Journal of Economics and Sustainable Development
ISSN 2222-1700 (Paper) ISSN 2222-2855 (Online)
Vol.5, No.10, 2014

Exchange Rate Volatility and Sectoral Export of Nigeria: Case of Oil and Non-Oil Sectors

* Mary Bosede Olufayo
College of Education, Ikere-Ekiti
Ekiti State, Nigeria
e-mail: threeolus@yahoo.com

** Fagite Babafemi A.
graduate Student
department of Economics
Obafemi Awolowo University,
Ile-Ife, Osun State, Nigeria
e-mail: austinefag@gmail.com

ABSTRACT
The study explored the effects of exchange rate volatility on the exports performance of both oil and non-oil sectors. The paper employed the econometrics method of GARCH in measuring volatility of exchange rate and seemingly unrelated regression method (SUR) in estimating the coefficient of the two system equation. ARCH and GARCH results suggested that the exchange rate is volatile , while SUR model shows that exchange rate has negative effect on the two sectors , though statistically not significant. Therefore, for the country export to improve, the country should adopt inward looking policy in order to enhance her capability to export and reduce the vulnerability of the country to the external shocks. This research will go a long way in addressing the behavior of Nigeria export in a correlated innovation and shocks system that goes along with international trade flows

1.1 INTRODUCTION

Exchange rate is the price of a domestic currency in terms of another currency(international), It is one of the most important variable in international trade sectors. The robustness and condition of the exchange rate system determine the fruit and outcome of international trade, which have a great effect on the balance of payment. Exchange rate bear on trade by determining the relationship between international and domestic prices. However, changes in the real exchange rate result in the rising or lowering of the prices of Nigerian goods in local currency terms around the globe. A rise in naira raises the price of Nigerian goods on the international market, while a fall in naira lowers these prices. The fluctuation of exchange rates makes the exports/imports costlier or cheaper and also the unstable tendency of this variable attaches a level of uncertainty or risk to trade. Exchange rate volatility can be defined as the rate of change in price over a given period. It is expressed as a percentage and computed as the annualized standard deviation of the percentage change in the daily price. The magnitude of the change determines the rate of change over time, it is clear that the magnitude of change, the higher the volatility. Friedman's argues that exchange rate instability is a manifestation of economic volatility. Exchange rate regimes differ in the mechanisms through which this underlying volatility is channelled. For instance, "money supply" or "liquidity" shocks affect the nominal exchange rate when rates float, but the money supply if rates are fixed. Underlying systemic volatility cannot be reduced by the regime, only channelled to one locus or another.

In views of this, some scholars has attributed the volatility of the exchange rate to the exchange regime and the issue of volatility could be traced to the exits of the Bretton wood system of fixed exchange rate regime in 1970s and the sudden introduction of the floating exchange rate regime across the world, However, this submission has been a controversial subject, which some opined from a theoretical point of view that increased exchange rate volatility following the move to floating exchange rates has an adverse effect on world trade due to risk averse exporters.

The performance of export depends on the favourable international market couple with stable exchange rate and risk inherent in the international trade. Many scholars has reported that Nigeria exchange rate is highly volatile and vulnerable to the international shocks, owning to this fact , the country exports which includes oil and non-oil goods cannot be immune against these external shocks and volatility of the exchange rate. However , does exchange rate volatility affects Nigerian oil and non-oil export and how does it affect? However, in analysing the impact of the exchange rate uncertainty on the country export, the study will adopt sectoral approach of non-oil and oil by assuming the sectors are seemingly unrelated but are related by their error term , which includes international trade shocks, governance , export policy and many more.

1.2LITERATURE REVIEWS

Scholars has been divided in their views and conclusion on how exchange rate volatility affects the export performance using different methodology and approach. Akhtar and Hilton(1984), using the sample period of 1974 to 1981 and ordinary least square method. They studied the effects of exchange rate uncertainty on German and U.S. Trade and concluded that the variable has a negative effect on trade. Similarly ,Peree and Steinherr(1989) in their studies on exchange rate uncertainty and foreign trade with sample period of 1960 to 1985 and also an econometrics method of ordinary least square submitted that there is negative effect of

exchange rate uncertainty on foreign trade. In the same vein ,Feenstra and Kendall(1991), explored the relationship between the exchange Rate volatility and international Prices using GARCH model and asserted that the volatility of exchange rate had negative effect on the international prices . Moreso, Belenger et al.(1988),conducted research on exchange rate variability and trade flows using sectoral estimates for the US-Canada Case using the instrumental variable estimate , they submitted that variability of exchange rate have significant and negative effect on the trade flows. In the process of determine the level of relationship and how the volatility of the exchange rates affects the international trade , Caballero and Corbo (1989),studied the effect of real exchange rate uncertainty on exports , they adopted the methodology of ordinary least square and instrumental variable estimate to arrive at the conclusion of negative effect , in addition , Bini-Smaghi(1991) in his attempt to examined how exchange rate variability affects trade by using ordinary least square method asserted that exchange rate variability had significant and negative effect on the trade flows. In like manner , Baak (2004) , examined the relationship between exchange rate volatility and exports from East Asian countries to Japan and the U.S and submitted that there is significant negative relationship .Furthermore, Doganlar(2002), used error correction and cointergration method to explored the impact of exchange rate volatility on export, he asserted that the volatility of exchange rate had negative effect on exports .Hook and Boon (2000) also affirmed the negative effects of volatility on export, likewise , Vergil(2002) who also conducted studies on determining the effect of volatility of exchange rate , he arrives at his conclusion using the standard deviation method and submitted that export had negative effect on the export performance .Anthony M.(2008), use an error correction model to study the impact of real effective exchange rate volatility on the performance of non-traditional exports for Zambia between 1965 and 1999. Using a generalized autoregressive conditional heteroscedasticity (GARCH) measure of real exchange rate volatility, he finds that exchange rate volatility depresses exports in both the short run and the long run

Clark et al(2004),carried out research on exchange rate volatility and trade flows, gravity model was employed in determining the empirical relationship, their results shows that volatility brings about uncertainty and this led to the negative relationship between the variables. In the research conducted by Arize, Osang, and Slottje (2000) using the cointegration and error correction model , they asserted that exchange rate volatility reduces the flow of international trade. Lee and Saucier (2005) studied the relationship between exchange rate instability and trade integration , they examined this relationship by using the ARCH-GARCH model and resolved that there exist negative relationship between the instability of exchange rate and trade integration.

In contrast, Asseery and Peel(1991), used ordinary least square method and error correction model to investigate the effects of exchange rate volatility on exports, they discovered that volatility of exchange rate had significant and positive effect on exports except UK. McKenzie and Brooks (1998) also achieved the same result when they adopted ordinary least square in the studied of exchange rate volatility on German - US trade flows. Similarly ,McKenzie(1998),studied the Impact of exchange rate volatility on Australian Trade Flows, he stated that exchange rate volatility is having negative effect on the trade flows of Australian using the ARCH method .

However, some scholars were of the views that volatility of the exchange rate is of no effect on the international trade,Gotur(1985), used ordinary least square to estimate the effects of exchange rate volatility on trade, he asserted that the uncertainty in the exchange rate has no significant effect on trade ,Bailey , Tavlas and Ulan (1987) also adopted the same the method of analysis and arrived at the conclusion of no significant relationship between the exchange rate volatility and export. In like manner ,Bailey and Tavlas (1988).Bailey et al(1987), Koray and Lastpares (1989),Medhora (1990),Akhtar and Hilton(1991),Kumar and Dhawam (1991), Aristoyelous(2001), Tenreyro(2004), Hwang and Lee(2005), argued that volatility of exchange rate had no significant effect on international trade especially the export performance .

In Nigeria context, Aliyu (2009a) and employed standard deviation measure of exchange rate volatility based quarterly observation and examined the impact of exchange rate volatility on non-oil export flows in Nigeria between 1986 and 2006. He revealed that exchange rate volatility decreased non-oil exports in Nigeria. In another study, Aliyu (2009b) examined the impact of oil price shock and exchange rate volatility on economic growth in Nigeria and measuring exchange rate volatility as the consumer price index based real exchange rate approach. But he failed to examine the degree and persistency of exchange rate volatility using standardized econometric.

Olowe (2009) investigate the volatility of Naira/Dollar exchange rates in Nigeria using several variants of Generalized Autoregressive Conditional Heteroskedasticity (GARCH) models. He used monthly data over the period January 1970 to December 2007 and found that all the GARCH family models indicated that volatility is persistent and reported similar evidence for the fixed exchange rate and managed float rate regimes.

1.3 THEORETICAL FRAMEWORK AND MODEL SPECIFICATION

The volatility of exchange rate is said to have negative effect on the export of the developing economies. According to Mahmood and Ali (2011), volatility of exchange rate induces uncertainty and risk in investment decision with destabilizing impact on the macroeconomic performance .

Clark (1973) model is one of the theories that examine the relationship between the exchange rate volatility and trade flows. It assume a competitive firm with no market power producing only one commodity which is sold entirely to one foreign market and does not import any intermediate inputs. The firm is paid in foreign currency and converts the proceeds of its exports at the current exchange rate, which varies in an unpredictable fashion, as there are assumed to be no hedging possibilities, such as through forward sales of the foreign currency export sales. Moreover, because of costs in adjusting the scale of production, the firm makes its production decision in advance of the realization of the exchange rate and therefore cannot alter its output in response to favourable or unfavourable shifts in the profitability of its exports arising from movements in the exchange rate. In this situation, the variability in the firm's profits arises solely from the exchange rate, and where the managers of the firm are adversely affected by risk, greater volatility in the exchange rate – with no change in its average level leads to a reduction in output, and hence in exports, in order to reduce the exposure to risk. Grier and Smallwood (2007) conclude that exchange rate volatility has a significant negative relationship with the export for developing countries and asserted that there is no such effect for the advanced economies .Caglayan and Di(2008), attribute this to the lack of proper financial tools in developing countries that firms can use to hedge against exchange rate risk . Similarly, Koren and Szeidl (2003) suggest that exchange rate volatility should affect trade volumes through the covariances of the exchange rate with other macroeconomic variables. Nnanna(2002), links the effect of exchange rate instability on exports to adverse monetary policy outcome, inflation, interest rate and growth in money supply .

Against this background, the study will use the variable of oil(OIL) , non-oil exports(Non-oil) , inflation(INFL) , interest rate(INTR) , credit to private sector (CREP), broad money supply (M2), volatility of exchange rate(EXRV) measured by first order difference,(Mckenzie, 1999).

THE MODEL SPECIFICATION

$LOIL=\alpha_1+ \alpha_2 LINTR+ \alpha_3 LINFL+ \alpha_4 LM2+ \alpha_5 LCREP+ \alpha_6 EXRV+\mu_t$

$LNON\text{-}OIL=\alpha_7+ \alpha_8 LINTR+ \alpha_9 LINFL+ \alpha_{10} LM2+ \alpha_{11} LCREP+ \alpha_{12} EXRV+\mu_t$

Where L means natural logarithms of the variable

1.4 ESTIMATION TECHNIQUE AND RESULTS

The research examine the impact of exchange rate volatility on the performance of Nigeria export sectors by separating the sectors into oil and non-oil sector. We adopt the econometrics method of Seemingly unrelated regression(SUR). If equations in a system of equations are related by their error term, estimating them together using ordinary least square method is less efficient compared to generalised least square(GLS) , (Zellner,1962). In this case oil and non oil exports are susceptible to international trade shock , global recession , and the sectors are mostly dominated by the multinationals firms and depends greatly on foreign direct investment , also serves as an inputs in advanced economies. In this regards, SUR will be the most appropriate method in estimating the coefficient of the model , more so ,in testing the volatility of the exchange rate, the study will adopt GARCH (generalised autoregressive conditional heteroskedasticity) and examine the effect of floating exchange rate policy on the volatility of the nominal exchange rate

The result

	Oil Export		Non-oil export	
Variables	Coefficients	P-value	Coefficients	P-value
C	-4.546722	0.0006	-5.313641	0.0003
EXRV	-0.138306	0.5247	-0.301113	0.2363
LINFL	-0.089274	0.1275	-0.034098	0.6159
LINTR	1.362875	0.0001	0.961382	0.0226
M2	1.299677	0.0169	1.98E-08	0.6654
CREP	-0.261296	0.6109	0.891641	0.0000
AR(1)	0.635323	0.0004	0.483192	0.0042
AR(2)	-0.318514	0.0595	-0.203508	0.2048
Model Diagnostics				
R-squared	0.980532		0.971153	
Adjusted R-squared	0.974043		0.961537	
S.E. of regression	0.394393		0.437051	
Durbin-watson	2.085377		2.003995	

Volatility test using GARCH

GARCH Model

Mean Equation		
Variables	Coefficients	P-value
C	-3.479991	0.0000
EXRV(-1)	0.080853	0.7194
EXRV(-2)	0.027184	0.8271
Variance Equation		
C	0.078338	0.0000
RESID(-1)^2	-0.084956	0.0021
GARCH(-1)	0.762468	0.0000
POLICY	-0.075981	0.0000

Using the GARCH model, we discovered that there exist volatility in the exchange rate of the country. The ARCH and GARCH indicates a significant variance, which could be attributed to the structural adjustment policy of 1980's .The policy induced volatility in the mean equation, which implies that the country adoption of floating exchange rate regime contribute immensely to the uncertainty in the country exchange rate .

The SUR model reports the insignificant negative relationship between the volatility of exchange rate of oil and non-oil export. Exchange rate volatility had negative effect on the export performance of both oil and non- oil, though judging by its p-value , it tend to be statistically insignificant , we can attribute this to the inelastic nature of the country export and over reliance on the international market especially the highly industrialised economies which exposes the country to the international price shock and in addition, the dearth in manufacturing capacity of the country which reduced the domestic utilisation of these commodities also contribute to the negative relationship.

The macroeconomics variables of interest rate , inflation rate , significantly affect the oil export , while only interest rate has significantly affect on the performance of non-oil export , this is an indication that lending rate contributes to the performance of the two sectors .One percent increase in lending rate will leads to 136 and 96.13 percent increase in oil and non-oil respectively, Similarly, money supply has significant positive relationship with the oil export , while insignificant negative relationship in the case of the non- oil export. However, credit to the private sector has significant positive relationship with the non oil export but the results indicates insignificant relationship with the oil sector , this further lend credence to the assertion that , Nigeria oil sector is dominated by the foreigners with low local input and less reliant macroeconomics policy of the country. Almost all the oil producing firms export their product and exposes the country to external shocks.

1.5 CONCLUSION

The study established the negative relationship between the volatility of exchange rate and export performance of oil and non-oil sectors using the time series data of 1980 to 2011, though it is statistically not significant , and also we discovered the significant effect of the floating exchange rate regime in Nigeria, thus, the introduction of floating exchange rate induces instability in the country exchange rate , this is in agreement with the submission of the many scholars, who asserted that the shift from fixed exchange rate to floating exchange rate brought about uncertainty in the exchange rate. More so, the negative relationship between the exchange rate volatility and exports in Nigeria called for drive toward domestication of the country's resources , through inward looking policy that will encourage the local utilisation of the country abundant resources and also diversification of the country's exports base . The country should developed linkages between the primary commodities and industrialization in order to reduce over reliance on the international market and reduce the effect of uncertainty exchange rate on the country's import.

REFERENCES

Akhtar, M. and R.SpenceHilton (1984), "Effects of Exchange Rate Uncertainty on German and U.S. Trade", *Federal Reserve Bank ofNew York. Quarterly Review*.Vol 9, 7-16.

Akhtar, M. and R.SpenceHilton (1984), "Effects of Exchange Rate Uncertainty on German and U.S. Trade", *Federal Reserve Bank ofNew York. Quarterly Review*.Vol 9, 7-16.

Aliyu, S. U. R. (2009a). "Exchange Rate Volatility and Export Trade in Nigeria: An Empirical Investigation". MPRA paper No. 13490. Retrieved from http://mpra.ub.unimuenchen.de/13490/

Aliyu, S. U. R. (2009b). "Impact of Oil Price Shock and Exchange Rate Volatility on Economic Growth in Nigeria: An Empirical Investigation". MPRA Paper No. 16319. Retrieved from http://mpra.ub.uni-muenchen.de/16319/

Aliyu, S. U. R. (2010). "Exchange Rate Pass-Through in Nigeria: Evidence from a Vector Error Correction Model". Conference paper presented in University of Oxford. Retrieved from http://www.csae.ox.ac.uk/conferences/2010-EDiA/papers/012-Aliyu.pdf

Anthony M.(2008) Exchange Rate Volatility and Non-Traditional Exports Performance: Zambia, 1965-1999, African Economic Research Consortium , Nairobi , Kenya .

Aristotelous, K., (2001), "Exchange-rate volatility, exchange-rate regime, and trade volume: evidence from the UK-US export function (1989-1999)", *Economic Letters* 72, 87-89.

Arize, A.C., (1995), "The effects of exchange rate volatility on US exports: an empirical investigation" *Southern Economic Journal* 62, 34–43.

Arize, A.C., (1997), "Conditional exchange rate volatility and the volume of foreign trade: evidence from seven industrialized countries", *Southern Economic Journa,l*64, 235–254.

Arize, C.A. and Osang, T. and SlottjeJ.D. (2000), "Exchange rate volatility and foreign trade: evidence from Thirteen LDC.s", *Journalof Business and Economic Statistics*, Vol. 18 (1) 10-17.

Asseery, A., & Peel, D. A. (1991), The effects of exchange rate volatility on exports. *Economics Letters, 37, 173-177.*

Baak, Saangjoon, (2004), "Exchange Rate Volatility and Trade among the Asia Pacific", International University of Japan, http://repec.org/esFEAM04/up.29293.1080736850.pdf

Bailey, M.J., Tavlas, G.S., & Ulan, M. (1987), "The Impact of Exchange Rate volatility on Export Growth: Some Theoretical considerations and empirical results", Journal of Policy Modeling, 9 (1), pp.225-43

Bailey, Martin J. and GeorgeS.Tavlas (1988), "Trade and Investment Under Floating Rates: the U.S. Experience", *CatoJournal* (Fall): 421-49.

Bélanger, Denis, SylviaGutiérrez and JacquesRaynauld (1988), "Exchange Rate Variability and Trade Flows: Sectoral Estimates for the US-Canada Case." Cahiers de Recherche IEA-89-01. Institutd'économieappliquée, École des HautesÉtudesCommerciales.

Bini-Smaghi, Lorenzo, 1991, "Exchange Rate Variability and Trade: Why Is It So Difficult to Find any Empirical Relationship? *AppliedEconomics* 23, May, pp. 927-35.

Caballero, R.J., and IV.Corbo, (1989), The Effect of Real Exchange Rate Uncertainty on Exports: Empirical Evidence, *The World BankEconomic Review* 3, pp. 263-78.

CaglayanMustafa, Di, Jing (2008),Does Real Exchange Rate Volatility Affect Sectoral Trade Flows, Sheffield Economic Research Paper SeriesSERP Number: 2008011

Clark, PeterB. (1973), Uncertainty, Exchange Risk, and the Level of International Trade. Western Economic Journal 11, 302-13.

Clark, P., Tamirisa, N., Wei, S.J., (2004), Exchange rate volatility and trade flows-some new evidence, *IMF WorkingPaper*, May 2004, International Monetary Fund

Doganlar, M. (2002), "Estimating the impact of exchange rate volatility on export: evidence from Asian countries", *AppliedEconomics Letters, 9,* 859-863.

Gotur, P. (1985), "Effects of exchange rate volatility on trade", *IMF Staff Papers, 32, 475-512.*

Gotur, P. (1985), "Effects of exchange rate volatility on trade", *IMF Staff Papers, 32, 475-512.*

Grier, K.B. and Smallwood, A.D. (2007), Uncertainty and export performance: Evidence from 18 countries, Journal of Money, Credit and Banking 39(4), 965C 979.

Hook, L.S.,& Boon, T.H., (2000), "Real exchange rate volatility and Malaysian exports to its major trading partners", Working Paper 6, UniversitiPutra Malaysia

Hwang, Hae-du and Lee, Jin-woo, (2005), Exchange Rate Volatility and Trade Flows of the UK in 1990s, International Area Review, Vol 8 (1), Spring, 173-82.

Koray, F. and Lastrapes, W. (1989) Real Exchange Rate Volatility and US Bilateral Trade: a VAR Approach, The Review of Economics and Statistics 71, pp. 708-712.

Koren, Miklos, and Adam Szeidl, (2003), Exchange Rate Uncertainty and Export Prices, mimeo, Harvard University.

Kumar R. and R. Dhawan.(1991) "Exchange Rate Volatility and Pakistani's Exports to the Developed World, *1974-85." World Development 19: 1225-40.*

LeeK.S., Saucier P., (2005), Exchange Rate Instability and Trade Integration -The Case of Asia, 5th International Conference International Trade And Logistics Corporate Strategies and The Global Economy, LE HAVRE – 28-29 September.

Mahmood, I. & Ali, S.Z. (2011).Impact of Exchange Rate Volatility on Macroeconomic Performance of Pakistan, *International Research Journal of Finance and Economics*, issue 64.Pp. 1450-2887.

McKenzie M. D (1999), The Impact of Exchange Rate Volatility on International Trade flows. Journal of economic Surveys 13(1): 71-106.

McKenzie, Michael D. and Brooks, R. (1997), "The Impact of Exchange Rate Volatility on German - US Trade Flows," *Journal ofInternational Financial Markets, Institutions and Money*, 7, pp. 73-87.

McKenzie, MichaelD., (1998), "The Impact of Exchange Rate Volatility on Australian Trade Flows," *Journal of InternationalFinancial Markets,Institutions and Money*, 8, pp.21-38.

Medhora, R. (1990), "The Effects of Exchange Rate Variability on Trade: The Case of the West African Monetary Union's Imports" World Development, 18(2), 313-324.

Nnanna, O.J. (2002) Monetary Policy and Exchange Rate Stability in Nigeria, Central Bank Of Nigeria's Economic and Financial Review, Vol. 40, Number 3. pp. 1 – 22

Olowe, R.A. (2009). Modelling Naira/Dollar Exchange Rate Volatility: Application of GARCH and Asymmetric Models.International Review of Business Research Papers, Vol. 5, No. 3. Pg.377-398

Peree, E., &Steinherr, A. (1989), "Exchange rate uncertainty and foreign trade", *European Economic Review, 33,1241-1264.* 101

Pozo, S. (1992), "Conditional Exchange Rate Volatility and the Volume of International Trade: Evidence from the Early 1990s", *Review of Economics and Statistics*. Vol 74, 325-329.

Pritchett, L. (1991) Measuring real exchange rate instability in developing countries. The World Bank Working Paper, WPS 791.

Rose, A. (2000), "One Money, One Market: Estimating the Effect of Common Currency on Trade", Economic Policy, 30. 7-45.

Savvides, Andreas (1992), "Unanticipated Exchange Rate Variability and the Growth of International Trade", *WeltwirtschaftlichesArchiv*, Vol. 128, 446-463.

Sercu, P., Vanhulle, C., (1992), "Exchange rate volatility, international trade, and the value of exporting firm", Journal of Banking and Finance, 16 (1), 152–182.

Siregar, R. and R. S. Rajan (2002), Impact of Exchange Rate Volatility on Indonesia_s Trade Performance in the 1990s. Centre for International Economic Studies Discussion Paper 0205.

Tenreyro, S., (2004), On the trade impact of nominal exchange rate volatility. Federal Reserve Bank of Boston, unpublished.

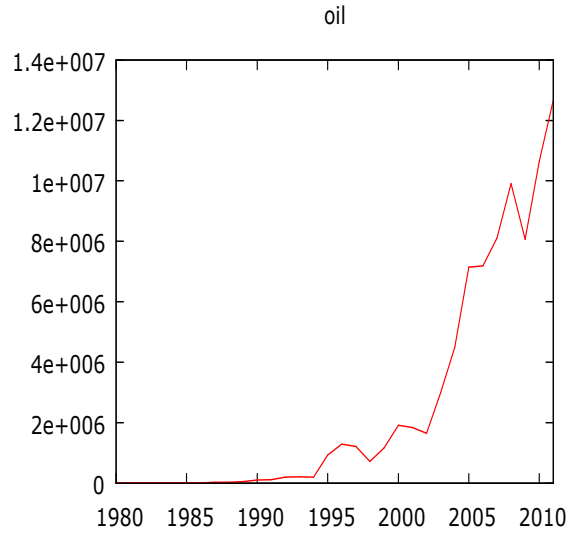
Tenreyro, S., (2004), On the trade impact of nominal exchange rate volatility. Federal Reserve Bank of Boston, unpublished.

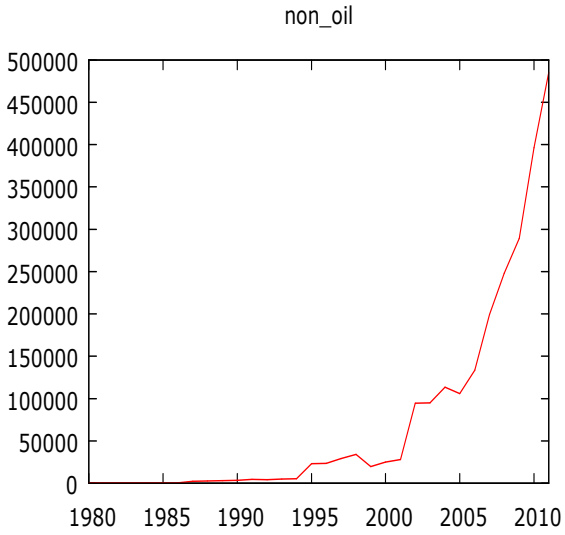
Thursby, M.C., &Thursby, J.G. (1987), "Bilateral trade flows, lender hypothesis, and exchange risk", *Review of Economics andStatistics, 69, 488-495*.

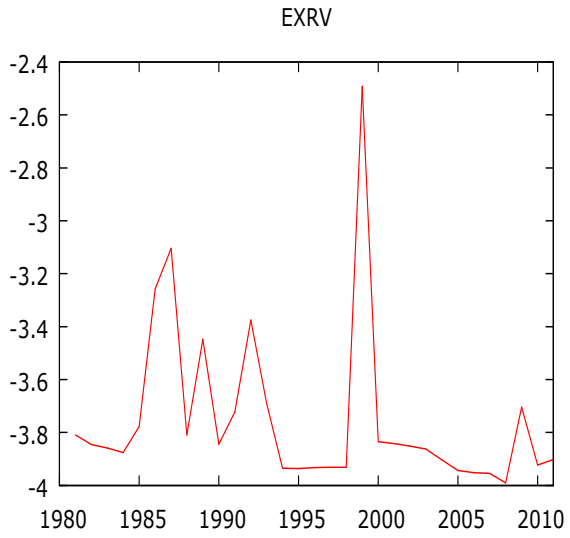
Vergil, H., (2002), "Exchange Rate Volatility in Turkey and Its Effect on Trade Flows", Journal ofEconomic and Social Research, 4 (1), 83-99.

Viaene, J.M., and C.G. de Vries, (1992), "International Trade and Exchange Rate Volatility, *European Economic Review* 36, pp. 1311- 21. Journal published by the EAADS: http://www.usc.es/econmet/ijaeqs.htm

Zellner, A. (1962). An efficient method of estimating seemingly unrelated regressions and tests for aggregation bias.*Journal of the American Statistical Association*, *57*, 348-368.


oil
1.4e+007
1.2e+007
1e+007
8e+006
6e+006
4e+006
2e+006
0
1980
1985
1990
1995
2000
2005
2010


non_oil
500000
450000
400000
350000
300000
250000
200000
150000
100000
50000
0
1980
1985
1990
1995
2000
2005
2010


EXRV
-2.4
-2.6
-2.8
-3
-3.2
-3.4
-3.6
-3.8
-4
1980
1985
1990
1995
2000
2005
2010

System: FEMI
Estimation Method: Iterative Seemingly Unrelated Regression
Date: 12/04/13 Time: 14:51
Sample: 1983 2011
Included observations: 31
Total system (balanced) observations 58
Simultaneous weighting matrix & coefficient iteration
Convergence achieved after: 12 weight matrices, 13 total coef iterations

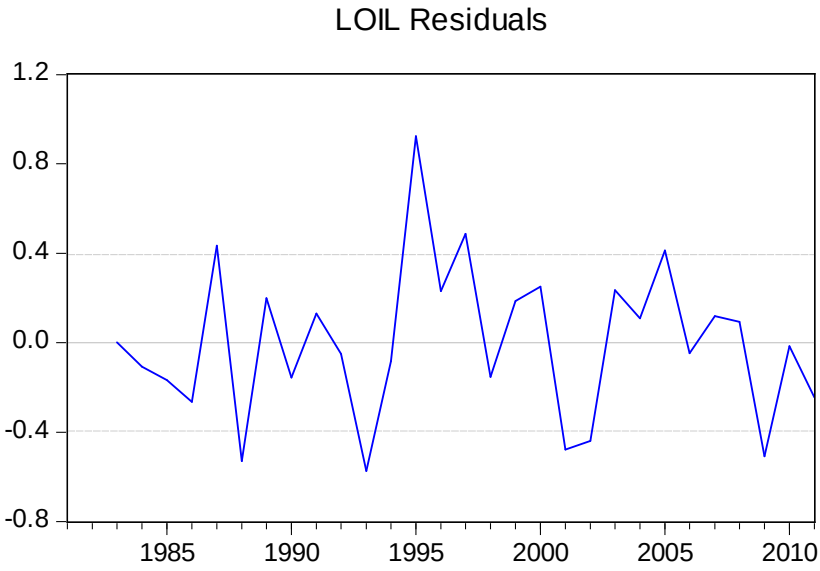
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-4.546722	1.218643	-3.730970	0.0006
C(2)	-0.138306	0.215598	-0.641501	0.5247
C(3)	-0.089274	0.057426	-1.554594	0.1275
C(4)	1.362875	0.318892	4.273777	0.0001
C(5)	1.299677	0.522578	2.487050	0.0169
C(6)	-0.261296	0.509688	-0.512658	0.6109
C(14)	0.635323	0.166656	3.812176	0.0004
C(15)	-0.318514	0.164438	-1.936982	0.0595
C(7)	-5.313641	1.335568	-3.978561	0.0003
C(8)	-0.301113	0.250616	-1.201489	0.2363
C(9)	-0.034098	0.067456	-0.505485	0.6159
C(10)	0.961382	0.405988	2.368005	0.0226
C(11)	1.98E-08	4.54E-08	0.435478	0.6654
C(12)	0.891641	0.086794	10.27306	0.0000
C(17)	0.483192	0.159629	3.026973	0.0042
C(16)	-0.203508	0.158004	-1.287989	0.2048
Determinant residual covariance		0.011424		

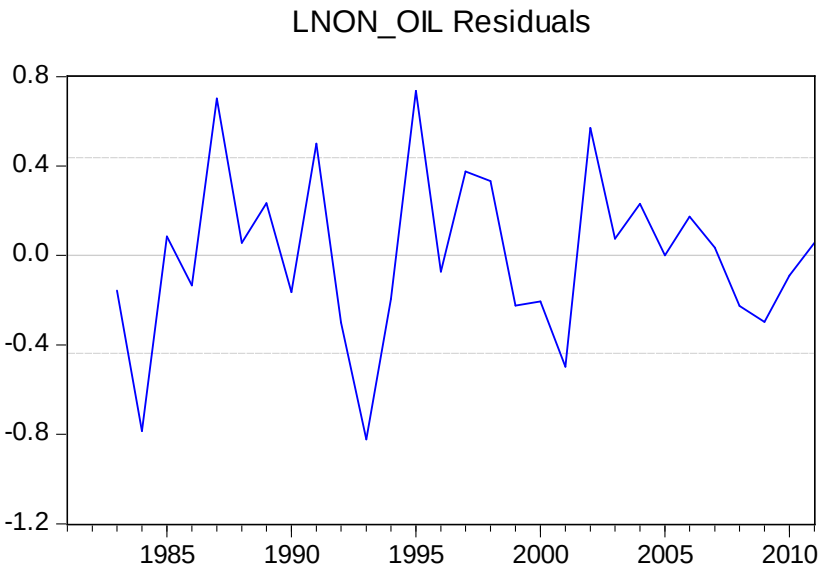
Equation:
LOIL=C(1)+C(2)*EXRV+C(3)*LINFL+C(4)*LINTR+C(5)*LM2+C(6)
*LCREP+[AR(1)=C(14),AR(2)=C(15)]
Observations: 29

R-squared	0.980532	Mean dependent var	13.18700
Adjusted R-squared	0.974043	S.D. dependent var	2.447940
S.E. of regression	0.394393	Sum squared resid	3.266461
Durbin-Watson stat	2.085377		

Equation: LNON_OIL=C(7)+C(8)*EXRV+C(9)*LINFL+C(10)*LINTR+C(11)
*M2+C(12)*LCREP+[AR(1)=C(17),AR(2)=C(16)]
Observations: 29

R-squared	0.971153	Mean dependent var	9.706447
Adjusted R-squared	0.961537	S.D. dependent var	2.228494
S.E. of regression	0.437051	Sum squared resid	4.011289
Durbin-Watson stat	2.003995		


LOIL Residuals
1.2
0.8
0.4
0.0
-0.4
-0.8
1985
1990
1995
2000
2005
2010


LNON_OIL Residuals
0.8
0.4
0.0
-0.4
-0.8
-1.2
1985
1990
1995
2000
2005
2010

	LOIL	LNON_OIL
LOIL	1.000000	0.516508
LNON_OIL	0.516508	1.000000

Dependent Variable: EXRV
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 12/13/13 Time: 08:07
Sample (adjusted): 1983 2011
Included observations: 29 after adjustments
Convergence achieved after 21 iterations
Presample variance: backcast (parameter = 0.7)
GARCH = C(4) + C(5)*RESID(-1)^2 + C(6)*GARCH(-1) + C(7)*POLICY

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-3.479991	0.562443	-6.187280	0.0000
EXRV(-1)	0.080853	0.225054	0.359260	0.7194
EXRV(-2)	0.027184	0.124464	0.218405	0.8271
Variance Equation				
C	0.078338	0.000816	96.05002	0.0000
RESID(-1)^2	-0.084956	0.027642	-3.073418	0.0021
GARCH(-1)	0.762468	0.064704	11.78401	0.0000
POLICY	-0.075981	0.002356	-32.24411	0.0000

R-squared	-0.183295	Mean dependent var	-3.744280
Adjusted R-squared	-0.274318	S.D. dependent var	0.326429
S.E. of regression	0.368492	Akaike info criterion	0.196422
Sum squared resid	3.530444	Schwarz criterion	0.526459
Log likelihood	4.151885	Hannan-Quinn criter.	0.299785
Durbin-Watson stat	1.651605		

The IISTE is a pioneer in the Open-Access hosting service and academic event management. The aim of the firm is Accelerating Global Knowledge Sharing.

More information about the firm can be found on the homepage:
http://www.iiste.org

CALL FOR JOURNAL PAPERS

There are more than 30 peer-reviewed academic journals hosted under the hosting platform.

Prospective authors of journals can find the submission instruction on the following page: http://www.iiste.org/journals/ All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Paper version of the journals is also available upon request of readers and authors.

MORE RESOURCES

Book publication information: http://www.iiste.org/book/

Recent conferences: http://www.iiste.org/conference/

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digtial Library , NewJour, Google Scholar