African Research Review
An International Multi-Disciplinary Journal , Ethiopia
Vol. 4 (2) April, 2010
ISSN 1994-9057 (Print) ISSN 2070-0083 (Online)

Exchange Rate Deregulation and Industrial Performance: An Assessment (1975 – 2006)

(Pp. 236-251)

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Abstract

This paper investigated the impact of exchange rate deregulation on industrial performance in Nigeria. In this study, secondary data over the period 1975 – 2005 was used and the co-integration technique and chow breakpoint test were considered as analytical tools. The study found that a long-run relationship exists between the industrial productivity growth rate, ration of industrial production to gross domestic product, exchange rate, interest rate and terms of trade, and that exchange rate deregulation has significant impact on industrial performance. In order to determine the short term dynamics around the equilibrium relationship, the estimated an error correction model (ECM) and industrial productivity growth rate and contribution of industrial production to GDP lagged by one and two periods, exchange and interest rates emerged as significant determinant of industrial productivity growth rate in Nigeria. The result however suggests the importance, as well as the imperative for Nigeria to embark on comprehensive exchange rate policy in order to accelerate and sustain industrial growth performance.

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Key Words: Exchange Rate, Deregulation, Industrial Performance, Co-integration, Error Correction Mechanism.

Introduction

Exchange rate as an economic indicator plays an increasingly significant role in an economy, as it directly affects domestic price level, profitability of traded goods and services, allocation of resources and investment decisions (Ajakaiye, 1994). Movements in these variables pose serious concerns not only to the monetary authorities faced with stabilization problem but also to firms engaged in international business, due to the consequences of political and exchange risk there from. In fact, exchange rate fluctuations are today a formidable bed rock for all economic activities across the globe. Thus, exchange rate management has fallen within the mainstream of the economic policies of many countries (Todaro, 2004).

The exchange rate which is the price of one currency in terms of another currency, as put forward by Fagbemi (2006), is a veritable instrument of economic management and therefore an important macroeconomic indicator used in assessing the overall performance of an economy. Moreover, Douglas and Jike (2005) noted that movements in the exchange rate are known to have ripple effect on other economic variables such as interest rate, inflation rate, inflation rate, unemployment rate, terms of trade, and so on. All of these factors underscore the importance of exchange rate to the economic well being of every country that deals in the international trade of goods and services.

Beside a great policy management, challenge is imposed on developing countries like Nigeria, because she produces and exports mainly primary product which is characterized by unfavourable terms of trade in the international market. The displacement of Agriculture by the crude oil exports in the early 1970s, due to a sharp rise in petroleum prices, enhanced official foreign exchange receipts. The foreign exchange in the period therefore experienced a further boom and greater attention was paid to the management of foreign exchange resources to ensure that shortages did not arise. However, the extent to which these managerial policies and reform measures have been effective in promoting industrial performance and growth has remained unascertained.

Trends of Industrial Performance in Nigeria

Empirical evidences seem to indicate that the growth performance of the industrial sector together with its capacity utilization level has not been encouraging. Though, the share of manufacturing which is a sub-sector of the industrial sector, in GDP rose from about 4percent in 1977 (at 1984 constant prizes) to a peak of 13 percent in 1982, but it has since fallen to less than 10 percent today. A number of factors account for this, chief among which is the inadequate access to raw materials and spare parts because of chronic foreign exchange shortages (Obadan, 1994). The lack of vital industrial inputs negatively affects industrial capacity utilization, which fell from 70 percent in 1981 to about 25 percent in the period 1982 – 1986.The foregoing provides a sketch of the industrial situation when the Structural Adjustment Programme (SAP) was introduced in July 1986, which gave birth to exchange rate deregulation. The programme envisaged the enhancement of manufacturing performance through a restructuring process geared at reducing import dependence and promoting manufacturing activities for export. A major feature of a SAP is increased cost of imported inputs (through the correction of the Nigerian naira's over-valuation) and thereby increased incentives to use local inputs. Shortage of foreign exchange and high tariffs or bans on imported inputs have also forced companies to source local inputs they previously imported.

With the formal introduction of deregulation as embodied in the Structural Adjustment Programme (SAP) in July 1986 and the scrapping of the import license system, there was a slight improvement in industrial activities. Capacity utilization in the manufacturing sub-sector in the period 1987-1989 rose slightly to an average of 32 percent from the pre-SAP level of 30percent. Partly responsible for these developments was the replacement of import license system of the pre-SAP period with the Second-tier Foreign Exchange Market (SFEM) (MAN Report, 1987-89). The latter operated generally on the principle of 'ability to pay'.

In the Food, Beverage and Tobacco (FBT) industry, capacity utilization fluctuated within the range of 30 to 40 percent in the period 1986-1993 as shown in table2. By the first half of 1993 however, the utilization of installed capacity in the FBT industry was lower than that of the manufacturing sub-sector as a whole. This stood at about 28.5 percent lower than the immediate pre SAP level of 30 percent in the manufacturing sector (AFBTE, 1992/9:6).

The general picture that emerges from the manufacturing sector and the food, beverage and Tobacco (FBT) industry is that, since the economic crisis and adjustment, utilization of installed capacity either before or during deregulation rarely attained 50 percent in the period of 1982-1993. The performances was still patiently below expectation, but that was the inevitable consequence of the unprecedented official depreciation of the naira exchange rate from N22.00 to N85.00 for US $1.00 in 1992 (Obadan, 1994).

Obadan therefore concluded that the efficiency of real exchange rate adjustment in an input import dependent economy like Nigeria was in serious doubt and pointed out the need for caution in relying on real exchange rate changes to achieve external balance without re-directing the production structure away from imported input in a significant manner, similar observations were also made by Edward (1996) and Ajakaiye (2001).

Closely related to the above crisis is the cost of raw materials-imported and local. While the depreciation of the naira affected the cost of imported raw materials directly, it it had a similar effect on local raw materials albeit indirectly. This is because producers of local raw materials also depend on imported machinery and spare parts for their production. Moreover they depend on products from imported raw materials for their existence.

One conclusion emerging from the table 2 is that the degree of dependence on imported inputs is high and it is also apparent that the achieved level of local raw materials sourcing at less than 50 percent is still low. This has been attributed to, among others, inadequate supply of raw materials that are locally available, poor quality of what is available and failure to meet users' specifications (Obaseki, 2000). It is also striking that sub-sectors with traditionally high potential for local sourcing of inputs performed much less well than expected industries like food, Beverage and Tobacco [FBT], Textiles, Furniture and wood products.

Unlike raw materials, some of which can be sourced locally, virtually all industrial machinery and spare parts are imported. This is the inevitable consequence of the lack of engineering industries and technological backwardness in the country. Apart from the cost implications, this dependence also has the potential of incessantly disruption manufacturing activities as several production outfits may be put out of operation because of the lack of a single spare part in the country.

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Oloyede (2004), also noted that, although the implementation of exchange rate deregulation with devaluation promotes industrial performance but its simultaneous implementation of imports liberalization policy may not yield the desirable results. This is because, since the Nigeria's real sector, particularly the industrial sector heavily depends on imported inputs (most of which has no domestic substitute), the cost effect of devaluation and depreciation of naira may outweigh the gains arising from import liberalization, regardless of provisions of export incentives. These observations therefore pose three important research questions which will form the main focus of this paper:

(i)How and to what extent has the exchange rate deregulation policy regime enhanced Nigeria's internal and external competitiveness?

(ii) Has exchange rate deregulation policy been able to alter Nigeria's industrial performance in a way that could enhance Nigeria's capacity to respond to external shocks?

(iii) To what extent/degree has the exchange rate deregulation policy affected Nigeria's industrial performance positively?

Model

The model for this study is specified as,

INDP = f (EXP, INTR, TOT, U) ………………(i)

Where INDP = Industrial performance to be captured by the industrial productivity growth rate {IPGR} and the contribution of industrial production to GDP {CIPG}.

The model is therefore splitted and linearised as;

$IPGR = \alpha o + \alpha 1EXR + \alpha 2INTR + \alpha 3TOT + \mu 1$............... (ii)

$CIPG = \beta o + \beta 1EXR + \beta 2INTR + \beta 3TOT + \mu 2$............. (iii)

Where IPGR is industrial productivity growth rate and it is calculated as;

$$IPGR = (IOt\text{-}1 - IOt)/IOt\text{-}1$$

IO is index of industrial output

CIPG is contribution of industrial production to GDP, calculated as;

CIPG = (IO/GDP) X 100/1

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EXR is Exchange rate

INTR is Interest rate

TOT is Terms of trade, calculated as (EXPORT/IMPORT) X 100/1

The estimation of the models employed the use of co integration test and Error correction mechanism (ECM). The intention for the use of this technique is to examine the long run effectiveness of exchange rate policy on industrial performance in Nigeria over the period: 1975-2005.

However, a test of stationarity (or non-stationarity) that has become widely popular over the years is the unit root test (Gujarati, 2004). The empirical test of co integration is usually a unit root test in which the order of integration of series involved in the estimation of a must be integrated of the same order. The idea is to ascertain the order of integration of the variables and the number of times the variables have to be differenced to arrive at stationarity. This enables us to avoid the problem of spurious or inconsistent regression that is associated with non-stationarity time series model.

First, a unit root test will be performed on each variable in the model using the Augmented Dickey Fuller (ADF) test.

$$\triangle Y_t = \alpha + \beta Y_{t-1} + \sum\beta \quad Y_{t-1} + \sum_t$$

Where Y represents the vector of the variable considered in this study, where B is negative and significantly different from zero, then the series 1(0) that is stationarity.

In most cases, stationarity series have a finite variance, transitory innovation from the mean and a tendency for the series to return to its mean value. The critical value for the test were calculated by Monte Carlo simulation and reported in Chariness and Deaden (1997), because the distribution is not standard. The ADF test can therefore be conducted by comparing the t-value on the coefficient of Y_{t-1} with the critical values.

According to Obaseki (1989), cointegration technique arose from the need to integrate short-run dynamics with long run equilibrium through the inclusion of an Error Correction Mechanism (ECM) in the dynamic formulation of the model for estimation. Furthermore, cointegration helps to explore the long run relationship status of the variables included in the estimated models. To therefore be related to one another statistically in the long run, variables must be of the same order of integration

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Then, the next step is to form a residual from this static regression as an error correction term. Following Engle and Granger (1989), the residuals become;

$\sum_t$ = INDP – (αo + α1EXR + α2INTR + α3TOT) …………. (v)

$\sum_t$ = CIPG – (βo + β1EXR + β2INTR + β3TOT) ………….. (vi)

The Error Correction Mechanism (ECM), first used by Sargan and later popularized by Engle and Granger, corrects for disequilibrium. An important theorem, known as Granger representation theorem states that if two variables Y and X are co integrated, then the relationships between the two can be explained or expressed by ECM (Gujarati, 2004). It must be noted that cointegration explains nothing about the direction of the causal relationship between the variables, but it follows that there must be Granger causality in at least one direction.

Results and Discussion

We started the empirical analysis by examining the characterization of the variables used, using the Augmented Dickey Fuller Unit Root Test. The essence of this is to establish the stationarity and non stationarity of variables to avoid spurious regression. To proceed with the test, graph of each series is first virtually examined to see whether a trend is present or not as shown in figure 1 (figure 1: variables are shown at levels, 1975 – 2006). A trend variable is necessary in the ADF regression if trends are present in the series. While in the absence of a trend in the series, only an intercept is included in testing for unit roots. Figure 1 however shows that only exchange rate is trended and others are not.

Table 3 reports the unit root test results. It shows that all the variables except industrial productivity growth rate were stationary at first difference. The results also reported that IPGR, INTR and TOT were stationary at 1 percent level, while CIPG and EXR were stationary at both 5 and 10 percent levels respectively.

The co-integration test presented in table 3 above is the summary of cointegration analyses using Johansen maximum likelihood ratio approach. This test statistics strongly rejects the null hypothesis of no cointegration, in favour of four co integrating relationship at 5 percent significance level in the two models.

Therefore, there is long run relationship among the variables employed.

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The results of model estimation and the various diagnostic tests as presented above have really helped to discover the behaviour and dimension of some macroeconomic variables on industrial performance in Nigerian context. This analysis started by fitting a stationarity test on the time series data used, in order to avoid spurious problem before proceeding to other tests. However, the result in table 2 shows that all the variables are stationary both at levels and first difference respectively.

In Johansen Cointegration tests reported in table 3, the likelihood ratios were compared with the Mackinnon Critical value at both 1 and 5 percent levels, to show the acceptance or rejection of cointegration or not among the variables. The condition is that, at any level, the critical value must be less than the likelihood ratio in at least one of the variable (Engle and Granger, 1989). However, this test statistics strongly rejects the null hypothesis of no co integration in favour of four co integrating relationship at 1& 5 percent significant levels in the two models.

The parsimonious error correction model shows the dynamic relationships that exist between the present and past values of industrial productivity growth rate, contribution of industrial production to GDP and the explanatory variables. This is estimated using industrial productivity growth rate and ratio of industrial production to GDP in percent as dependent variables in different cases. The results of parsimonious models were reported in table 4. The parameters estimated, alongside with the standard errors, t-values and the corresponding critical values which help in conducting series of diagnostic tests to verify stability and to evaluate the predictive accuracy of the models were given in the tables. Hence, the parameters of useful variables in both tables are significant at 1 and 5 percent levels. Meanwhile, it is apparently glaring from all indications that the parsimonious error correction model for series 1 is better than that of the series 2.

Moreover, the coefficient of multiple determination (R-Squared) for series 1; 0.981259 and that of series 2; 0.543674, indicate the explanatory power of the models. It therefore means that about 98 percent variations in the industrial productivity growth rate and 54 percent variations in the contribution of industrial production to GDP were explained by variations in the past values of IPGR and CIPG, past and present values of terms of trade, exchange and interest rates. Meanwhile, of just 2 percent in series 1 and 46 percent in series 2 were explained by the error term or un-included variables because of qualitative measures.

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However, the goodness of fit of these models is confirmed by F-statistics and their probability; 0.000000 and 0.000495 respectively. The f-statistic measures the overall significance of the parameters. Since the F-statistics are 25.97590 and 14.199948 for series 1 and 2 respectively, it shows that the R-squared are statistically different from zero at 1 percent level of significance. While the Durbin-Watson is within the conventional acceptable range, thus, there is absence of serial autocorrelation in all the various estimation scenarios carried out.

Furthermore, there existed a pronounced feed back of the previous period disequilibria from the long-run trend in the case of these models. Specifically, the results indicate a feed back of about 99 and 55 percent for the series 1 and 2 respectively from the previous period disequilibria between the present and past values of industrial productivity growth rate, ratio of industrial production to GDP, terms of trade, exchange and interest rates. The coefficients of the ECM also show the speed of adjustment from past disequilibrium to equilibrium in the current period.

Finally, the results estimated assert that exchange rate deregulation produces the expected result of stimulating the industrial sector activities, but at a minimal rate, due to the fact that there are many other factors that affect and influence industrial performance, which this study does not put into consideration. This finding therefore is against that of Ogun and Oloyede, (2004).

Conclusion and Recommendations

The empirical results show that there is a long-run negative relationship between exchange rate and industrial performance. However, the relationship between exchange rate and industrial productivity growth rate in one shows that they are positively related though insignificantly and negatively related with the contribution of industrial production to GDP on the other hand. Considering the trend of industrial productivity growth rate over the years, it could be deduced that some of the macroeconomic (exchange rate) policies designed during the oil boom period seem not to favour the promotion of industrial sector in Nigeria, but prior to the implementation of SAP, the promotion of industrial productivity started receiving some level of attention.

Conclusively, in spite of the various incentive schemes designed and direct towards promoting industrial productivity, it has continue to perform very poorly over the years when compared with cases of some developing countries like India, China, Korea and the likes. Thus, the objective of promoting industrialization is yet to be achieved. There is more to industrial promotion than just providing generous incentives to industrialists for mere selfish interest. The successful industrial promotion drive is a function of the existence of an enabling socio-economic environment, adequacy of domestic production and conducive international economic environment.

The implication of the above is that there is a need to achieve an equilibrium exchange rate, such that, when combined with industrial incentives, will promote all categories of industrial and manufacturing productivity in Nigeria. Also, to be taken into consideration is the state of infrastructure (which is also a major determinant of production cost), as well as the general price level (inflation rate). These, couple with improvement of the quality of industrial output would raise international competitiveness and merchandise terms of trade. This will in turn enhance the demand for industrial exports and hence, foreign exchange receipts.

Lastly, since most of the past development institutions which are expected to finance manufacturing sub-sector in Nigeria have failed, due to harsh environment, the establishment of small and medium industries equity investment schemes (SMIES) and Bank of industries should therefore be strengthened.

References

Adeolu, O. A. and Babatunde, W. A. (2005), "Trade and Exchange Rate Policy Reforms and Export Performance in the Real Sector", *NISER Individual Research Project***,** NISER Ibadan.

Ajakaiye, D. O. and Ayodele, A. S. (2001), "Industrial Transformation Efforts in Nigeria", a Publication of the *Nigeria Institute of Social and Economic Research (NISER)***.**

Ajakaiye, O. (2001), "Impact of Exchange Rate Depreciation on Sectorial Prices", *NISER Monograph Series***,** (1986 – 2000).

Akinlo, A. E. (2002), "An Alternative Framework of Assessing the Impact of Adjustment Policies on Industrial Performance", *Nigerian Journal of Economics and Social Studies*, 2002, 38(2), pp 91 – 110.

Azeez, O. (2002), "Performance of the Indian Manufacturing sector in Terms of Economic Capacity Utilization", (1974 – 1998).

Central Bank of Nigeria (CBN) (2006), "Statistical Bulletin", *Annual Publication of the Central Bank of Nigeria***.**

Central Bank of Nigeria (CBN) (2006), "Annual Report and Statement of Account", *Annual Publication of the Central Bank of Nigeria***.**

Dickey, D. A. and Fuller, W. A. (1981), "Likelihood Ratio Tests for Autoregressive Time Series with a Unit Root", *Econometrica,* 49:1057 – 1072.

Douglas, G. O. and Jike, V. T. (2005), "Policy Reforms and Manufacturing Exports in Nigeria", Paper Presented at the 2005 Nigeria Economic Society (NES) National Conference.

Engle, R. F. and Granger, C. W. O. (1979), "Cointegration and Error Correction Representation, Estimation and Testing", *Econometrica***.**

Fabayo, A. (1981), "Industrial Capacity Utilization in a Developing Economy: A Case Study of the Nigerian Cotton Textile Industry. *J. Busin. Soc. Stud.*, 4:22

Federal Office of Statistics (FOS) (2000), "National Account Statistics", **A** Publication of the Federal Office of Statistics, Nigeria.

Gujarati, B. L. (2004), "Basic Econometrics",

Ifeanyi, O. (2003), "Globalization and Industrial Performance in Nigeria", *Monograph Publication of the Council for Social and Economic Research in Africa, 2003***.**

Jhingan, M. L. (1997), *Macroeconomic Theory*, Vrinda Publications Ltd, Delhi, pg. 697.

Johansen, S. and Juselius, K. (1990), "Maximum Likelihood Estimation and Inference on Cointegration with Applications to the Demand for Money", *Oxford Bulletin of Economics and Statistics***,** 52: 169 – 210.

Koutsoyianis, A. (1993), Theory of Econometrics, Second Edition,

Manufacturers Association of Nigeria (MAN), 1992 and 1993 Half Yearly *Economic Review*, July – December.

Table 1: Industrial Capacity Utilization by Sectors (Percentage)

S/N	SECTORS	1988	1989	1990	1991	1992	1993
1	Food, Beverage and Tobacco	37.81	32.50	36.67	32.61	45.34	37.8
2	Textiles, Wearing Apparel, Footwear, Leather Products and Carpet/Rug	39.73	41.00	51.12	35.40	50.11	43.49
3	Wood and Wood Products Including Furniture	NA	NA	NA	67.75	49.05	34.73
4	Pulp, Paper and Paper Products, Printing Products	38.56	41.00	30.07	30.35	35.19	32.26
5	Chemicals and Pharmaceuticals	37.76	24.00	32.67	31.01	30.35	31.06
6	Non-Metallic Mineral Products	50.01	33.50	47.09	45.10	37.39	32.63
7	Plastic, Rubber and Foam Products	38.69	34.50	41.86	48.90	42.45	41.1
8	Electrical and Electronic	NA	26.50	26.35	28.67	34.58	24.24
9	Basic Metal, Iron and Steel	28.33	17.50	35.46	24.32	25.52	25.46
10	Motor Vehicle and Miscellaneous	NA	23-50	23.08	13.79	24.06	25.87
	Average Capacity Utilization	37.56	30.00	36.92	33.53	35.44	32.33

Note: *NA represents Not Available.*
Source: *Manufacturers Association of Nigeria (1995 Reports).*

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Table 2: Local Sourcing of Raw Materials by Industries (Percentage)

S/N	SECTORS	1988	1989	1990	1991	1992	1993
1	Food, Beverage and Tobacco	62.9	62.9	72.4	65.4	67.1	63.6
2	Textiles, Wearing Apparel, Carpets and Leather Products	54.8	62.0	66.8	67.0	67.0	68.0
3	Wood, Wood Products and Furniture	NA	NA	74.0	80.3	81.3	79.0
4	Pulp, Paper and Paper Products	28.7	40.0	45.4	39.0	32.9	31.2
5	Chemicals and Pharmaceuticals	36.2	37.5	47.5	42.0	40.5	46.5
6	Non-Metallic Mineral Products	86.7	79.0	78.0	83.4	72.7	65.6
7	Plastic and Rubber Products	50.5	22.3	31.5	36.6	43.8	30.2
8	Electrical and Electronics	NA	31.5	28.0	35.5	33.4	31.1
9	Basic Metal, Iron and Steel and Fabricated Metal Products	34.9	42.0	22.3	24.9	43.0	43.3
10	Motor Vehicles and Miscellaneous Assembly	NA	38.5	34.9	25.5	37.4	41.1

Note: *NA represents Not Available.*
Source: *Manufacturers Association of Nigeria (1995 Reports).*

Table 3: Augmented Dickey Fuller Unit Root Test (1975 – 2006).

Variables	Trend Status	ADF Statistics	Order of Integration
IPGR	Without	-4.452068*	I(0)
CIPG	Without	-3.418276**	I(1)
EXR	With	-3.437561***	I(1)
INTR	Without	-6.567543*	I(1)
TOT	Without	-5.615924*	I(1)

Note: *(**)(***) denotes significant at 1(5)(10) percent levels respectively
I(0) means stationary at levels
I(1) means stationary at first difference
Source: Authors' Computation.

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Table 4: Results of Johansen Co integration Test
Sample: 1975 – 2006 **Included Observations:** 28
Test Assumption: Linear Deterministic Trend in the Data
Lags Interval: 1 to 1
Series 1: D(IPGR,2) D(EXR,2) D(INTR,2) D(TOT,2)

Eigen Value	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No of CE(s)
0.882724	155.7127	47.21	54.46	None**
0.815489	95.70243	29.68	35.65	At Most 1**
0.744593	48.38117	15.41	20.04	At Most 2**
0.304414	10.16400	3.76	6.65	At Most 3**

Series 2: D(CIPG,2) D(EXR,2) D(INTR,2) D(TOT,2)

Eigen Value	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No of CE(s)
0.873382	143.3868	47.21	54.46	None**
0.763015	85.52253	29.68	35.65	At Most 1**
0.710961	45.20934	15.41	20.04	At Most 2**
0.311628	10.45592	3.76	6.65	At Most 3**

Note: ** denotes rejection of the hypothesis at 5% level of significance.
L. R. tests indicate 4 co integrating equations at 5% significance in both cases.

Table 5: The Parsimonous Error Correction Models

Series 1: IPGR EXR INTR TOT **Dependent Variable:** D(IPGR,2)

Variable	Coefficient	Std Error	t-statistics	Prob.	Remarks
C	0.005792	0.019126	0.302848	0.7650	Not Significant
D(IPGR(-1),2)	0.529836	0.144783	-3.659524	0.0015	Significant
D(IPGR(-2),2)	-0.238831	0.125462	-1.903616	0.0708	Significant
D(EXR,2)	0.000742	0.001106	0.670610	0.5098	Not Significant
D(INTR(-2),2)	-0.003813	0.003583	-1.064115	0.2994	Not Significant
D(TOT,2)	0.000702	0.000274	-2.560065	0.0182	Significant
ECM(-1)	-0.987049	0.301627	-5.460553	0.0000	Signific:ant

$$IPGR = 0.005792 + 0.529836\ IPGR_{t-1} - 0.238831\ IPGR_{t-2} + 0.000742\ EXR_t - 0.003813\ INTR_{t-2} + 0.000702\ TOT_t - 0.987049\ ECM_{t-1}$$

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R – Squared =

Adjusted R-Squared =

F-Statistic =

Prob (F-Statistic) =

Durbin-Watson =

Series 2: CIPG EXR INTR TOT **Dependent Variable:** D(CIPG,2)

Variable	Coefficient	Std Error	t-statistics	Prob.	Remarks
C	-0.000131	0.003815	-0.034337	0.9729	Not Significant
D(CIPG(-1),2)	0.659597	0.164385	-4.012503	0.0006	Significant
D(CIPG(-2),2)	0.498562	0.162516	-3.067775	0.0058	Significant
D(EXR(-1),2)	-1.845305	0.000216	-0.085020	0.0331	Significant
D(INTR,2)	-0.001107	0.000763	-1.449706	0.1619	Not Significant
D(TOT(-2),2)	3.584805	4.624705	0.774447	0.4473	Not Significant
ECM(-1)	-0.549953	0.109042	-2.292273	0.0323	Signific:ant

$CIPG_t = -0.000131 + 0.659597\ CIPG_{t-1} + 0.498562\ CIPG_{t-2} - 1.845305\ EXR_{t-1} - 0.001107\ INTR_t + 3.584805\ TOT_{t-2} - 0.549953\ ECM_{t-1}$

R-Squared =

Adjusted R-Squared =

F-Statistic =

Prob (F-Statistic) =

Durbin-Watson =

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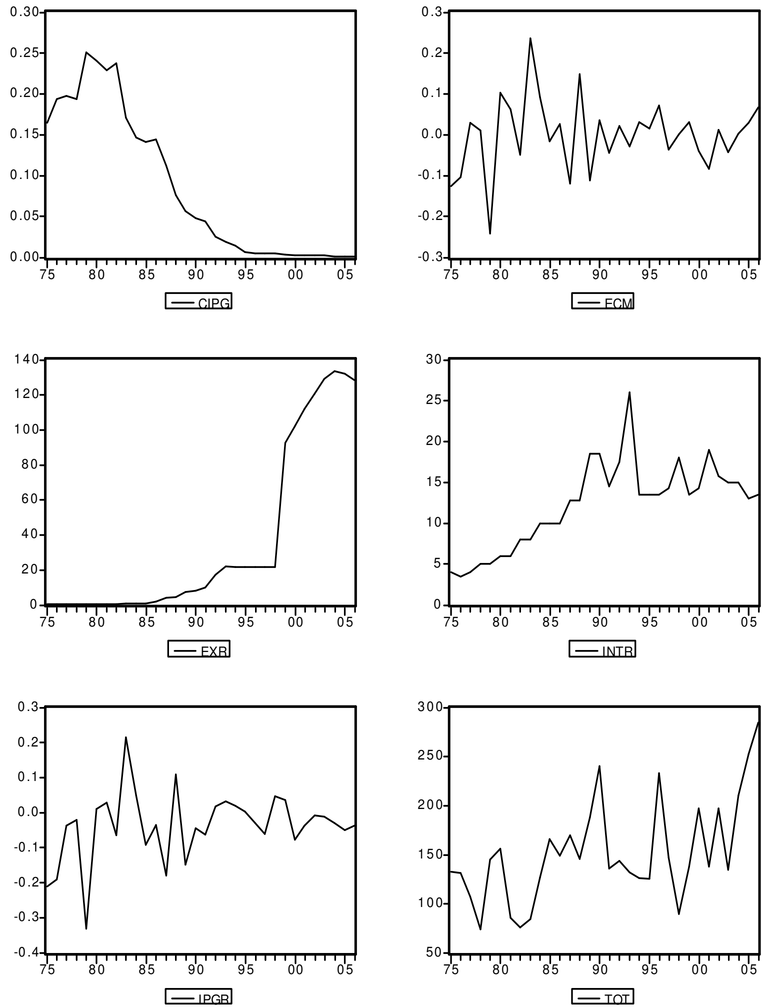
Figure 1:



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