THE INFLUENCE OF FINANCE AND MACROECONOMIC VARIABLES ON MANUFACTURING CAPACITY UTILIZATION IN NIGERIA

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Abstract

This paper estimates the response of manufacturing capacity utilization in Nigeria to changes in key macroeconomic indicators in Nigeria using annual data on exchange rate, interest rate, inflation rate, external debt, terms of trade and trade openness over the period 1975 – 2012. The variance decomposition analytical technique was adopted. The study presents the following results: (i) Both the Engle and Granger (1987) and Johansen (1991) co-integration tests show evidence of co-integration between the endogenous and exogenous variables. However, the error correction mechanism (ECM) shows that the model has a low speed of adjustment to short-run disequilibrium, of approximately 6.5 per cent; (ii) The forecast error variance decomposition analysis shows that variations in manufacturing capacity utilization in Nigeria are largely driven by its own shocks. The study further shows that exchange rate, interest rate and terms of trade contribute significantly but negatively to variations in manufacturing capacity utilization. Though it shows evidence of negative contributions from inflation rate, external debt and trade openness, they do not significantly influence movements in manufacturing capacity utilization in Nigeria; (iii) The study also presents evidence of causal impact of manufacturing capacity utilization on exchange rate and manufacturing capacity utilization on interest rate and not vice versa but did not produce evidence of causality between manufacturing capacity utilization and the other exogenous variables namely, inflation rate, external debt, terms of trade and trade openness. It is strongly recommended that government should adopt drastic measures to stabilize the flow of foreign exchange as well as enthrone and sustain low interest rate regime. Government should also emphasize local content in domestic manufacturing.

BACKGROUND OF THE STUDY

Finance has been widely acknowledged in literature as a key determinant of the rate of capacity utilization in an economy. The cost of finance or funds is the interest rate. Opinions however differ on the impact of interest rate on manufacturing capacity. There have been arguments that the level of interest rate significantly determines the performance of real sector activities like manufacturing. Proponents of low interest rates include Ojo (1988), Leba (2012) and Manufacturers Association of Nigeria (2006). On the other hand, others like Ogwuma (1993), Nwankwo (1989) and the Federal Government of Nigeria (1987) advocate for a liberalized interest rate regime as a tonic for enhanced productively growth.

Manufacturing is a sub-sector of the real sector of the Nigerian economy. It constitutes the main driving force of modern economies and therefore, the engine of economic growth and development (Sanusi, 2011). The manufacturing sub-sector in Nigeria consists of large, medium, small and micro-enterprises (MSMEs). In this sub-sector, goods and services are produced through the combined utilization of raw materials, labour, capital (physical and human) and land. Through optimum utilization of these inputs, tangible goods and services are produced and distributed to satisfy consumer demands within the economy and possibly beyond. The performance of the sub-sector can be used as an index of economic growth and development as well as a measure of effectiveness of government macroeconomic policies. Government policies are considered successful if they impact positively on the production and distribution of goods and services and therefore raise the welfare of the citizens. A vibrant manufacturing sub-sector supports the economy through employment generation and production, not only for domestic consumption but also for export. A weak real sector, on the other hand, poses a systemic problem for the

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entire economy, especially with respect to economic linkages, value addition and job creation. Aganga (2012) avers that no meaningful economic progress can be made without a robust manufacturing sub-sector.

In view of the pivotal role of manufacturing to the economic health of the nation, at independence the government initiated various programmes and policies as enunciated in the various development plans aimed at transforming the hitherto agrarian (traditional) economy to an industrialized or modern one. To fast-track the industrialization process, Nigeria embraced the large scale or import substitution strategy which involves the establishment of fully-integrated, strategically located, large-scale industries as the foundation for industrializing the economy with the expectation that the emerging industries would enjoy economies of scale and propel the establishment of feeder industries (small-scale enterprises) thereby enhancing industrial growth (Okafor , 2000). The choice of this strategy was informed by the need to achieve high value-added industrialization; conserve foreign exchange through import substitution; and achieve rapid acquisition of transferred technology. The establishment of vehicle assembly plants in the mid-1970s and the development of River Basin Development Authorities (RBDAs) as well as heavy investments in iron, steel and machine tools production were off-shoots of this strategy. However, rather than achieve set objectives, the large-scale industrialization strategy produced industries that were unduly reliant on imported inputs (machinery and equipment, raw materials, technical manpower and spare parts). Available industrial infrastructure could not support the sophisticated imported machinery and hence the realization of low value-addition and net outflow of foreign exchange. Thus, the performance of the sub-sector has been characterized by sub-optimal levels of capacity utilization and low contribution to the nation's GDP. For instance, since the attainment of political independence, the sub-sector in Nigeria has, on the average, contributed less than 7 per cent annually to the economy (National Bureau of Statistics, 2011) while average capacity utilization stood at an annual average of about 50.02 per cent over the period 1975 – 2012 (Central Bank of Nigeria, 2012).

An important implication of operating below optimum capacity is that industries (factories) that would have provided employment are either closing shop or operating at sub-optimal levels, thus the incidence of rising levels of unemployment and poverty. Inability to attain optimal capacity utilization levels also imply resort to importation in order to support domestic consumption. This practice renders domestic production vulnerable to external shocks. Anyanwu (2000) identifies "unprecedented fall in capacity utilization rate" as adversely affecting economic growth and development in Nigeria. Capacity underutilization translates to declining productivity which constitutes an impediment to economic growth. Manufacturing capacity therefore is an important element in economic growth and development and according to Anyaoku,(2011) there are few countries that grew without optimizing their manufacturing capacity.

In response to the growing need to optimize the performance of manufacturing in Nigeria, the study was designed to investigate the influence of key macroeconomic indicators in Nigeria (namely, exchange rate, interest rate, inflation rate, external debt, terms of trade, and trade openness) on capacity utilization in the manufacturing sub-sector of the Nigeria economy over the period 1975-2012. The choice of 1975 as the base period was informed by the fact that the computation of the manufacturing capacity utilization rate dataset in Nigeria commenced in 1975 (Central Bank of Nigeria, 2011). Complete dataset could therefore not be obtained on all the research variables in earlier years.

Statement of the Problem

Manufacturing in Nigeria is largely externally focused with the result that the sub-sector is heavily dependent on importation of inputs (machinery and equipment, raw materials, technology and spares) for the maintenance and expansion of its operations. The performance of the sub-sector since independence has been characterized by sub-optimal levels of capacity utilization and low contributions to the nation's GDP. The basic economic problem confronting the nation therefore is one of low productivity. For instance, since independence the sub-sector has on the average contributed less than 7 per cent annually to the economy (National Bureau of Statistics, 2011) and average capacity utilization in the sub-sector stood at an annual average of about 50.02 per cent over the period, 1975 – 2012 (Central

Bank of Nigeria, 2012). Government efforts at promoting the performance of the sub-sector have also yielded sub-optimal results and the nation continues to depend on importation to support domestic consumption, with its attendant massive outflow of domestic resources.

Being largely dependent on the external sector for the sustenance and expansion of its operations, we suspect that the performance of the sub-sector may be linked to movements in some key macroeconomic indicators like, exchange rate, interest rate, inflation rate, external debt, terms of trade and trade openness. Evidence from literature shows that earlier studies related to the subject area have largely focused on examination of the response of aggregate output (GDP) to variations in these macroeconomic variables. We doubt the extent to which the findings of these studies could be confirmed for specific sectors/sub-sectors, taking due cognizance of their individual peculiarities.

This study therefore sought to estimate the extent to which fluctuations in manufacturing capacity utilization in Nigeria are explained by movements in key macroeconomic indicators: exchange rate, interest rate, inflation rate, external debt, terms of trade and trade openness.

Review of Theoretical Literature

The dual issues of lack of adequate capital stock and underutilization of existing stock of capital characterize most developing economies (Kalin, 1998). A key issue in Nigerian manufacturing since independence is persistent underutilization of existing production capacity in the sub-sector in spite of several government policy initiatives aimed at promoting its performance. Sub-optimal levels of capacity utilization in the sub-sector have continued to engage the attention of government and other stakeholders as well as provoke theoretical and empirical arguments on what account for the present state of affairs in the sub-sector.

The Centre for Financial Management and Research (1984), Ahmed (1987) and Okafor (2000) attribute the underutilization of installed manufacturing capacity in Nigeria to adoption of an industrialization policy choice that emphasize the establishment of manufacturing facilities which are unduly reliant on wholesale imported inputs and which available level of industrial infrastructure could not support. A direct outcome of the chosen industrialization policy is the massive outflow of foreign exchange from the economy. Nwankwo (1984) argues that the inability of the government to sustain the requisite outflow of foreign exchange for the procurement of manufacturing inputs due, largely, to its indiscriminate allocation among competing uses inhibited the continued inflow of essential raw materials required to enhance production capacity.

The Federal Government of Nigeria (1989), attributes low manufacturing capacity utilization in Nigeria to adjustments in foreign exchange rates (arising from the SAP) which led to generalized increase in prices due to the high import content of our installed production capacity. Ude (1996), and Sobowale (2011) attribute the inability of SAP to revitalize domestic manufacturing to lack of domestic capacity to satisfy local consumption needs as well as the potentiality to expand domestic production of goods should their demand occur abroad as a result of the SAP-induced currency devaluation.

Following from its potential effects on costs of manufacturing inputs, inflation also presents obvious challenges to the attainment optimum capacity utilization in manufacturing. The growing interest in price stability as a major goal of monetary policy by the monetary authorities is an acknowledgment that high rates of inflation disrupts the smooth functioning of a market economy (Bawa and Abdulahi, 2012). The Manufacturers Association of Nigeria (2009) and Osisioma (2004) argue that high rates of inflation render domestic production uncompetitive relative to the output of foreign economies with relatively low inflation rates thereby inducing consumers to re-assess their spending priorities in favour of basic essentials. The net impact therefore is unplanned accumulation of unsold inventory and ultimately a contraction of domestic capacity as consumption is switched to cheaper products from abroad.

Manufacturing capacity utilization in an economy can also exert causal impact on the rate of inflation in the economy. However, whether high or low levels of manufacturing capacity drive inflation remains a subject of considerable debate. Olowu (2009) contends that high productivity growth rates propel growth in inflation rates while Yellen (2005) avers that low productivity rates raise unit costs of production,thereby exerting upward pressure on prices.

Sachs (2002) and Adepoju et al (2007) identify inadequate internal capital formation as an impediment to enhanced capacity utilization in the manufacturing sub-sector. To finance capital formation in an economy, Ayadi and Ayadi (2008) identify external borrowing as a viable option. However, it is argued that external debt can impair the ability of an economy to build domestic capacity because repayment of part or all of the debt stock and the attendant debt service payments represent outflows of foreign exchange which are likely to crowd out public investment (Cohens, 1993 and Clements et al, 2003). Debt-induced liquidity constraints adversely affect government expenditure and thereby creates an infrastructure gap which is an impediment to domestic manufacturing.

Evidence from developing economies like Nigeria reveals that external borrowings have served needs other than infrastructural and industrial development. Okoye (2012) highlights a disconnect between the state and level of infrastructures, industrial capacity, poverty and employment in Nigeria vis-à-vis quantum of external loans outstanding which peaked at 35.94 billion in 2004 when the campaign for debt relief intensified. According to Moyo (2010), the inability of external borrowings to propel growth derives from the failure of debtor-nations to distinguish debt (which carries the burden of future repayment) from grants.

Opposing arguments exist on the effect of terms of trade on utilization of the productive capacity of manufacturing facilities. Prebisch (1950) and Singer (1950) contend that natural resource-rich economies have the potential for enhanced production capacity owing to favourable terms of trade arising from their primary exports. Auty (1993) and Sachs and Warner (1995) however posit that economic prosperity derived from primary exports in developing economies stunt the growth of those economies rather than enhance it because they lack institutional framework for good governance and cases of corruption, internal conflicts, political instability, etc characterize them. It is quite glaring that Nigeria enjoys an unenviable place in this latter group. Capacity underutilization in Nigeria can be linked to these negative outcomes of natural resource endowments (natural resource curse)

Openness of an economy has been shown to drive economic growth in countries like China, India, South Korea, Japan, etc. However, Sanni (2009) argues that economic liberalization has not supported the growth of most developing economies owing to challenges posed to real sector growth by weak infrastructure, policy inconsistency, hostile operating environment, etc which renders the output of these economies uncompetitive. Yaqub (2010), for instance, contends that the decline in the real GDP in 1978 is strongly linked to the liberalization of import controls in 1976 which threatened the domestic production of the agricultural and manufacturing sectors.

Review of Empirical Literature

Employing vector autoregression model (VAR), Rodriguez and Diaz (1995) find that output growth in Peru is largely driven by own shocks and also negatively affected movements in exchange rate. Adopting this model also, Rogers and Wang (1995) find that most variations in Mexican output arise from own shocks. Ibrahim and Amin (2005), Berman et al (2012) and Yaqub (2010) also find evidence of negative impact of exchange rate movements on output. However, while Akpan and Atan (2012) find no evidence of a strong relationship between output and exchange rate, Okonkwo (2012) finds evidence of a positive effect of movements in exchange rate and manufacturing output.

Empirical studies on the impact of interest rates on domestic production capacity have also produced mixed results. Studies like Ibrahim and Amin (2005), Okoye (2006), Adebiyi and Obasa (2004) and Gbadamasi (1989) show evidence of negative impact of interest rate on real domestic activities like manufacturing. On the other hand, Adofu et al (2010), Obamuyi (2009) and Okpara (2010) show evidence of positive impact.

Evidence presented by studies on inflation and economic performance largely show that the threshold level of inflation within an economy determines whether or not inflation hurts domestic capacity to produce (see for example Khan and Sanhedji, 2001; Ahmed and Mortaza, 2005; Kremer et al, 2009; Li, 2005; Bawa and Abdulahi, 2011 and Doguwa, 2012). These studies show different thresholds for developing and developed economies but agree that above the identified thresholds, inflation contracts domestic capacity while at lower rates, capacity is enhanced. Studies like CBN (1974), Faria and Carneiro

(2001) and Simon and Bulman (2003), show evidence that inflation hurts domestic production but failed to establish evidence of threshold effect while others like CBN (1974), Paul et al (1997) and Umaru and Zubaisu (2012) show evidence that inflation promotes domestic capacity utilization.

There are also conflicting results on the impact of external debt on domestic capacity utilization. Literature reveals that external debt exposure is an impediment to productive capacity in an economy (see for instance, Edo, 2002, Ayadi and Ayadi, 2008, Arnone et al, 2005, Clements et al, 2003, Ezeabasili et al, 2011 and Ajayi and Oke, 2012. However, studies like Suleiman and Azeez (2012), Oke and Sulaiman (2012) and Jayaraman and Evan (2008) produce evidence that external borrowing enhances the productive capacity of the economy.

Similarly, empirical evidence on the effect of fluctuations in terms of trade on production capacity presents mixed results. Deaton (1999), Deaton and Miller (1996) and Bleaney and Greenaway (2001) find evidence of positive impact of terms of trade on domestic production capacity. Fosu and Gyapong (2010) present evidence of positive impact for Botswana and negative impact for Nigeria. They argue that superior institutional quality in Botswana accounts for the dichotomy in the results. Broda and Tille (2003) and Kose (2002) specify that terms of trade shocks has little impact on output growth under a flexible exchange rate regime but leads to a substantial contraction in output under a fixed exchange rate regime.

Rodriguez (2000) shows a strong negative impact of trade liberalization (openness) on domestic production. However, Krueger (1997) and Edwards (1992) find evidence of strong empirical support for a positive relation between domestic output and trade openness.

Research Methodology

Quantitative research technique based on ex-post facto research design was adopted for the study. This involves the use of published (secondary) data to explain past events by identifying the extent to which the data relate to the events.

Variables included in the study were chosen on the basis of data availability and theoretical justification. Manufacturing capacity utilization (MCUR) is the dependent variable while exchange rate (EXR), interest rate (IR), inflation rate (INF), external debt (EXD), terms of trade (EXPO) and trade openness (TFT) are the independent variables. Data on the research variables over the period 1975-2012 were sourced mainly from the publications of the Central Bank of Nigeria (CBN) and the National Bureau of Statistics (NBS).

Theoretical Framework

The dependency theory of development formed the basis of our analysis. The theory argues that the development process in the less developed nations is impaired by their dependence on the developed nations who manipulate them to their advantage using various policies that are inimical to development process in the less developed economies.

Manufacturing in Nigeria, for instance, is based on foreign technology and therefore dependent on importation of machinery and equipment, raw materials, spare parts and manpower. Dependence on foreign capital leads to outflows domestic financial resources which should have been directed at the development of domestic production capacity. Dependency economists also argue that capital intensive technologies imported from the developed countries are often inappropriate to the production and consumption needs of the less developed nations who lack information about the availability of technology that is best suited to their need.

Method of Analysis

The Johansen (1991) likelihood ratio and Engle and Granger (1987) methods were used to ascertain evidence of long-run cointegrating condition within the model while the error correction mechanism (ECM) was used to determine its speed of adjustment to shocks in the short run.

A variance decomposition analysis was done on the macroeconomic data to determine the contributions from individual macroeconomic variables in the model to changes in manufacturing capacity utilization in Nigeria. This is an analytical tool within the vector autoregression (VAR)

technique. It treats all the research variables as a priori endogenous and assumes that the current level of each variable in the model is a function of past movements (innovations) in that variable as well as those of other variables in the model.

The Granger causality test was conducted to test for evidence of causation between the exogenous variables (exchange rate, interest rate, inflation rate, external debt, terms of trade and trade openness) and the endogenous variable (manufacturing utilization).

Analysis of the Results

Tables on the econometric tests are presented in the appendix section. However, the results are analyzed as follows:

(i) The unit root test shows that all the variables do not have the same order of integration EXR, INF and EXPO are stationary at level. However all other variables (MCUR, IR, EXD and TFT) became stationary at first difference.

(ii) The result of the cointegration test using the technique of Johnsen (1991) shows that at 5 per cent level of significance, there exists two (2) cointegrating equation as shown by higher values of likelihood ratio (170.04 and 101.45) in relation to the critical values (124.24 and 94.15). Also, the Engle and Granger (1987) technique shows evidence of cointegration since the ADF (Augmented Dickey-Fuller) test statistic (2.798) is greater than the critical value at 5 per cent significance level (1.950).

(iii) The error correction coefficient as shown by the error correction mechanism is 0.0647 or 6.45 per cent.

(iv) The variance decomposition analysis shows that over the entire forecast horizon (10 periods), manufacturing capacity utilization contributes about 684.36 per cent to its total variations while exchange rate, interest rate and terms of trade contribute 88.90 per cent, 41.85 per cent and 58.83 per cent respectively. Other variables namely inflation, external debt and trade openness contribute 6.16 per cent, 30.24 per cent and 23.95 per cent to total variations in manufacturing capacity utilization in Nigeria.

(v) An analysis of the relationship (correlation analysis) between the endogenous and the exogenous variables shows that all the exogenous variables (exchange rate, interest rate, inflation rate, external debt,, terms of trade and trade openness) have negative relationships with manufacturing capacity utilization (endogenous variable).

(vi) The pair-wise granger causality test for evidence of causation shows the following results: EXR – MCUR (2.16; 3.64), IR – MCUR (0.093; 2.78), INF-MCUR (1.13; 1.39), EXD – MCUR (0.32; 1.43), EXPO – MCUR (0.75; 0.44) and TFT – MCUR (1.57; 0.90). On the other hand, the critical value of the f-statistic at 95 per cent confidence level and $^{6}/_{29}$degree of freedom is 2.43. This result shows that the calculatedf-statistic exceed the critical value in the cases of exchange rate and manufacturing capacity utilization as well as interest rate and manufacturing capacity utilization and the direction runs from manufacturing capacity utilization in each instance. For the other variables (inflation, external debt, terms of trade and trade openness), the critical values of the f-statistic exceed the calculated values.

Summary of Findings

The following observations derive from the results presented in the previous section.

i) Variations in manufacturing capacity utilization (MCUR) are largely accounted for by its own shocks. Past developments or innovations in the sub-sector largely influence present and future movements in manufacturing capacity utilization in Nigeria.

ii) With respect to contributions from the exogenous variables, exchange rate (EXR), terms of trade (EXPO) and interest rate (IR) significantly but negatively influence movements in manufacturing capacity utilization. On the basis of their individual contributions, the result shows that exchange rate (EXR) is the lead variable influencing the performance of manufacturing in Nigeria, followed by terms of trade (EXPO) and then interest rate (IR). Though the study shows evidence of negative contributions from inflation (INF), external debt (EXD) and trade openness (TFT) to

variations in manufacturing capacity utilization, the magnitudes of their respective contributions are not significant.

iii) Exchange rate and interest rate have causal relationships with capacity utilization in the Nigerian manufacturing sub-sector, with manufacturing capacity utilization granger – causing exchange and interest rates. However the study did not produce evidence of causality between manufacturing capacity utilization in Nigeria and other macroeconomic variables namely, inflation rate, external debt, terms of trade and trade openness.

iv) Both the Engle and Granger (1987) and Johansen (1991) methods produce evidence of co-integration. However, estimation of the short-run dynamics shows a low speed of adjustment of the model to disequilibrium. Approximately, 6.47 per cent of disequilibrium from previous years shock is corrected in the current year.

Conclusions

The following conclusions are drawn from the findings of the study:

i) Movements in capacity utilization in the manufacturing sub-sector of the Nigerian economy are explained partly, by its own shocks as well as by variations in exchange rate, interest rate and term of trade. Upward movements in these macroeconomic indicators contract manufacturing capacity utilization. A major implication of the findings is that capacity utilization in the Nigerian manufacturing sub-sector is very sensitive to input prices as determined by variations in exchange rate (EXR) and interest rate (IR).

ii) There is causation between manufacturing capacity utilization in Nigeria and the macroeconomic variables namely, exchange rate and interest rate. This result implies that variations in manufacturing capacity utilization (MCUR) in Nigeria induce changes in these price indicators (i.e. exchange rate, EXR and interest rate, IR).

Recommendations

Based on the findings of this study, it is strongly recommended that the government should take drastic economic measures to stabilize the flow of foreign exchange. In this regard, government should diversify the revenue base of the economy, provide incentives to encourage the consumption of locally produced goods, ensure that the proceeds of corrupt practices are not domiciled in foreign accounts, achieve prudent management of national financial resources as well as borrowings from abroad, initiate policies to minimize capital flight through repatriation of earnings or outright withdrawal by foreign interests, etc.

Government should also pursue policies and programmes aimed at enthronement and sustenance of low interest rate regime. Such policies may include development of requisite infrastructure, maintenance of price stability and institutionalization of good governance practices.

Finally, government should also vigorously pursue a sound and sustainable industrial development policy. Such a policy should strongly emphasize utilization of local inputs in manufacturing, increased local content through capacity building, a vibrant agricultural sector, among other things.

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Appendix

Table 1:Johansen (1991) method.

Eigenvalue	Likelihood Ratio	5 percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.851222	170.0428	124.24	133.57	Non**
0.663619	101.4519	94.15	103.18	At most 1*
0.510535	62.22948	68.52	76.07	At most 2
0.368763	36.50955	47.21	54.46	At most 3
0.279088	19.94691	29.68	35.65	At most 4
0.158596	8.166339	15.41	20.04	At most 5
0.052719	1.949750	3.76	6.65	At most 6

***(**) denotes rejection of the hypothesis at 5% (1%) significance level**
L.R. Test indicates 2 co-integrating equation(s) at 5% significance level

Table 2.: Engle & Granger (1987) method

Variable	ADF Tests Statistic	Test Critical Value	Order of integration
Residual	-2.797869	1% = -2.6280 5% = -1.9504 10% = -1.6205	1(0)

Note: * = Stationary at 1 per cent.

Table 3: Error Correction Mechanism (ECM)

Regression Result Applying Error Correction Model (ECM) with the Respective Levels of Series-Integration

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.266362	3.383888	-0.669751	0.5083
EXR	0.030911	0.056123	0.550768	0.5860
D(IR)	0.000634	0.219491	0.002886	0.9977
INF	-0.052687	0.068179	-0.772768	0.4459
D(EXD)	-0.019762	0.068133	-0.290058	0.7738
EXPO	0.014560	0.017489	0.832550	0.4119
D(TFT)	-0.035705	0.060526	-0.589911	0.5598
ECM(-1)	-0.064705	0.091698	-0.705628	0.4860

Table 4: Variance Decomposition of MCUR

Period	S.E.	MCUR	EXR	IR	INF	EXD	EXPO	TFT
1	3.199956	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	5.441603	92.10338	1.964760	1.372669	0.027671	1.133969	2.182778	1.214769
3	7.156353	81.03561	8.108434	2.265052	0.434340	1.130764	5.889398	1.136400
4	8.401305	74.68103	10.07605	3.868375	0.499438	1.627656	7.798021	1.449432
5	9.111126	72.21441	11.04406	4.486418	0.508466	2.258682	7.822135	1.665832
6	9.588105	69.96599	11.97579	4.980386	0.467015	3.093662	7.422599	2.094555
7	9.933125	67.95771	12.04241	5.466232	0.486096	4.066290	7.158167	2.823096
8	10.20833	66.05658	11.67221	5.877307	0.752899	4.976808	6.991685	3.672505
9	10.45206	64.14867	11.24480	6.403010	1.227501	5.710922	6.852886	4.412213

10	10.68537	62.25611	10.77577	7.134220	1.758421	6.241734	6.710324	5.123423
Σ =	-	684.3629	88.90428	41.85367	6.161847	30.24049	58.82799	23.95223

Table 5: Granger Causality Estimate
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Probability
EXR does not Granger Cause MCUR	36	2.15495	0.13296
MCUR does not Granger Cause EXR		3.63933	0.03804
IR does not Granger Cause MCUR	36	0.09280	0.91163
MCUR does not Granger Cause IR		2.77625	0.07778
INF does not Granger Cause MCUR	36	1.12943	0.33616
MCUR does not Granger Cause INF		1.38873	0.26448
EXD does not Granger Cause MCUR	36	0.32285	0.72649
MCUR does not Granger Cause EXD		1.43496	0.25350
EXPO does not Granger Cause MCUR	36	0.75006	0.48072
MCUR does not Granger Cause EXPO		0.43780	0.64938
TFT does not Granger Cause MCUR	36	1.56626	0.22490
MCUR does not Granger Cause TFT		0.89738	0.41796