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Do Trade Balances Adjust to Exchange Rate Shocks? An Enquiry Evidence of J-Curve in Nigeria

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Abstract: This study investigates the response of trade balance to exchange rate changes in Nigeria. The long-run relationship between these variables is explored using Engel-Granger Two-Stage, Johansen and the Autoregressive Distributed Lag cointegration approaches on a data sample between 1980:Q1 and 2007:Q4. The analyses show that there is only limited adjustment in the trade balance to exchange rate shocks in both the short- and long-run. Apparently, trade balance adjustment to exchange rate depreciation in Nigeria is prolonged. Although rightly signed (negative), it appears that that the elasticities of demand for export and import have not sufficiently adjusted to lead to improvement of trade balance thereby failing to depict a J-curve.

Key words: Trade balance, exchange rate, autoregressive distributed lag, import, export, Nigeria

INTRODUCTION

The response of trade balance to changes in exchange rate changes has been a long mooted issue in the international economics literature. Earlier studies analysed the relationship between exchange rate and trade balance using the Marshall-Lerner condition, hereafter known as ML condition. The ML condition holds that devaluation of a country's real exchange rate should improve her trade balance, if the sum of the country's price elasticity of demand for exports and imports are greater than one in absolute value (Devaluation of the exchange rate causes the price of exports to become cheaper, the demand for exports will therefore increase. The price of imports, meanwhile, will rise and the demand for imports will decrease. The net effect on the trade balance will depend on price elasticities. If exports are elastic to price, their demand will increase proportionately more than the decrease in price and the total export revenue will increase. If imported goods are elastic, the total import expenditure will decrease. The trade balance will improve in both cases). This effort led to the idea of the development of the elasticity approach to trade balance (Robinson, 1947; Meltzer, 1948).

Contrary to the belief that trade balance will improve with devaluation, the United States (US) trade balance deteriorated in defiance to the corrective measure of devaluation of the US dollar over a short period before the desired impact is felt. This describes the phenomenon known as J-curve in the literature. Junz and Rhomberg (1973) showed that following devaluation, the existence of lags in the trade balance adjustment process would initially lead trade balance to respond slowly and negatively and after a while the elasticities of demand for export and import must have sufficiently adjusted to lead to improvement of trade balance thereby portraying a J-curve (Magee (1973) also described this as a J-curve phenomenon. This depicts a situation where currency devaluation (depreciation) worsens the trade balance first and improves it later resulting in a pattern that resembles the letter J). More succinctly, exchange rate depreciation initially means cheaper exports and imports that are more expensive. This makes the current account worse (a bigger deficit or smaller surplus). After a while, the volume of exports will start to rise because of their lower price to foreign buyers and domestic consumers will buy fewer of the more costly imports leading to improvement in trade balance, eventually. J-curve has been described as a phenomenon explaining the failure of devaluation to improve trade balance in the short-run even when the necessary and sufficient conditions required are satisfied (This refers to the Marshall-Lerner (ML) condition which says that the success of devaluation depends on whether the sum of import and export demand elasticities exceeds unity).

The evidence of devaluation in Nigeria can be traced back to the introduction of Structural Adjustment Programme (SAP) in September, 1986 which evolved from the failure of exchange control measures to address the

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Balance Of Payments (BOP) problem. During the regime of controls, the country's external sector was plunged into crisis. The fall in the price of crude oil in the 1980s brought about the depletion of the external reserve; an indication of a worsening balance of payments brought about by current account deficit which in turn is produced by trade deficit. This problem was confronted by the deregulation policies inherent in the SAP, a core of which is the deregulation of the foreign exchange markets. One of the goals of deregulation is the attainment of internal and external balance. Internal balance is achieved through budget discipline or through measures to reduce government spending/investment on economic sectors with a view to a successful take over by the private sector. On the other hand, external sector balance is attained through price and exchange rate adjustment. The fact, however, is that the Nigerian BOP had seen more deficits after the introduction of SAP than during the era of controls (Aliyu, 2007).

The continued depreciation of the naira against the dollar thus calls for concern in terms of the overall benefit to the country. There are claims that this was a deliberate attempt by the monetary authorities to arrest the decline in government's revenue because of falling oil prices (a consequence of the global financial crisis). The only difference between what is happening now and during the period of controls is the exchange rate regime. Prior to current period, we had a fixed exchange rate regime and this resulted into decline in government revenue. However presently, we have a flexible exchange rate regime that the CBN believes will not trigger further problems such as increased inflation. The extent to which this depreciation of the naira would affect the economy through its impact on the trade balance remains cloudy.

Several studies have investigated the relationship between changes in exchange rate and trade balance with a view to unraveling the relationship. These have been broadly classified into two:

- Earlier studies that made use of aggregate trade date
- The relatively recent ones that utilized bilateral trade data of trading partners, justified on the fact that a currency can simultaneously depreciate and appreciate relative to others

This study follows the first category. The problem of simultaneous currency depreciation and appreciation is assumed moderate as Nigeria major currency of exchange is the US dollar.

Devaluation engenders a long-run improvement in the trade balance provided the ML conditions are met. Given that the short-run elasticities are usually smaller than the long-run elasticities, the trade balance may not improve in the short-run. As Magee (1973) pointed out, the J-curve phenomenon is theoretically ambiguous and empirical evidence has been rather mixed or inconclusive. Various reasons ranging from the use of different techniques to different model specification have been ascribed to this elusive result. Most studies on J-curve have focused mainly on developed economies as compiled by Bahmani-Oskooee and Ratha (2004). A study by Nasir *et al.* (2009) highlighted three facts from the literature: First, existing literature provides mostly inconclusive evidence on the issue of response of trade balance to exchange rate shock. Second, the studies investigating developing country samples are limited both in number and in the coverage of developing countries. Third, studies (Bahmani-Oskooee and Brooks, 1999; Bahmani-Oskooee and Ratha, 2004; Bahmani-Oskooee and Kantiapong, 2001) utilizing a recent development, Autoregressive Distributed Lag approach in the cointegration literature appears to identify some type of adjustment in the trade balance following currency depreciation. The present effort therefore hopes to increase the spread of the coverage of the investigation by investigating the existence of the phenomenon in Nigeria with the use of different approaches to unravel long-run relationships among variables.

This study adopts the model of Rose and Yellen (1989) that has been used by many other empirical studies in the literature (Wilson, 2001; Baharumshah, 2001; Onofowora, 2003). The model suggests that bilateral trade balance is influenced by real exchange rate, domestic income and foreign income. The long-run relationship of variables in the model is examined using different approaches to cointegration. The dynamics of trade balance to a shock in real exchange rate are examined using the error correction mechanism. The outcome of this investigation will assist the government to conduct an effective policy in transacting with the rest of the world.

The study seeks to examine the long-run and short-run impact of real exchange rate depreciation on trade balance in Nigeria between 1980:Q1-2006:Q4.

MATERIALS AND METHODS

Analytical framework: Rose and Yellen (1989) framework began with a specification of the import demand equations. As in Marshallian demand analysis, the volume of imported goods demanded by the home (foreign) country is determined by real domestic (foreign) income and the relative price of imported goods. Clearly, real income has a positive impact on the volume of import demand and the relative price of imported goods has a negative relationship. Demand for imports is given by:

$$D_m = D_m\left(YN, p_m\right); D_m^* = D_m^*\left(YW, p_m^*\right) \quad (1)$$

Where:

- $Dm(D_m^*)$ = The quantity of goods imported by the home (foreign) country
- $YN(YW)$ = The level of real income measured in domestic (foreign) output
- p_m = The relative price of imported goods to domestically produced goods, both measured in home currency and
- p_m^* = The analogous relative price of imports abroad

Likewise, they specify the equations for the supply of exportables. In a simple purely competitive market, the relative price of exportables determines their supply:

$$S_x = S_x(p_x); S_x = S_x^*(p_x^*) \quad (2)$$

Where:

- $S_x = (S_x^*)$ = The supply of home (foreign) exportables
- p_x = The home country relative price of exportables (defined as the ratio of the domestic currency price of exportables to the domestic price level, p)
- p_x^* = The foreign currency price of exportables, divided by the foreign price level

Therefore, the domestic relative price of imports can be written as:

$$p_m = EP_x^*/P = REERP_x^* \quad (3)$$

where, E is the nominal exchange rate, defined as the number of domestic currency units per unit of foreign currency and REER is the real effective exchange rate. Similarly the relative price of imports abroad is:

$$p_m^* = p_x/REER \quad (4)$$

In equilibrium, quantities of trade and the relative price of exported goods in each country are determined by the two equilibrium conditions:

$$D_m = S_x^*; D_m^* = S_x \quad (5)$$

The value of the home country's balance of trade in real terms is the difference between the value of exports and the value of imports in domestic currency:

$$B = P_x D_m^* \text{-PEER}.p_x^* D_m \quad (6)$$

Equations 1 through 6 yield the following reduced form:

$$B = B\,(REER, YN, YW) \quad (7)$$

Rose and Yellen (1989) and Aziz (2008) estimated a log-linear variant of Eq. 7:

$$TB_t = a + b \ln YN_t + c \ln YW_t + d \ln REER_t + \varepsilon_t \quad (8)$$

Where TB_t is the Nigeria trade balance with the rest of the world and it is usually measured as the difference between the value of total exports and total imports. In this study, researchers measure trade balance as the ratio of the exports value to the imports value. The X/M ratio or its inverse has been used in many empirical investigations of the trade balance-exchange rate relationship (Onofowora 2003; Bahmani-Oskooee and Brooks 1999). Such a measure is not only unit free but also reflects movements of the trade balance both in real and nominal terms. YN_t is the index of Nigeria real GDP, YW_t is the rest of the world's GDP and $REER_t$ is the real effective exchange rate between Nigeria naira and the rest of the world defined such that an increase reflects a real depreciation of the naira against the major trading currency.

It is expected that the volume of imports (exports) in a home country (foreign country) will increase with an increase in real income and purchasing power in the home country (trading partners) and vice versa. Hence, researchers expect $b<0$ and $c>0$. If the increase in real income is as a result of an increase in production of import substitutes, imports may fall as income rises. This implies in this case that $b>0$ and $c<0$. The impact of exchange rate changes on trade balance is ambiguous, that is, d could be positive or negative. If there is a real depreciation or devaluation of the domestic currency, that is REER decreases, then this makes imports more expensive without a corresponding rise in export prices; the increased competitiveness in prices for the domestic country should result in it exporting more and importing less (the volume effect). However, the lower REER also increases the value of each unit of import (the import value effect) which would tend to diminish the trade balance. Krugman and Obstfeld (2001) argued that in the short-run import value effects prevail whereas the volume effects dominate in the longer run. For real exchange rate depreciation to improve trade balance therefore volume effect should overwhelm the price effect. Hence, $d>0$ satisfies the Marshall-Lerner condition (Marshall-Lerner condition says that devaluation will improve the trade balance only if the sum of the foreign elasticity of demand for exports and the home country elasticity of demand of imports is greater than unity. If the sum of these two elasticities is less than unity then devaluation will lead to a deterioration of the trade balance).

The study employed quarterly data on Nigeria from 1980:Q1-2007:Q4. The time series characteristics of the data is first investigated to test whether the variables are stationary or not. By definition, a time series is said to be stationary if its means, variances and covariances are all invariant with respect to time (This implies that a stationary series tends to return to its mean value and fluctuate around it within a more or less constant range while a non-stationary series has a different mean at different points in time and its variance increases with the sample size). The Augmented Dickey-Fuller (ADF) as specified in Dickey and Fuller (1979) is employed. The null hypothesis under ADF is that the variable being considered has a unit root against an alternative that it does not (The presence of unit root in a variable implies that the variable is non-stationary, i.e., it is integrated of order one I(1) and it has to be differenced to be made stationary, i.e., integrated of order zero I(0)). The long-run relationship among the variables was explored using three approaches for robustness of the result: Engel-Granger Two-Stage, Johansen and the Autoregressive Distributed Lag (ARDL) cointegration procedure.

RESULTS AND DISCUSSION

Engel-Granger Two-Stage procedure: The variables for the analysis are subjected to unit roots test to determine whether they are stationary series or non-stationary series. The tests employed are the Augmented Dickey Fuller test (ADF) and Phillips-Perron (PP).

The tests suggest that only trade balance is stationary at level while the other variables are difference stationary at 1% level of significance. Following the findings that the data series are by nature, mostly non-stationary stochastic processes, econometric developments regarding the concepts of cointegration are particularly apposite in testing for equilibrium. Accordingly, the long-run properties of the variables in the behavioural equations were examined using the Engle-Granger Two-Step procedure. The unit root test of the residuals of the static long-run models show that the residual is significant at 1% level. The regression residuals have zero mean and as they are not expected to have deterministic trend, the unit roots exercise were conducted by excluding both the models that include constant and constant with time trend. The ADF test statistics in Table 1 suggest that the disequilibrium error is I(0) and as such the variables in the static equations are cointegrated. The graphical representation of this residual of the long-run estimation is shown Fig. A1 in the Appendix. The results of the long-run estimation show that there is a limited impact of exchange rate shocks on trade balance. A 100% depreciation of exchange rate leads to 0.066% decrease in trade balance while domestic income however improves trade balance. Precisely, a 100% increase in domestic income increases trade balance by 0.8% (Table 2).

Johansen cointegration procedure: In view of the problems with the Engle-Granger framework for testing cointegration, the results were validated using the Johansen (1991, 1995) approach. This framework provides the number of cointegrating equations and estimates of all

Table 1: Tests for order of intergration

	Augmented Dickey Fuller		Philip-Perron			
Variables	Level	Difference	Level	Difference	Decision	Sig. level (%)
lnREER	-1.671320	-5.85023	-1.679160	-5.92098	I(1)	1
lnTB	-2.755500	-	-2.609550	-	I(0)	10
lnYN	1.617986	-8.08688	3.775874	-4.20961	I(1)	1
lnYW	-0.599560	-9.89369	-0.791210	-13.52300	I(1)	1

Table 2: Long-run estimation, dependent variable; log of trade balance

Variables	Coefficient	SE	t-statistic	Prob.
C	0.296698	0.333082	0.890765	0.3750
lnYN	0.008125	0.002270	3.579304	0.0005
lnYW	-0.004360	0.004860	-0.897740	0.3713
lnREER	-0.000660	0.000241	-2.727570	0.0074
R^2	0.430600		Mean dependent var.	0.470458
Adjusted R^2	0.414783		SD dependent var.	0.366857
SE of regression	0.280643		Akaike info. criterion	0.331597
Sum squared resid	8.506158		Schwarz criterion	0.428686
Log likelihood	-14.569400		F-statistic	27.224460
Durbin-Watson stat.	0.288095		Prob. (F-statistic)	0.000000

Authors' computation

Table 3: Johansen cointegration test

Hypothesized		Trace test			Maximum Eigenvalue test		
No. of CE(s)	Eigenvalue	Statistic	CV (5%)	CV (1 %)	Statistic	CV (5%)	CV (1%)
None**	0.240007	35.909830	24.31	29.75	29.365750	17.89	22.99
At most 1	0.059306	6.544074	12.53	16.31	6.541692	11.44	15.69
At most 2	2.23E-05	0.002382	3.84	6.51	0.002382	3.84	6.51

*(**) denotes rejection of the hypothesis at the 5% (1%) level; trace test indicates 1 cointegrating equation(s) at both 5 and 1% levels; Max-Eigenvalue test indicates 1 cointegrating equation(s) at both 5 and 1% levels

cointegrating vectors in the multivariate case. The Johansen cointegration test results are contained in Table 3.

The trace test and the max-eigen test were conducted to establish the number of cointegrating relations in each of the equations. The null hypothesis of no cointegrating relationship is rejected if the calculated value of the statistic exceeds the critical value. Test results indicate the existence of one cointegrating equation in the equations at the 1 and 5% significance level. For example, the calculated trace test statistic of 35.90 exceeds the 1% critical value of 29.75 for no cointegrating relationship. Therefore, the null hypothesis is rejected implying that the trace test indicates one cointegrating equation for the model.

Autoregressive Distributed Lag cointegration procedure: Multivariate cointegration techniques such as the Johansen and Juselius (1990) has been fraught with certain flaws which prompted the use of the Autoregressive Distributed Lag (ARDL) cointegration procedure developed by Pesaran *et al.* (2001). The procedure, referred to as the bound testing procedure, has the merit of estimating cointegration relationship by OLS once the lag order of the model is identified. In addition, the procedure does not require the pre-testing of the variables included in the model for unit roots unlike other techniques. Also, it is applicable irrespective of whether the regressors in the model are purely I(0), purely I(1) or mutually cointegrated. The ARDL representation of Eq. 8 is formulated as follows:

$$\begin{aligned}\Delta \ln TB_t &= b_0 + b_1 \ln TB_{t-1} + b_2 \ln YN_{t-1} + b_3 \ln YW_{t-1} + \\ &\quad b_4 \ln REER_{t-1} + \sum_{i=1}^{m} b_5 \Delta \ln TB_{t-i} + \sum_{i=0}^{m} b_6 \Delta \ln YN_{t-1} + \\ &\quad \sum_{i=0}^{m} b_7 \Delta \ln YW_{t-1} + \sum_{i=0}^{m} b_8 \Delta \ln REER_{t-1} + \varepsilon_t \end{aligned} \quad (9)$$

where, m stands for the lag length. Pesaran *et al.* (2001) cointegration procedure is briefly outlined as follows. The bounds testing procedure is based on the F or

Table 4: Wald test

Test statistic	Values	df	Probability
F-statistic	5.610652	(4, 91)	0.0004
Chi-square	22.44261	4	0.0002

Critical value bounds of the Wald statistic with unrestricted intercept and no trend at 97.5%, I(0) 3.25 and I(1) 4.89; hence, null rejected

Wald-statistics and is the first stage of the ARDL cointegration method. The null of no cointegration hypothesis, (H_0: $b_1 = b_2 = b_3 = b_4 = 0$) is tested against the alternative hypothesis, H_1 : $b_1 \neq b_2 \neq b_3 \neq b_4 \neq 0$). The F test used for this procedure has a non-standard distribution. Thus, Pesaran *et al.* (2001) compute two sets of critical values for a given significance level. One set assumes that all variables are I(0) and the other set assumes they are all I(1). If the computed F-statistic exceeds the upper critical bounds value, then the H_0 is rejected. If the F-statistic is below the lower critical bounds value, it implies no cointegration. Lastly, if the F-statistic falls into the bounds then the test becomes inconclusive. In such an inconclusive case, one may use Kramers *et al.* (1992) which suggests that the error correction term can be used to establish cointegration. The result of the Wald test is shown in Table 4.

Bahmani-Oskooee and Brooks (1999) however argued that the existence of a cointegration derived from Eq. 9 does not necessarily imply that the estimated coefficients are stable. These tests also incorporate the short-run dynamics to the long-run through residuals. The CUSUM and CUSUMSQ statistics are updated recursively and plotted against the break points of the model. The two tests incorporate the short-run dynamics to the long-run through residuals. The statistics of the two tests are updated recursively and plotted against the break points of the model providing that the plot of these statistics fall inside the critical bounds of 5% significance, one assumes that the coefficients of a given regression are stable. These tests are usually implemented by means of graphical representation.

Once the long-run is established, we proceed in the spirit of Engle and Granger (1987) by specifying the error correction term to obtain the short run dynamics. A general Error Correction Model (ECM) of Eq. 2 is formulated as follows:

Table 5: Parsimonious short-run dynamics of trade balance [D (lnTB)]

Variables	Coefficient	SE	t-Statistic	Prob.
C	-0.011510	0.015837	-0.726910	0.4690
D(TB(-1))	0.352617	0.092681	3.804620	0.0002
D(TB(-2))	0.165557	0.096732	1.711499	0.0901
D(YN(-1))	0.017152	0.011655	1.471643	0.1443
D(REER(-3))	0.000406	0.000413	0.984627	0.3272
D(REER(-4))	-0.000720	0.000411	-1.747700	0.0836
ECM(-1)	-0.238180	0.053853	-4.422850	0.0000
R^2	0.237765	Mean dependent var.		0.009191
Adjusted R^2	0.192031	SD dependent var.		0.139936
SE of regression	0.125785	Akaike info. criterion		-1.245310
Sum squared resid	1.582183	Schwarz criterion		-1.070450
Log likelihood	73.623840	F-statistic		5.198864
Durbin-Watson stat.	1.942937	Prob. (F-statistic)		0.000108

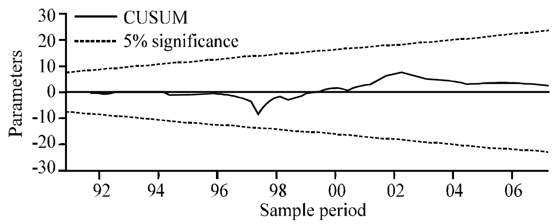

Fig. 1: CUSUM plot

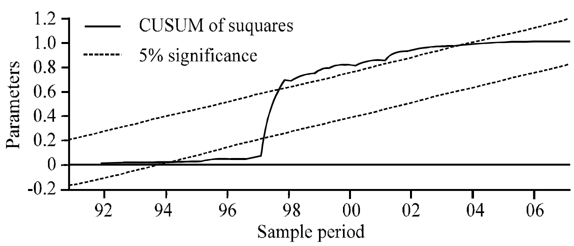

Fig. 2: CUSUMQ plot

$$\Delta \ln TB_t = b_0 + \sum_{i=1}^{m} b_1 \Delta \ln TB_{t-i} + \sum_{i=0}^{m} b_2 \Delta \ln YN_{t-i} + \sum_{i=0}^{m} b_3 \Delta \ln YW_{t-i} + \sum_{i=0}^{m} b_4 \Delta \ln REER_{t-i} + \tau ECM_{t-1} + \varepsilon_t \quad (10)$$

where, τ is the speed of adjustment parameter and ECM is the error correction term usually the residual obtained from the estimated cointegration model of Eq. 8.

The impact of real effective exchange rate depreciation, domestic and foreign incomes on trade balance is examined by estimating an error correction model. The result in Table 5 reveals that exchange rate depreciation has a negative effect on trade balance, implying that depreciation worsens trade balance. In the short-run, 100% depreciation of the exchange rate leads to 0.072% decrease in trade balance. The apparently low estimate implies that there is a limited impact of devaluation on trade balance. The result also reveals that past values of trade balance have positive and significant impact on the current value of trade balance. A 100% increase in the immediate past value of trade balance in 35% increase in trade balance. This suggests that model of trade balance is autoregressive.

Reliability and stability test of the estimates: In addition, Table 2 presents diagnostic tests of the model and suggests an absence of major diagnostic problems such as serial correlation, non-normality and specification errors. These results indicate that our estimated import price model is well specified. Thereafter, it is necessary to check for the stability of the import price function. This is because of the importance of the stability of the import price function for an effective trade policy. This, therefore, makes it necessary to test whether the estimated import price equation has shifted over time as an important part of this empirical study. As can be observed from Fig. 1, the CUSUM test of parameter stability indicate that the parameters are stable during the sample period, however the CUSUM square test in Fig. 2 seems unstable for the same period.

CONCLUSION

This study examines the long-run and short-run impact of real exchange rate depreciation on trade balance in Nigeria between 1980:Q1-2007:Q4 using three different approaches to test for cointegration. The results show the existence of cointegration among trade balance, however there is only limited adjustment in the trade balance to exchange rate shocks in both the short- and long-run. Apparently, trade balance adjustment to exchange rate depreciation in Nigeria is prolonged. Although rightly signed (negative), it appears that the elasticities of demand for export and import have not sufficiently adjusted to lead to improvement of trade balance thereby failing to depict a J-curve.

APPENDIX

Table A1: Trade balance

Variables	Coefficient	SE	t-statistic	Prob.
C	0.583325	0.234233	2.490366	0.0146
TB(-1)	-0.274930	0.064003	-4.295510	0.0000
YN(-1)	0.003836	0.001479	2.593364	0.0111
YW(-1)	-0.008050	0.003371	-2.387240	0.0190
REER(-1)	-0.000430	0.000157	-2.734870	0.0075
D(TB(-1))	0.320215	0.098191	3.261147	0.0016
D(YN(-1))	0.018537	0.018986	0.976354	0.3315
D(YW(-1))	0.003085	0.003961	0.778875	0.4381
D(REER(-1))	-0.000270	0.000455	-0.595980	0.5527
D(TB(-2))	0.114548	0.101500	1.128550	0.2621
D(YN(-2))	0.000273	0.020749	0.013172	0.9895
D(YW(-2))	0.002099	0.003638	0.576756	0.5655
D(REER(-2))	0.000346	0.000504	0.686248	0.4943
D(TB(-3))	0.079684	0.096827	0.822946	0.4127
D(YN(-3))	0.014889	0.017865	0.833391	0.4068
D(YW(-3))	0.001359	0.003215	0.422759	0.6735
D(REER(-3))	0.000482	0.000480	1.003277	0.3184
R^2	0.297495	Mean dependent var.		0.007812
Adjusted R^2	0.173977	SD dependent var.		0.140016
SE of regression	0.127255	Akaike info. criterion		-1.141700
Sum squared resid	1.473640	Schwarz criterion		-0.719520
Log likelihood	78.652000	F-statistic		2.408526
Durbin-Watson stat.	1.978267	Prob. (F-statistic)		0.004659

RESET: 0.0851[0.771], Breusch-Godfrey Serial Correlation LM Test: 1.873[0.159]; ARCH test: 0.477[0.621]; Dependent Variable: D(TB); Method: Least squares; Date: 09/07/09; Time: 09:58; Sample(adjusted): 1981:1 2007:4; Included observations: 108 after adjusting endpoints

Table A2: Data description

Variables	TB	YN	YW	REER
Mean	0.470458	87.24586	88.79959	224.5142
Median	0.415237	83.85872	93.28000	127.8200
Maximum	1.018691	155.2040	114.6519	839.9200
Minimum	-0.492450	53.03408	51.33000	66.21000
Std. Dev.	0.366857	26.33398	16.69140	200.4629
Skewness	-0.483958	0.763881	-0.519096	1.587868
Kurtosis	2.544143	2.833459	2.240123	4.331070
Jarque-Bera	5.341777	11.02171	7.724519	55.33288
Probability	0.069191	0.004043	0.021020	0.000000
Sum	52.69129	9771.536	9945.554	25145.59
Sum Sq. Dev.	14.93881	76976.14	30924.93	4460579
Observations	112	112	112	112

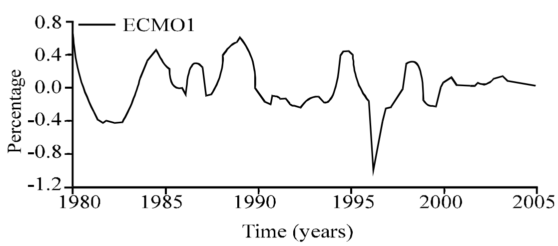

Fig. 1A: Graph of the residuals of the static long-run models

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