see if there is heteroscedasticity in the data. From the regression line, the idea being to find out whether the estimated mean value of Y is systematically related to the squared residual. In Figure 1 in Appendix 1, it can be seen that there is no systematic pattern between the two variables, suggesting that perhaps no heteroscedasticity is present in the data.

Finally, to meet some assumptions of a linear regression model. To do these, some figures have been done.

In Figure 2 in Appendix 1, it can be seen that P.P plot of the residuals which follows the shape of the normal curve fairly well. Also in Figure 3 in Appendix 1, the lot of residuals by the predicted values shows that the variance of errors does not increase with increasing predicted imports. It means there is a good scatter.

4-Conclusion

From literature review, there is no dealt with some factors including (GDP), (ER), (CPI), (RP) and (REM) as independent variables impact on Imports in Jordan. So Imports are affected by Consumer Price Index (CPI), Remittance (REM), Relative Prices (RP) and Exchange Rate(ER) respectively. ER has a small coefficient compared to *other* predictors , *CPI* actually contributes more to the model because it has a larger standardized coefficient.

According to references of this paper, the finding of this paper is not the same.

REFERENCE

1- Bahmani ,M and Kovyryalova, M. (2008). Impact Of Exchange Rate Uncertainty On Trade Flows:Evidence From Commodity Trade Between The United States And The United Kingdom. The World Economy.

2- Dutta, D and Ahmed, N. (2004). An Aggregate Import Demand Function For India: A Cointegration Analysis. Applied Economic Letters. Vol. 11, pp 607-613.

3- Draper N. R. and H. Smith.(1981). Applied regression analysis, 2nd edition, New York, John Wiley and sons.

4- Gujarati, D.N.(2003). Basic Econometrics, 4th edition.

5- Islam, A, M. and Hassan, M. K. (2004). An Econometric Estimation Of The Aggregate Import Demand Function For Bangladesh:Some Further Results" Applied Economic Letters. Vol. 11. pp 575-580.

6- Leslie, J.(1987). International Finance And Developing Countries. Longman York Press, London.

7- Min, H and Galle W. (1991). International Purchasing Strategies of Multinational U.S. Firms. *International Journal of Purchasing and Materials Management* (Summer1991):9-18.

8- Matsubayashi, Y and Hamory, S. (2003). *Some Iternational Evidence.*

9- Norusis, M. (2004). *SPSS 13.0 Statistical Procedures Companion.* Upper Saddle-River, N.J.: Prentice Hall, Inc..

10- Onwoka, K, O and Zoral, K Y. (2009). *Foreign Direct Investment And Imports Growth In Turkey*. Journal of Yasar University. 4(15), 2357-2380.

11- Rad, A,A. and Dehghan, M,A. (2006)."*The Effect Of Exchange.*

12- SPSS.(2004 ,2009).Statistical package 13.0 and 17.0.
13- Tang, T, C and Nair, M .(2002). *A cointegration analysis of* Tang.
14- Tuck, C. (2008). *Aggregate Import Demand Function For Japan: A Cointegration Re-Investigation*. Global Economic Review. Vol.37, No. 3, pp 363-377.

Appendix 1

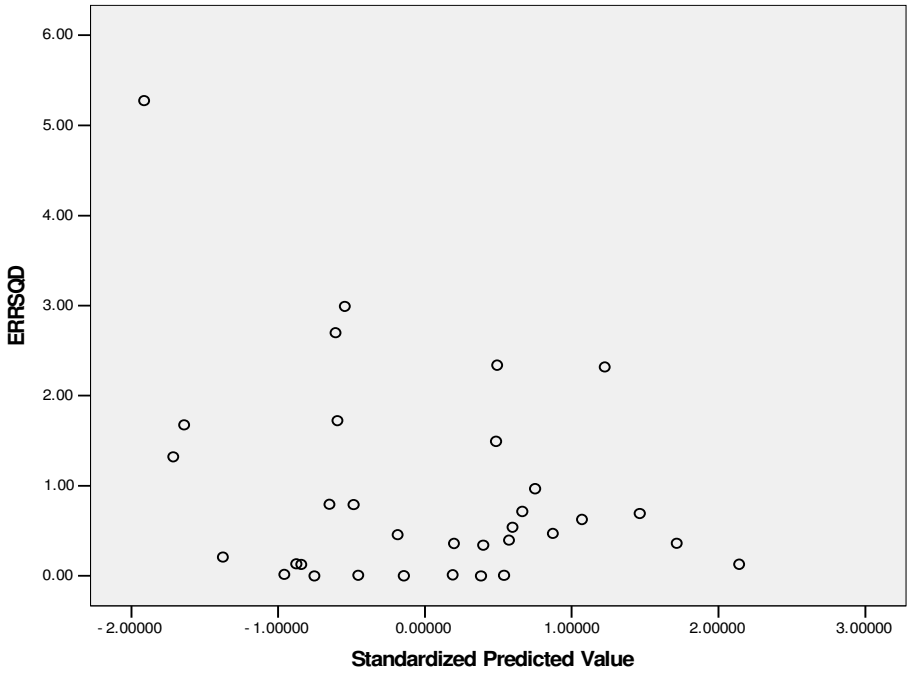

Figure 1 Scatter plot of heteroscedasticity

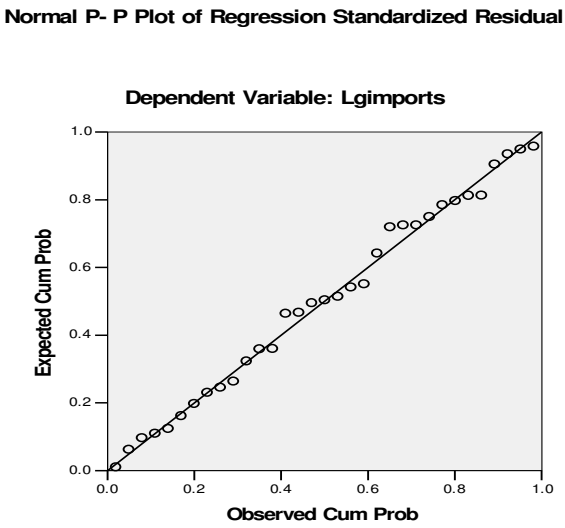

Figure 2 p- p plot

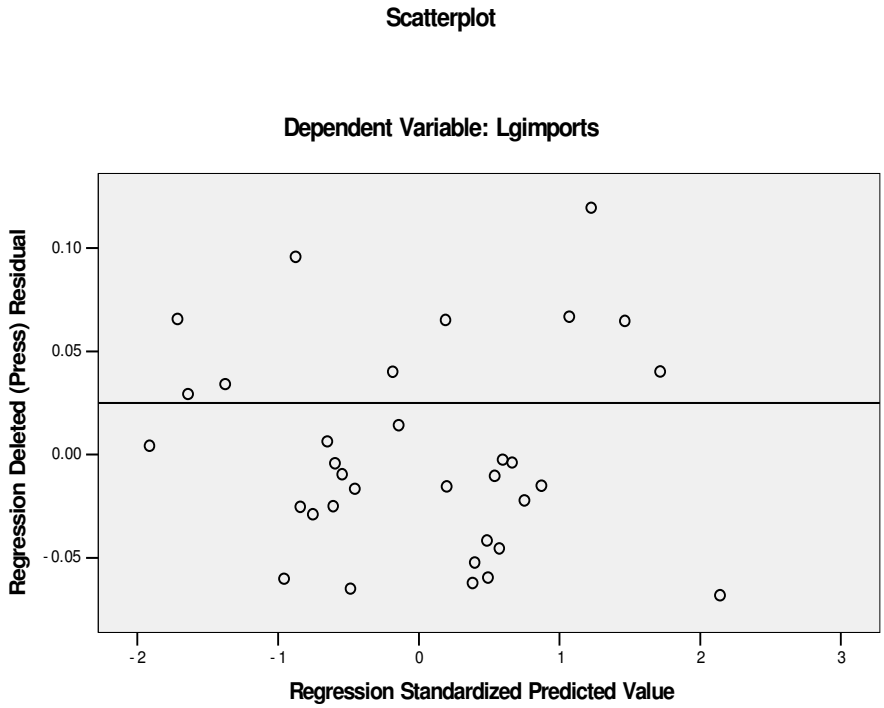

Figure 3 Scatter plot of the residuals